

People's Democratic Republic of Algeria
Ministry of Higher Education and Scientific Research



المدرسة العليا للتجارة

القطب الجامعي القليعة

A Thesis submitted in fulfillment of the requirements for the
degree of Doctorate (LMD system) in Management Sciences

Option: Finance

**The determinants of the dividend payout
policy of large private Algerian firms: A
GMM analysis over the period 2010-2020**

Presented by:

Ms. Imene REMAICHE

Thesis supervisor:

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Examiner: Professor Nabil KHOURI, University of Algiers 3.

Academic year: 2025-2026

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DEDICATION

*I dedicate this thesis to the sweetest and most wonderful of all mothers, **Malika**, whose unwavering patience and heartfelt prayers have been a source of strength and motivation throughout my academic journey. Your enduring love and support have been invaluable, and this accomplishment is as much yours as it is mine.*

My dear Mom, you gave me everything without counting the cost, you never stopped supporting and encouraging me. No tribute could ever fully express the love, devotion, and respect I have for you. I dedicate this work to you, fulfilling your dearest dream, which only came true because of you. No matter what I say or write, I can never express the depth of my affection and profound gratitude. I hope I will never disappoint or betray your trust and sacrifices. I implore Allah to help me compensate for all the past hardships. May sorrow never again touch your heart. May Allah preserve you and grant you health, long life, and happiness, so that I may give back to you at least a small part of what I owe you.

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*I extend my deepest gratitude to my dear friend, **Azza**, who has stood by my side through every triumph and setback. Your unwavering support has been an integral part of my success, and for that, I am forever grateful.*

Finally, I dedicate this work to everyone who supported me during the completion of this thesis.

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In the name of God, the Most Gracious, the Most Merciful

Almighty Allah tells us in verse 7 of Surah 98, Al-Bayyinah, The Clear Proof: “As for those who believe and do righteous deeds, they are the best of all creatures.”

My special gratitude goes to **Almighty Allah**, the Greatest, the Compassionate, the All-Knowing, the All-Powerful, and the Most Merciful, who made everything possible and allowed this work to reach its conclusion. And to the **Prophet Muhammad**, peace and blessings be upon him.

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LIST OF ACRONYMS

AMEX	American Stock Exchange
CAPM	Capital Asset Pricing Model
CFO	Chief Financial Officer
CRSP	Compustat and the Center for Research in Security Prices
EPS	Earnings Per Share
ESO	Employee Stock Options
FE	Fixed Effect
GLS	Generalized Least Squares
GMM	Generalized Method of Moments
HENR	Holtz-Eakin, Newey and Rosen (HENR), 1988
IBES	Institutional Brokers' Estimate System
IBS	Corporate Income Tax
IPO	Initial Public Offering
IRS	Internal Revenue Service
JGRRTA	Jobs And Growth Tax Relief Reconciliation Act of 2003
LBO	Leveraged Buyout
LM	Lagrange Multiplier
LSDV	Least Square Dummy Variable
M&A	Mergers and Acquisitions
M&M	Modigliani and Miller
MNL	Multinomial Logit
NASDAQ	National Association of Securities Dealers Automated Quotations
NLS	National Surveys of Labor Market Experience
NPV	Net present value
NYSE	New York Stock Exchange
PSID	Panel Study of Income Dynamics
OLS	Ordinary Least Square
QLME	Quasi-Maximum Likelihood Estimation
RE	Random Effect
SDC	Securities Data Company
SEO	Seasoned Equity Offering
SOA	Speed of adjustment
SOI	Statistics of Income
VAT	Value Added Tax
VIF	Variance Inflation Factor
TRA	Tax Reform Act
USA	United States of America

ABSTRACT

This dissertation examines corporate payout policies and their determinants in the context of Algeria's emerging economy. Payout policies are a key mechanism through which firms distribute value to shareholders and signal financial performance, making their determinants of interest to investors, managers, and policymakers. The study explores the evolution of payout practices, highlighting the traditional dominance of cash dividends alongside the increasing use of share repurchases, driven by their flexibility and potential tax advantages. The analysis is grounded in established theoretical frameworks, including dividend irrelevance theory, the bird-in-the-hand hypothesis, and Lintner's partial adjustment model.

The research further investigates payout behavior in imperfect markets, focusing on the influence of taxation, asymmetric information, and agency conflicts on corporate distribution decisions. It also provides empirical evidence on payout policy using firm-level data, allowing for an assessment of theoretical predictions under real market conditions. Methodologically, the study employs panel data econometric techniques, including fixed effects, random effects, and dynamic models estimated via the Generalized Method of Moments (GMM), to address endogeneity and dynamic adjustment in payout behavior.

The findings highlight significant sector heterogeneity in dividend policies, with manufacturing firms exhibiting more stable payout patterns compared to more volatile sectors such as agribusiness. Retail and services sectors display more balanced distribution strategies. The results further confirm that earnings and past dividends are the primary determinants of payout decisions, alongside profitability, liquidity, firm size, and growth opportunities, while macroeconomic and institutional factors also play a significant role.

Overall, this research contributes to the limited literature on dividend policy in emerging markets by providing evidence from the Algerian context, characterized by family-owned firms and evolving financial structures. The findings offer implications for corporate financial strategy, investment decision-making, and policy development aimed at improving dividend practices and corporate governance.

Key words: Corporate payout policy, Dividend policy, emerging markets (Algeria), panel data econometrics (GMM), and Lintner model.

GENERAL INTRODUCTION

GENERAL INTRODUCTION

General introduction

Over the past decades, considerable attention has been devoted to understanding the determinants of corporate dividend policy. Finance scholars have developed extensive theories to identify the factors influencing a firm's dividend decisions, including tax preferences, signaling effects, and agency considerations. In addition to theoretical exploration, researchers have empirically tested various models to explain dividend behavior and conducted surveys with corporate managers to uncover the key factors driving dividend decisions (Baker & Powell, 2000, p. 30).

Historically, dividends have been the primary means through which companies distribute profits to shareholders. However, over the past few decades, share repurchases have gained popularity as an alternative payout method. This shift is attributed to several factors, including the flexibility of share repurchases, tax considerations, and changes in corporate governance practices (Fama & French, 2001, p. 4).

The questions "Why do corporations pay dividends?" and "Why do investors value dividends?" have long intrigued both academics and corporate managers. The debate over the significance of dividend policy was notably initiated by Miller and Modigliani (1961). They argued that in a world with perfect capital markets, dividend payments have no impact on a firm's value, rendering them irrelevant (Baker & Powell, 2000, p. 29).

Miller and Modigliani (1961) demonstrated that in perfect and complete capital markets, a firm's dividend policy has no impact on its value. Their argument is based on the principle that firm value is driven by optimal investment decisions, with net payout—calculated as the difference between earnings and investment—treated as a residual. Since net payout consists of dividends and share issuances or repurchases, a firm can adjust dividends to any level by making corresponding changes to the number of shares outstanding (Allen & Michaely, 2003, p. 351).

In contrast, the dividend-signaling models offer a framework for understanding how dividends can convey important new information to the market. Some information is difficult to convey directly through financial statements alone, dividends act as a credible signal of a firm's prospects, especially when they are costly and hard to mimic. The decision to pay dividends, therefore, often reflects underlying favorable private information, leading to an upward adjustment in the firm's share price if investors perceive the signal as credible (Kalay & Lemmon, 2008, p. 37).

The hypothesis that dividend policy functions as a signaling mechanism and a means of mitigating managerial opportunism is frequently validated by empirical research. Such studies, particularly in the context of developed economies, consistently reveal that firms tend to smooth their dividend payments, as originally observed by Lintner (1956) (Ben Naceur, Goaid, & Belanes, 2006, p. 3).

In 1956, John Lintner established the groundwork for the contemporary understanding of dividend policy. Through interviews with managers from 28 companies, Lintner (1956) argued that dividend policies are guided by a target long-term payout ratio. He also concluded that dividends tend to be sticky, closely linked to sustainable long-term earnings, predominantly paid by mature firms, and smoothed consistently over time (Brav, Graham, Harvey, & Michaely, 2005, p. 484).

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Companies' payout decisions are shaped by various factors such as profitability, available cash flow, growth opportunities, and capital structure. Market conditions, economic factors, and governance also impact these strategies. In emerging markets like Algeria, these decisions are further influenced by local economic and regulatory environments. Algerian economy is different compared other countries. Payout behaviors among Algerian firms may be influenced by local economic conditions, regulatory environment, and corporate governance structures.

Despite the global significance of payout policies, there is a noticeable gap in literature concerning their determinants in the Algerian context. Most existing studies focus on developed economies. Therefore, this dissertation aims to fill this gap by investigating the factors that influence payout policy decisions among Algerian firms. Understanding these determinants can provide valuable insights for corporate managers, investors, and policymakers, helping to enhance financial practices and contribute to the development of the Algerian financial market.

Understanding the application of the Lintner model within the Algerian context represents a significant contribution to the existing literature. Furthermore, analyzing payout policies across various sectors can provide better insight into the behavior of companies within each sector regarding dividend payments.

By exploring the unique economic and corporate landscape of Algeria, this study aims to shed light on how local firms shape their payout decisions. It will examine the interplay between profitability, growth opportunities, cash-flows, macroeconomic conditions in determining payout policies. The findings of this research are expected to offer an understanding of corporate financial strategies in an emerging market context, ultimately contributing to the broader field of corporate finance.

1/Research Problematic

Algerian economy has undergone various reforms aimed at diversifying its economic base and developing its financial markets. These reforms potentially alter the landscape in which firms operate, further complicating the understanding of payout policy determinants. Our research aims to investigate how these reforms and the unique economic conditions of Algeria impact corporate payout decisions. Our research aims to address the following primary problem:

What are the determinants of the payout policy of large private firms operating in Algeria?

To address this central question, we will attempt to answer the following questions :

- To what extent does the Lintner model accurately reflect dividend smoothing behavior in Algerian firms?
- How do industry characteristics influence dividend payouts in different sectors of the Algerian economy?
- What is the higher dividend distributing sector compared to others in Algeria?
- What are the main drivers of dividend policy among Algerian companies?

GENERAL INTRODUCTION

2/Hypothesis

In order to address the central problem, we have formulated the following main hypothesis:

H0: Payout policies in private Algerian firms are shaped by multiple determinants and exhibit notable variation across sectors. The key drivers include profitability, liquidity, firm size, and industry-specific characteristics.

This main hypothesis is based on certain assumptions, which will serve as the starting point for our research and can be summarized as follows:

H1: The Lintner model accurately reflects dividend smoothing behavior in Algerian firms to a significant extent, as these companies tend to align their dividend payouts with a target payout ratio.

H2: Industry characteristics play a significant role in influencing dividend payouts across different sectors in the Algerian economy.

H3: The **Retail & Services** sector typically has the highest average dividend ratio followed by **Agribusiness** sector. Meanwhile, the **Manufacturing** sector is ranked in the third position in paying dividends.

H4: The main determinants of dividend policy among Algerian companies include profitability, liquidity, firm size, growth opportunities, and GDP growth.

3/Justification of the theme

The choice of the research theme is motivated by the following reasons:

- **Relevance to Financial Decision-Making:** Understanding dividend policy is crucial for corporate finance, as it directly impacts shareholder wealth and reflects firm strategy;
- **Sector-Specific Insights:** Large private firms may have different payout strategies depending on their industry, making sector analysis valuable for identifying trends and determining best practices;
- **Impact on Investors:** Investors are keen on understanding payout determinants as they influence stock attractiveness and predictability in returns, especially in private firms;
- **Algerian Market Context:** Examining this topic in the context of Algeria's evolving market can provide insights into corporate governance, economic conditions, and sector-specific challenges.

4/Previous empirical studies

Numerous studies on payout policy highlight that dividend distribution is influenced by a range of theories and factors. Earnings play a central role as the primary source of dividends, while reserves are generally retained to address potential liquidity challenges that firms may encounter.

GENERAL INTRODUCTION

In the following, we will present some studies that have attempted to analyze the impact of various mechanisms of dividend distribution policy. These studies, which have adopted different research methods, are summarized as follows:

- **BenNaceur, Goaied, & Belanes (2006):**

This study investigated the factors affecting the payout policies of 48 firms listed on the Tunisian Stock Exchange, analyzing data from 1996 to 2002. The findings revealed that profitable firms are more likely to distribute higher dividends. Conversely, higher levels of liquidity and firm size are associated with lower dividend payouts; as liquidity and size increase, dividends tend to remain at low levels. Additionally, the effects of ownership concentration and financial leverage on dividend payments were found to be insignificant. These results are consistent across various model specifications and offer valuable insights into the dynamics of dividend policy within the Tunisian context.

- **Labhane (2015) :**

This study is conducted in India to examine the factors influencing dividend payments among 239 firms listed on the National Stock Exchange (NSE). The research revealed that companies with higher leverage tend to distribute lower dividends, suggesting that firms with more debt prioritize maintaining liquidity to manage financial obligations over returning cash to shareholders.

- **Alaeto (2020):**

This study examined the determinants of dividend decisions among non-financial firms listed on the Nigerian Stock Exchange (NSE). Dividend policy was assessed using variables like dividend intensity and the dividend payout ratio as dependent measures. The results demonstrated that profitability, measured by return on assets, along with growth opportunities and liquidity (represented by the liquidity ratio), are positively associated with dividend payments. In contrast, leverage, firm size, and asset tangibility were found to have a negative impact on the dividend payout ratio, suggesting that firms with higher debt, larger size, and more tangible assets are less likely to distribute higher dividends.

- **Allal & Benilles (2020):**

In the Algerian context, a study analyzed the dividend distribution behavior of private banks between 2011 and 2017. Using panel data regression on a sample of eleven banks, the results indicated that profitability, previous dividend payments, equity levels, debt, liquidity, and bank growth all positively influence dividend payouts. On the other hand, dividend adjustments exhibit a negative relationship with risk, suggesting that higher risk levels lead to lower dividend distributions.

5/Research objectives

The objectives of this research are as the following:

1. **To provide a theoretical and empirical overview of payout policy models:** This includes studying models such as Lintner's (1956), Gordon's (1956), and Modigliani and Miller's (1961) dividend irrelevance theory. The research aims to compare these models and discuss their relevance in various contexts (e.g., private vs. public firms) and emerging trends;

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2. **To analyze the determinants of payout policy in imperfect markets:** This involves examining factors like taxation, asymmetric information, and agency relationships, and how they shape dividend policies in markets that are not fully efficient or transparent, such as Algeria's.
3. **To investigate the forms and measurements of payout policy:** The research will look into the mechanisms used by firms, such as dividends versus share repurchases, and explore the different metrics used to measure payout policies.
4. **To explore the determinants of dividend payments in Algeria:** The research seeks to identify the key determinants of dividend payments in the context of private Algerian firms, applying models such as Lintner's and conducting comparative analysis across sectors.
5. **To apply econometric models and analyze panel data:** The research will utilize static and dynamic panel data methods to empirically test the determinants of dividend payouts, with a focus on Algeria. This includes applying the Generalized Method of Moments (GMM) and conducting specification tests.

6/ Importance of the research

Investigating the payout policies in Algeria, particularly in private large firms, leads to understand how companies distribute profits to their shareholders. This contributes to the knowledge of corporate finance behavior in an emerging market like Algeria, where economic policies and corporate governance structures may differ from more developed markets. Moreover, Algeria's capital market is still developing, and understanding payout policy can offer insights into how Algerian firms interact with investors. It may shed light on how family ownership can draw a specific policy in distributing dividends. The majority of Algerian firms are a family owned-business.

Payout policies are directly tied to how firms reinvest profits or distribute them. By studying this in Algeria, researchers can gain insights into how companies balance reinvestment and distribution, influencing overall economic growth. For an emerging economy like Algeria, understanding this balance is crucial for sustainable development. Furthermore, Research on payout policy can also inform policymakers about the financial health of firms, corporate taxation, and the potential need for reforms.

In the Algerian context, private large firms may exhibit unique payout behavior due to a number of factors. Many large private firms in Algeria are family-owned or controlled by a few individuals. These companies are typically managed by founding family members with a strong emphasis on maintaining control and preserving the family legacy. This ownership model often leads to a centralized decision-making approach, where key strategic and operational decisions are influenced by familial interests.

7/Methodology

This study employs a quantitative empirical methodology to examine the determinants of dividend policy among 88 large private Algerian firms over the period 2010–2020. The analysis is based on balanced panel data, which combines both cross-sectional and time-series dimensions, allowing for a more comprehensive assessment of firms' payout behavior over time. To address potential econometric issues such as endogeneity, unobserved heterogeneity, and dynamic persistence in dividend decisions, the study applies the Generalized Method of

GENERAL INTRODUCTION

Moments (GMM) estimator, specifically designed for dynamic panel data models. This approach is particularly appropriate given the likely correlation between lagged dividend payments and explanatory variables such as profitability, liquidity, firm size, and growth opportunities. The model also incorporates macroeconomic and firm-specific control variables to capture the broader economic environment and internal financial characteristics influencing payout decisions. By using GMM, the study ensures consistent and efficient parameter estimation while controlling for simultaneity bias and omitted variable bias. The methodology thus provides a robust framework for identifying the key determinants of dividend policy in the Algerian private sector and for capturing both short-run dynamics and long-run adjustment behavior in payout decisions.

8/Structure of the research

This research work is divided into four chapters. The first chapter establishes the foundational theories that underlie payout policies, integrating both theoretical models and empirical insights. The chapter begins by discussing key payout policy models, including Lintner's Model, which emphasizes the relationship between a firm's past dividend payments and its current earnings. Lintner posits that firms strive for stability in their dividend payouts, adjusting them gradually in response to changes in earnings. The chapter also delves into Gordon's Model, which highlights the significance of expected future dividends in determining stock prices, suggesting that a company's value is closely tied to its dividend policy.

Furthermore, Modigliani and Miller's irrelevance theory is presented, which argues that in a perfect market, a firm's dividend policy does not affect its overall value. This theory challenges traditional views on dividends, suggesting that investors can create their own income streams by buying or selling shares, thus rendering the firm's payout policy insignificant in terms of valuation.

The chapter also provides a comparative analysis of different payout theories, exploring how these models interact and diverge in their implications for both private and public firms. It discusses recent trends in payout policies, examining shifts in corporate behavior regarding dividend payments and repurchases.

Additionally, chapter one addresses the various forms of payout policies, such as dividends and share repurchases. It outlines the different motivations behind these methods and their implications for shareholders. The chapter concludes by discussing how payout policies should be measured, emphasizing the importance of appropriate metrics in evaluating a firm's distribution strategies.

The second chapter focuses on understanding the various determinants of payout policies in imperfect markets. The chapter begins with an exploration of how taxes impact dividend decisions, discussing the effects of dividend taxation on stock prices and investor behavior. It examines the implications of both static and dynamic tax clienteles, analyzing how different investor groups react to changes in tax legislation.

This chapter then investigates the role of asymmetric information and agency relationships in shaping dividend policies. It introduces the dividend-signaling model, which suggests that firms use dividends as a signal of their financial health. This model underscores the importance of managing investor expectations and maintaining market confidence through strategic dividend announcements. The chapter also addresses the concept of dividend

GENERAL INTRODUCTION

smoothing, highlighting how firms attempt to maintain stable dividends to align with investor preferences.

Empirical evidence is presented to support these theories, with discussions of studies that have explored the impact of asymmetric information and agency costs on payout policies. The chapter synthesizes various findings, providing a comprehensive overview of how these determinants interact to influence dividend decisions in imperfect market environments.

The third chapter focuses on econometric modeling techniques, particularly in the context of panel data analysis. It begins by defining panel data and outlining its relevance in economic research. The chapter discusses the advantages of using panel data, such as the ability to capture both cross-sectional and time-series variations, which enhance the robustness of econometric analyses. However, it also addresses the limitations associated with panel data, including issues related to data quality and model specification.

This chapter further explores methods for estimating static panel data, detailing various estimation techniques and the importance of conducting specification tests to validate the panel data-generating process. It emphasizes the necessity of econometric tests used in random models, providing a framework for understanding how to effectively analyze panel data.

Chapter three then shifts to dynamic panel modeling, discussing the characteristics and conditions required for dynamic models. It introduces the Generalized Method of Moments (GMM) as a key estimation technique for dynamic panel models, highlighting its advantages in addressing potential endogeneity issues commonly faced in econometric analysis.

The last chapter provides a detailed examination of the determinants of payout policies in the context of Algeria. It begins by outlining the legal and tax framework governing dividend distribution in the country. This includes an analysis of dividend payments, capital gains, and the regulatory environment surrounding share transfers, providing essential context for understanding how these factors influence corporate behavior regarding dividends.

This chapter then conducts a comparative analysis of payout policies across different firms in Algeria. It presents a comprehensive overview of the dividend framework and models applicable in Algeria. This study is supplemented by a descriptive analysis of dividend payments across various sectors. This comparative approach sheds light on the diversity of dividend practices among firms, revealing trends and patterns in payout behaviors.

Finally, the chapter delves into the specific determinants of dividend payments in Algeria. It assesses the application of established models, such as Lintner's Model, within the local context. It examines variations in dividend practices across sectors, highlighting the unique factors that influence payout decisions in private Algerian firms. This chapter aims to contribute valuable insights into the dynamics of dividend policy in Algeria, drawing connections between theoretical frameworks and empirical evidence.

Overall, this dissertation provides a comprehensive exploration of payout policies, integrating theoretical foundations, empirical findings, and specific contextual analysis, ultimately enhancing our understanding of dividend behavior across different markets, with a particular focus on Algeria.

**CHAPTER 1:
THEORETICAL AND
EMPIRICAL
FRAMEWORK ON
PAYOUT OUT POLICY**

Chapter I: Theoretical and empirical framework on payout out policy

Introduction of the chapter

Dividend policy stands as a central and highly debated subject in corporate finance, representing one of the most pivotal financial decisions a firm can make. While the aim of dividend policy is generally assumed to enhance shareholder wealth, dividends are fundamentally constrained by the firm's net profit, making profit generation a central focus for companies. Despite extensive empirical research, however, dividend policy remains an area of theoretical divergence, with no consensus reached on an optimal approach. The development of diverse theories, from Lintner's model (1956) to Miller and Modigliani's dividend irrelevance theory (1961), reflects a dynamic discourse on payout policy. While Lintner emphasized dividend smoothing and consistency, Modigliani and Miller argued that dividend policy is of secondary importance to investment decisions, proposing that, in a perfect market, a firm's value is unaffected by payout decisions.

In contrast, other theories have contended that dividends positively impact a firm's share price and overall market value, signaling financial health and future profitability to investors. Lintner's (1956) model suggests that companies tend to smooth dividends to align with their earnings trajectory, thereby maintaining stable dividend payments over time. Gordon (1959), building on this notion, suggested that dividends may influence investment opportunities and subsequently impact the firm's rate of return.

The evaluation and analysis of dividend policy have typically employed various financial measures and metrics. Yet, understanding the theoretical foundation of dividend policy remains crucial. According to Modigliani and Miller, dividend payout represents the net distribution to shareholders, but empirical studies often focus primarily on dividends, overlooking the potential of share repurchases. In recent decades, particularly since the 1980s, share repurchases have emerged as a preferred form of capital return to shareholders, often in response to tax considerations and investor preferences.

This chapter is structured into three sections, each dedicated to a key area of dividend policy. The first section reviews a range of dividend policy theories, exploring the diversity and rationale behind each. The second section provides a comparative analysis of the theories, highlighting similarities and distinctions among them. Finally, the third section delves into the various forms and measurement approaches of payout policy, offering a comprehensive framework for understanding how dividends and share repurchases are assessed and utilized by firms.

I. Payout policy models

This section surveys different theories of payout policy. We start out by discussing Lintner's Model (1956). We then present Gordon's Model (1956). Last, we describe the Miller and Modigliani (1961) payout irrelevance proposition, and consider the effect of relaxing the assumptions on which it is based.

I.1 Lintner's Model (1956)

In the 1950s, Lintner (1956) conducted a landmark series of interviews with corporate managers regarding their dividend policy. From these interviews, he developed a seemingly coherent model outlining how companies make decisions about dividend payments. Marsh and Merton (1987) later interpreted Lintner's survey findings, summarizing them into four fundamental "stylized facts" (Wolmarans, 2003, p. 246):

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- Firms maintain stable dividend payout ratios over the long term.
- Managers prioritize adjustments in dividends over their absolute levels.
- Dividend changes reflect shifts in sustainable, long-term earnings. This practice suggests managers prefer to stabilize dividends, thereby minimizing the impact of temporary earnings fluctuations.
- Managers are hesitant to modify dividends in ways that might necessitate reversals, especially concerning dividend increases.

I.1.1 Definition of the model

In 1956, Lintner led a study on 600 listed companies to show that dividend-smoothing behavior was widespread. Selecting 28 firms from the 600 listed companies to survey and interview, Lintner introduced the following model to encompass the most important elements of dividend policy (Allen & Michaely, 2003, p. 351): For a firm i ,

$$D_{i,t}^* = \alpha_i E_{it} \quad (1),$$

$$D_{i,t} - D_{i(t-1)} = a_i + c_i(D_{i,t}^* - D_{i(t-1)}) + u_{it} \quad (2),$$

$D_{i,t}^*$ = desired dividend payment during period t ;

$D_{i,t}$ = actual dividend payment during period t ;

α_i = target payout ratio;

E_{it} = earnings of the firm during period t ;

a_i = a constant relating to dividend growth;

c_i = partial adjustment factor;

u_{it} = error term.

Equations 1 and 2 illustrate that the company targets the α_i of the earnings E_{it} to pay out dividend. The firm's dividend change decisions were a function of their targeted payout ratio and the speed of adjustment of current dividends. In order to maintain dividend payment despite changes in earnings, managers smooth the difference between the target dividend payout ratio ($\alpha_i E_{it}$) and last year's dividend $D_{i(t-1)}$ with a speed of adjustment rate c_i . Thus, the target dividend payout ratio α_i is considered as a rough guide and not strictly maintained (Ben Naceur, Goaied, & Belanes, 2006, p. 3). Lintner noted that the constant a_i could be zero or positive to confirm the great reluctance of not paying dividend. Fama & Babiak (1968) found that the constant in the Lintner model is positive but small. With a sample mean and median of 0.109 and 0.028, respectively, they deduced that for most firms the constant is not significantly different from zero (Lambrecht & Myers, 2012, p. 1792).

Lintner came inductively to his model, based on interviews with 28 large public manufacturing firms. Before repurchases the model has been confirmed as a good fit to the time series of cash dividends. But, this model is not considered as a formally derived model (Lambrecht & Myers, 2012, p. 1761). Lintner (1956) found c_i of about 0.3 using aggregate data on corporate earnings and dividends. Fama and Babiak (1968) undertook a comprehensive study of the Lintner model's performance for individual firms over a 20-year period and reported a mean c_i of 0.32 and a mean target payout ratio of 0.52. Skinner (2008) found c_i for total payout of 0.4 and 0.55 for the periods 1980 to 1994 and 1995 to 2005, respectively (Lambrecht & Myers, 2012, p. 1793).

Lintner noted the important observations on payout policy (Allen & Michaely, 2003, p. 349):

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- Firms do not make frequent changes on dividend, since managers strongly believe that the market favors firms with stable payout policy. However, when firms have to make a necessary change on dividend they would decide how large it would be.
- Earnings are the most important observable indicator managers need to explain to shareholders in case of changing in dividends. Thus companies have a target payout ratio and they adjust slowly dividends when a sudden unexpected increase in earnings. Earnings are the most important determinants of any change in dividends.
- Lintner's third finding was that management set dividend policy first. Other policies are then adjusted, taking dividend policy as given.

Lintner (1956) stated that managers are reluctant to cut dividends. Dividend policy is relevant and comes before the other decisions since they were then adjusted. Brav, Graham, Harvey, and Michaely (2005) reported the evidence that managers of firms with long-standing dividends are especially reluctant to reduce dividends. They prefer to maintain the tendency of the firms' dividend history (Skinner, 2008, p. 584). Lintner's model is applied on 48 listed firms of the Tunisian Stock Exchange during the period 1996–2002. The results are not consistent with Lintner's hypothesis. Dividend decisions are not based on long-term target payout. There is no indication that firms use stable dividends payout to signal their future profitability or to minimize agency costs. Tunisian Stock Exchange listed firms frequently change their dividend payments, while changes in earnings and dividend smoothing are of low order (Ben Naceur, Goaied, & Belanes, 2006, p. 14).

Neither Lintner (1956) nor the literature that followed have been able to offer an explanation as to why firms are so reluctant to cut dividends or why they appear to smooth dividends. Brav et al. (2005) evidence confirmed the Lintner's findings. However, in private firms dividend policies are more erratic because of differences in information content.. The consequences of dividend cuts and omissions are less severe than their public counterparts. They also reported that private firms are more likely to pay dividends in response to temporary changes in earnings (Michaely & Roberts, 2011, p. 15). Fama and Babiak (1986) suggested that the level of dividend per share is the key metric for payout policy. Brav et al. (2005) have already approved this evidence later. They also demonstrated from a survey that almost 40% of the surveyed CFOs target the level of dividends per share rather than the payout ratio, unlike the original Lintner (1956) model assuming that the firm has a target payout ratio and gradually converges toward it. Leary and Michaely (2011) showed that the sample of Lintner is short and varies with the true level of c_i . It could potentially mask cross-sectional differences among stocks within the sample. Using a simulation exercise, they showed that the estimation of c_i from a deviation of target payout ratio mitigates the small-sample bias, and also reduces the dependence of the bias on the true c_i (Brav et al. (2005)) (Larkin, Leary, & Michaely, 2016, p. 7).

Leary & Michaely (2011) documented variation in both dividend and total payout smoothing as well, along the cross section. Furthermore, they showed that proxies for many of the market frictions previously linked to payout policy vary systematically with smoothing behavior. Information asymmetry proxies tend to be negatively correlated with smoothing behavior. Firms less likely subject to information asymmetry are younger firms, smaller firms, firms with low dividend yields, firms with high earnings volatility and return volatility, as well as firms with less analyst following and with more dispersed and less accurate analyst forecasts. They all smooth less. Aivazian, Booth, & Cleary (2006) found that a bond rating firms pay substantially smoother dividends than firms without a bond rating. This evidence

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opens some horizons of reflection and many theories of smoothing based on signaling motivations emerged (Farre-Mensa, Michaely, & Schmalz, 2014, p. 87).

I.1.2 Limit of the model

Empirical modeling of dividends has been dominated by Lintner (1956). However, some theories deprecate the model for many reasons (Bauer & Bhattacharyya, 2008, p. 1):

- Lintner's model suffers from the logical paradox that if companies have target payout ratios then in the steady state the companies will have reached those target payout ratios;
- Moreover as demonstrated by Bond & Mougoue (1991), Lintner's model is also poorly specified when earnings are serially correlated;
- Lintner's model; however, suffers from certain serious theoretical shortcomings.

According to Lintner, the partial adjustment model describes dividend policy which relies on target payout ratios and speed of adjustment. Based on this definition, companies have a rather definite policy regarding the ideal or target ratio of dividends to current earnings. Considered as an ideal ratio toward which that company would move, the target ratio is the key of payout policy. Companies also have standards to move toward a full adjustment of dividends to current earnings. The Lintner evidence on the subject of the partial adjustment model of dividend payment has been revised. Bond & Mougoue (1991) found that the combination of target payout rate and the speed of adjustment when earnings follow a linear autoregressive process may drive to several composites that would fit the same earnings stream and dividend stream. Thus, Lintner's partial adjustment model gives results that are not unique. They conclude that firms with autoregressive earnings model, the adjustment partial model may not define dividend policy since in their own sample 72% of the sample showed significant auto-regression in earnings (Bauer & Bhattacharyya, 2008, p. 2).

I.2 Gordon's Model (1956)

Myron Gordon is one of the supporters of "a bird in hand theory", arguing that if market conditions are uncertain the information is asymmetric then dividends are preferable to capital gains claiming a bird in the hand is worth two in the bush. The model is based on the following assumptions (Tanushev, 2016, p. 2):

- The company is financed by equity only.
- There is a perpetual flow of earnings for the firm.
- Retention ratios for the company are constant that implies constant growth rate.
- Cost of capital (discount rate) is greater than the growth rate.
- Corporate taxes do not exist

To underpin his theory, Gordon (1959) developed empirical evidence directly from his stock price valuation model. The model asserts that the price of a share is equal to the discounted value of expected future dividends. If dividends are expected to grow at the constant rate, g , in perpetuity, and the discount rate is k , this principle leads to the familiar valuation formula (Brennan, 1971, p. 2):

$$P = (D/k-g) \quad (3),$$

where :

P : is the current stock price, and

D : is the current amount of dividends per share.

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If the firm retains a constant fraction, b , of its earnings per share, and earns a constant average rate of return, r , on its investment, employing no outside financing,

Then
$$g = br \quad (4)$$

and
$$D = (1 - b)Y \quad (5)$$

where:

Y : is the current, amount of earnings per share.

Substitution for g and D in yields

$$P = (1 - b) Y / (k - br) \quad (6)$$

This equation may then be used to evaluate the effect of alternative retention ratios (and therefore payout ratios) on the value of a share (Brennan, 1971, p. 2).

Considering three hypotheses, Gordon (1959) examined these assumptions and calculated various regression models using data samples from four industries for two years, namely 1951 and 1954. The dividend hypothesis was tested using linear regression of the following type:

$$P_{it} = \alpha_0 + \alpha_1 D_{it} + \alpha_2 R_{it} + u_{it} \quad (7)$$

where:

P_{it} – price of shares of company i in period t ,

D_{it} – dividends paid by company i in period t ,

R_{it} – retained profit by company i in period t ,

α_1 – required rate of return on common shares with no growth (dividend coefficient) α_2 – price of growth (coefficient of retained profit).

Gordon's calculations proved that dividends have a great impact on the share price. He confirmed that the required rate of return increases proportionally to retained earnings due to the greater uncertainty of future profits. Fischer (1961, pp. 121-141) confirmed the same conclusions in his publication that analyzed data from the United Kingdom for the period between 1949 and 1957 (Tanushev, 2016, p. 3).

I.3 Modigliani and Miller irrelevance theory (1961):

Prior to Modigliani and Miller (1961) most economists considered the more firms payout the more their market value will increase. Modigliani and Miller (1961) theory alleged that payout policy is irrelevant. They claimed that unlike the investment decision which drives the firm to be more valuable, paying out does not affect the share price (Allen & Michaely, 2003, p. 341). They argued that a firm's total market value is not affected by its dividend policy and stated the irrelevance effect of dividends. Villamil (2000) endorsed the M&M third proposition which determines that there is no dependence of the firm's market value of its dividend policy. According to them, in a perfect market, the market value is determined by its earning power and the risk of its underlying assets. The value of a firm remains unaffected by its dividend policy. Breuer & Gürtler (2008) argued that this proposition is nothing more than net present value (Ahmeti & Prenaj, 2015, p. 7). Furthermore, with respect to this proposition, there is a possibility for the firm's financiers to make independent decisions regarding to the firm's investment decisions.

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I.3.1 Model's assumptions:

The Modigliani and Miller considered the irrelevance impact of dividend on the market value of the firm. They developed a model based on some paramount assumptions. The first assumption relies on perfect capital market which reposes on the fact that (Breuer & Gürtler, 2008 , p. 5):

- The number of buyer or seller of securities is large enough and they could not play an appreciable impact on the then ruling price.
- Market' information, about the ruling price and all other relevant characteristics of shares, is costless and equally accessible for all traders.
- No brokerage fees, transfer taxes, or other transaction costs are incurred when securities are bought, sold, or issued.
- No tax differentials either between distributed and undistributed profits or between dividends and capital gains.

The second assumption concerns the rational behavior. Investors prefer more to less. They are indifferent of the form of wealth, whether it takes cash form or an increase in the market value of their holdings of shares. The last assumption is about perfect certainty. It refers to complete assurance on the future return and the guarantee of each part for investor. Therefore, it is not necessary to distinguish between stocks and bonds as sources of funds at this stage of the analysis. Only a single type of financial instrument the shares of stock can be used. The valuation of the share is determined the rate of return (dividends plus capital gains per dollar invested) on every share will be the same throughout the market over any given interval of time (Modigliani & Miller, 1961, p. 412).

I.3.2 Definition of the model:

Let:

$d_j(t)$ = dividends per share paid by firm j during period t

$p_j(t)$ = the price (ex any dividend in $t - 1$) of a share in firm j at the start of period t ,

let have:

$$\frac{d_j(t) + p_j(t + 1) - p_j(t)}{p_j(t)} = p(t) \text{ independent of } j; \quad (8)$$

or, equivalently,

$$p_j(t) = \frac{1}{1 + p(t)} [d_j(t) + p_j(t + 1)] \quad (9)$$

for each j and for all t .

In equilibrium, differential in rates of return is eliminated since holders of low-return (high-priced) shares will sell their shares and buy shares with a higher rate of return. This process would drive up the price of high-return shares and drive down the prices of the low-return shares (Modigliani & Miller, 1961, p. 412).

The effect of dividend policy:

Dropping the firm subscript j since this will lead to no ambiguity in the present context and letting:

$n(t)$ = the number of shares of record at the start of t ;

$m(t + 1)$ = the number of new shares (if any) sold during t at the ex dividend closing price $p(t + 1)$;

so that $n(t + 1) = n(t) + m(t + 1)$;

$V(t) = n(t) p(t)$ = the total value of the enterprise;

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and $D(t) = n(t) d(t)$ = the total dividends paid during t to holders of record at the start of t ;
Let's rewrite (9)

$$V(t) = \frac{1}{1 + p(t)} = \frac{1}{1 + p(t)} [D(t) + V(t + 1) - m(t + 1)p(t + 1)] \quad (10)$$

According to the late formula current dividends might affect the current market value of the firm $V(t)$. First, direct effect such as the first term in the bracket shows that the quantity of $V(t)$ relies on the value of $D(t)$. Also, current dividends can influence $V(t)$ through the third term, $-m(t + 1)p(t + 1)$, the value of new shares sold to outsiders during the period since high amount of dividends require to rise more new capital from external sources to maintain any desired level of investment. Then, which is the best strategy in financing investment: to reduce dividends and rely on retained earnings or to rise dividends but float more new shares? To answer let's express $m(t+1)p(t+1)$ in terms of $D(t)$ the two dividend effects must always exactly cancel out so that the payout policy to be followed in t will have no effect on the price at t (Modigliani & Miller, 1961, p. 413).

Specifically, if $I(t)$ is the given level of the firm's investment or increase in its holding of physical assets in t and if $X(t)$ is the firm's total net profit for the period, the amount of outside capital required will be :

$$m(t + 1)p(t + 1) = I(t) - [X(t) - D(t)] \quad (11)$$

Substituting expression (11) into (10), the $D(t)$ cancel and obtain for the value of the firm as of the start of t :

$$V(t) = n(t)p(t) = \frac{1}{1 + p(t)} [X(t) - I(t) + V(t + 1)] \quad (12)$$

Let deduce that the net payout is the difference between earnings and investment, and is simply a residual. Because the net payout comprises dividends and share issues/repurchases, a firm can adjust its dividends to any level with an offsetting change in shares outstanding. The irrelevance effect appears since $X(t)$, $I(t)$, $V(t + 1)$ and $p(t)$ are all independent of $D(t)$ which means that current value of the firm must be independent of the current dividend decision. By the same token, we can conclude that $V(t)$ is unaffected by the current dividend; via showing that future decisions can influence $V(t)$ through their effect on $V(t + 1)$. Hence, $V(t + 1)$ and all subsequent values are independent of the current dividend. Thus, we may conclude that given a firm's investment policy, the dividend payout policy will affect neither the current price of its shares nor the total return to its shareholders (Allen & Michaely, 2003, p. 414).

I.3.3 Contributions of M&M

The contributions of Modigliani and Miller to the theory of corporate finance are justly celebrated. In their article published (1961) about analyzing payout policy, they developed a rigorous framework and argued the importance of the firm's investment policy. It is important to note that their framework is rich enough to encompass both dividends and repurchases, as the only determinant of a firm's value is its investment policy. Firms choose optimal investments. Because, a firm can adjust its dividends to any level with an offsetting change in shares outstanding. The evidence remains the same if management can finance dividends by using both debt and equity issues. No additional value is created by debt-financed dividends, since capital markets are perfect and complete so the amount of debt does not affect the total value of the firm. The most important insight of Miller and Modigliani's analysis is in identifying the situations in which dividend policy can affect firm value when one of the assumptions underlying the result is violated (Modigliani & Miller, 1961, p. 351).

I.3.4 Limits of M&M propositions:

Modigliani and Miller made a huge contribution to financial economics. Most finance economists would agree that M&M propositions are the most famous. They represent a greater impact on financial economic theory development (Stern & Chew, 2003, p. 590). However, today's markets with their dramatic development, have known dramatic movements in stock prices. Additionally, the past 30 years have shown that corporate values are affected by changes in capital structure and dividend. Despite of the lack of analytical power of M&M propositions, economists are still maintaining their evaluation in current finance economic theory.

The Miller and Modigliani framework has formed the foundation of subsequent work on dividends and payout policy in general (Stern & Chew, 2003, p. 591). However, theories succeeding the Miller and Modigliani article managed to create an agreement between dividend irrelevance theorem and the notion that both managers and markets care about payouts and dividends in particular. This issue suggests five possible imperfections that management should consider when it determines dividend policy (Allen & Michaely, 2003, p. 341):

Taxes: Dividend policy depends on which form of payout is more taxed.

Asymmetric information: Dividends may convey information about the future prospects of the firm.

Incomplete contracts: Equity holders may use dividends to discipline managers or to expropriate wealth from debt holders.

Institutional constraints: various institutions avoid investing in non- or low dividend- paying stocks because of legal restrictions.

Transaction costs: If dividend payments minimize transaction costs to equity holders.

The differences between theory of capital structure introduced by M&M (1956) and the traditional theory have been narrowed down the same later article (1961). Two opposing views on the importance of dividend policy in perfect markets have emerged. The first and older view, originally articulated by Gordon, asserted that the more generous is the dividend policy, the higher will be the price of the share even in perfect capital markets regarding the existence of uncertainty about the future. Miller and Modigliani on the other hand, alleged that once investment is determined, the share price remains the same no matter the size of the dividend paid (Brennan, 1971, p. 1115).

II. Analogy of different payout theories

The analysis of dividend policy has led to a divergence of different theories. First, we compare the Gordon model to the M&M model. Next, we draw an analogy between the different dividend theories for private companies and publicly traded companies. To conclude the section, we present recent trends of payout policy.

II.1 Gordon Model vs. Modigliani and Miller theory

Lintner (1956), in his classic study, initiated the theory of dividend smoothing. He found that dividend smoothing behavior is widespread. In his classic study, Lintner selected 28 public US firms to investigate the dividend policies. He interviewed management teams of these firms over seven years (1947–1953). Lintner found that the sample firms hold a huge consideration to keep the stability of dividends. Managers appear to strongly think that the market devoted a premium on remaining paying dividends. As a result, earnings are the most important determinant of any dividend changes. Firms do not set dividends de novo each

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quarter. However; changing is necessarily, if firms need to make any changes to their latest dividend per share, then it should be by the increment of dividends. Leary & Michaely (2011) noted that the most smoothing dividends firms are those most likely to be subject to agency costs of free cash flow. This conclusion is consistent with models like Easterbrook (1984), Jensen (1986), and Allen, Bernardo, & Welch (2000). This evidence appears most consistent with a link between agency conflicts and smoothing (Farre-Mensa, Michaely, & Schmalz, 2014, p. 86).

On the other side, Miller and Modigliani's (1958, 1961) developed irrelevance theorems in modern corporate finance theory. According to them, the choice among all feasible capital structure, dividend policy is irrelevant in frictionless markets with investment policy fixed. By the same token, investment policy determines stockholder wealth in frictionless markets. Leverage and payout decisions have no impact on firm value. Specifically, individual values in frictionless markets must inevitably sum to the value generated by the underlying investment policy when a firm considers different leverage and payout decisions (DeAngelo & DeAngelo, 2006, p. 294). There is a paucity of articles on the theoretical differences between Gordon and M&M. The textbook treatment of the two conflicting theories is in most cases highly unsatisfactory. The two opposing views based on hypotheses in perfect capital market. However, actual securities markets suffer from several imperfections such as the existence of transactions costs and of differential taxes on income from dividends and capital gains (Brennan, 1971, p. 1115).

The quandary faced while studying the two evidences is set. Both authors develop plausible theories from reasonable assumptions, but mystifyingly reach opposing conclusions. M&M dividend irrelevance theorem can be derived from a somewhat weaker assumption than that of symmetric market rationality. In the other hand, Gordon's argument does in fact rest upon a confounding of the effects of dividend policy and investment policy. The model is based on developing directly stock price valuation model. The model asserted that the price of a share is equal to the discounted value of expected future dividends. If dividends are expected to grow at the constant rate, g , in perpetuity, and the discount rate is k , this principle leads to the familiar valuation formula:

$$P = \frac{D}{k - g} \quad (13)$$

Where,

P is the current stock price, and

D is the current amount of dividends per share.

If the firm retains a constant fraction, b , of its earnings per share, and earns a constant average rate of return, r , on its investment, employing no outside financing, then

$$g = br \quad (14),$$

$$D = (1 - b)Y \quad (15)$$

Where:

Y is the current, amount of earnings per share.

Substitution for g and D in (13) yields

$$P = \frac{(1 - b)Y}{k - br} \quad (16)$$

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Equation (16) refers to the effect of alternative retention ratios (and therefore payout ratios) on the value of a share. In particular, let differentiate that equation partially with respect to b to examine the effect of alternative retention ratios, if the discount rate, k , and the average rate of return on investment, r , are independent of the retention ratio b (Brennan, 1971, p. 1116)

$$\frac{\partial P}{\partial b} = \frac{(r-k)Y}{(k-br)^2} \quad (17)$$

In this equation, let deduce that when re-invested is just that the average rate of return, r , which is also the rate of return on the marginal investment of retained earnings, is equal to the discount rate, k , then, the share price to be invariant with respect to the fraction of earnings retained. In this case, dividend policy is irrelevant if the effects of investment policy are neutralized by setting the net present value of marginal investment equal to zero. The same result obtained by Modigliani and Miller. However, Gordon holds the net present value of investment constant whereas the M and M theory which neutralized the effects of investment policy by holding the amount of investment constant under alternative dividend policies (Brennan, 1971, p. 1117).

Payout policy, according to M and M, in perfect and complete capital markets with no taxes, does not affect the firm's value. Since, the net payout is the difference between earnings and investment, and is simply a residual. Firm can adjust its payout to any level with an offsetting change in shares outstanding. Furthermore, appropriate purchases and sales of equity replicate the payout policy. As long as the funds are invested in zero-NPV projects, none of the payout policies will have any impact on value, whether dividends are paid by (costless) external finance or by equity issuance. Extreme inspiration from Miller & Modigliani's conclusions is that dividends are not only the residual, but can even be set arbitrarily (Farre-Mensa, Michaely, & Schmalz, 2014, p. 92).

The Gordon's result is not general since the hypothesis of the discount rate " k " is independent of the retention ratio " b " may be violated. Dividends expected at different dates in the future will be subject to different risks, and that therefore each expected future dividend should be discounted at a different rate to reflect this differential risk."

Thus the valuation formula for a share should be written explicitly as:

$$P = \frac{D(1)}{(1+k_1)} + \frac{D(2)}{(1+k_2)^2} + \dots + \frac{D(t)}{(1+k_t)^t} + \dots \quad (18)$$

Where:

$D(t)$ = the expected dividend per share t periods in the future;

k_t = the discount rate appropriate to the risk of a dividend expected t periods ahead.

The k_t 's should strictly be interpreted as market determined discount rates, rather than the subjective discount rates of any individual investor, although these will be equal in equilibrium, since the market value of a share, is determined by the interactions of the supply and demand functions of all market participants. Gordon notes that there is nothing to guarantee that k_t is a constant for all values of t or whether it is an increasing or decreasing function of t (Brennan, 1971, p. 1117).

The k in the valuation formula (13) is a generalized average of the individual k_t , if k_t is a function of t .

The K_t weights are not independent of the time path of expected dividends.

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In the particular case of exponential dividend growth considered here, k is a function of the growth rate g .

$$i. e. \quad \frac{\partial k}{\partial g} \neq 0$$

Since the growth rate of dividends is given by $g = br$, it follows that if r is independent of b ,

$$\frac{\partial k}{\partial b} = \frac{\partial k}{\partial g} \cdot \frac{\partial g}{\partial b} = \frac{\partial k}{\partial g} \cdot r \neq 0 \quad (19)$$

Thus, allowing for this dependence of k on b , the effect of a change in the retention ratio on share price is given by:

$$\frac{dP}{db} = \frac{Y [r - k - (1 - b) \frac{\partial k}{\partial b}]}{(k - br)^2} \quad (20)$$

Then, if $r=k$

$$\frac{dP}{db} = \frac{-Y(1 - b) \frac{\partial k}{\partial b}}{(k - br)^2} \neq 0 \quad (21)$$

The price of a share is not independent of the retention ratio if the average discount rate k is equal to the marginal investment r unless $\frac{\partial k}{\partial b} = 0$. Then, Gordon asserted that in general, stock price and the cost of capital depend on dividend policy. This conclusion has been rejected by M&M resuming that Gordon's argument rests on a confounding of the effects of dividend and investment policy. According to Gordon, the two effects mean that change in the amount of investment followed by the change in dividend policy in Gordon's model would of itself have effected a change in share price, whatever how it was financed. However, Gordon is mistakenly attributing to dividend policy the effect of the change in investment policy. For M and M the net present value of the marginal investment is zero, even when r is set equal to k (Brennan, 1971, p. 1118).

When assuming a firm financed completely by equity at time $t = 0$, the value of the all-equity firm is the present value of future dividends received by the investors, given by:

$$S_0 = \sum_{t=0}^{\infty} \frac{E_0 [D_t]}{(1 + r)^t} \quad (22)$$

Where:

S_0 is the stock price at time $t = 0$,

$E_0 [D_t]$ is the expected value of the dividend to be paid at time t conditional on information available at $t = 0$, and

r is the risk-adjusted rate of return that investors require to hold the stock.

In equation 22, let define the sources and uses of funds identity in each period

$$CF_t + F_t = D_t + I_t + (1 + r)F_{t-1} \quad (23)$$

By substituting dividends in Equation (22), let rewrite the value of the firm as:

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$$S_0 = \sum_{t=0}^{\infty} \frac{E_0(CF_t - I_t)}{(1+r)^t} \quad (24)$$

From Equation (24), the value of the firm depends only on the difference between operating cash flows net of investment. Dividend policy is irrelevant to firm value because both cash flows and investment outlays are not a function of dividend policy. The free cash flows might be paid as dividend. However; if investment needs exceed current cash flows, then the firm must sell additional securities. Indeed, since both cash flows and investment outlays are not a function of dividend policy, dividend policy is irrelevant to firm value. Firms need to sell additional securities to fund the optimal investment plan which increases owners 'wealth, instead of paying out a dividend that exceeds the difference between current cash flow and investment. By increasing today's dividend by a dollar, the firm need to raise additional financing worth a dollar in present value. Thus, dividend policy is irrelevant to the value of the firm under the perfect capital market assumptions used by Miller and Modigliani. According to them, in perfect market dividend policy has no effect on shareholder wealth (Kalay & Lemmon, 2008, p. 9).

Once considering the net present value of the marginal investment which implies the variability of the retention ratio in Gordon's model, thus, the validity of the M&M argument is readily examined. The change in the retention ratio from b_1 to b_2 involves changes in earnings and investment in all subsequent periods, or a change in investment policy and not only a single change in the amount invested and earned. These change denoted by ΔI_t must be evaluated regarding the net present value of this change in investment policy. It is the change in period t investment implied by a change in the retention ratio from b_1 to b_2 . Then, given that the marginal investment earns a perpetual rate of return, r , and that cash flows expected t periods ahead are discounted at the rate k_t , the net present value of the change in investment policy is given by:

$$NPV = \sum_{t=1}^{\infty} \frac{\Delta I_t}{(1+k_t)^t} \left(-1 + r \sum_{r=1}^{\infty} \frac{1}{(1+k_{t+r})^r} \right) \quad (25)$$

From the expression in (25), setting $r = k$ will not lead to zero, unless all the k_t are equal, and equal to k and it is the only case Gordon finds the irrelevance of dividend policy. This finding deluded Gordon by the fact that when all the k_t are equal, setting $r = k$ does neutralize the effect of the profitability of investment, into believing that this procedure neutralized the profitability of investment when the k_t are unequal. Gordon's proof of the relevance of dividend policy is based on a confounding of investment and dividend policy effects, and then the M&M's argument is upheld. It is true of course that changing the firm's dividend policy will change the average discount rate in the valuation formula (22). If the k_t are unequal, the corporation has no unique cost of capital: the average discount rate applicable to an investment project will depend upon the exact time path of the project's returns. Thus, formula (22) uses an algebraic artifact which is irrelevant for decision-making purposes and far from being the corporation's cost of capital (Brennan, 1971, p. 1119).

M&M show from the firm's budget constraint that the total return to shareholders in firm i , $R_i(0)$, from holding the shares of the firm for one period is:

$$\tilde{R}_i(0) = \tilde{X}_i(0) - \tilde{I}_i(0) + \tilde{V}_i(1) \quad (26)$$

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Where;

$X_i(0)$ is the firm's operating income stream;

$I_i(0)$ is the investment budget for the period, and

$V_i(1)$ is its value at the end of the period.

M&M posit two firms ($i = 1, 2$) identical in all respects except their first period dividend, and argue that:

(1) $R_1(0) = R_2(0)$, and therefore,

(2) the initial values of the firms are identical.

For the first point, Modigliani and Miller assumed symmetric market rationality. It requires first that every market participant behaves rationally in the sense of preferring more wealth to less and being indifferent to the form in which his wealth increment is received; this assumption backs supposing $X_1(0) = X_2(0)$ and $I_1(0) = I_2(0)$ and all investors will expect that $V_1(1) = V_2(1)$. This argument derives from other assumption that in forming his expectations, he believes that every other market participant both behaves rationally and believes that all others also behave rationally. Since $V_1(1)$ and $V_2(1)$ will depend only on the prospective future earnings, dividends and investment of the two firms from period 1, all participants will believe that the two firms will be valued rationally at the end of the period so that. Since these are identical by assumption, it follows that all investors will expect the same value $V_1(1) = V_2(1)$, so that the same return $R_1(0) = R_2(0)$. A more direct set of assumptions leading to the same conclusion might be called the "independence of irrelevant information" which requires that:

(a) Investors are rational in the above sense (is the standard assumption of rational behavior), and

(b) Shares are valued only on the basis of their future prospects (has the advantage of familiarity, for it is an implicit assumption of all stock valuation models (including Gordon's), and

(c) At least some investors know from experience that this is so (would appear to be empirically valid).

It follows directly from this set of assumptions that since the prospects of the two firms are known to be identical as of the end of the period, at least some investors will expect $\tilde{V}_1(1) = \tilde{V}_2(1)$. For the second point, the assumption of symmetric market rationality, all investors will perceive that $\tilde{R}_1(0) = \tilde{R}_2(0)$, and therefore by the assumption of individual rationality will value the two firms equally, so that the value of the firm is independent of its first period dividend policy (Brennan, 1971, p. 1120).

Prior to M and M most economists believed that the more dividends a firm paid the more valuable the firm would be, following the extension of the discounted dividends approach to firm valuation.

$$V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r_t)^t} \quad (27)$$

Given by the previous formula which indicates that value V_0 of the firm at date 0, if the first dividends are paid one period from now at date 1.

Where:

D_t = the dividends paid by the firm at the end of period t , and

r_t = the investors 'opportunity cost of capital for period t (Allen & Michaely, 2003, p. 341).

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M&M proceed to show that $V_1(2)$ and hence $V_1(1)$ and $V_1(0)$ are independent of second period dividend policy and once investment policy is given, the value of the firm is independent of its dividend policy in all subsequent periods. Therefore, to reject the irrelevance of dividend policy, the assumptions of symmetric market rationality and the independence of irrelevant information are excluded. Hence, (a) investors are not rational, or (b) stock prices depend on past events as well as on their expected future prospects, or (c) there exist no investors who understand the security valuation process (Brennan, 1971, p. 1121).

II.2 Theories of Payout policy in private and public firms

Miller and Modigliani (1961) demonstrated that in ideal "perfect" markets with constant investment, dividend policy has no impact on the firm's value. However, various empirical studies, such as Allen and Michaely (2003), the survey evidence of Lintner (1956), and Brav et. al. (2005), strongly contradict this view, indicating that dividend policy is highly significant to managers and markets. Corporate dividend policies tend to follow specific patterns, such as "smoothing" dividends, infrequent dividend decreases, and positive market reactions to dividend increases while negative reactions to decreases. Despite these well-established patterns, the underlying economic mechanism driving these tendencies—how and why firms choose their specific dividend policies—is not yet fully understood. Several studies propose tax-based explanations for dividend behavior (e.g., Miller & Scholes (1982), but the prevailing explanations come from theories based on either information asymmetry or agency problems between managers and shareholders.

In the case of asymmetric information, dividends are utilized as signals to communicate information about future profitability (e.g., Bhattacharya (1979), Miller and Rock (1985), John and Williams (1985), and Bernheim & Wantz (1995). On the other hand, agency theories suggest that dividends serve as a means to curb perquisite consumption, empire building, or other activities that could destroy firm value (e.g., Jensen & Meckling (1976), Easterbrook (1984), Jensen (1986), La Porta et al. (2000)). While both sets of theories align with the observed link between dividend changes and subsequent stock price reactions, other implications for dividend policy derived from these theories have received mixed empirical support from studies examining the dividend behavior of publicly traded firms (Michaely & Roberts, 2006, p. 2).

In their paper, Michaely and Roberts (2006) take a different approach compared to previous empirical studies. They compare the dividend policies of publicly-held firms with privately-held firms in the United Kingdom (UK). The study made three significant contributions to the literature on corporate dividend policy. First, they investigated whether Lintner's findings of dividend smoothing are related to the public or private status of firms. In other words, they test whether capital markets play a role in influencing the decision to smooth dividends. Secondly, the authors provided fresh evidence on various hypotheses related to agency problems and information asymmetry. They do so by utilizing a sample that offers a broad range of variation in these frictions. The sample is more extreme compared to previous studies focusing solely on publicly traded firms. Last, the study sheds light on the dividend policy of private firms. These firms have been somewhat neglected despite their economic significance. To classify firms into different groups based on ownership structure and access to public equity markets, the authors examined ownership data. They identify three distinct groups (Michaely & Roberts, 2006, p. 3):

- "Wholly Owned" firms, where ownership is concentrated among very few, often just one, shareholders. These firms experience minimal information and agency problems

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between managers and shareholders because the shareholder(s) are closely involved in the firm's operations, management, and may hold positions on the board of directors or managerial roles.

- "Private Dispersed" firms, at the other end of the spectrum, have a significant number of minority outside shareholders. These firms suffer from high informational opacity and agency conflicts, with relatively limited investor protection or recourse against potential managerial abuses.
- "Public" firms fall in between the two extremes. They have a relatively dispersed ownership structure, leading to some information and agency problems, but these issues are partially mitigated by institutional and regulatory structures designed to enhance the flow and quality of information while also safeguarding investors' rights (e.g., similar to the findings in La Porta et al. (2000)).

Brav et al. (2005) conducted a survey of 384 US financial executives, 50 years after Lintner's study. Their findings continue to support the idea that maintaining stable dividends remains a top priority for managers of public firms. The executives reported being willing to take drastic measures, such as selling assets, laying off employees, heavy borrowing, or bypassing positive NPV projects, to avoid having to cut dividends. In fact, the practice of dividend smoothing seems to be on the rise. Leary & Michaely (2011) further backed this trend. They demonstrated a consistent and substantial increase in dividend smoothing among public US firms since the early 1930s. Although the use of repurchases may have contributed to this trend in the last two decades, most of the increase in smoothing occurred before repurchases became prevalent (see Figure 1).

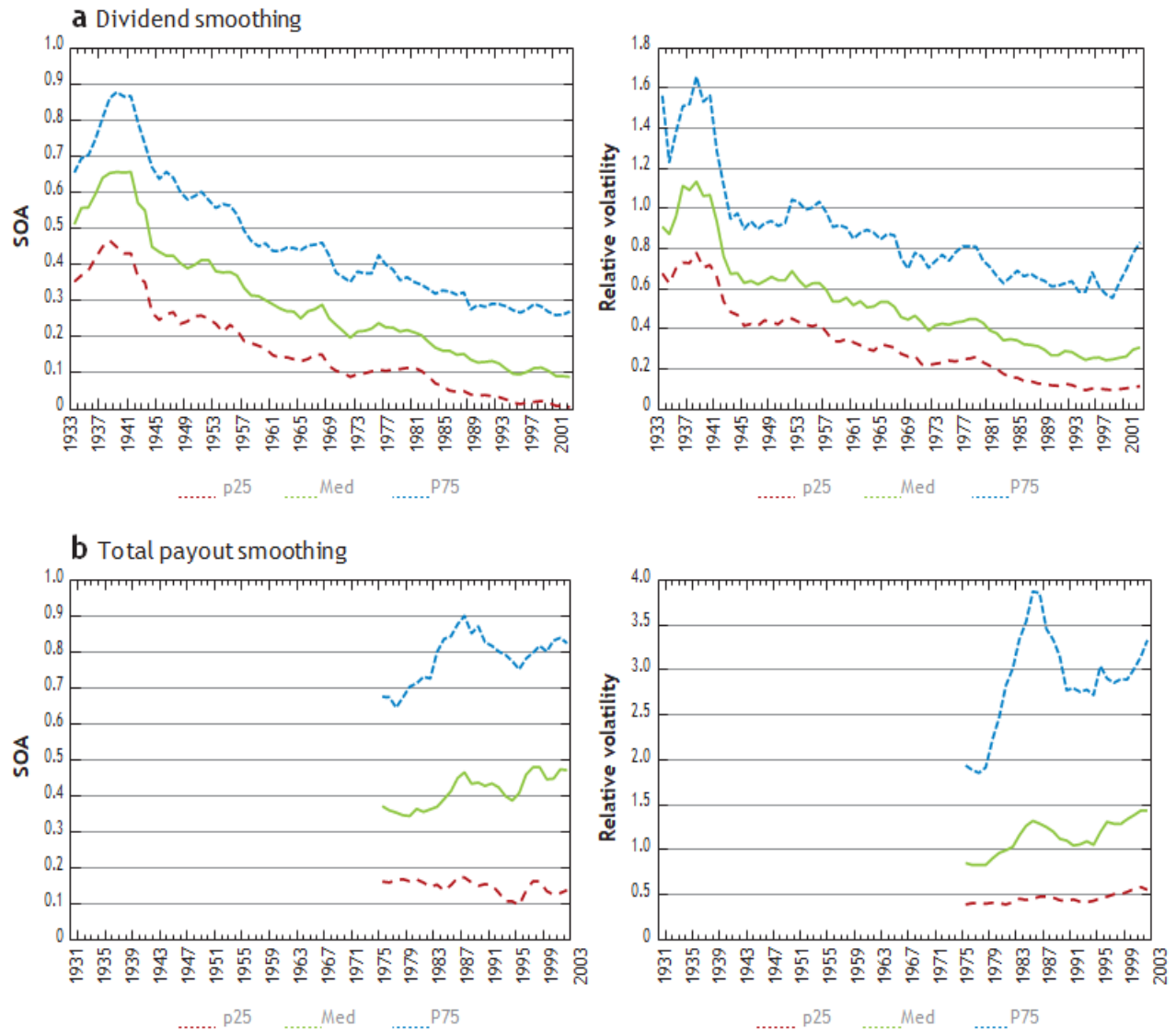
Their analysis, which includes panel regressions controlling for firm characteristics and a constant-firm subsample, suggests that the rise in dividend smoothing cannot be solely attributed to changes in the nature of publicly traded firms over time. Interestingly, Michaely & Roberts (2012) presented evidence that the inclination of public firms to smooth dividends does not extend to private firms. Using data from the United Kingdom, they show that private firms do not exhibit the same level of dividend smoothing observed in their public counterparts (Farre-Mensa, Michaely, & Schmalz, 2014, p. 86).

Michaely and Roberts (2006) conducted a comparison between the dividend policies of publicly-held and privately-held firms. They aimed to explore the validity of Lintner's (1956) dividend model, along with more recent theories related to agency and information considerations. The findings revealed that public firms, subject to the scrutiny of public capital markets and traditional financing challenges, tend to adopt a dividend-smoothing strategy over time. This strategy involves gradual increases in dividends, infrequent decreases, and dividends that are relatively insensitive to short-term earnings fluctuations (Michaely & Roberts, 2006, p. 1).

On the contrary, private firms exhibit more erratic dividend policies. They are highly responsive to transitory earnings shocks, whether positive or negative. Firms with family ownership show that dividend policies are residual financing decisions. They align with the predictions of Modigliani and Miller's irrelevance theorem. This behavior is due to the relative lack of information and agency concerns in these cases. Furthermore, our research demonstrates that publicly-traded companies, benefiting from robust governance mechanisms, tend to distribute a higher proportion of earnings as dividends. Additionally, their dividends are more influenced by variations in investment opportunities compared to similar private firms. The lack access to these mechanisms serves to mitigate agency conflicts (Michaely & Roberts, 2006, p. 1).

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Figure 1: Time trends in smoothing behavior. (a) Dividend smoothing. (b) Total payout smoothing.



Data are from Moody's Industrial Manuals and Compustat. A separate sample is constructed for each rolling 10-year period starting in 1928, consisting of firms in the CRSP universe with at least eight years of earnings and positive dividend data during the period, excluding financial firms. Years on the horizontal axis label the midpoint of each sample period. The two plots in panel a report the median and first and third quartiles of SOA and relative volatility, respectively, for each period. SOA is the speed of adjustment from the partial dividend adjustment model of Lintner (1956), estimated using a two-step procedure in order to improve the precision of the estimates. Specifically, Leary & Michaely (2011) first estimate the target payout ratio as the firm's median payout ratio over the sample period. Using that estimated target, they then compute the deviation from target for each period. Finally, SOA is defined as the estimated coefficient on the deviation from target when the actual dividend change is regressed on this deviation. To construct the relative volatility measure, Leary & Michaely first generate a scaled earnings series, defined as the firm's median payout ratio times each year's earnings. They then fit a quadratic time trend to both the split-adjusted dividend and the scaled, split-adjusted earnings series, and define relative volatility as the ratio of the root mean square errors from these two regressions. Panel b repeats the exercise of panel a, substituting the sum of common dividends and common share repurchases for dividends. Abbreviations: CRSP, Center for Research in Security Prices.

Source: Farre-Mensa, Michaely, & Schmalz, 2014, p. 88

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Numerous theories propose that payout policies are influenced by factors like asymmetric information and agency considerations (Allen and Michaely, 2003). Although analyzing whether a firm is publicly traded or has insider stock ownership does not precisely differentiate between asymmetric information and agency theories. It does provide valuable insights into the combined impact of these factors. For instance, public firms would be more hesitant to decrease dividends. The reason is that privately held firms can often communicate information through alternative means. They have a better ability to monitor managers and prevent excessive spending. Consequently, the consequences of reducing dividends may be more detrimental for public firms. On the other hand, private firms may be more inclined to cut dividends when they identify lucrative investment opportunities (Brav, Graham, Harvey, & Michaely, 2005, p. 514).

Overall, the distinct responses of public and private firms support the idea that information and agency problems significantly influence payout policy decisions. In their analysis, Brav et al. (2005) found that private firms perceive the negative consequences of cutting dividends as less severe. Additionally, private firms believe that dividends convey less information compared to public firms, although the difference is not statistically significant. They also consider that repurchases are less informative. Moreover, private firms are less likely to use dividends in place of investing. They are more likely to pay dividends in response to temporary changes in earnings. In general, both private and public managers concur on the motivations driving payout policy decisions, with some variations in specific aspects (Brav, Graham, Harvey, & Michaely, 2005, p. 514).

Michaely and Roberts observed that private firms tend to employ significantly less dividend smoothing compared to public firms. Their analysis suggests that, unlike public firms, the dividend policy of private firms, especially those with concentrated ownership, resembles a residual financing decision, where dividends are decided after investment decisions. This finding aligns with the idea that agency considerations play a crucial role in explaining the smoothing behavior of public firms since private firms with concentrated ownership have no separation between ownership and control, thus minimizing agency problems (as proposed by Jensen & Meckling (1976). However, Michaely and Roberts also noted that there seems to be something inherent in public capital markets that drives publicly listed firms to smooth dividends more than what traditional frictions like agency conflicts would predict. However, it remains uncertain whether Michaely and Roberts' (2012) findings regarding UK firms are applicable to US firms (Farre-Mensa, Michaely, & Schmalz, 2014, p. 86).

Unlike in the United Kingdom, the majority of private US firms are not required to publicly disclose their financial statements. Making large-sample studies that compare the dividend policies of public and private US firms is scarce. As for public firms, existing evidence suggests that the payout policy of UK public firms has gone through similar trends as those observed for US public firms. There are other unresolved issues related to dividend smoothing. For example, although it is commonly believed that managers prefer smooth dividends, there is no evidence suggesting that investors share this preference. A study by Larkin, Leary & Michaely (2014) explores whether investors value dividend smoothing stocks differently by examining the implications of dividend smoothing on firms' stock prices and cost of capital. They found no consistent relationship between the smoothness of a firm's dividends and the expected return or market value of its stock. The lack of evidence showing that smoothing dividends enhances stock price or reduces the cost of equity capital raises questions about the prevalence of this policy (Farre-Mensa, Michaely, & Schmalz, 2014, p. 86).

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The primary distinction between public and private firms lies in the level of power granted to outside shareholders through institutional and governance mechanisms. Public companies have several institutional and governance mechanisms in place, designed to safeguard the interests of their outside shareholders. For instance, both the UK and US exchanges impose stringent disclosure requirements on listed firms, going beyond the reporting obligations faced by all companies (public and private) under the Companies Act. In the case of the London Stock Exchange, firms must comply with the Disclosure Standards. They are subject to information and explanation requests from the Exchange to ensure adherence to regulations. Public firms are also mandated to inform the stock exchange about any announcements that could impact the rights of existing shareholders, along with providing a timetable for dividend and interest payments.

Moreover, boards of directors of public firms are held accountable for key management decisions. They are responsible for running the company in the best interests of shareholders. Exchanges possess the authority to sanction and discipline companies that violate their established rules and standards. Apart from institutional protection, the market for corporate control presents an additional advantage for shareholders of public firms. This market allows them the potential to remove inefficient management through proxy fights and takeover contests. Notably, Becht, Bolton, & Roell (2003) have extensively studied this aspect. In contrast, private firms generally lack the same level of external oversight and protection for outside shareholders due to their closed ownership structure. As a result, public firms have greater accountability and mechanisms to ensure the interests of their shareholders are safeguarded and to potentially address issues of inefficiency through market-driven mechanisms like the corporate control market (Michael & Roberts, 2006, p. 8).

Each of the mechanisms discussed earlier is primarily applicable to public firms and collectively contributes to facilitating the monitoring and discipline of managers. Consequently, these mechanisms grant outside shareholders in public firms a certain level of "power" (La Porta et al., 2000) over managerial actions. This power serves to partially alleviate the information and agency problems that are inherent in public firms due to their widely dispersed ownership structure. Therefore, while information and agency problems are indeed present in public firms, the numerous institutions and governance mechanisms surrounding these firms work to mitigate these challenges to some extent. However, it is essential to acknowledge another key distinction between public and private firms before drawing conclusive comparisons regarding the extent of information and agency problems. (Michael & Roberts, 2006, p. 9).

Certain private firms lack significant minority outside shareholders, constituting the second distinction from public firms. In particular, some private firms are family-controlled, exclusively owned by one or more family members. Other private firms may have sole ownership by an individual, corporation, or financial institution. In these cases, outside shareholder(s) often possess substantial interest and expertise in the firm's operations. They actively participate in the firm's management through positions on the board of directors, indirect monitoring, and direct engagement with management. For such private firms, the power afforded to outside shareholders. This power facilitated by ownership concentration, expertise, and active monitoring, is arguably considerably greater than the power provided to outside shareholders of public firms through institutional and governance mechanisms (Michael & Roberts, 2006, p. 9).

II.3 Recent Trends of payout policy

In 2022, a study investigated how the COVID-19 pandemic affected the decisions regarding dividends and share repurchases among publicly listed companies in the G-7 countries. It was found that companies in the United Kingdom, Germany, France, and Italy generally reduced their dividend payments, while those in the United States and Canada primarily relied on reducing cash payouts through share repurchases. Japanese firms fell somewhere in between these two approaches. Additionally, it was observed that corporate cash reserves played a role in mitigating the adverse effects of COVID-19 on payout adjustments. However, the impact of cash reserves was less pronounced for European companies compared to others. The COVID-19 pandemic, officially declared a global pandemic by the World Health Organization in March 2020, has made a profound impact on both public health and the global economy. Businesses across the world experienced significant decreases in cash flows, leading to heightened uncertainty about their future prospects. Consequently, company executives prioritized survival during the early stages of the crisis (Ntantamis & Zhou, 2022, p. 1).

Due to the COVID-19 pandemic, studying the effects on asset pricing is relatively more straightforward and yields conclusive results. However, analyzing the impacts of COVID-19 on corporate finance, decision-making, and outcomes is more challenging. The release of financial statements on a quarterly basis poses difficulties in gathering sufficient data for meaningful research. Despite these limitations, seven articles in the field of corporate finance that address various topics, including the cost of capital, payouts, cash holdings, firm efficiency, and innovation are achieved. One notable finding by Ke (2021) is that crisis-driven increases in operational and financial risks lead to a higher cost of capital for companies. Firms that manage to maintain adequate cash reserves during crisis situations tend to fare better in weathering crises like COVID-19. Similarly, Zheng (2022) demonstrated that companies with ample cash reserves outperform those with insufficient reserves. During a crisis period, reducing payouts and investments enables companies to accumulate higher cash reserves, as observed by various studies (Iyer & Simkins, 2022, p. 12).

Krieger et al. (2021), using data from 1,400 dividend-paying firms in the United States, found that 213 firms reduced their dividends, and 93 firms completely omitted dividend payments during the COVID-19 crisis. The extent of dividend reductions was much greater in the COVID-19 crisis compared to the financial crisis of 2008. These findings suggested that payout reductions and cash accumulation often indicate the efficient operation of firms. Despite the challenges of studying the impacts of COVID-19 on corporate finance, these articles shed light on important aspects such as the cost of capital, cash reserves, payout decisions, and firm efficiency. They provided valuable insights into how companies navigate crises and make strategic financial decisions during challenging times like the COVID-19 pandemic (Iyer & Simkins, 2022, p. 12).

In 2020, the United States experienced a significant drop in cash payouts, specifically in dividends and share repurchases, compared to the other G-7 countries. However, the drops in dividends and share repurchases for the other three countries (Canada, Japan, and Germany) were relatively small. Table 1 provides an overview of the aggregate amounts of dividends, share repurchases, and total cash payout for each year, all converted to 2020 U.S. dollars for easier comparison. Panel A demonstrates that, in most years, a larger proportion of cash was distributed through dividends across all G-7 countries. However, in 2020, the COVID-19 pandemic caused a decrease of approximately \$85 billion in dividends and \$199 billion in share repurchases (Ntantamis & Zhou, 2022, p. 5).

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Table 1: Annual aggregate dividends, repurchases, and total payout

Panel A: AllG-7countries						
	Year	In Millions USD (2020constant)		As the percentage of Aggregate Total Payout		
		Aggregate Total Payout	Aggregate Dividends	Aggregate Repurchase	Aggregate Dividends	Aggregate Repurchase
AllG-7Countries	2015	1261,405	623,580	637,825	49.4%	50.6%
	2016	1229,273	626,920	602,353	51.0%	49.0%
	2017	1216,268	679,696	536,573	55.9%	44.1%
	2018	1551,743	724,535	827,208	46.7%	53.3%
	2019	1483,019	757,655	725,363	51.1%	48.9%
	2020	1198,664	672,548	526,117	56.1%	43.9%
Panel B: Country-by-Country						
	Year	In Millions USD(2020constant)		As the percentage of Aggregate Total Payout		
		Aggregate Total Payout	Aggregate Dividends	Aggregate Repurchase	Aggregate Dividends	Aggregate Repurchase
USA	2015	909,723	363,814	545,909	40.0%	60.0%
	2016	905,168	382,447	522,721	42.3%	57.7%
	2017	844,276	393,988	450,288	46.7%	53.3%
	2018	1115,642	416,909	698,733	37.4%	62.6%
	2019	1006,036	411,905	594,131	40.9%	59.1%
	2020	844,458	398,180	446,278	47.2%	52.8%
Canada	2015	33,135	21,336	11,799	64.4%	35.6%
	2016	29,262	18,423	10,839	63.0%	37.0%
	2017	38,199	20,876	17,323	54.7%	45.3%
	2018	51,746	21,800	29,947	42.1%	57.9%
	2019	42,547	23,686	18,861	55.7%	44.3%
	2020	31,722	22,120	9,601	69.7%	30.3%
UK	2015	94,593	79,840	14,753	84.4%	15.6%
	2016	82,100	67,919	14,182	82.7%	17.3%
	2017	102,675	82,387	20,288	80.2%	19.8%
	2018	112,036	85,263	26,773	76.1%	23.9%
	2019	124,994	98,062	26,932	78.5%	21.5%
	2020	85,430	75,609	9,821	88.5%	11.5%
Germany	2015	38,964	34,471	4,493	88.5%	11.5%
	2016	36,224	33,602	2,621	92.8%	7.2%
	2017	44,213	40,597	3,616	91.8%	8.2%
	2018	52,030	46,622	5,407	89.6%	10.4%
	2019	49,209	43,960	5,249	89.3%	10.7%
	2020	43,917	37,522	6,395	85.4%	14.6%
France	2015	51,681	38,155	13,527	73.8%	26.2%
	2016	49,161	37,121	12,040	75.5%	24.5%
	2017	50,954	39,966	10,988	78.4%	21.6%
	2018	60,088	45,292	14,795	75.4%	24.6%
	2019	69,713	55,841	13,872	80.1%	19.9%
	2020	50,430	39,432	10,998	78.2%	21.8%
Italy	2015	9166	8662	504	94.5%	5.5%
	2016	8402	7234	1168	86.1%	13.9%
	2017	10,124	9087	1037	89.8%	10.2%
	2018	10,663	8924	1739	83.7%	16.3%
	2019	16,816	14,223	2593	84.6%	15.4%
	2020	6699	5797	902	86.5%	13.5%
Japan	2015	124,143	77,302	46,840	62.3%	37.7%
	2016	118,957	80,174	38,783	67.4%	32.6%
	2017	125,827	92,794	33,032	73.7%	26.3%
	2018	149,539	99,725	49,814	66.7%	33.3%
	2019	173,704	109,978	63,725	63.3%	36.7%
	2020	136,009	93,887	42,122	69.0%	31.0%

This table presents aggregate dividends, repurchases, and total payout each year for all G-7 countries (Panel A) and for each country (Panel B). All the amounts have been converted into 2020 U.S. dollars. The last two columns of each table report the portions of aggregate cash payout distributed through dividends and through share repurchases each year.

Source: Ntantamis & Zhou, 2022, p. 4

Panel B highlights notable variations among countries. U.S. firms allocated a significantly larger amount of cash towards share repurchases compared to dividend payments. In contrast,

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European countries saw repurchases account for less than a quarter of the total payout amount. Moreover, the impact of COVID-19 on the total amount of dividends and share repurchases varied across countries. In the United States, Canada, and Japan, the aggregate amount of share repurchases experienced a larger drop compared to dividend payouts (Ntantamis & Zhou, 2022, p. 5).

For instance, compared to 2019, American firms reduced dividends by approximately \$13.73 billion and share repurchases by \$147.85 billion. Similarly, Canadian firms reduced dividends by \$1.57 billion and share repurchases by \$9.26 billion. Japanese firms also experienced reductions of \$16.09 billion in dividends and \$21.60 billion in share repurchases. On the other hand, European countries predominantly reduced dividends more than share repurchases. For example, in France, the reduction in dividends relative to 2019 was \$16.41 billion, while the reduction in share repurchases was \$2.87 billion. Italy saw a reduction of \$8.43 billion in dividends and \$1.69 billion in share repurchases, while the UK experienced a reduction of \$22.45 billion in dividends and \$17.11 billion in share repurchases. Germany, however, witnessed a \$6.44 billion decrease in aggregate dividend amount but an increase of \$1.15 billion in aggregate share repurchases (Ntantamis & Zhou, 2022, p. 5).

Table 2 highlights the changes in cash payouts among firms by examining the percentage of companies that adjusted their payouts, including dividend decreases, dividend omissions, dividend increases, repurchase decreases, and repurchase increases, before and after the onset of COVID-19. To facilitate comparison with the changes observed during the COVID-19 year of 2020, the average annual percentages during the pre-COVID period of 2015-2019 is calculated. In the pooled sample of all G-7 countries, the results highlighted that a higher proportion of firms reducing dividends and a lower proportion of firms increasing dividends after the emergence of COVID-19. This finding aligns with the results obtained by Ali (2022) for the G-13 countries. Similarly, a similar impact of COVID-19 on share repurchases, with more firms reducing repurchases and fewer firms increasing repurchases after the pandemic. However, the impact on repurchases is relatively smaller compared to dividends.

When examining the changes in each country individually, some interesting observations emerge. The four European countries (Germany, France, Italy, and the UK) experienced the largest increase in the percentage of firms cutting dividends and the largest decrease in the percentage of firms increasing dividends. In contrast, the adjustments in repurchases were relatively smaller (Ntantamis & Zhou, 2022, p. 5). After COVID-19 hit, approximately 45% (in Germany) to 56% (in the UK) of firms in European countries reduced their dividends, compared to an average of about 14% to 17% during the pre-COVID years. The percentage of firms omitting dividends also surged from single digits (ranging from 3.1% to 5.4%) to double digits (ranging from 16.6% to 32.1%).

On the other hand, in the United States and Canada, more firms reduced share repurchases than dividends, and this difference became more pronounced after the arrival of COVID-19 in 2020. During that year, 43.4% of American firms reduced share repurchases, while 18.2% reduced dividends. In Canada, 37.3% of firms decreased share repurchases, to 26.5% reducing dividends. In Japan, the adjustments in dividends and repurchases triggered by COVID-19 were more moderate compared to companies in North America and Europe. Overall, the findings suggest that the impact of COVID-19 on cash payout adjustments varied across countries. European countries experienced larger changes in dividend distributions, while North American countries witnessed more pronounced adjustments in share repurchases.

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Japan demonstrated more moderate adjustments relative to its counterparts in North America and Europe (Ntantamis & Zhou, 2022, p. 5).

Table 2: Decreases and increases in dividends and share repurchases

		Dividends Decrease	Omission	Increase	Repurchases Decrease	Increase
All G-7 Countries	Pre-COVID Years	14.6%	1.9%	45.5%	29.4%	30.5%
	COVID Year	33.5%	7.3%	28.0%	36.6%	25.8%
	Difference	18.9%	5.5%	-17.5%	7.2%	-4.7%
USA	Pre-COVID Years	10.4%	1.8%	33.3%	33.6%	36.8%
	COVID Year	18.2%	2.1%	25.0%	43.4%	29.8%
	Difference	7.8%	0.4%	-8.4%	9.8%	-7.1%
Canada	Pre-COVID Years	15.5%	2.5%	38.3%	21.3%	26.9%
	COVID Year	26.5%	3.0%	29.5%	37.3%	22.6%
	Difference	11.0%	0.5%	-8.8%	16.1%	-4.3%
UK	Pre-COVID Years	14.4%	3.3%	60.6%	20.7%	21.7%
	COVID Year	55.8%	27.3%	22.3%	26.9%	18.9%
	Difference	41.4%	23.9%	-38.3%	6.2%	-2.8%
Germany	Pre-COVID Years	17.3%	4.1%	49.5%	11.7%	11.0%
	COVID Year	45.0%	16.6%	20.1%	11.8%	10.7%
	Difference	27.7%	12.5%	-29.4%	0.1%	-0.2%
France	Pre-COVID Years	17.0%	3.1%	38.8%	29.0%	27.8%
	COVID Year	48.0%	24.4%	11.9%	30.9%	27.1%
	Difference	30.9%	21.3%	-26.8%	1.9%	-0.7%
Italy	Pre-COVID Years	17.3%	5.4%	44.3%	19.6%	23.3%
	COVID Year	46.2%	32.1%	20.7%	27.2%	23.4%
	Difference	28.9%	26.7%	-23.7%	7.5%	0.1%
Japan	Pre-COVID Years	16.9%	0.8%	53.0%	32.2%	31.4%
	COVID Year	36.4%	2.0%	35.1%	37.9%	26.6%
	Difference	19.5%	1.2%	-17.9%	5.6%	-4.8%

This table presents the percentage of firms that adjust their dividends (decrease, omission, and increase) or share repurchases (decrease and increase) during pre-COVID years of 2015–2019 and during the COVID year of 2020. For pre-Covid years, the annual percentage of a given adjustment is calculated, and then the time series average across the years 2015–2019.

Source: Ntantamis & Zhou, 2022, p. 6

III. Payout policy: Forms and measurement

There are several commonly used measures to assess and analyze payout policy. However, it is important to understand why payout should be measured. Modigliani and Miller considered it as the net payout to shareholders. Most empirical works ignore share repurchases and consider the amount of dividends paid to assess payout. Also, net payout (accounting for capital raising activities) or cash spent on mergers and acquisition, are not taken into account in measuring the payout. Since, shareholders also receive cash payouts from corporations through mergers and acquisitions that are accomplished through cash transactions. Thus, shareholders of the firm receive dividends and repurchases (based on aggregate dividends plus aggregate repurchases relative to aggregate earnings) in addition to the cash payouts of mergers and acquisitions (Allen & Michaely, 2003, p. 354).

III.1 Dividends and Repurchases

III.1.1 Disappearance of Dividends and Explosion of Share Repurchases

Payout policy relies on the return of significant amounts of capital to shareholders in the form of dividends and share repurchases. It is important to understand which form the payout is adopted. Table 3 shows summary statistics on the payout policies of U.S. companies via dividend payments and share repurchases for each year from 1972 to 2003. Results displayed in the table below show that the aggregate total payout (TP) varies between 40 and 70% of aggregate firm earnings and between 2 and 5% of the aggregate market value of equity. In this figure, repurchases payout form evolve over time, particularly since 1983, becoming more important. Unlike repurchases, dividends have declined over time (Kalay & Lemmon, 2008, p. 6).

When Lintner (1956) and Miller and Modigliani (1961) wrote their papers, the other form of payout was virtually nonexistent. Since, financial markets were emerging and repurchases were still out of firms' options in paying out. So it is not surprising that prior studies on dividend ignore repurchases. However, over the last decades repurchases have recorded a growing importance. The growing trends of repurchases lead to identify key factors that influence repurchase policy. Repurchases are consistent with a Miller and Modigliani irrelevance theorem. Since, managers make repurchase decisions after investment decisions, in contrast to decisions about preserving the level of the dividend. Many executives prefer share repurchase when they believe their stock price is low. Hence, share repurchases is more flexible than dividends, and firms may enter the market using this flexibility (Brav, Graham, Harvey, & Michaely, 2005, p. 485).

In their investigation on whether Chief Financial executives use stock repurchase to manage diluted earnings per share (EPS). Bens et al. (2003) found that executives increase the level of their firms' stock repurchases when: First the potential impact of outstanding employee stock options (ESOs) on the diluted EPS is becoming more significant. Either, the number of outstanding stock options increases or the potential conversion of these options into shares would have a larger dilutive impact on earnings per share compared to previous periods. This could occur if more employees are granted stock options or if the strike price is significantly below the current market price. The second reason when earnings may not reach the desired rate of EPS growth. They also find that there could be certain incentives for management's decision to repurchase in order to manage the diluted EPS (Bens, Nagar, Skinner, & Wong, 2003, p. 51).

Figure 2 represents the evolution of dividend yield (total dividends over market value of equity), repurchase yield (repurchases over market value of equity) and payout yield (dividends plus repurchases over market value of equity) since the early 1970s. In early 2000s, the dollar amount of repurchases has been virtually equal to that of cash dividends. Even the number of firms that repurchase has increased dramatically. According to Fama and French (2001) and Grullon and Michaely (2002), the observed declining trend of dividends is related to the rise of repurchases. The dividend policies of public US firms, highlighting the decrease in the population of dividend payers from the late 1970s until the early 2000s and the apparent reversal of this trend over the past decade (Allen & Michaely, 2003, p. 404).

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Table 3: Summary statistics on payout policy of firms 1972–2003

The table presents summary information on payout policies of firms in the Compustat database.

Year	Number of Firms	Dividends as a% of Earnings	Repurchases as a% of Earnings	Total Payout as a% of Earnings	Dividends as a% of Market Value	Repurchases as a% of Market Value	Total Payout as a% of Market Value	% of Firms with Dividends > 0	% of Firms Decreasing Dividends	% of Firms Increasing Dividends
1972	2794	43.0%	3.5%	46.5%	2.2%	0.2%	2.4%	58.84%	15.50%	22.87%
1973	3000	35.3%	5.5%	40.8%	3.0%	0.5%	3.5%	60.60%	9.17%	63.15%
1974	3096	34.9%	2.3%	37.2%	4.8%	0.3%	5.1%	63.15%	8.85%	63.40%
1975	3292	39.3%	1.3%	40.6%	3.6%	0.1%	3.7%	63.40%	13.79%	37.30%
1976	3329	35.9%	2.1%	38.0%	3.4%	0.2%	3.6%	66.84%	12.86%	43.29%
1977	3283	38.4%	4.0%	42.4%	4.4%	0.4%	4.8%	69.54%	10.47%	50.17%
1978	3318	35.7%	4.1%	39.7%	4.4%	0.5%	4.9%	68.99%	12.31%	47.43%
1979	3495	31.9%	4.1%	36.1%	4.2%	0.5%	4.8%	63.75%	11.94%	42.78%
1980	3557	34.6%	4.7%	39.3%	3.5%	0.5%	3.9%	60.28%	15.21%	35.90%
1981	4090	36.6%	5.2%	41.8%	4.0%	0.6%	4.6%	51.20%	15.90%	25.05%
1982	4118	50.2%	11.2%	61.4%	3.7%	0.8%	4.5%	47.16%	13.79%	22.92%
1983	4354	44.0%	8.5%	52.6%	3.1%	0.6%	3.6%	42.28%	16.56%	15.20%
1984	4437	37.9%	22.4%	60.3%	3.4%	2.0%	5.4%	39.78%	8.93%	20.90%
1985	4354	48.5%	37.4%	85.9%	3.1%	2.4%	5.4%	38.24%	9.94%	18.70%
1986	4596	61.6%	35.3%	96.9%	2.9%	1.7%	4.6%	34.12%	10.95%	14.41%
1987	4772	47.0%	31.3%	78.4%	3.1%	2.1%	5.2%	31.71%	9.44%	15.44%

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Table 3 (continued)

Year	Number of Firms	Dividends as a% of Earnings	Repurchases as a% of Earnings	Total Payout as a% of Earnings	Dividends as a% of Market Value	Repurchases as a% of Market Value	Total Payout as a% of Market Value	% of Firms with Dividends > 0	% of Firms Decreasing Dividends	% of Firms Increasing Dividends
1988	4586	47.8%	26.5%	74.3%	3.5%	1.9%	5.5%	31.86%	6.17%	19.76%
1989	4407	45.2%	27.7%	72.9%	2.8%	1.7%	4.5%	32.77%	7.29%	19.86%
1990	4385	51.5%	21.8%	73.3%	3.1%	1.3%	4.4%	32.16%	7.62%	18.55%
1991	4458	68.0%	16.4%	84.4%	2.4%	0.6%	3.0%	31.16%	8.87%	14.35%
1992	4680	67.4%	19.1%	86.5%	2.4%	0.7%	3.0%	30.77%	9.09%	13.22%
1993	5011	59.0%	17.2%	76.2%	2.1%	0.6%	2.7%	29.44%	7.73%	13.55%
1994	5328	43.1%	14.9%	58.0%	2.1%	0.7%	2.9%	28.10%	5.62%	14.25%
1995	5936	43.7%	20.9%	64.6%	2.0%	0.9%	2.9%	26.45%	4.90%	14.39%
1996	6135	40.1%	24.7%	64.8%	1.8%	1.1%	2.8%	26.00%	5.78%	12.75%
1997	6193	38.0%	33.8%	71.8%	1.4%	1.2%	2.6%	25.22%	6.54%	11.53%
1998	6002	50.2%	48.1%	98.2%	1.4%	1.3%	2.7%	24.43%	6.63%	11.47%
1999	5955	39.3%	40.5%	79.8%	0.9%	0.9%	1.8%	22.15%	6.20%	11.24%
2000	6052	36.8%	41.9%	78.7%	1.0%	1.2%	2.2%	20.42%	6.63%	9.63%
2001	5770	284.2%	263.7%	547.9%	1.3%	1.2%	2.5%	19.79%	6.51%	8.86%
2002	5438	169.1%	156.1%	325.2%	1.6%	1.5%	3.1%	19.24%	5.78%	9.02%
2003	3824	36.6%	30.9%	67.4%	1.5%	1.2%	2.7%	23.77%	3.09%	15.24%

Source: Kalay & Lemmon, 2008, pp. 7-8

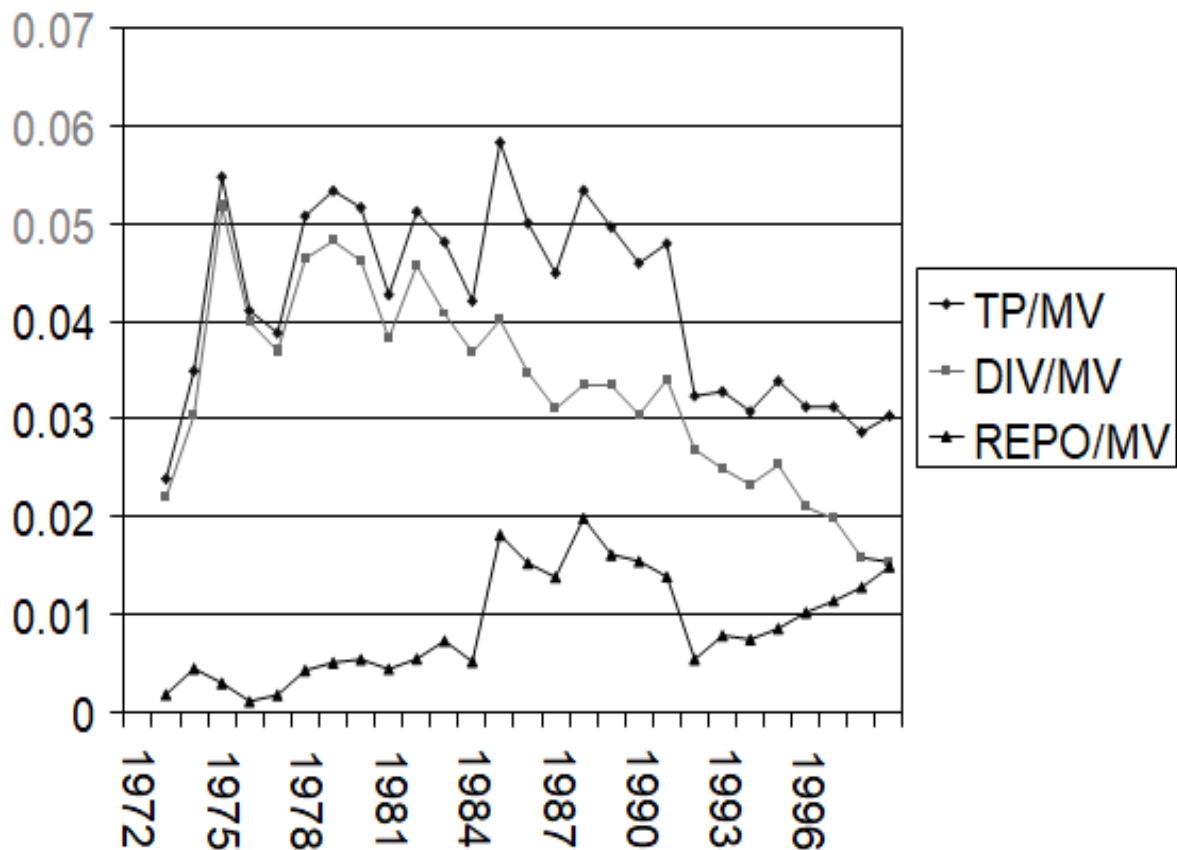
Table 3 and Figure 2 provide a visual representation demonstrating that well-established corporations tend to allocate a notable portion of their earnings as dividends and repurchases. Throughout history, dividends have traditionally been the primary mode of payout. However, the significance of share repurchases was relatively minimal until the mid-1980s. Subsequently, they have gained prominence and become a significant means of payment (Allen & Michaely, 2003, p. 345).

The percentage of firms distributing cash dividends experiences a significant decline, dropping from 66.5% in 1978 to 20.8% in 1999. This trend can be attributed, in part, to the evolving nature of publicly traded firms. With an influx of new listings, the composition of publicly traded firms progressively shifts towards smaller entities characterized by lower profitability and substantial growth opportunities—traits commonly associated with firms that have never engaged in dividend payouts. Furthermore, findings of this experience indicate that firms, regardless of their specific characteristics, have become less inclined to distribute dividends. This decreasing propensity to pay dividends is as significant a factor as the changing characteristics contributing to dwindling prevalence of dividend paying firms (Fama & French, 2001, p. 3).

Figure 3 clearly illustrates a decline in the number of firms distributing dividends. The proportion of firms paying dividends, regardless of their earnings, has significantly decreased over time among all CRSP-listed firms. Prior to 1980's, firms initiating cash payments were more prevalent.

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Figure 2: Evolution of total payout, dividends and repurchases



Cash distributions to equity holders as a percentage of market value

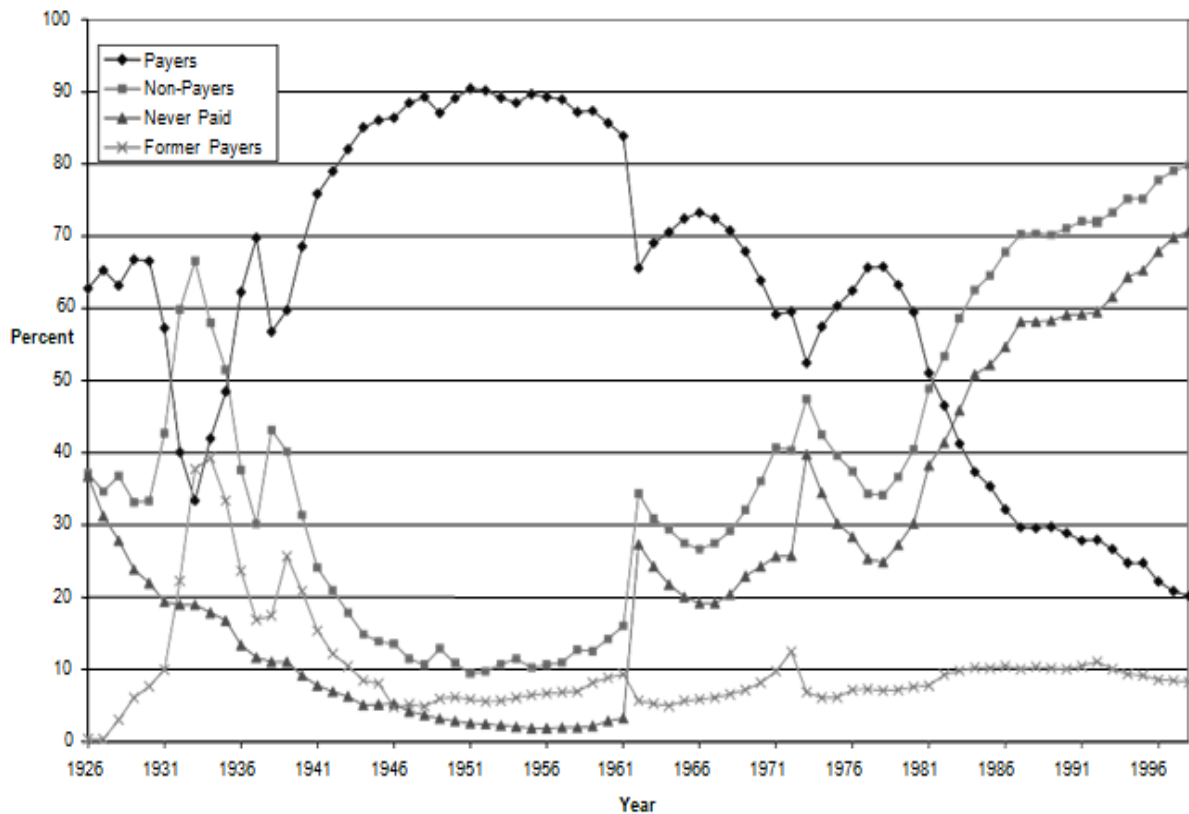
This figure depicts the average total payout (dividends plus repurchases) yield, the average dividend yield, and the average repurchase yield (all relative to market value) for a sample of USA firms. The data sample consists of all firm-year observations on Compustat (Full-Coverage, Primary, Secondary, Tertiary, Research, and Back Files) over the period 1972–1998 that have positive earnings and have available information on the variables REPO, DIV, and MV. REPO is the expenditure on the purchase of common and preferred stocks (Compustat item 115) minus any reduction in the value (redemption value) of the net number of preferred shares outstanding (Compustat item 56). DIV is the total dollar amount of dividends declared on the common stock (Compustat item 21). MV is the market value of common stock (Compustat item 24 Compustat item 25). The total payout is the sum of the dividend payout and the repurchase payout. The data sample contains 121973 firm-year observations and excludes banks, utilities, and insurance companies.

Source: Allen & Michaely, 2003, p. 345, (Based on data from Grullon and Michaely (2002), “Dividends, share repurchases and the substitution hypothesis”).

Historically, before the 1980s, it was typical for firms that initiated cash payments to primarily utilize dividends as the preferred method. However, since the early 1980s, a majority of firms have begun implementing cash distributions through share repurchases. This observation is supported by Figure 4 which specifically focuses on industrial firms in the United States. To define a cash distribution initiation, the first instance related after 1972 in which firms pay dividends and/or repurchases shares. Figure 4 clearly demonstrates that the percentage of firms initiating cash distributions solely through share repurchases increased from less than 27% in the 1974 to over 81% in 1998. Share repurchase programs have emerged as the preferred method of payout among firms that initiate cash distributions to their equity holders. For earlier evidence on the trend repurchases, refer to Bagwell and Shoven's study 1989 (Allen & Michaely, 2003, p. 346).

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Figure 3: Percent of all CRSP firms in different dividend groups



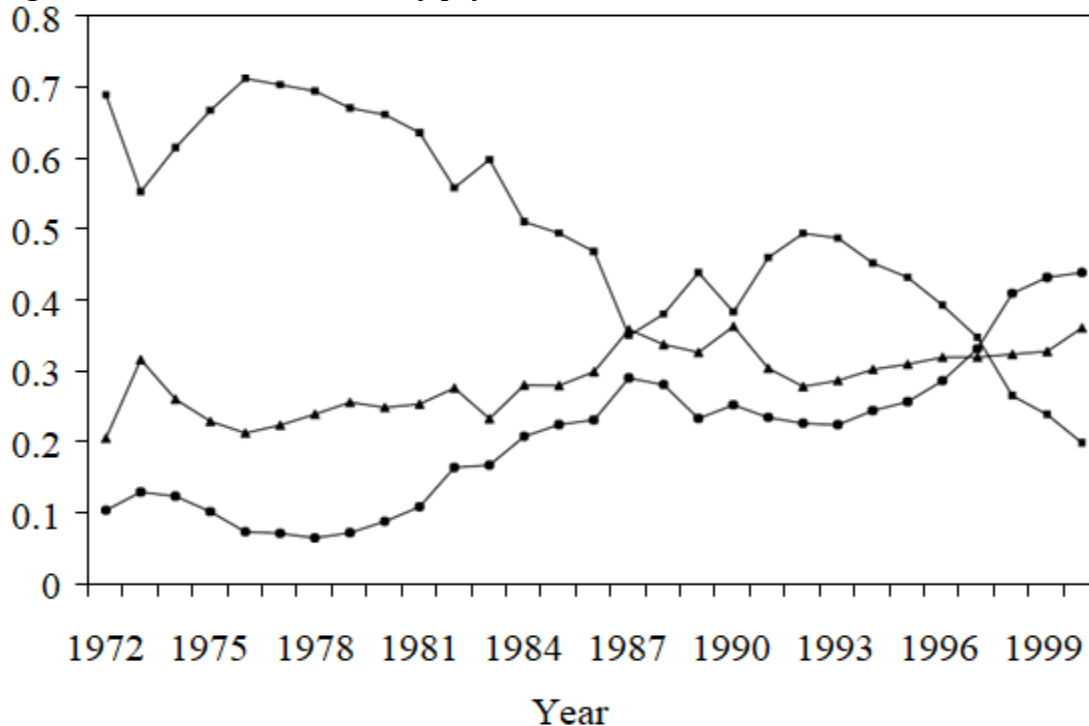
Source: (Allen & Michaely, 2003, p. 346) (Based on Fama and French (2001, Figure 2), “Disappearing dividends: changing firm characteristics or lower propensity to pay?”).

In figure 5, it can be observed that the average repurchase payout ratio, which represents the proportion of repurchases to earnings, has exceeded that of dividend payments. In 2007, aggregate share repurchases reached a peak of over 560 billion real 2012 dollars, accounting for more than 73% of the total amount paid out by public US firms that year. Following a significant decline during the Great Recession, repurchases have since rebounded. In 2012, the total dollar volume of shares repurchased was \$364 billion, constituting 58% of the overall payouts. Notably, Figure 6 demonstrates that the substantial growth in the aggregate dollar volume of repurchases over the last decade is not primarily driven by few major repurchases. There appears to be a negative correlation between the aggregate dollar volume of repurchases and the share of repurchases made by the top 25 repurchases. This suggests that it is the extensive scale that primarily influences the overall level of repurchases activity (Allen & Michaely, 2003, p. 82).

In figure 6, it can be observed that the significant increase in the overall dollar value of repurchases in the past ten years is not attributed to a small number of major repurchases. Instead, there seems to be a negative correlation between the aggregate dollar value of repurchases and the proportion of repurchases carried out by the top 25 buyers. This suggests that the extensive scale of repurchase activities, rather than the intensive scale, is the primary driving force behind the aggregate repurchase trend. On the other hand, the total payout ratio reached its highest level since 1971, standing at 28.7% in 2012, as depicted in Figure 5.

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Figure 4: Distribution of firms by payout method.



The distribution of firms by payout method on a sample of USA firms. Let determine the payout policy of a firm by observing the cash disbursements of the firm over a period of a year. The data sample consists of all firm-year observations on Compustat (Full-Coverage, Primary, Secondary, Tertiary, Research, and Back Files) over the period 1972–2000 that have available information on the following variables: REPO, DIV, EARN and MV. REPO is the expenditure on the purchase of common and preferred stocks (Compustatitem115) minus any reduction in the value (redemption value) of the net number of preferred shares outstanding (Compustatitem56). DIV is the total dollar amount of dividends declared on the common stock (Compustat item21).EARN is the earnings before extraordinary items (Compustatitem18).MV is the market value of common stock (Compustat item 24Compustat item 25). The data sample contains 136646 firm-year observations and excludes banks, utilities, and insurance companies. Squares, proportion of firms that payout only with dividends; triangles, proportion of firms that payout with dividends and repurchases; circles, proportion of firms that payout only with repurchases. [Grullon and Michaely (2002), “Dividends, share repurchases and the substitution hypothesis”].

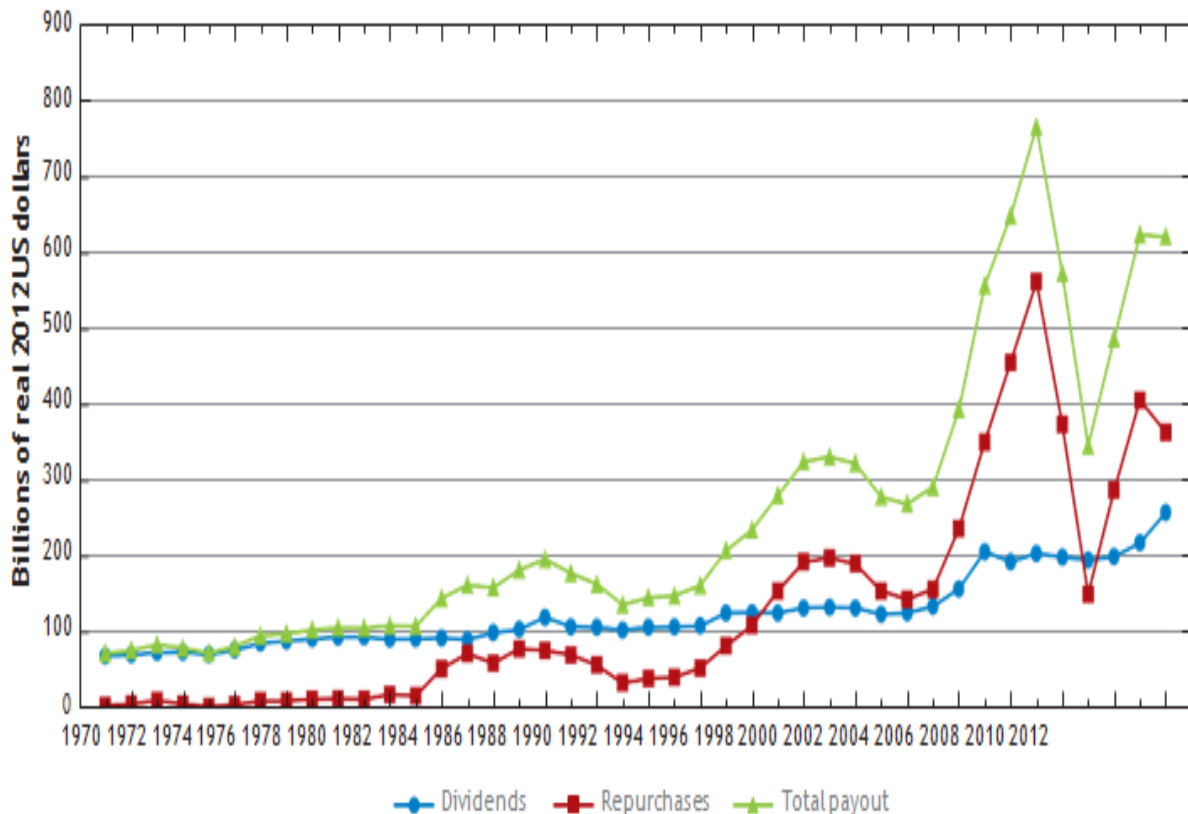
Source: Allen & Michaely, 2003, p. 347, [Based on Grullon and Michaely (2002), “Dividends, share repurchases and the substitution hypothesis”].

The percentage is significantly higher than the lowest point of 15.4% recorded in 1996. Additionally, established companies that traditionally paid dividends also began to utilize repurchases more frequently, while generally avoiding reducing their dividend payments. Instead, they opted to increase their dividends at a slow rate compared to what would have been expected under different circumstances (Allen & Michaely, 2003, p. 83).

To examine the underlying reasons behind the increasing significance and acceptance of share repurchases, Lee and Rui (2007) adopt a different approach that employs time-series analysis. This methodology allows us to evaluate two hypotheses regarding the motivations behind share repurchases and dividends hypotheses regarding the motivations behind share repurchases and dividends: the flexibility hypothesis and the substitution hypothesis. By considering both policies of share repurchase and dividend payouts within a time-series vector autoregression framework, accounting the dynamic and multifaceted nature of these two payout strategies.

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Figure 5: Aggregate dollar amount of dividends, share repurchases, and total payouts (the sum of dividends and share repurchases) paid out by the sample of publicly listed US firms.



To be part of public-firm sample, a firm has to be in both Compustat and the Center for Research in Security Prices (CRSP); be incorporated and located in the United States; be listed on the NYSE, AMEX (American Stock Exchange), or NASDAQ; have valid stock prices in CRSP; have a CRSP share code of 10 or 11 (which screens out non operating entities such as real estate investment trusts, mutual funds, or closed-end funds); and be neither a financial firm (SIC6) nor a regulated utility (SIC49). Dividend payout is defined as the total dollar amount of dividends declared on the common stock during the fiscal year (Compustat item *dvc*). Repurchase payout is the total expenditure on the purchase of common and preferred stocks (Compustat item *prstk*) minus any reduction in their redemption value of the net number of preferred shares outstanding (Compustat item *pstkrv*). Total payout is the sum of dividend and repurchase payout.

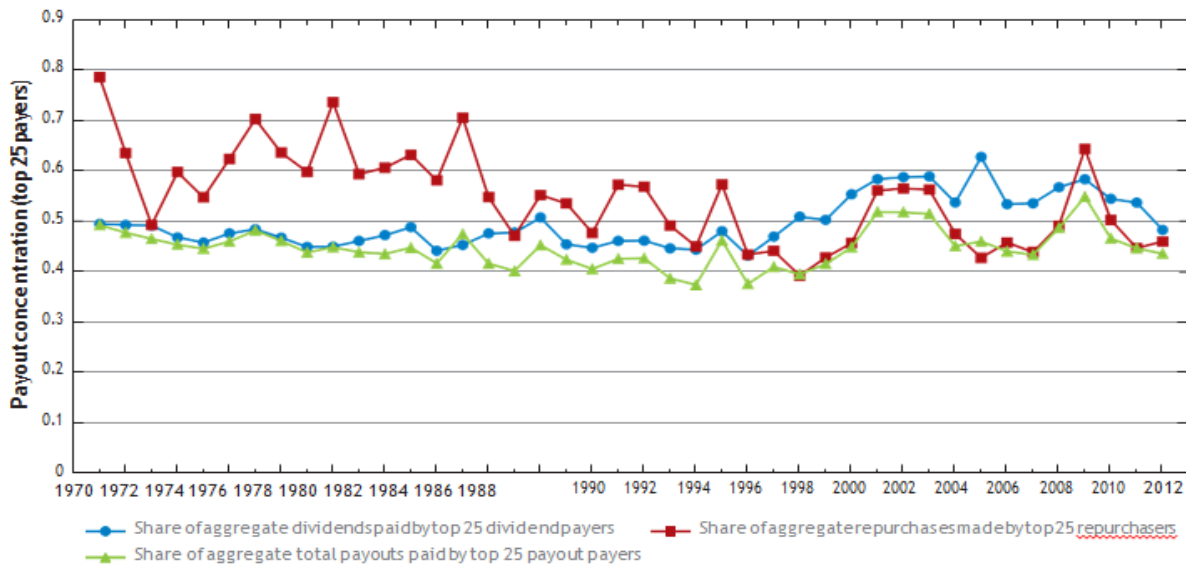
Source: Farre-Mensa, Michaely, & Schmalz, 2014, p. 83

Findings indicate that share repurchases are linked to transient components of earnings, indicating a temporary nature to these repurchases. In contrast, dividends do not exhibit the same association with temporary earnings components. Furthermore, the analysis reveals that share repurchases and dividends are not perfect substitutes, suggesting that these two payout mechanisms serve different purposes and are not interchangeable in their effects or outcomes (Lee & Rui, 2007, p. 42).

Koch and Sun (2004) led a study to determine whether the financial market perceives alterations in dividends as an indication of the continuity of previous earnings fluctuations. Prior to receiving this signal, investors may hold the belief that past changes in earnings do not necessarily provide insight into future earnings levels. Through empirical analysis, the study aims to examine whether a modification in dividends influences investors' evaluation regarding the valuation implications of past earnings. The results of the investigation validate the hypothesis that changes in dividends prompt investors to revise their expectations regarding the sustainability of past earnings changes.

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Figure 6: the fraction of aggregate dividends, share repurchases, and total payouts paid by the 25 industrial firms with the largest dividend payout, repurchase payout, and total payout that year, respectively.



For details on the sample construction and variable definitions, see Figure 5.

Source: Farre-Mensa, Michaely, & Schmalz, 2014, p. 85

This effect exhibits predictable variations based on the extent of the dividend alteration and the direction of the past earnings change. In other words, the magnitude of the dividend change and whether the past earnings change was positive or negative play a role in shaping investor ‘reassessment of the persistence of earnings fluctuations (Koch & Sun, 2004, p. 2093).

The choice made regarding risk management and payout strategies have a significant impact on a company’s financial flexibility, which refers to its ability to avoid costly financial distress and underinvestment. Bonaimé, Hankins and Harford (2014), in their study, presented a compelling evidence of a trade-off between hedging decisions and payout decisions by examining both financial and nonfinancial firms. The study’s findings indicated that when firms prioritize a more flexible distribution policy that favors share repurchases over dividends, it is associated with a negative correlation with financial hedging activities within the same firm. This alignment suggests that financial flexibility in payout decisions and hedging serve as substitutes. Furthermore, the results remain robust even after accounting for the potential endogeneity of both hedging and payout choices. Overall, the research suggests that having flexibility in payout decisions can offer operational hedging benefits for companies, enabling them to effectively manage risks while maintaining their financial flexibility and avoiding undesirable outcomes such as financial distress or underinvestment (Varma, Raveesh, & Munjal, 2021)

Varma et al (2021) analyzed the factors that contribute to special payouts, including open market repurchases, tender offer repurchases, and special dividends. A multinomial logit (MNL) model is employed to examine the selection of payout methods using data from 754 payout announcements in India between 2004 and 2017. The study investigated various variables such as agency cost, shareholder heterogeneity, clientele effect, distribution size, misvaluation, and takeover threat. Additionally, the research examined the influence of ownership structure, distinguishing between business group affiliated firms and standalone firms. The findings indicated that the choice of dividend payout is impacted by the nature of

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ownership. Group affiliated firms are driven by the clientele effect and distribution size, whereas agency cost and shareholder heterogeneity play a role in standalone firms. To conduct the MNL analysis, a Bayesian approach is employed, combining prior information with the available current data. The results suggest that the decision to utilize open market repurchases and tender offer repurchases instead of special dividends is influenced by misevaluation and shareholder heterogeneity. The results of the MNL analysis reveal that open market repurchases are chosen when there is a high takeover threat, significant firms, or undervaluation of firms. On the other hand, tender offer repurchases are preferred in situations of high agency cost, high takeover threat, low shareholder heterogeneity, and undervaluation (Varma, Raveesh, & Munjal, 2021, p. 1).

The total amount of payouts in India has experienced a significant increase, rising from Rs 129.34 billion in 2004 to Rs 597.91 billion in 2017. Among the three payout methods (special dividends, tender offer repurchases, and open market repurchases), special dividends have been the preferred choice in 8 out of 14 years. Tender offer repurchases have been more prevalent in recent years, occurring in 3 out of 14 years, while open market repurchases have been the dominant mode in 3 out of 14 years. Varma et al (2021) study aimed to develop a predictive model for special payouts, including open market repurchases, tender offer repurchases, and special dividends, focusing on Indian companies between 2004 and 2017. The descriptive comparison of payout firms in terms of agency cost, clientele effect, size of previous distribution, institutional ownership, and takeover threat highlights the differences between firms choosing special dividends and those opting for open market repurchases or tender offer repurchases. Firms that prefer special dividends over open market repurchases are characterized by higher dividend yield, lower dividend distributions, larger size, low takeover threat, and higher misevaluation. On the other hand, when comparing firms choosing special dividends to those selecting tender offer repurchases, the former tend to have higher leverage, higher dividend yield, lower dividend distributions, and higher misevaluation (Varma, Raveesh, & Munjal, 2021, p. 16).

III.1.2 Dividends disappearance ‘origins and reappearance:

Fama and French (2001) conducted a highly influential study that revealed a significant decrease in the proportion of US public companies that distributed cash dividends. Their findings showed that this fraction declined from 66.5% in 1978 to 20.8% in 1999. The researchers demonstrated that a portion of this decline could be attributed to a shift in the composition of publicly traded firms, particularly towards smaller companies with limited profitability but strong growth prospects. Such firms do not engage payments. This shift in the population of public firms was a consequence of a surge in newly listed firms. The number of public companies grew from 3,638 in 1978 to a peak of 5,670 in 1997, contributing to this change. Moreover, the characteristics of these newly listed firms underwent a significant transformation. The average profitability of small firms with high growth potential notably decreased during the 1980s and 1990s. Interestingly, prior to 1978, newly listed firms were more profitable than established firms, but the trend reversed for firms going public in the 1990s. As a result, the reduced profitability of these numerous newly listed firms played a role in the decline of the proportion of companies paying dividends (Farre-Mensa, Michaely, & Schmalz, 2014, p. 79).

Building on Grullon, Michaely & Swaminathan's (2002) maturity hypothesis whereby firms pay out more as they mature, DeAngelo, DeAngelo & Stulz (2006) argue that in line with a life-cycle theory of dividends, the proportion of publicly traded industrial firms that distribute dividends tends to be high when retained earnings constitute a significant portion of total

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equity (and total assets). Conversely, this fraction approaches zero when most equity is contributed rather than earned. The research demonstrated a highly significant relationship between the decision to pay dividends and the mix of earned and contributed capital. This relationship remains robust even when considering factors such as profitability, growth, firm size, total equity, cash balances, and dividend history. It holds true for both the initiation and omission of dividends. Interestingly, in their regression analysis, the composition of earned and contributed capital has a more pronounced impact than measures of profitability and growth opportunities. They also observed a substantial increase in the number of firms with negative retained earnings, which rose from 11.8% of industrials in 1978 to 50.2% in 2002. However, when controlling for the mix of earned and contributed capital, firms with negative retained earnings display virtually no change in their inclination to pay dividends from the mid-1970s to 2002 (DeAngelo, DeAngelo, & Stulz, 2006, p. 227).

On the other hand, companies with earned equity, which would make them reasonable candidates for dividend payments, experienced a reduction in propensity to pay dividends that was twice as large as the overall reduction noted in Fama and French's earlier work (Fama and French, 2000). Finally, the simulations indicate that if well-established firms had refrained from paying dividends, they would have amassed substantial cash balances and held trivial long-term debt. This finding implies that managers of these mature firms would have been granted significant discretion in financial matters. In general, these findings align with Fama & French's conclusion that the decrease in the proportion of companies paying dividends in the early 2000s can be attributed to a combination of changes in company attributes and a reduced likelihood of dividend payment among companies possessing the usual characteristics of dividend-paying entities (DeAngelo, DeAngelo, & Stulz, 2006, p. 227).

Grullon & Michaely (2002) and DeAngelo, DeAngelo & Skinner (2004) have presented evidence that despite the significant decline in the number of companies paying dividends, there was a noteworthy 22.7% rise in the actual amount of dividends paid by industrial firms between 1978 and 2000. The question arises as to how this contradiction between the decline in dividend-paying firms and the increase in aggregate dividends can be explained. According to DeAngelo, DeAngelo & Skinner (2004), there are two key factors at play. First, the decline in the number of dividend payers primarily affected companies that distributed relatively small dividends. Therefore, the overall supply of dividends was minimally affected due to the insignificance of these firms' dividend contributions. Secondly, alongside the reduction in the number of dividend payers, there was a simultaneous substantial growth in dividends paid by the largest dividend-paying companies. This increase reflected a significant rise in their actual earnings, thus compensating for the decline in the overall number of dividend-paying firms (Farre-Mensa, Michaely, & Schmalz, 2014, p. 80).

In summary, DeAngelo, DeAngelo & Skinner (2004) demonstrated that the increase in actual dividends paid by top-tier firms overwhelmed the decrease in dividends caused by the loss of numerous small dividend payers. Additionally, as highlighted by Grullon & Michaely (2002), the overall increase in earnings during this period outpaced the growth in dividends, resulting in a significant decline in both the dividend payout ratio and the dividend yield. Significantly, DeAngelo, DeAngelo & Skinner (2004) also observed that these two trends led to a notable concentration of dividends in the United States. In fact, by 2000, the 25 largest dividend-paying companies, which were predominantly well-established firms, collectively accounted for 54.9% of the total industrial dividends. This concentration of dividends mirrored a concentration of earnings, with the top 25 dividend payers generating 51.4% of the aggregate industrial earnings in the same year (Julio & Ikenberry, 2004, p. 90).

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Fama & French (2001), Grullon & Michaely (2002), and DeAngelo, DeAngelo & Skinner (2004) concluded their respective studies in 1999, 2000, and 2002. This leads to a natural question: Has the downward trend in the number and proportion of companies paying dividends persisted in the last decade? Julio & Ikenberry (2004) were the first to indicate a potential reversal in this decline and suggested the resurgence of dividends. The purpose of their paper was to investigate the underlying causes behind this shift. Are cash dividends making a comeback, and if so, what are the reasons behind it? They examined five plausible factors contributing to this phenomenon. They began by examining the impact of the Bush tax cut implemented in May 2003, which reduced the tax burden on dividends to match that of capital gains, thereby addressing (although not entirely eliminating) the tax-related issues associated with dividends. Furthermore, they present evidence suggesting that U.S. companies have indeed responded to this alteration in tax policy (Julio & Ikenberry, 2004, p. 90).

However, it is important to note that the resurgence of dividends predated the discussion of the Bush tax cut as a policy matter, with the trend starting as early as 2000. Hence, the tax cut alone cannot fully explain the reversal. Another potential explanation for the resurgence of dividends is that large companies, particularly those with limited growth prospects, may be utilizing dividends as a means to instill confidence in investors regarding the "quality" of their earnings. The beginning of the 21st century marked an extraordinary period in the economic history of the United States. Following the surge in stock prices during the late 1990s and the subsequent Nasdaq crash starting in March 2000, investors faced a crisis of trust that aligned with the burst of the Internet bubble. Within a remarkably brief period, several prominent, well-regarded companies with strong ratings experienced a sudden downfall. This development cast a shadow of doubt over the entire corporate governance system in the United States. As recent experiences have shown, investors have come to realize that earnings can be manipulated and subject to both intentional manipulation and genuine estimation errors. In contrast, dividends represent tangible cash returns (Julio & Ikenberry, 2004, p. 90).

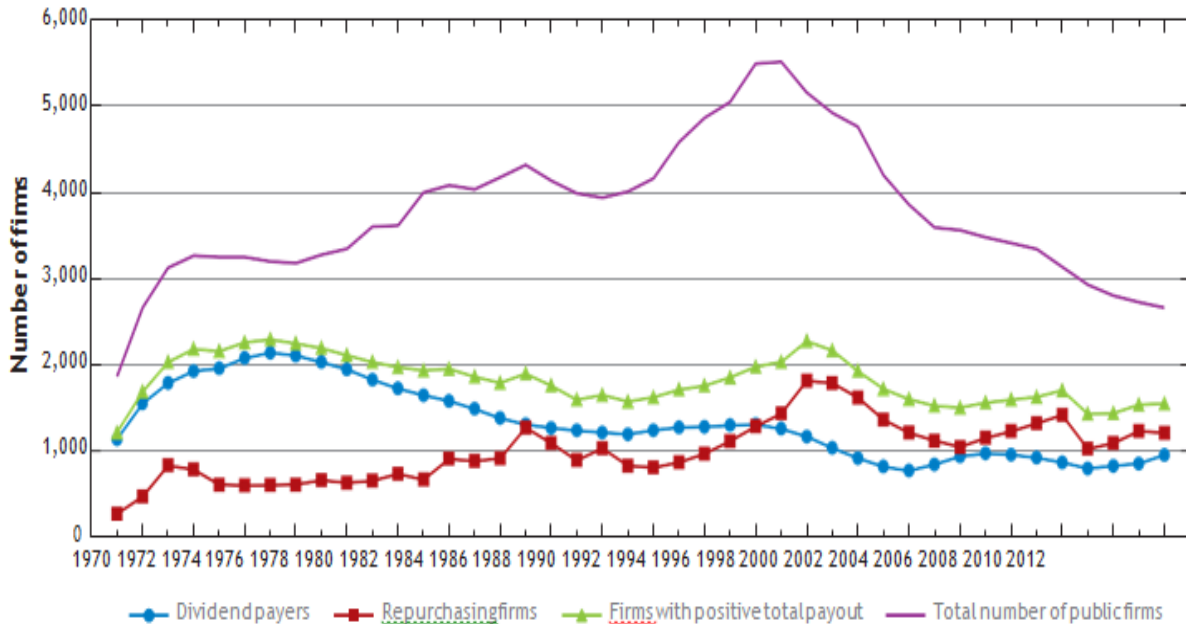
One plausible explanation is that the recent upsurge in dividends can be partially attributed to the maturation of Internet-era startups, leading them to reassess their payout strategies. The technological advancements of the 1990s ushered in a dynamic period of capital growth, comparable to transformative epochs in history such as the construction of transcontinental railroads in the 1880s or the advent of phone and radio communication in the 1920s, which fundamentally reshaped the U.S. economy. While many former dot-com companies from that era have fallen by the wayside, numerous once-youthful firms are now reaching a stage of maturity. As these companies mature and the value of their growth prospects diminishes (in relation to their current market valuations), it is likely that their payout policies will also undergo changes. For instance, let's consider Microsoft's recent actions, such as initiating a regular dividend in early 2003 and paying a special dividend of \$32 billion in late 2004. Although the more favorable tax treatment of dividends might have played a role in the decision to distribute the special dividend, Microsoft's new dividend policy also aligns with a natural progression towards maturity. Microsoft, being a highly successful company, has generated substantial cash flows that surpass the growth potential of promising new investments. However, the fact that their earlier decision to commence regular dividend payments preceded the final approval of the Bush tax cut implies that taxes alone would not have been the primary motivation for this particular firm (Julio & Ikenberry, 2004, p. 91).

The fourth potential factor contributing to the resurgence of dividends shares similarities with the maturity hypothesis, which suggests that dividend policy is determined by a company's

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capital budgeting process. In other words, companies tend to distribute dividends with the mindset of "paying out what cannot be reinvested to earn the cost of capital."

Figure 7: Evolution of the number of publicly listed payout-paying firms in the United States from 1971 through 2012.



For details on the sample construction and variable definitions, see 5.

Source: Farre-Mensa, Michaely, & Schmalz, 2014, p. 81

While the maturity hypothesis can shed light on dividend choices at the individual firm level, a broader decrease in viable capital investment opportunities may indicate a more widespread decline in the economy. Therefore, Julio & Ikenberry (2004) also explored whether investment prospects experienced a surge during the 1990s but abruptly declined with the arrival of the new millennium. Furthermore, as the fifth and final consideration, they delved into "behavioralist" explanations for the recent upswing in dividends. By this, they refer to explanations that rely on investor preferences that may not have a clear foundation in fundamental economic principles and thus lie beyond the scope of what economists typically define as "rational" behavior. These explanations take into account factors that go beyond traditional economic analysis and delve into the realm of non-traditional influences on dividend decisions.

Baker and Wurgler proposed a theory known as the "investor catering" theory, which suggests that investor preferences for dividends may evolve over time. While let not fully comprehend the factors driving investor demand for cash dividends, let cannot disregard the possibility that this demand has significantly increased in recent years, prompting U.S. managers to respond by either initiating or increasing dividend payments. In order to examine each of these potential explanations for the reappearance of dividends, let collect quarterly data from Compustat and the Center for Research in Security Prices (CRSP) for U.S. industrial companies spanning from the first quarter of 1984 to the first quarter of 2004. Utilizing this dataset, a series of tests to assess the explanatory power of each of the five hypotheses mentioned above is devised (Julio & Ikenberry, 2004, p. 91).

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Previous studies conducted by Fama& French (2001), Grullon & Michaely (2002), and DeAngelo, DeAngelo& Skinner (2004) focused their analyses on data up until 1999, 2000, and 2002 respectively. This raises a pertinent question: Has the downward trend in the number and proportion of companies paying dividends persisted over the past decade? Surprisingly, it has not. Julio & Ikenberry (2004) were the first to observe a potential reversal in this decline, indicating a resurgence of dividends. Further analysis by Farre-Mensa, Michaely & Schmalz (2014) confirms that the reappearance of dividends has gained momentum subsequent to the lowest point in the population of dividend-paying firms in 2002. Figure 7 illustrates this trend, depicting an increase in the number of dividend-paying companies from 767 in 2002 to 968 in 2005, signifying a growth of 26%. Moreover, despite a brief decline during the 2008-2009 financial crisis, the number of dividend-paying firms stood at 949 in 2012 and has continued to exhibit signs of growth (Farre-Mensa, Michaely, & Schmalz, 2014, p. 80).

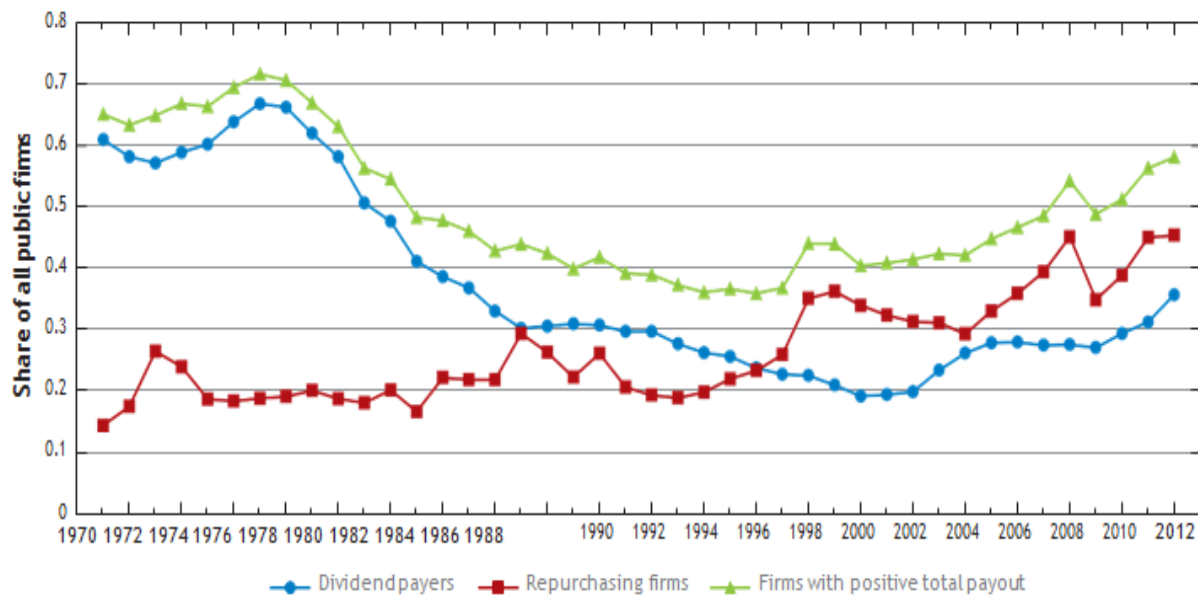
The examination of the fraction of dividend-paying firms as a proportion of the total number of publicly traded companies in the United States, leads to the reappearance of dividends becomes even more evident, as shown in Figure 8. This is due to the continuous decline in the overall number of publicly traded firms since its peak of over 5,500 in 1997. By 2012, the count of public firms had diminished to less than 2,700, marking a decrease of over 50% from its highest point. Consequently, the fraction of dividend-paying firms reached 35% in 2012, a level not witnessed since 1985, following a period between 2000 and 2002 when it remained below 20%. What factors contribute to this resurgence of dividends? Figure 8 indicates that the rise in the proportion of dividend-paying firms among the population of publicly traded companies in the U.S has been influenced by the delisting or bankruptcy of numerous dot-com firms that went public during the 1990s, the majority of which never paid dividends (Farre-Mensa, Michaely, & Schmalz, 2014, p. 80).

However, Figure 7 also reveals that the decline in the absolute number of dividend-paying firms, which commenced in the late 1970s, began to reverse itself in 2003, coinciding with the implementation of the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA). This act reduced the top dividend tax rate from 35% to 15% (referred to as the 2003 dividend tax cut), thereby eliminating the tax disadvantage of dividends compared to capital gains. Furthermore, it is worth noting that similar patterns of dividend reappearance have been observed in other countries that have not undergone significant changes in dividend taxation. This observation suggests that taxes alone might not provide a comprehensive explanation for the reappearance of dividends over the past decade. The presence of similar trends in countries with different tax regimes implies the existence of additional factors influencing the resurgence of dividends (Farre-Mensa, Michaely, & Schmalz, 2014, p. 80).

Floyd et al. (2015) conducted a study to examine the significance of share repurchases and dividends for US industrial firms and banks during the financial crisis. Contrary to the trend of increasing share repurchases prior to the crisis, the study revealed a decrease in share repurchases at the onset of the financial crisis. The authors demonstrated that banks displayed a greater and more consistent inclination to pay dividends and were reluctant to reduce dividend payouts as the financial crisis unfolded. Regarding industrial firms, the study found that dividends were increasingly concentrated in firms that also engaged in share repurchases. This observation supports the complementary theory of dividends and share repurchases, suggesting that these two mechanisms are intertwined and mutually reinforcing in industrial firms (Diedrich, Dierkes.Johannes, & Sümpelmann, 2022).

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Figure 8: the fraction of dividend-paying firms, repurchasing firms, and firms with positive total payout



This figure shows the fraction of dividend-paying firms, repurchasing firms, and firms with positive total payout in the sample of publicly listed US firms.

For details on our sample construction and variable definitions, see Figure 5.

Source: Farre-Mensa, Michaely, & Schmalz, 2014, p. 82

Both industrials and banks experienced significant increases in their payout ratios in the years leading up to the financial crisis. These increases were remarkable both in absolute terms and when compared to their earnings. However, there are distinct differences in the evolution of payout policies between industrials and banks over the past three decades. In the case of industrials, there has been a growing concentration of dividends among firms that also engage in share repurchases. This suggests that dividends serve as a viable solution to address free cash flow issues, particularly in large and mature firms that dominate the industrial sector. The survival of dividends in these firms is further supported by the rarity of dividend increases, indicating managers' reluctance to make cuts.

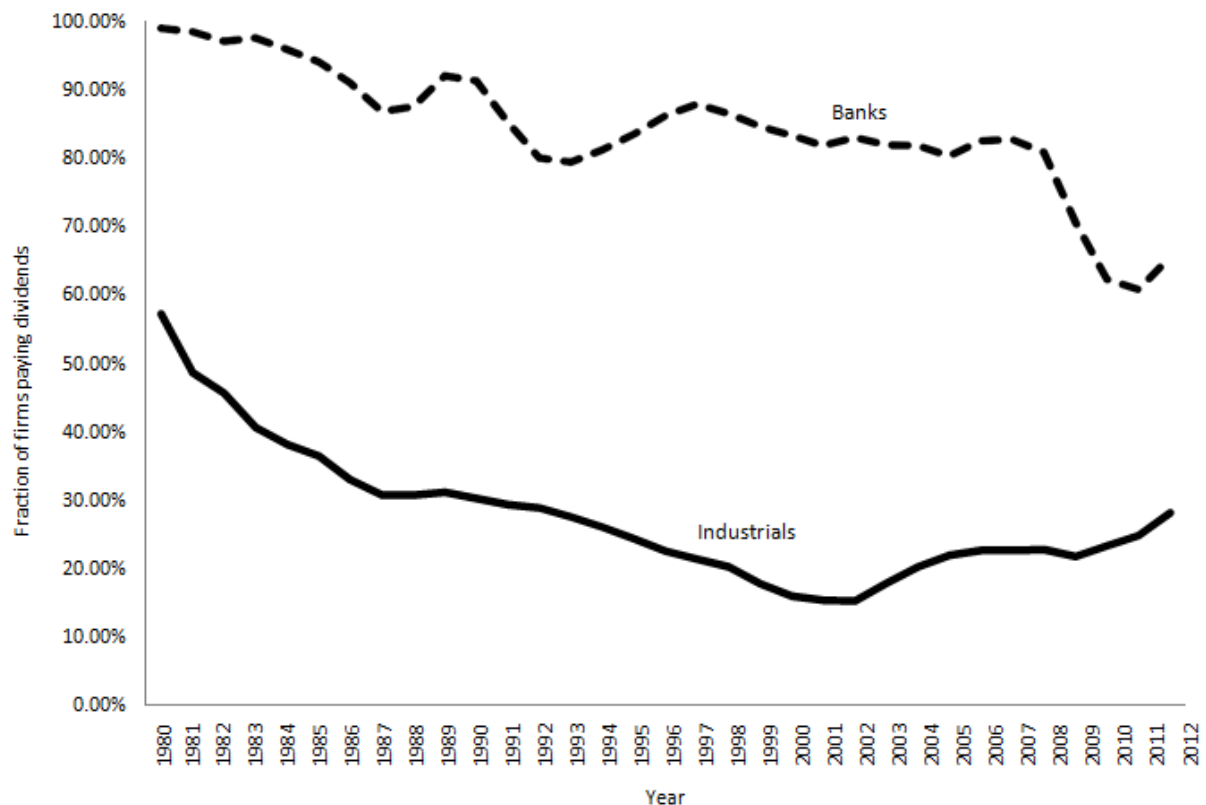
This finding aligns with earlier survey evidence on dividends, such as Lintner (1956) and Brav, Graham, Harvey, and Michaely (2005), as well as recent research demonstrating dividend smoothing by industrial firms (Leary and Michaely, 2011; Michaely and Roberts, 2012). An often-overlooked explanation for bank dividends is their use as a means to signal financial stability to different stakeholders, such as depositors and short-term creditors. Unlike industrial firms, banks do not exhibit a declining inclination to pay dividends, and majorities of banks have consistently paid dividends over the last three decades. In fact, banks tend to increase their dividend per share (DPS) more frequently and by larger amounts compared to industrial firms. This pattern resulted in substantial and consistent growth in bank dividends during the 1990s and 2000s, extending up until the onset of the financial crisis (Floyd, Li, & Skinner, 2015, p. 314).

Following the implementation of the Jobs and Growth Tax Relief Reconciliation Act (JGTRRA), there is indeed an increase in the proportion of companies paying dividends. However, this increase is part of a broader trend of higher payouts, which also includes an

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uptick in share repurchases. Interestingly, there is no clear indication of a shift towards a higher proportion of dividends in the payout mix during the years following JGTRRA. If anything, the opposite seems to be true. Moreover, there is no substantial evidence of an overall increase in dividend payout ratios during this period. This finding aligns with the observations made by Edgerton (2013) and Floyd et al. (2015), indicating that changes in payout policy over the past decade are not primarily driven by tax considerations. Although taxes may have some marginal impact, the evidence suggests that other factors play a more significant role in shaping payout decisions (Hanlon and Hoopes, 2014) (Floyd, Li, & Skinner, 2015, p. 314).

Figure 9: Fraction of US industrials and banks that pay dividends based on Compustat data from 1980 to 2012. Sample includes all firms with non-missing earnings and dividends in each year.



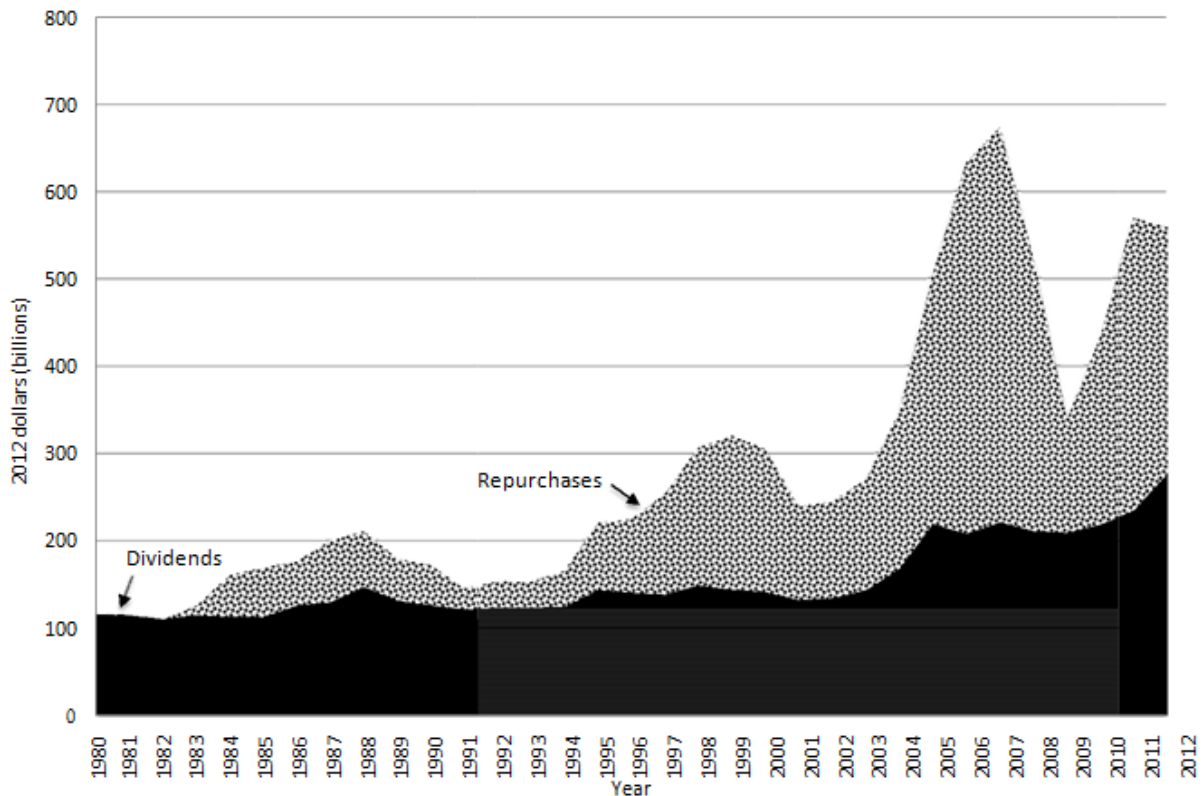
Source: Floyd, Li, & Skinner, 2015, p. 315

III.2 Theories of repurchases

The favorable market response to announcements of share repurchases, coupled with the similarity of cash payouts to dividends, helps to explain why many dividend theories can be applied to repurchases as well. Notably, theories such as Miller and Rock's (1985) and Bhattacharya's (1979) signaling models can seamlessly extend to repurchases. In these models, firms allocate cash resources to signal their quality (Miller and Rock) or their requirement for external financing at a cost (Bhattacharya). Furthermore, the free-cash-flow models can be equally applicable to repurchases as they are to dividends. Additionally, models rooted in relative taxation (such as John and Williams' 1985 model) or those asserting that dividends serve as a superior signaling mechanism do not assume or imply that repurchases and dividends are perfect substitutes. These models recognize that repurchases and dividends can have distinct characteristics and implications, thereby acknowledging the nuanced nature of these payout strategies (Allen & Michaely, 2003, p. 407).

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Figure 10: Real aggregate dividends and repurchases for US industrials based on Compustat data from 1980 to 2012 (2012 constant dollars, in billions).



Source: Floyd, Li, & Skinner, 2015, p. 316

Some research elucidates the motivations behind firms engaging in share repurchases independently. Vermaelen (1984) examines the use of repurchase tender offers as a means of signaling inside information and investigates managerial incentives in a different context. Previous research findings support the notion that stock repurchases can serve as an information signal. Dann, Masulis, Rosenfeld, and Vermaelen discovered that repurchase tender offer announcements led to significant abnormal returns, averaging around 15 percent. Following various hypotheses tests, Dann and Vermaelen concluded that the primary reason for this increase in value is the disclosure of new information. Vermaelen further context analyzed the event within the signaling literature but unlike previous theoretical studies on signaling, his analysis does not provide a specific solution for an equilibrium signaling function (Vermaelen, 1984, p. 163).

In Vermaelen's model, it would be costly for poorly performing firms to imitate this signal because managers, who hold a portion of the company, choose not to tender their shares. Consequently, if the firms were to repurchase shares at inflated prices and managers abstained from participating, the value of their fractional share would diminish. Vermaelen's study also highlights that the market's reaction to the repurchase announcement strengthens as the proportion of shares sought increases, as a higher share acquisition underscores the credibility of the signal being sent. Another frequently cited reason for share buybacks is their impact on takeover battles. When a firm repurchases its stocks from investors who assign them lower value, it effectively increases the cost of a potential acquisition by raising the price the acquiring party would have to pay in order to gain control [Bagwell (1991), Stulz (1988)] (Allen & Michaely, 2003, p. 407).

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The extent of management's fractional ownership becomes a crucial factor in determining the potential premium in the event of a takeover. This motive is particularly relevant in fixed-price tender offers and Dutch auctions, where companies repurchase a significant proportion of shares within a short timeframe. However, it's important to note that while these types of repurchases are significant in their own context, they represent a relatively small fraction when compared to open market repurchases. Therefore, they do not appear to be a major driving factor from the perspective of overall payout policy. In addition, repurchases can address the issue of free-cash-flow and help alleviate conflicts of interest between external shareholders and management (Allen & Michaely, 2003, p. 407).

When a firm possesses excessive cash reserves that exceed its capacity for profitable investments, repurchasing shares becomes a prompt and tax-efficient method of returning cash to shareholders. Furthermore, when a company buys back its shares, and assuming that management holds some equity, either in the form of stocks or stock options, it enhances the relative ownership of management. This adjustment serves to reduce potential conflicts of interest by aligning the interests of management more closely with those of external shareholders, as outlined in the work of Jensen and Meckling (1976) (Allen & Michaely, 2003, p. 407).

Fischer Black's renowned work, "The Dividend Puzzle," published in 1976, highlighted the lack of a convincing explanation for the longstanding practice of public corporations paying cash dividends to their shareholders. Black based his argument on two key premises. First, he referred to Modigliani and Miller's research, which demonstrated that in an ideal world without taxes or market imperfections, a company's value is determined solely by its earnings power, regardless of the distribution of those earnings to investors. According to this view, every dollar paid out in dividends should be considered a reduction in potential capital gains for investors and companies (Julio & Ikenberry, 2004, p. 89).

The second premise was the tax disadvantage associated with dividends. Unlike interest payments on debt, dividends are subject to taxation at both the corporate and personal levels. Black's reasoning implied that if dividends had any impact on corporate values, it would likely be negative. Since then, financial economists have dedicated considerable effort to exploring the reasons behind companies' decisions to pay dividends over the past three decades. The first explanation that gained significant attention from finance academics was put forth by Frank Easterbrook from the University of Chicago, who is now a distinguished judge on Chicago's Seventh Circuit (Julio & Ikenberry, 2004, p. 89).

Easterbrook proposed an argument suggesting that dividends serve as a monitoring and control mechanism for investors. According to this view, when companies commit to paying out cash as dividends instead of using it for capital investment, they increase the likelihood of needing to seek external capital from the markets. The process of raising capital from external sources subjects the company to greater scrutiny by the market, ultimately giving investors more influence over the factors that drive corporate value, such as investment and operational decisions. This mechanism aligns the interests of investors and management, as regular dividend payments increase investor oversight over the fundamental drivers of corporate value (Julio & Ikenberry, 2004, p. 89).

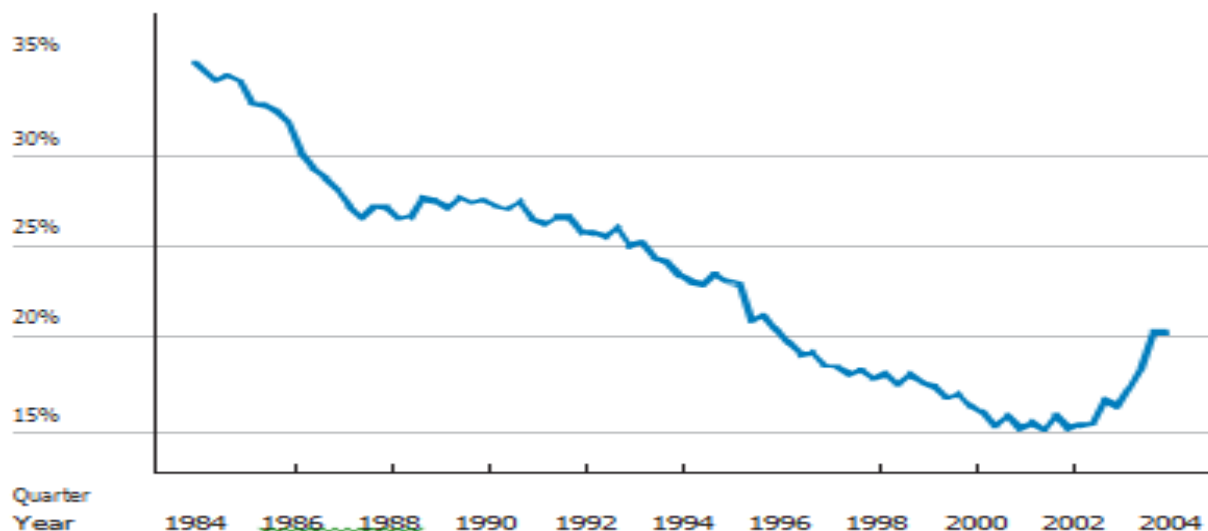
In 1986, Jensen expanded on Easterbrook's explanation and presented a more detailed account of the disciplinary role of dividend payments in managing corporate organizations. Jensen argued that dividend payouts enhance the value of mature companies that generate cash by

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curbing management's inclination to invest excess capital in low-return projects. Similar to stock repurchases and substantial debt financing, high dividend payouts help management prioritize profitability and value maximization, discouraging them from pursuing growth at any cost. In fact, Jensen even advocated that mature companies with limited growth prospects should commit to distributing all of their "free cash flow," which refers to non-operational cash that cannot be reinvested in the firm profitably (Julio & Ikenberry, 2004, p. 89).

Jensen's influential "free cash flow theory" not only provided a compelling explanation for dividends but also shed light on the leveraged buyouts (LBOs) and other transactions involving high levels of debt that characterized the 1980s. During the 1990s, corporations in America continued to distribute substantial amounts of capital to shareholders, but there was a notable shift from dividends to stock repurchases as the preferred method. In fact, the growth of dividends during the 1990s was rather lackluster, and the prevalence of stock buybacks overshadowed dividends to such an extent that Fama and French conducted a study in 2001 titled "Disappearing Dividends". The study by Fama and French, consistent with its title, highlighted the declining presence of dividends. Figures 11, which aligns with their findings, illustrates that from 1984 to 1999 (the final year covered by their study), the proportion of U.S. industrial companies (excluding financial and utility sectors) that paid cash dividends dropped from 32% to 16%. A significant portion of this decline occurred during the last five years of the century, suggesting a substantial decrease in the prevalence of dividend payments (Julio & Ikenberry, 2004, p. 89).

Figure 11: Percentage of Dividend-Paying Firms among US Industrials, 1984-2004



Source: Julio & Ikenberry, 2004, p. 90

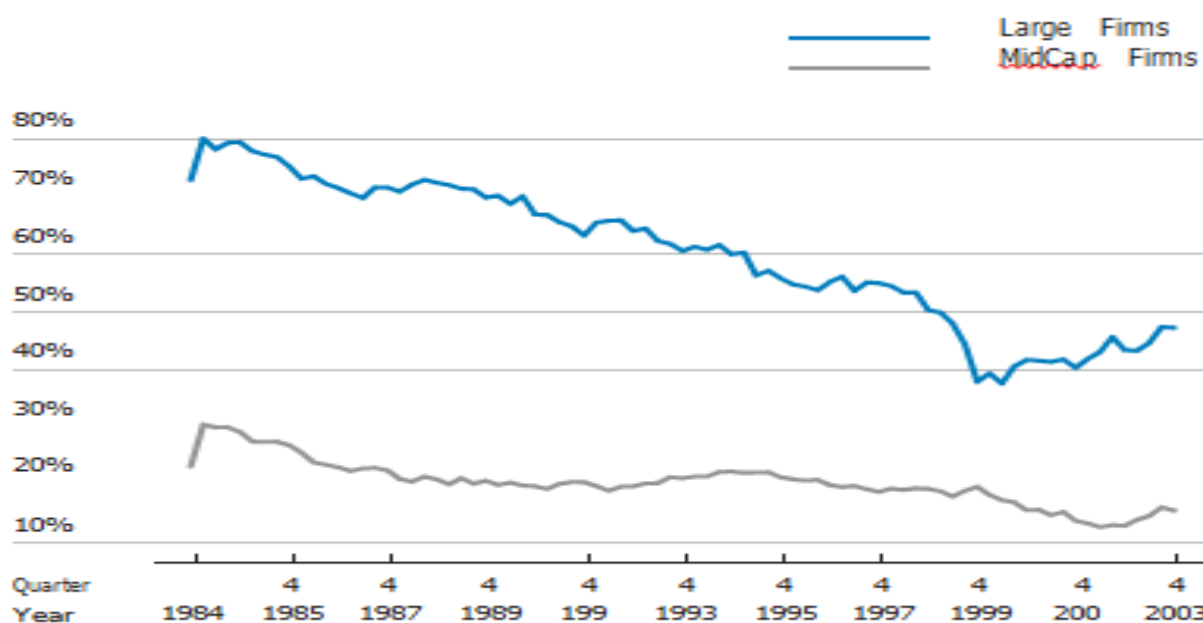
However, as indicated by the figure, there was a notable shift in the trend. After reaching a low point of 15% in 2001, the percentage of companies paying dividends began to rise again. By the end of the first quarter of 2004, which is the last available data point, over 20% of U.S. industrial companies were paying dividends. One factor contributing to the decline in the percentage of dividend-paying firms throughout the 1990s was the significant number of initial public offerings (IPOs) and the subsequent emergence of newer and riskier companies. It is widely recognized, both in theory and through casual observation that such firms are less inclined to pay dividends compared to larger, more established companies with stable cash

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flows and fewer growth opportunities. Therefore, the analysis initially focused on the behavior of larger companies. As depicted in Figure 12, among the 1,000 largest U.S. industrial firms, the proportion of dividend payers declined from 79% in 1984 to approximately 36% in 2000 (Julio & Ikenberry, 2004, p. 90).

However, by the first quarter of 2004, it had rebounded to 46%. The pattern observed for mid-cap stocks, representing the next largest 2,000 industrial firms, followed a similar trend but with a lower proportion of dividend payers. This aligns with the fact that mid-cap firms generally have greater growth opportunities as a percentage of their firm value and face more limited access to capital markets. Similar to larger companies, the percentage of mid-cap firms paying dividends also experienced a decline of about half between 1984 and 1999. Although the percentage of dividend payers among mid-cap stocks increased after 1999, the recovery came approximately two years later than the rebound observed among larger companies (Julio & Ikenberry, 2004, p. 90).

Figure 12: Percentage of Dividend-Paying Firms by Size, 1984-2004



Source: Julio & Ikenberry, 2004, p. 90

III.3 How should we measure payout policy

In the context of payout policy, the Miller and Modigliani framework defined it as the net payout to shareholders. However, empirical studies typically focused solely on dividends as a measure of payout, disregarding repurchases, net payout (which considers capital raising activities), and cash spent on mergers and acquisitions. To understand the aggregate cash payout by corporations relative to their earnings, it is necessary to consider aggregate measures. Table 3 presents one such measure: the combination of aggregate dividends and repurchases in relation to aggregate earnings. However, even this measure is incomplete. Additionally, shareholders receive cash payouts from corporations through mergers and acquisitions that involve cash transactions. In these cases, shareholders of acquired firms

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receive a cash payment, which can be seen as a liquidating or final dividend (Allen & Michaely, 2003, p. 354).

The measurement takes into consideration not only the funds flowing out from corporations to their shareholders but also the funds flowing in. Table 4, specifically columns 3 and 4, provides information on the amount of capital raised by USA corporations through SEOs (Seasoned Equity Offerings) and IPOs (Initial Public Offerings). In column 5, the net amount is presented, which is the cash from mergers and acquisitions minus the proceeds from IPOs and SEOs. These figures are substantial. When comparing Tables 3 and 4, it becomes evident that over the past decade, these amounts are comparable to the cash payments made through dividends and repurchases combined. Furthermore, let interest in assessing their impact on the overall aggregate payout (Allen & Michaely, 2003, p. 356).

Notably, in certain years, the aggregate payout exceeds after-tax earnings, indicating the significance of these factors in determining the overall payout. The aggregate payout can be defined as the complete cash transfer from the corporate sector to the private sector. This definition encompasses three components: dividends distributed to individual investors, repurchases of shares from individual investors, and the net cash generated from mergers and acquisitions, with the proceeds directed towards the private sector (Allen & Michaely, 2003, p. 356).

By employing the aforementioned definition and utilizing data from the IRS Statistics of Income and the Federal Reserve Flow of Funds publications, a rough estimation of the total payout to the private sector over the years is estimated. This calculation takes into account the combined value of dividends, repurchases, and cash generated from mergers and acquisitions. The approximation assumes that the proportional ownership of each group (individuals, corporations, and institutions) remains consistent across all firms in the economy. In Table 5, the percentage of shares held by individual investors is determined, using information extracted from Table L-312 of the Federal Reserve Flow of Funds. With this ratio, a rough estimation is led that the portion of repurchased shares and net cash from mergers and acquisitions that were received by the private sector (Allen & Michaely, 2003, p. 356).

For instance, in 1995, the private sector received \$94 billion in dividends (as indicated in Table 5), \$82 billion from cash M&A activity (calculated by multiplying the 57.9% of shares owned by individuals with the \$143 billion of net cash from M&As from Tables 4 and 5), and approximately \$50 billion from repurchases (calculated by multiplying the 57.9% of shares owned by individuals with the \$72.3 billion of repurchases from Tables 3 and 5). It's worth noting that out of a total cash payment to the private sector of around \$219 billion, less than half is constituted by "formal" dividends. Table 6 presents the cash payout directed to the private sector, incorporating dividends, repurchases, and net cash from mergers and acquisitions, for different years. These aspects have not garnered significant attention in the existing literature. (Allen & Michaely, 2003, p. 356).

In the case of these firms, it becomes infeasible to establish a total payout ratio, a repurchase payout ratio, or a dividend payout ratio. The discussion brings forth several crucial points. Firstly, the central focus should not be on determining which measure is superior to others. Instead, considering the question attempted to address, as this question should guide the choice of payout definition. The definition of payout also holds significance in the realm of excess volatility literature. Ackert and Smith (1993), for instance, demonstrated that the outcomes of variance bound tests are influenced by how cash distributions to shareholders are

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measured. When they solely considered stated dividends, they discovered evidence of excess volatility. However, when their payout measure incorporated share repurchases and takeover distributions, they did not find evidence of excess volatility (Allen & Michaely, 2003, p. 357).

Table 4: Mergers and acquisitions and capital raising activities by USA corporations ^a

Year payout	(1) Total M&A Activity (\$mln) firms are (\$mln) the target)	(2) Cash mergers (where USA (\$mln))	(3) IPOs proceeds raising capital	(4) SEOs proceeds	(5) Net from M&A and (2-3-4)
1977	191.8	191.8	221	382	-412
1978	8882	8086	225	305	7556
1979	7993	7589	398	247	6944
1980	17570	10417	1387	10901	-1871
1981	86098	59725	3114	10958	45653
1982	53426	27080	1339	14743	10998
1983	82757	30539	12460	26071	-7992
1984	151709	94029	3868	6032	84129
1985	169156	151999	8477	16493	127029
1986	193620	167028	22251	20430	124347
1987	185730	158662	23982	16613	118067
1988	310895	289377	23806	5941	259630
1989	235759	194966	13706	9332	171928
1990	143402	109427	10122	8998	90307
1991	106659	66778	25138	33749	7890
1992	130264	75957	39620	31866	4471
1993	203545	113186	57423	48995	6768
1994	307047	183956	33728	27487	122741
1995	462829	228104	30207	54176	143721
1996	544484	306812	50000	71222	185590
1997	819663	390359	44226	75409	270724
1998	1392997	410619	43721	70886	296012
1999	1021026	543324	71327	100048	371949

^aThompson Financial Securities Data

Using data from SDC, Table 4 presents the magnitude of such payments. For each year the total dollar amount is calculated and that was paid to USA corporations in all cash M&A deals. (Note that this figure is a lower bound, since it does not account for deals in which payment was partially in cash and partially in stocks). The amount is not trivial and it does vary by year. This type of liquidating dividend seems to have a significant weight in the aggregate payout of USA corporations. For example, in 1999, proceeds from cash M&As

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were more than the combined cash distributed to shareholders through dividends and repurchases combined.

Source: Allen & Michaely, 2003, p. 355

Table 5: Cash dividends from the corporate to the private sector

Year	(1) ^a	(2) ^b	(3) ^c	(4) ^d	(5) ^e
1973	0.774	29.9	9.4	18.7(62%)	42%
1974	0.740	33.2	13.8	20.8(63%)	44%
1975	0.727	33	8.8	21.9(66%)	45%
1976	0.741	39	11.9	24.5(63%)	46%
1977	0.718	44.8	13.9	27.8(62%)	47%
1978	0.696	50.8	13.3	30.2(59%)	50%
1979	0.708	57.7	16.8	33.5(58%)	53%
1980	0.710	64.1	18.6	43.6(68%)	54%
1981	0.690	73.8	17.4	48.1(65%)	52%
1982	0.653	76.2	18.15	52.1(68%)	55%
1983	0.624	83.6	19.7	48.6(58%)	56%
1984	0.600	91.0	21.2	48.6(53%)	57%
1985	0.572	97.7	16.9	55.0(56%)	58%
1986	0.592	106.3	15.1	61.6(58%)	61%
1987	0.578	112.2	13.8	66.8(59%)	57%
1988	0.617	129.6	15.1	77.3(60%)	64%
1989	0.612	155	15.4	81.3(52%)	66%
1990	0.617	165.6	13.4	80.2(48%)	66%
1991	0.630	178.5	13.1	77.3(43%)	66%
1992	0.620	185.5	13.1	77.9(42%)	67%
1993	0.611	203.2	13.6	79.7(39%)	65%
1994	0.585	234.9	13.2	82.4(35%)	66%
1995	0.579	254.2	22.8	94.6(37%)	71%
1996	0.543	297.7	16.3	104.2(35%)	73%
1997	0.513	333.7	NA	NA	NA
1998	0.485	348.6	NA	NA	NA
1999	0.495	364.7	NA	NA	NA

^aShare of corporate equity owned by individuals. Authors' calculation with data on market value of domestic corporations and the holding (at market value) of households, personal trust and estates. Source: Table L.213 from the Federal Reserve statistical release, Flow of Funds Accounts of the United States, March 2000.

^bTotal dividends paid by US corporations(\$bln).From the Federal Reserve, Flow of Funds Accounts of the United States,Tablef.7,March2000.

^cDividends received by corporations. Including only dividends received from domestic corporations. Internal Revenue Service, SOI Bulletin, Corporations return,Table2, various years.

^dDividends received by individuals (%of total div).Internal Revenue Service, SOI Bulletin, Individuals Tax Returns, Table1.2,various years.

^eDividends received by individual with an adjusted gross income of over \$50000 relative to dividends received by all individual investors. Source: Internal Revenue Service, SOI Bulletin, Individuals Tax Returns, Table 1.4, various years.

Source: Allen & Michaely, 2003, p. 348

the current state of the literature, with a greater emphasis and allocation of space to dividends compared to other forms of payouts (Allen & Michaely, 2003, p. 357).

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Introducing the net total payout to investors is likely to introduce some variability into cash flows while potentially reducing the disparity between cash flow volatility and price volatility. This area warrants further research. Secondly, it is evident that a majority of the finance literature has predominantly examined the payout policy question using a narrow definition focused solely on dividend payout. Some studies have endeavored to analyze repurchase payout, but apart from a few exceptions, the literature has not extensively covered the topic of total payout, its composition, and determinants. This gap in research is understandable given that dividends have historically been the dominant form of payout. However, the landscape has changed, and it is no longer the case. Consequently, the review article primarily reflects

Table 6: Net total payout to individual investors

Year	(2) ^a	(3) ^b	(4) ^c	(5) ^d	(6) ^e	(7) ^f	(8) ^g
1977	0.718	-412	-296	3566	2560	27800	30065
1978	0.696	7556	5259	4256	2962	30200	38421
1979	0.708	6944	4916	5421	3838	33500	42254
1980	0.71	-1871	-1328	5689	4039	43600	46311
1981	0.69	45653	31501	6262	4321	48100	83921
1982	0.653	10998	7182	9593	6264	52100	65546
1983	0.624	-7992	-4987	8899	5553	48600	49166
1984	0.6	84129	50477	27971	16783	48600	115860
1985	0.572	127029	72661	33136	18954	55000	146614
1986	0.592	124347	73613	35707	21139	61600	156352
1987	0.578	118067	68243	52041	30080	66800	165122
1988	0.617	259630	160192	48765	30088	77300	267580
1989	0.612	171928	105220	54949	33629	81300	220149
1990	0.617	90307	55719	46275	28552	80200	164471
1991	0.63	7890	4971	22962	14466	77300	96737
1992	0.62	4471	2772	33289	20639	77900	101311
1993	0.611	6768	4135	36334	22200	79700	106035
1994	0.585	122741	71803	46503	27204	82400	181408
1995	0.579	143721	83214	72330	41879	94600	219694
1996	0.543	185590	100775	101808	55282	104200	260257
1997	0.513	270724	138881	143842	73791	NA	NA
1998	0.485	296012	143566	175488	85112	NA	NA
1999	0.495	371949	184115	202000	99990	NA	NA

^a Portion held by individuals (fromTable5).

^b Net payout from M&A and raising capital(fromTable4).

^cNet M&A payout to individual investors (column 2 column3).

^dAmount repurchased (Table3).

^eAmount repurchased from individual investors(column2 column5).

^fDividends received by individuals(fromTable5).

^gNet total payout to individual investors(columns4+6+7).

Source: Allen & Michaely, 2003, p. 357

Another intriguing aspect is to examine payout, its components, and the relationship between payout and earnings at the individual firm level. For instance, it would be valuable to explore the characteristics of firms that provide liquidating dividends to their shareholders and how

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such dividends correspond to other forms of payout. Investigating the interplay between overall payout, dividends, and the recent increase in repurchases would also necessitate insights into the payout policies of individual firms. However, defining payout ratios relative to earnings at the firm level poses an additional challenge, particularly for a considerable portion of companies that have negative earnings (Allen & Michaely, 2003, p. 356).

Conclusion of the chapter

The foundational theories of dividend policy, namely Lintner's Model (1956), Gordon's Model (1956), and Modigliani and Miller's irrelevance theory (1961), present key perspectives that continue to shape the field of corporate finance. Lintner's model underscores the stability of dividend payouts, illustrating that firms are conservative in adjusting their dividends, with a preference for steady, predictable distributions to shareholders. This model reveals that firms only increase dividends when they experience a sustainable increase in earnings, aiming to avoid signaling financial instability to the market.

Gordon's Model further emphasizes the significance of dividends in firm valuation, proposing that investors generally favor a certain and consistent dividend stream, which can enhance a firm's appeal and perceived stability. This stands in contrast to the Modigliani and Miller (1961) irrelevance theory, which posits that, in a perfect market, dividend policy has no effect on the firm's intrinsic value. According to Modigliani and Miller, a firm's value is determined by its investment decisions and profitability rather than by the method through which it distributes cash to shareholders. Their theory suggests that retained earnings, if reinvested effectively, can generate higher value than immediate cash distribution. Thus, in the context of an efficient market, shareholders should remain indifferent to dividends, as they can replicate dividend effects by selling shares if needed.

Dividends and share repurchases represent two primary mechanisms for returning capital to shareholders, each with distinct financial and signaling implications. Dividends offer regular cash payments, often on a quarterly basis, signifying a stable cash flow and management's commitment to shareholder returns. Conversely, share repurchases reduce the total outstanding shares, potentially enhancing per-share value and signaling management's confidence in the firm's undervalued stock. In some markets, repurchases offer tax advantages over dividends, which may appeal to shareholders seeking tax efficiency.

To evaluate dividend policies, financial analysts utilize several key metrics, such as the dividend payout ratio, dividend yield, and dividend growth rate. These metrics help assess not only the consistency and sustainability of a company's dividend policy but also the company's broader financial health, growth potential, and level of risk. Although Modigliani and Miller argue for dividend irrelevance under ideal conditions, the practical reality shows that dividend policy holds significant weight in investor decision-making. Empirical analysis of dividends and share repurchases thus remains critical to understanding market perceptions of firm value, helping to inform investment choices and indicating the firm's stability and growth prospects. Together, these theories and evaluative metrics provide a robust framework for understanding the implications of dividend policy on firm valuation and shareholder wealth.

CHAPTER 2:
DETERMINANTS OF
PAYOUT POLICY IN
IMPERFECT MARKET

Chapter II: Determinants of payout policy in imperfect market

Introduction of the chapter

Miller and Modigliani (1961) established a foundational principle in corporate finance by asserting that, within a perfect and complete capital market, a firm's payout policy does not influence its overall value, given a set of underlying assumptions. Grasping the implications of their proposition is essential for understanding how deviations from these assumptions can render payout policy relevant, thereby impacting firm value. Their proposition of irrelevance generally holds true only under idealized conditions typical of perfect and complete markets. However, when any of the assumptions inherent to their model are violated, the relevance of payout policy emerges, potentially influencing the valuation of a firm. These assumptions include a tax-free environment, symmetric information among market participants, the possibility of complete contracts, the absence of transaction or issuance costs, competitive product and financial markets, and the rational behavior of both investors and managers. In practice, it is evident that these assumptions are seldom fully realized.

In real-world scenarios, the first assumption regarding taxation directly challenges the concept of perfect capital markets. Both dividends and capital gains are subject to taxation, with varying tax rates that can distort investor preferences. The second assumption of symmetric information rarely holds, as insiders and managers typically possess more information than other market participants, leading to significant issues of information asymmetry. The third assumption concerning complete contracts is often unattainable, resulting in conflicts of interest that may arise between agents and principals. These conflicts can manifest in various forms, including tensions between management and external equity holders, disparities among large and small shareholders, and conflicts between shareholders and debt holders. Such agency issues can significantly influence payout policy, thereby affecting firm value. The fourth assumption posits the absence of transaction costs, which further complicates Miller and Modigliani's irrelevance proposition; the presence of transaction costs can affect investors' preferences regarding cash flow distributions, while issuance costs can create a gap between gross and net payout policies. Lastly, the fifth assumption underscores the necessity of competitive capital and product markets within the framework of perfect and complete capital markets.

The chapter is structured into three distinct sections. Section 1 addresses various theories of the impact of taxation on payout policy. Section 2 explores the ramifications of asymmetric information and agency relationships as they pertain to dividend decisions. The third section presents empirical evidence related to payout policy, providing a comprehensive examination of how these theories manifest in real-world contexts.

I. Payout policy and taxes

Large studies have made a sharper focus on how the taxation of dividends and capital gains affects corporate payout policy, as well as the impact of taxation on valuation. The basic literature and academic work devoted to this issue in the economics, finance, accounting, and tax literatures suggest that, given that investors value after-tax cash flows, dividend taxation should be of first-order importance. However, a survey undertaken by Brav et al. (2005) reveals that most CFOs say that tax considerations matter, but are not a dominant factor, in their decisions about whether to pay or increase dividends, or in the choice between paying out via share repurchases or dividends. The results of empirical evidence likewise indicated that differential taxes are a second-order concern for corporate executives (Farre-Mensa, Michaely, & Schmalz, 2014, p. 94).

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In his famous “dividend puzzle” article, Black (1976) argued that if in frictionless model and an immediately taxable payout policy is irrelevant, investors are always better off under a policy of cash retention generating unrealized capital gains. In the same token of the puzzle Feldstein and Green (1983) concluded with a question on “Why do corporations not eliminate (or sharply reduce) their dividends and increase their retained earnings?” since then early universal policy of paying substantial dividends is not consistent with taxation (DeAngelo, DeAngelo, & Skinner, 2008, p. 222).

The 2003 dividend tax cut in the US revealed significant effects on the amount of dividends and the proportion of dividend payers (Chetty and Saez (2005) and Brown et al. (2007)). Nonetheless, according to Blouin et al. (2011)’ findings, the increment of dividend in the three months immediately after this reform is linked to solely 17 firms who paid special dividends. Firms are expected to postpone dividends, when they are taxed, until the present value of payout taxes are zero, or opt for share repurchases when capital gains taxes are lower than the taxes on dividends (e.g., DeAngelo et al., 2008) (Alzahrani & Lasfer, 2012, p. 747).

An empirical study examined the combined impact of changes in investor composition and shareholder distributions following a 2003 reduction in dividend and capital gains tax rates for individuals. Our analysis reveals that directors and officers adjusted their portfolios to optimize after-tax returns under the revised tax rules, whereas other individual investors did not show significant changes in behavior. Additionally, we find that firms adjusted their distribution policies, specifically choosing between dividends and share repurchases, in a manner consistent with the altered tax incentives for individual investors. The study represented the first attempt to use simultaneous equations to estimate both shareholder and managerial responses to the 2003 tax rate reductions. The findings, using the generalized method of moments (GMM) estimates, demonstrate stronger results compared to ordinary least squares (OLS) estimates. This supports the hypothesis that investor and manager responses are interconnected and jointly determined. The failure of prior studies to account for simultaneous equations may explain some of the inconsistent and weak results observed in research on the 2003 tax rate reductions (Blouin, Raedy, & Shackelford, 2011, p. 887).

Brav et al. (2008) found that this reform led to temporarily surging of dividend; meanwhile, even aggregate repurchases also increased which is inconsistent with the tax effect. Their survey suggested that this reform had only a second-order influence on dividends. To overcome these drawbacks, some economists focus on cross-country differences on tax systems. Eije and Megginson, (2008) asserted that the tax differential ratio is positive and significant in determining the probability of paying dividend, but negative and significant in determining the amount of dividends; while Denis and Osobov, (2008) argue that cross-country studies ignore tax effects. In a study based on dividing countries into four groups, relying on dividend tax system and the corruption index, Pinkowitz et al. (2006) found that market value and cash holding, are independent of the tax effect. In countries with poor investor protection where dividends are tax disadvantaged, they may contribute to market value (Alzahrani & Lasfer, 2012, p. 748).

A study analyzed the trends in cash dividends and share repurchases across 15 European Union nations from 1989 to 2005, focusing on countries that were members before May 2004. Similar to the United States, the observation showed a decline in the proportion of European firms paying dividends, accompanied by an overall increase in real dividends paid and a notable rise in share repurchases. Additionally, the study found a positive association between financial reporting frequency and higher payout levels. Furthermore, privatized companies

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contribute nearly one-quarter of the total cash distributed through dividends and share repurchases. Regression analyses indicated that increasing fractions of retained earnings relative to equity do not significantly raise the likelihood of cash payouts, whereas the age of the company does have a positive effect (Eije & Megginson, 2008, p. 347).

DeAngelo and DeAngelo (2006) raised important questions about the impact of taxes on payout decisions. According to basic Modigliani-Miller (MM) intuition, when a firm forgoes immediate payout, investors should experience an equivalent increase in capital appreciation. Consequently, if immediate payouts are subject to taxation while unrealized capital appreciation is not, maximizing stockholder wealth would seemingly require firms to minimize taxable payouts, as Black (1976) suggests. This logic was applied not only to a specific period but also to infinite-horizon models, implying that firms have incentives to avoid all payouts permanently. However, Black's argument fails for two significant reasons. First, it assumes a property that holds true in a tax-free world, where each dollar of foregone dividends generates an immediate dollar of capital appreciation. This assumption no longer holds when payouts are taxed, as demonstrated by Auerbach (1979) and Bradford (1981) in their "tax capitalization" models. In these models, the dollar-for-dollar trade-off between payouts and capital gains breaks down because retained cash within the firm cannot be distributed without incurring personal tax liabilities. The present value of these tax liabilities remains independent of the timing of the firm's payouts, thereby reducing the market value of equity only by the after-tax value of the foregone dividend (DeAngelo, DeAngelo, & Skinner, 2008, p. 224).

To summarize, the work of DeAngelo and DeAngelo (2006) shed light on the intricate impact of taxes on the relationship between payouts, capital appreciation, and maximizing stockholder wealth. The assumption of a one-to-one trade-off between payouts and capital gains loses validity when taxation is considered, as demonstrated by tax capitalization models. Additionally, Black's argument overlooks a crucial aspect: in a rational expectations framework, investors derive value from owning corporate securities based on their reasonable expectation of cash distributions from the firm to the owners of those securities. This remains true regardless of whether or not those payouts are subject to taxation, as discussed by DeAngelo and DeAngelo (2006). Unless the government permits widespread tax evasion on payouts, which would essentially recreate a tax-free environment, investors cannot receive distributions from firms without paying taxes on those distributions (DeAngelo, DeAngelo, & Skinner, 2008, p. 224).

In practical scenarios, the first assumption regarding taxation challenges the notion of perfect capital markets. Both dividends and capital gains are subject to taxation, and tax rates can vary over time, introducing discrepancies. The second assumption of symmetric information among market participants is rarely valid. In reality, insiders and managers possess more information than other participants, leading to asymmetric information issues. The third assumption of complete contracts is seldom achieved, resulting in conflicts of interest between agents and principals. These conflicts can arise between managers and outside equity holders, among large and small shareholders, or between shareholders and debt holders. Such conflicts can impact payout policy and consequently affect firm value. The fourth assumption, which assumes no transaction costs, has implications for Miller & Modigliani's (1961) irrelevance proposition. Transaction costs can influence investors' preference for specific cash flow streams, and the presence of issuance costs creates a disparity between payout policy and net payout policy. Last, the fifth assumption highlights the importance of competitive capital

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and product markets within the perfect and complete capital markets framework (Farre-Mensa, Michaely, & Schmalz, 2014, p. 94).

I.1 Impact of Dividend Taxation on Stock Prices and Returns

To study the impact of dividend taxation on both firm's valuation and returns as well, two distinct settings have been used, namely capital asset pricing model (CAPM)-based studies and ex dividend- day studies. First, on the theory side of the CAPM studies, Brennan (1970) is credited with developing the initial after-tax version of the Capital Asset Pricing Model (CAPM). Building on Brennan's work, Litzenberger and Ramaswamy (1979, 1980) further expanded the model to incorporate constraints related to borrowing and short-selling. In both cases, the fundamental finding is that, at a given level of risk, the compensation for a higher dividend yield is positively correlated with the difference in tax treatment between dividends and capital gains. Empirically, several researchers have examined the impact of dividend yield on returns within the framework of the CAPM. Notable studies in this area included the works of Black and Scholes (1974), Miller and Scholes (1982), as well as Litzenberger and Ramaswamy (1979, 1980). However, the empirical findings in this field are varied, yielding mixed results (Farre-Mensa, Michaely, & Schmalz, 2014, p. 95).

Brennan (1970) proposed the Capital Asset Pricing Model (CAPM), which asserted that the pretax excess return of a security is linearly and positively associated with its systematic risk and dividend yield.

Formally:

$$E(r_{it} - r_{ft}) = a_1 + a_2\beta_{it} + a_3(d_{it} - r_{ft}) \quad (28)$$

Where

r_{it} is the rate of return on stock i during period t ,

β_{it} is its systematic risk,

d_{it} is the dividend yield,

and r_{ft} is the risk-free rate of interest during period t .

A significantly positive coefficient (a_3) is considered indicative of a tax effect. The Brennan model has been subject to two influential tests: Black and Scholes (1974) and Litzenberger and Ramaswamy (1979). Interestingly, these tests yield seemingly conflicting results. Black and Scholes did not find any evidence of a tax effect, whereas Litzenberger and Ramaswamy discovered evidence that aligns with the tax hypothesis (Kalay & Lemmon, 2008, p. 11).

Brennan (1970) introduced the first after-tax version of the Capital Asset Pricing Model (CAPM). Building upon Brennan's model, Litzenberger and Ramaswamy (1979, 1980) expanded it to include considerations for borrowing and short-selling constraints. In both instances, the fundamental finding suggested that, at a given level of risk, the compensation for a higher dividend yield is positively associated with the difference in tax treatment between dividends and capital gains.

Formally,

$$E(R_{it} - R_{ft}) = a_1 + a_2b_{it} + a_3(d_{it} - R_{ft}) \quad (29)$$

Equation (29) presents the equilibrium relationship between a security's expected return ($E(R_{it})$), expected dividend yield (d_{it}), and systematic risk (b_{it}). A significantly positive coefficient (a_3) in this equation is interpreted as evidence of a tax effect. This implies that two stocks with the same risk exposure (same beta) will have the same expected return only if

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they possess the same dividend yield. However, if there is a difference in dividend yield, the stock with the higher dividend yield will have a higher expected return to compensate for the increased tax burden associated with dividends. Numerous researchers have examined this relationship, including Black and Scholes (1974), Blume (1980), Morgan (1982), Poterba and Summers (1984), Keim (1985), Rosenberg and Marathe (1979), Miller and Scholes (1982), Chen, Grundy, and Stambaugh (1990), and Kalay and Michaely (2000). However, the empirical findings from these studies are mixed. Some studies reported a positive coefficient for the yield, which they attribute to differential taxes. One of the earliest and most influential tests was conducted by Black and Scholes (1974). Using annual data and a slightly modified version of Equation (29), they examined the tax effect hypothesis (Allen & Michaely, 2003, p. 364):

$$\tilde{R}_i = g_0 + [\tilde{R}_m - g_0]b_i + g_1(d_i - d_m)/d_m + e_i, i = 1, \dots, N, \quad (30)$$

where

$\tilde{R}_i$ = the rate of return on the i_{th} portfolio;

g_0 = an intercept term that should be equal to the risk-free rate,

R_f , based on the CAPM;

$\tilde{R}_m$ = the rate of return on the market portfolio;

b_i = the systematic risk of the i_{th} portfolio;

g_1 = the dividend impact coefficient;

d_i = the dividend yield on the i_{th} portfolio, which is measured as the sum of dividends paid during the previous year divided by the end-of-year stock price;

d_m = the dividend yield on the market portfolio measured over the prior 12 months;

e_i = the error term.

In order to test the Brennan model, Black and Scholes constructed portfolios of stocks based on a long-term estimation of the dividend yield. This estimation is calculated by dividing the dividends paid in the previous year by the end-of-year share price. Stocks with a higher estimated dividend yield are categorized as having a greater expected yield for the upcoming year. However, Black and Scholes's analysis revealed no discernible discrepancy in pretax risk-adjusted returns between stocks with high and low dividend yields. Additionally, they found no disparity in after-tax risk-adjusted returns associated with the dividend yield. Based on these findings, they recommend that investors disregard dividends when forming portfolios (Kalay & Lemmon, 2008, p. 12).

Litzenberger and Ramaswamy (1979, 1980) conducted a study that resulted in a positive and statistically significant yield coefficient, which they interpreted as supporting Brennan's (1970) after-tax CAPM. This interpretation suggested the presence of a dividend tax effect. However, isolating the specific impact of dividend taxes in such a setting proves challenging. Miller and Scholes (1982) raised concerns regarding the interpretation and findings of Litzenberger and Ramaswamy. They argued that information effects could influence the positive yield coefficient, making it difficult to attribute it solely to differential taxes (Farre-Mensa, Michaely, & Schmalz, 2014, p. 95).

Furthermore, Miller and Scholes demonstrated that when they adjusted the sample to include only dividends declared in advance, the yield coefficient became statistically insignificant. In response to these criticisms, Litzenberger and Ramaswamy (1982) constructed a dividend yield variable that incorporated only information available to investors at the time. They found that the yield coefficient remained positive and significant. However, Miller and

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Scholes remained unconvinced by these findings (Farre-Mensa, Michaely, & Schmalz, 2014, p. 95).

A study examined that the most rigorous empirical methods fail to demonstrate any significant difference in expected returns between high-yield and low-yield common stocks, both pre- and post-tax. For a taxable investor heavily invested in low-yield securities, data analysis does not reveal whether such a concentration increases or decreases expected after-tax returns. Similarly, a tax-exempt investor favoring high-yield securities cannot discern from available data whether this choice enhances or diminishes expected returns. The research argued that the most effective approach to evaluate the impact of dividend policy on stock prices is to examine the relationship between dividend yield and stock returns. Therefore, the inability of current methods to determine how dividend yield influences stock returns implies a corresponding uncertainty about the potential impact of a dividend policy change on a corporation's stock price (Black & Scholes, 1974, p. 1).

To address the informational concern, Kalay and Michaely (2000) conducted an experiment based on Litzenberger and Ramaswamy's (1982) approach, using weekly data and excluding weeks that included both the dividend announcement day and ex-dividend day. Surprisingly, they found a positive and statistically significant yield coefficient, suggesting that information alone may not explain Litzenberger and Ramaswamy's earlier findings. However, they also discovered that the positive yield coefficient primarily arose from time-series variation rather than cross-sectional variation among stocks with different yields. This observation indicates that the return variation occurs between ex-dividend weeks and non-ex-dividend weeks (Farre-Mensa, Michaely, & Schmalz, 2014, p. 95).

These results are inconsistent with the tax interpretation. Overall, the significance of dividend yield in asset pricing tests remains unclear. Various studies, such as Campbell and Shiller (1988), Cochrane (2011), Boudoukh et al. (2007), and Eaton and Paye (2014), have explored this issue. Furthermore, determining whether a significant dividend yield can be attributed to a tax effect is challenging, particularly due to the potential correlation between dividend yield and risk factors (as shown, for instance, by Chen, Grundy, and Stambaugh in 1990). For instance, Fama and French (1993) demonstrated that, when employing the three-factor model, there is no evidence of differing intercepts among portfolios with varying dividend yields. While many asset pricing tests utilize dividend yield to explain return variation, the focus is often not specifically on the tax effect. Therefore, the examination of this extensive branch of the literature is best reserved for another occasion, considering studies such as Campbell and Shiller (1988), Cochrane (1991), and Boudoukh et al. (2007) (Farre-Mensa, Michaely, & Schmalz, 2014, p. 95).

An analysis examined how different measures of payout yield, such as payout (dividends plus repurchases) and net payout (dividends plus repurchases minus issuances) yields, affect asset pricing models. The findings demonstrated both statistically and economically significant predictability in the time series when these measures are substituted for the traditional dividend yield. Moreover, the research established that payout (net payout) yields provide richer information about the expected stock returns across different stocks compared to dividend yields alone. Additionally, this analysis identified the high minus low payout yield portfolio as a factor that impacts asset pricing (Boudoukh, Michaely, Richardson, & Robe, 2007, p. 877).

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A study explored the relationship between dividend yield and expected return across different stocks, aiming to incorporate the impacts of varying risk measures and changing risk premiums. Risk for each stock is assessed based on sensitivities to two factors: a market factor and a factor representing fluctuations in risk premiums over time. After analyzing how dividends influence changes in risk measures, an investigation of whether dividends affect expected returns using four distinct methods was run, each imposing a different framework on the temporal dynamics of risk measures and risk premiums. Across all methods, the findings consistently indicated the absence of a robust cross-sectional relationship between dividend yield and risk-adjusted expected return (Chen, Grundy, & Stambaugh, 1990, p. S51).

An empirical study examined a dividend-ratio model where the logarithm of the dividend-price ratio for a stock is linearly related to optimally forecast future one-period real discount rates and future one-period growth rates of real dividends. If ex post discount rates are observable, this model can be empirically tested using vector autoregressive methods. To assess the validity of the model, four versions are examined using U.S. time series data spanning 1871–1986 and 1926–1986: one version assumes constant real discount rates, while the others derive discount rates from real interest rate data, aggregate real consumption data, and return variance data. Through these tests, the study aimed to determine the relative significance of real dividend growth, measured real discount rates, and residual factors in influencing the dividend-price ratio (Campbell & Shiller, 1988, p. 195).

Elton and Gruber (1970) conducted a study aiming to examine the relationship between marginal tax rates and dividend yield. They utilized ex-dividend date price data for their analysis. Their approach involved considering the decision-making process of investors who were planning to sell a stock around its ex-dividend date. They evaluated whether it was more advantageous to sell just before or just after the ex-dividend date. Selling before the ex-dividend date would result in a higher selling price, with the capital gain being subject to their marginal tax liability. Conversely, selling just after the ex-dividend date would involve receiving the dividend along with a lower price due to the dividend payment, and the tax liability would be based on their personal tax rate multiplied by the dividend amount (Allen & Michaely, 2003, p. 363).

This setting allowed for a direct comparison between the market valuation of after-tax dividend dollars and after-tax capital gains dollars. In equilibrium, stock prices needed to be set in a way that individuals' marginal tax liabilities were the same for both strategies. Under the assumptions of risk neutrality among investors and the absence of transaction costs, it is necessary to satisfy the following condition (Allen & Michaely, 2003, p. 363):

$$P_B - t_g(P_B - P_0) = P_A - t_g(P_A - P_0) + D(1 - t_d), \quad (31)$$

where

P_B = stock price cum-dividend (the last day the stock is traded with the dividend);

P_A = expected stock price on the ex-dividend day (the first day the stock is traded without the dividend);

P_0 = stock price at initial purchase;

D = dividend amount;

t_g = personal tax rate on capital gains;

t_d = personal tax rate on dividends.

In Equation (31), the left-hand side denotes the after-tax receipts that a seller would receive if they sold the stock while still entitled to the dividend (cum-dividend) after purchasing it

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initially at a price of P_0 . On the other hand, the right-hand side represents the expected net receipts from selling the stock on the ex-dividend day (Allen & Michaely, 2003, p. 363)

Rearranging,

$$(P_B - \bar{P}_A) / D = (1 - t_d) / (1 - t_g) \quad (32)$$

Therefore, in this context, the magnitude of the price decrease relative to the dividend payment is directly linked to the relative taxation of dividends and capital gains. If the taxes on dividends are higher (compared to capital gains), the premium (price drop) will be lower. This insight serves as the foundation for the literature on tax clienteles. The concept suggests that investors in lower tax brackets tend to hold stocks with higher dividend yields, while investors in higher tax brackets prefer stocks with lower dividend yields. As a result, the observed premium on the ex-dividend day reflects the characteristics of these clienteles. Stocks with higher dividend yields will exhibit higher premiums (a price drop closer to the amount of dividend paid) compared to stocks with lower dividend yields, reflecting the marginal tax bracket of the respective clientele. Elton and Gruber (1970) provide robust evidence supporting this effect (Farre-Mensa, Michaely, & Schmalz, 2014, p. 95).

Kalay (1982a) contends that in the absence of transaction costs, the elimination of profit opportunities implies an expected ex-dividend price drop that is equal to the dividend per share. However, there are certain limitations on the amount of short-term capital losses that individuals can offset against dividend income (approximately \$3,000 per year). Dealers, on the other hand, are not subject to these restrictions. Consequently, in the absence of transaction costs, short-term traders are expected to engage in trading activities as long as there is a difference between the expected ex-dividend price drop and the dividend per share (Kalay & Lemmon, 2008, p. 16).

However, it is important to note that the expected ex-dividend price drop does not necessarily have to be equal to the dividend per share. The involvement of corporations investing in other corporations plays a role in this regard. As stockholders, corporations are taxed on only 30% (recently increased from 15%) of the cash dividends they receive, while realized capital gains are taxed at the corporate income tax rate. Therefore, corporations have a preference for cash dividends. When there is equality between the expected ex-dividend price drop and the dividend per share, it presents profit opportunities for corporations. For example, if the stock price drops by \$2 on the ex-dividend day, the corporation pays tax on only 30% of the \$2 dividends it receives, while it can deduct the full \$2 capital loss. If the corporate tax rate is 34%, the after-tax dividend per share the corporation receives is \$1.796, while its after-tax capital losses per share amount to only \$1.32. This results in a net gain of 47.6 cents per share, representing a before-tax return on investment of approximately 1% per day, equivalent to an annual return of 1100% (Kalay & Lemmon, 2008, p. 16).

I.2 Static and Dynamic Tax Clienteles

Investors exhibit heterogeneity in terms of the relative taxation of dividends versus capital gains, leading to the existence of both static (buy and hold) and dynamic (trading around the ex-dividend day) clienteles. While there is robust, albeit mostly indirect, evidence of dynamic clienteles consisting of investors who engage in trading activities around the ex-dividend days, the exact identification of these traders remains challenging (Michaely & Vila, 1996). The observed increase in trading volume around the ex-day provides indirect evidence, but direct information about the specific traders involved is often lacking. The literature often

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attributes the buying before the ex-dividend day to corporations, which face lower taxes on dividends compared to capital gains, as well as institutions seeking to arbitrage the discrepancy between the expected price drop and the dividend amount (Farre-Mensa, Michaely, & Schmalz, 2014, p. 97).

To gain more direct insights into the identities of buyers and sellers before and after the ex-dividend day, a comprehensive database containing trader information would be necessary. Merely distinguishing between institutions and individuals would not suffice, as there are varying tax rates for dividends and capital gains within each group. Graham and Kumar (2006) take a step in this direction by examining the trading patterns of 60,000 individual accounts and suggest that investors in lower tax brackets tend to buy before the ex-dividend day. Similarly, Hietala (1990) found that individuals are the marginal sellers of stocks on ex-dividend days in Finland, which has a tax code similar to that of the United States. It is important to note that the vast majority of trades on the NYSE (more than 95%) are executed by institutions, which implies that individual trades may not provide the most crucial evidence in the context of dynamic trading around the ex-day (Farre-Mensa, Michaely, & Schmalz, 2014, p. 98).

A research examined the stock holdings and trading behaviors of over 60,000 households, revealing findings that support the existence of dividend clienteles. The analysis of retail investors' stock portfolios suggested a preference for dividend yield that correlates with age and income levels, aligning with age and tax-based clienteles respectively. Trading activities further substantiate these findings: Older investors with lower incomes exhibit a disproportionate tendency to buy stocks just before the ex-dividend date. Additionally, within the realm of small stocks, the extent of price drops on ex-dividend days diminishes with age and intensifies with income, consistent with clientele effects. Finally, in line with the behavioral "attention" hypothesis the older and lower-income investors tend to acquire stocks following dividend announcements (Graham & Kumar, 2006, p. 1305).

1.2.1 Static Model

First, let's consider the case where all investors are subject to the same tax rules, and the tax rate on dividend income is higher than the tax rate on capital gains income. In an otherwise perfect capital market, the optimal payout policy would be to refrain from paying dividends altogether. Equity holders would be better off receiving profits through share repurchases or selling their shares, as this would subject them to lower capital gains taxes instead of the higher taxes on dividends. However, many US corporations have not followed this optimal scenario. For a significant period, these firms have regularly paid dividends while rarely repurchasing their shares. This behavior appears puzzling, particularly if we assume that market agents behave rationally. The underlying assumption in this simplified static model is that dividends pose a substantial tax disadvantage for all investors since they are taxed heavily as ordinary income, whereas share repurchases are taxed lightly as capital gains (Allen & Michaely, 2003, p. 359).

Even if the statutory tax rates on dividends and capital gains were equal (although they have often differed historically), receiving unrealized capital gains would still be more advantageous from a tax perspective. The first reason is that capital gains can be postponed, allowing investors to delay the associated tax payment. This ability to postpone taxes can generate significant value. For instance, consider an investor with a marginal tax rate of 20% on long-term capital gains and an investment in a stock with an expected annual return of 15%. If the investor has \$1000, a ten-year investment horizon, and chooses to realize gains at

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the end of each year, their final wealth would be \$3106. However, if they wait and realize all gains at the end of the tenth year, their final wealth would be \$3436, a substantial difference. Secondly, investors have the flexibility to choose when to realize their capital gains, unlike dividends, which are received according to a predetermined schedule (Allen & Michaely, 2003, p. 360).

Constantinides (1984) demonstrated that investors should be willing to pay for the option to delay the realization of capital gains, labeling it the "tax timing option." In reality, not all investors are subject to individual taxation. Financial institutions such as pension funds and endowments are often tax-exempt and have no preference between capital gains and dividends. On the other hand, individuals and corporations hold stocks directly or indirectly. Corporations, for example, hold dividend-paying stocks as a form of near-cash assets and investments. Under the US tax code, a significant portion of intercorporate dividends are exempt from taxation, while intercorporate interest payments are not. Previously, only 15% of dividends, deemed taxable income, were taxed, resulting in an effective tax rate on dividends received of 0.15×0.46 (marginal corporate tax rate) = 6.9%. However, corporations had to pay the full amount of taxes on any realized capital gains. Under the current tax code, 30% of dividends are taxed (Allen & Michaely, 2003, p. 360).

The tax law offers investors a strategic timing option: they can choose to realize capital losses while deferring capital gains. Given that long-term gains and losses are taxed at approximately half the rate of short-term gains, another timing opportunity arises: investors can opt to realize losses in the short term and gains in the long term, if they choose to realize gains at all. A theory and simulations conducted over the period from 1962 to 1977 demonstrate that taxable investors should consider realizing long-term gains in stocks with high volatility. They can then repurchase the stock to potentially realize losses in the short term in the future. While tax-motivated trading does not provide a satisfactory explanation for the small-firm anomaly, it does predict a seasonal pattern in trading volume. This pattern corresponds to a seasonal trend in stock prices known as the January anomaly. This prediction holds true only if investors are assumed to be irrational or unaware of the seasonal price fluctuations (Constantinides, 1984, p. 65).

I.2.2 Dynamic Model

Theoretical analysis of stock price behavior around the ex-dividend day focuses on comparing the expected price drop to the dividend per share. In a perfect capital market with complete certainty, the stock price drop should be equal to the dividend per share. Any deviation from this behavior would create potential arbitrage opportunities. If the price drop is smaller or larger than the dividend per share, it allows for profitable trades by buying on the cum-dividend day and selling short on the ex-dividend day (or vice versa). A similar analysis can be conducted when there is uncertainty, assuming that any additional risk during the ex-dividend period is not priced.

This assumption holds if the risk can be diversified or if investors are risk-neutral. In our analysis, we will assume that the required rate of return during the ex-dividend period is not different from any other day. Elton and Gruber (1970) developed a model to examine the conditions under which there are no profit opportunities around the ex-dividend day, considering the differential taxation of realized capital gains and dividend income. Let t_g represent the realized long-term capital gains tax rate, and t_d represent the tax rate on dividend income, with $t_g < t_d$. Denoting D as the dividend per share, P_b as the last cum-dividend stock price, and $E(P_a)$ as the expected ex-dividend stock price, we equate the after-

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tax returns from these two sources of income (Kalay & Lemmon, 2008, p. 14).

The recognition that investors can engage in dynamic trading strategies to minimize their tax liabilities has been an important development in the literature on taxes and dividends. Miller and Scholes (1978) were among the first to highlight this aspect, pointing out that various dynamic strategies could be employed to avoid taxes, and in a perfectly efficient capital market, all taxes could be circumvented. This observation leads us back to the scenario where dividend policy becomes irrelevant. However, in practice, the transaction costs associated with implementing these strategies appear to be prohibitively high, making them less empirically significant. One area where dynamic trading strategies appear to have greater empirical relevance is trading around the ex-dividend date. Several studies, starting with Kalay (1982a), have examined the implications of such strategies. In our analysis, we consider both approaches – the avoidance of taxes through dynamic strategies in perfect capital markets and the more specific focus on trading around the ex-date (Allen & Michaely, 2003, p. 368).

Miller and Scholes (1978) suggested an ingenious strategy for avoiding taxes. By borrowing and investing the proceeds with tax-free institutions, such as insurance companies or pension funds, investors could create an interest deduction that allowed them to avoid taxes. Since there were assets that were held to offset the borrowing, the position could be closed out at an appropriate point. Several other dynamic tax avoidance strategies were suggested by Stiglitz (1983). If individuals can easily “launder” dividends so they do not have to pay taxes on them, then essentially, we are back in a Miller and Modigliani world, and dividend policy is irrelevant. However, there is little evidence that investors are actually using this or other such strategies. Peterson, Peterson and Ang (1985) showed that individual investors’ marginal tax on dividend income has been about double the marginal tax rate they pay on capital gains income. This evidence does not support a widespread use of tax avoidance strategies of the type described by Miller and Scholes. Rather, it suggests that the transaction costs of such strategies are too high to be useful to investors (Allen & Michaely, 2003, p. 369).

The theoretical analysis of stock price behavior around the ex-dividend day compares the expected price drop to the dividend per share. In perfect capital markets, assuming complete certainty; the stock price drop should equal the dividend per share. Any other stock price behavior provides potential arbitrage opportunities. A smaller (larger) price drop provides arbitrage profits by buying (selling short) on the cum-dividend day and selling (covering) on the ex-dividend day. A similar analysis can be conducted in the presence of uncertainty if we assume that any excessive ex-dividend period risk is not priced. This is the case if the risk is diversifiable and/or investors are risk-neutral.¹⁰ We will continue our analysis assuming that the ex-dividend period required rate of return is not different from that of any other day (Kalay & Lemmon, 2008, p. 14).

Elton and Gruber (1970) model the conditions for no profit opportunities around the ex-dividend day in the presence of differential taxation of realized capital gains and dividend income. Denote the realized long-term capital gains tax rate as $t_g < t_d$, where t_d is the tax rate on dividend income. Let D be the dividend per share, P_b the last cum-dividend stock price, and $E(P_a)$ the expected ex-dividend stock price. Equating the after-tax returns from these two sources of income results in:

$$(1 - t_g)(P_b - E[P_a]) = (1 - t_d)D \quad (33)$$

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Elton and Gruber present empirical findings that demonstrate a smaller decrease in stock price on the ex-dividend day compared to the dividend amount per share. This evidence suggests that investors may exhibit a preference for capital gains due to tax implications. However, the tax code introduces additional complexity. According to Kalay (1982a), short-term capital gains are subject to ordinary income tax rates. Consequently, short-term traders can exploit the difference between the ex-dividend day price drop and the dividend per share. For instance, let's consider a scenario where the stock price before the ex-dividend day is \$50, the dividend per share is \$2, and the expected price drop on the ex-day is 70% of the dividend per share, amounting to \$1.4. A short-term investor can purchase the stock before the ex-dividend day and sell it on the ex-day. In this case, the investor incurs a capital loss of \$1.4 but receives \$2 in cash dividends, resulting in a net gain of 60 cents per share before taxes. This translates to a daily before-tax excess return of 1.2%, equivalent to an annual excess return of 1,873% (assuming 250 trading days per year) (Kalay & Lemmon, 2008, p. 15).

I.3 Tax changes effect

The aforementioned studies provide valuable insights into theories concerning the influence of taxes on payout policies. However, a more robust analysis of these effects can be achieved by studying tax shocks. Numerous studies have employed exogenous changes in the relative taxation of dividends and capital gains to examine the impact of taxation on ex-dividend-day prices and investor behavior. These studies adopted a more localized approach, focusing on specific periods rather than utilizing all available data over an extended timeframe. This approach helps mitigate confounding factors such as transaction costs and bid-ask spreads, enabling a more controlled experiment.

One early study conducted by Poterba and Summers (1984) examines the British market before and after tax changes. Their findings indicate a tax effect, as changes in the relative taxation of dividends and capital gains led to higher abnormal returns on the ex-dividend day. Another study by Barclay (1987) investigates the behavior of ex-dividend-day prices prior to the introduction of federal taxes in the United States in 1913 and compares it with the period from 1962 to 1985. Barclay discovers that the average premium was not significantly different from one before the enactment of federal taxes but significantly lower afterward. This suggests that the higher taxes imposed on dividends after 1913 caused investors to devalue their worth (Farre-Mensa, Michaely, & Schmalz, 2014, p. 99).

In Michaely's study conducted in 1991, the focus is on analyzing the impact of the Tax Reform Act (TRA) on the behavior of stock prices on the ex-dividend day. The TRA, implemented to remove preferential tax rates for long-term capital gains that were established in 1921, resulted in equal taxation of dividend income and realized capital gains. The study found that both before and after the TRA, the average premium of stock prices on the ex-dividend day was not significantly lower than one. When comparing these findings to earlier periods, Michaely (1991) suggests that the change in the relative pricing of dividends between the 1960s and the 1980s was not primarily influenced by taxes. Instead, it may be attributed to shifts in the relative importance of different trading groups. Factors such as reduced transaction costs and the availability of more accessible and cost-effective hedging instruments likely contributed to increased ex-day trading activities by corporations and arbitrageurs. As a result, the ex-dividend price behavior aligns with the marginal tax rates of these groups (Farre-Mensa, Michaely, & Schmalz, 2014, p. 99).

Citizens Utilities Company (CU), located in Stamford, CT, has two types of common stock: one that pays cash dividends and another that pays stock dividends. The prevailing belief was

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that, following the 1986 tax change, the price of cash dividend shares would raise compared to stock dividend shares if shareholders took dividend taxation into account. Surprisingly, our research reveals that the relative value of these two classes of shares did not experience a lasting impact due to the tax change. Although Hubbard and Michaely (1997) did notice a temporary pricing shift around the time of the tax reform, this effect was short-lived. The relative valuation before (1982-1984) and after (1987-1989) the tax change remained almost identical. To explain the observed valuation of the two types of stocks, two possibilities were considered: clientele effects and differences in liquidity. However, the investigation found that neither of these factors could adequately explain the relative pricing of the shares (Hubbard & Michaely, 1997, p. 117).

Hubbard and Michaely (1997) conducted a study examining the price dynamics of two classes of common stock in Citizens Utilities following the passage of the Tax Reform Act (TRA). The company had Series A and Series B stocks, which differed only in their dividend policies. Series A stock paid stock dividends, while Series B stock paid cash dividends. Therefore, the price ratio between these two stocks should reflect the relative taxation of dividends. The authors hypothesized that the price ratio would decrease after the TRA, as the advantage of receiving stock dividends diminished. They observed a significant decrease in the price ratio in 1986 compared to previous years. However, from 1987 to 1989, the price ratio increased and consistently remained above the dividend ratio. It was challenging to attribute this pattern solely to changes in differential taxes. In a more recent study by Graham, Michaely, and Roberts (2003), they investigated the price behavior surrounding the 1997 reduction in the capital gains tax rate from 28% to 20%. According to the tax hypothesis, a decrease in capital gains taxation relative to dividends should lead to reduced premiums (Farre-Mensa, Michaely, & Schmalz, 2014, p. 100).

By the end of January 2001, all NYSE stocks transitioned from using fractions (1/8s and 1/16s) to decimal price quotations. A study investigated how this change in price quotations impacted ex-dividend day activity. The findings revealed that abnormal ex-dividend day returns rose during the periods when stocks quoted in decimals and 1/16s, compared to the era of 1/8s. This trend contradicts explanations rooted in microstructure theories of ex-day price movements. Furthermore, the observation showed that abnormal returns increased following a reduction in the capital gains tax rate in May 1997, consistent with expectations if the relative taxation of dividends and capital gains influences ex-day pricing (Graham, Michaely, & Roberts, 2003, p. 2611).

Empirically, they found a reduction in the median premium from 0.89 in the year prior to the tax change to 0.75 in the years following the change. This reduction was statistically significant, economically substantial, and in line with the magnitude expected given the size of the capital gains tax rate reduction. Another significant change in the tax regime, particularly concerning relative taxation on dividends, is the Jobs and Growth Tax Relief Reconciliation Act (JGTRRA). The JGTRRA lowered the top tax rate on dividends and capital gains to 15%, effectively equalizing it with the tax rate on long-term capital gains (Brav et al., 2008b). Many of the studies reviewed below focus on the impact of the JGTRRA on the supply of dividends. The hypothesis that the act increased dividend supply is plausible since one of the primary objectives of the JGTRRA was to stimulate the economy by boosting investors' disposable income (Farre-Mensa, Michaely, & Schmalz, 2014, p. 100).

II. Asymmetric information and Agency relationships

Studies devoted to asymmetric information and payout policy examine whether unanticipated changes in dividends cause share prices to change in the same direction as the dividend change. Pettit (1972) found that the announcement of dividend conveys good news in the market, thus, share prices tend to rise; though, it decreases once dividends are cancelled. Aharony and Swary (1980) showed that dividends contain incremental information about firm value. Studies by Asquith and Mullins (1983), Healy and Palepu (1988), and Michaely, Thaler, and Womack (1995) examined initiations and omissions of dividends and found out that the market reactions to these events are dramatic, since the excess returns are about 3% following dividend initiations; meanwhile, those following dividend omissions are over -7%. Kalay and Lowenstein (1986) focused on the timing of the announcement of dividend; hence, early announcement conveys good news while delayed announcements are generally associated with bad news. Signaling evidences show the “costly” mechanism for signaling the firm’s future prospects (Kalay & Lemmon, 2008, p. 36).

The consensus of theories about signaling is recently violated and many studies established that firms that are more subject to information asymmetry are less likely to pay, initiate, or increase dividends, and disburse smaller amounts. Thus, the conclusion endorsed the negative relation between asymmetric information and dividend policy (Li & Zhao, 2008, p. 673). Li and Zhao (2007) studied some examples from IBES files during 1983 to 2003 including observations of 22413 firms. They found that firms that are more subject to information asymmetry are less likely to pay, initiate, or increase dividends, such firms therefore disburse smaller amounts. Their results depict a negative relation between asymmetric information and measures of dividend policy which is not consistent with the signaling theory of dividends (Okpara, 2010, p. 213).

II.1 Dividend-Signaling Model:

The signaling theories were developed until the late 1970’s and 1980’s and the best known are those of Bhattacharya (1979), Miller and Rock (1985) and John and Williams (1985). According to these theories, dividends convey information to the market about the firm’s profitability since managers are well informed about the firm’s true worth and prospects than do investors. The main common insight between these models is the positive relation between information asymmetry and dividend policy, thus, firms pay out so much of their earnings as dividends. The basic intuitive idea in all signal models is that firms adjust dividends to signal their prospects. A rise in dividends typically signals how good the firm is in the future; however, a decrease communicates bad performance of the firms (Allen & Michaely, 2003, p. 387).

Survey evidence led by Brav et al., (2005) indicated that eighty percent of executives believe that dividend decisions convey information to investors, as well as repurchases. Some managers believe that dividend payout and share repurchases convey information regarding the mean of the distribution of future earnings, while others believe that information conveyance primarily helps resolve uncertainty. These two alternatives are thought to transmit the majority of information to outsiders (Brav, Graham, Harvey, & Michaely, 2005, p. 512).

II.1.1 The model of Kalay (1980)

In 1980, Kalay introduced a dividend signaling model aiming to elucidate Lintner’s (1956) observation of managers’ reluctance to decrease dividend levels. This model adapts Ross’s (1977) framework to the dividend issue, implying that managers face penalties for attempting to send misleading signals. To construct his model, Kalay (1980) operated under specific

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assumptions. He posited a two-period framework where managers, possessing superior insights into future profitability, make decisions regarding dividends at the outset of the first period (denoted as t_0). Subsequently, at the conclusion of the first period (denoted as t_1), dividends are disbursed and the firm is liquidated. Furthermore, Kalay assumed that managers' compensation (denoted as M) hinged on two factors: the initial firm value at t_0 (denoted as V_0) and the cash flows generated by the end of the period (denoted as E_1). This compensation structure is presumed to follow the format (Kalay, 1980, p. 857):

$$M = (1+r) \gamma_0 V_0 + \gamma_1 E_1 \quad (34)$$

With,

γ_0 and γ_1 represent the nonnegative weight,
 r is the interest rate.

In addition, Kalay assumed that there are two types of firms, good firms (type A) and bad firms (type B) with respectively income E_a and E_b . When the announced dividend (D) surpasses a specific threshold (D^*), the market perceives the firm as highly profitable (type A). Consequently, the firm's value is estimated according to the following criteria (Kalay, 1980, p. 857):

$$V_0^A = \frac{E_a}{1+r} \quad (35)$$

If E_A represents the cash flows distributed as dividends by strong firms (type A), otherwise, the market will view the firm as unprofitable (type B), valuing it only at:

$$V_0^B = \frac{E_b}{1+r} \leq V_0^A \quad (36)$$

Let E_B denoted the cash flows paid as dividends by weak firms (type B). Assume a firm in the market, chosen randomly, has a probability (q) of being type A and a probability ($1-q$) of being type B, where only the manager knows the firm's type. The market assigns the same value V_0 to both types of firms under the condition that (Kalay, 1980, p. 857):

$$V_0 = \frac{qE_A}{1+r} + \frac{(1-q)E_B}{1+r} \quad (37)$$

$$V_0^A > V_0 > V_0^B$$

In establishing a signaling equilibrium, Kalay posits the need for an additional assumption concerning the executive's compensation structure. This assumption reflects that the manager is fully committed to avoiding any decision that decreases the dividend level. Conversely, attempting such a reduction incurs a penalty (c). Therefore, the compensation function, incorporating this cost (the penalty), takes the following form (Kalay, 1980, p. 858):

$$M = \gamma_0(1+r)V_0 + \gamma_1 \begin{cases} E_1 & , si E_1 > D_0 \\ E_1 - \frac{c}{\gamma_1} & , si E_1 < D_0 \end{cases} \quad (38)$$

With: D_0 the dividend announced on period t_0

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Considering this remuneration function, Kalay illustrates the presence of a "Spencian" signalling equilibrium where type A firms will select a dividend such that $E_b < D^* < E_a$, and the market will classify firms paying dividends below the optimal level $D_0 > D^*$ as type A, and those paying dividends above the optimal level $D_0 < D^*$ as type B.

The compensation scheme of the type A managers is as follows:

$$M^A = \begin{cases} \gamma_0 E_a + \gamma_1 E_a & , \text{ si } D^* < D_0^A < E_a \\ \gamma_0 E_b + \gamma_1 E_a & , \text{ si } D_0^B < D^* \end{cases}$$

As long as, $E_a > E_b$, we have $M^A(D_0^A < D^*) > M^A(D_0^A < D^*)$

In this scenario, managers of type A firms will select a dividend level, denoted as $D_0^A > D^*$, which exceeds a certain threshold. Similarly, the compensation structure for type B managers is designed as follows:

$$M^B = \begin{cases} \gamma_0 E_a + \gamma_1 E_b - c & , \text{ si } D_0^B < D^* < E_b \\ \gamma_0 E_b + \gamma_1 E_a & , \text{ si } D_0^B < E_b \end{cases} \quad (39)$$

The manager of type B firms who report accurately will decide based on whether the penalty exceeds the profits gained from sending false signals. To express it formally:

$$\gamma_0 E_b + \gamma_1 E_b > \gamma_0 E_a + \gamma_1 E_b - c \quad (40)$$

So we obtain:

$$c > \gamma_0 (E_a - E_b) \quad (41)$$

The available empirical evidence regarding the assertion of reluctance to cut dividends is inconclusive. In our study, we tested the hypothesis that observed dividend reductions are not voluntary managerial decisions but rather obligatory cuts due to an existing and binding dividend constraint. These reductions do not reflect managers' expectations of future earnings. Therefore, discovering a significant proportion of mandated reductions would question the informative value typically associated with dividend cuts. However, our findings indicated that only 5 percent of these reductions were mandatory. Consequently, we cannot dismiss the informational significance of dividend cuts. (Kalay, 1980, p. 863).

According to Kalay, the presence of this penalty and managers' reluctance to decrease dividends are crucial factors enabling the existence of a signaling equilibrium through dividends. Without assuming managerial aversion to reducing dividends, a signaling equilibrium using dividends cannot exist. Building on this model, Kalay proposed a testable version heavily influenced by Lintner's foundational model from 1956, aimed at examining managerial attitudes towards dividend cuts. To do this, Kalay analyzed 1248 instances of dividend variations across a randomly selected sample of 100 companies. Among these, he identified 197 reductions and categorized them into forced cuts due to cash shortages and voluntary cuts. Approximately 5% of the reductions were forced. This low percentage led him to retain the hypothesis that dividend reductions convey meaningful information, as it was insufficient to reject this hypothesis (Taleb, 2019, p. 4).

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The Kalay model (1980) is theoretically intriguing; however, it has limitations regarding signaling equilibrium. Leaders' signals adhere to Spence's (1974) conditions: the optimal dividend is sufficiently high to deter inferior firms from mimicking superior ones. Therefore, the penalty, which represents the signal's cost, must be significant to prevent less efficient firms from emitting false signals. Kalay (1980) also posits that managers' aversion to reducing dividends, as emphasized by Lintner in 1956, is essential for achieving signaling equilibrium in his model (Taleb, 2019, p. 5).

To assess this hypothesis, Kalay's signaling model, despite being developed under stringent assumptions, holds significant importance as it theoretically frames the concept of dividend signaling. However, in practical application, the model fails to adequately explain firms' dividend distribution behavior. It asserts that dividends signal information effectively only under severe penalties for managers reducing promised dividends. Furthermore, the model's limitations are apparent as it applies to a simplistic economy with two firms and two periods, and it relies on restrictive assumptions that do not capture the complexities of real-world scenarios. (Taleb, 2019, p. 5).

Other signaling models, such as the Bhattacharya (1979) model, similarly utilize dividends as a signal and aim to elucidate firm behavior amidst information asymmetry. These models have innovated by revising managerial objectives and integrating a more realistic economic framework into their foundational assumptions. (Taleb, 2019, p. 5).

II.1.2 Bhattacharya (1979):

Bhattacharya (1979) has assumed that existing shareholders of firms care about the market value "assigned" by outsiders and outsiders have imperfect information about firms' profitability. The model applies to a setting in which cash dividends are taxed at a higher rate than capital gain and planning horizon over which finite-lived investors have to realize their wealth is shorter than the time span over which the firms' assets generate cash flows (Bhattacharya, 1979, p. 260).

The model' assumptions (Bhattacharya, 1979, p. 261):

To preserve the simplicity of the model's structure, Bhattacharya (1979) has assumed:

- Assets owned by firms generate cash flows that are perpetual streams are intertemporally independently identically distributed.
- Existing shareholders have a single-period planning horizon.
- The firms have sufficient investment opportunities, so that all of the cash flows from existing assets can be rationally reinvested.
- If the cash flows generated by the project are insufficient to cover the announced dividend payments, then the firm must resort to costly outside financing.
- Communicating the even ex post cash flows from existing assets is costly, because dividends are taxed at a higher personal tax rate.

To lead dividend-signaling equilibrium, the assumption of "market conventions" is recommended. A firm ought to meet its dividend commitments without needing unexpected additional financing. Consequently, if the likelihood of X (possibly a measure of financial stability or cash flow predictability) being low forces the firm to maintain its dividend payments, it may incur costs. These costs could involve selling physical assets in secondary markets, or delaying (though not necessarily cancelling) investment or replacement projects that have a positive net present value. Similar costs might arise if the firm chooses to hold

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excess liquid assets that earn returns below the discount rate, or if it opts for unforeseen "bail-out" financing at an extra expense. If substituting cash-flow surpluses for initially planned external financing is expensive—whether due to the need to temporarily hold liquid assets or because cancelling planned external financing incurs costs—it will affect the firm's cost structure similarly. As we will explore, these "frictional" costs are crucial in establishing a viable signaling equilibrium (Bhattacharya, 1979, p. 262).

Description of the model:

To simplify the study the model is divided into two periods. The first period concerns asymmetric information between managers and shareholders. At time zero, the managers invest in a project which investors do not know the expected profitability. At this time, the managers who are well informed commit to a dividend policy and at time 1 project generates cash flows that lead to a payoff used to pay dividends. However, if the firms could not bear the amount of dividends; they resort to outside financing and incur transaction costs in doing so. To convey a good signal about the firm's project, managers pay large amount of dividend at time 1 and only good projects enable firms to pay dividends not to resort to outside financing and avoid associated transaction costs (Kalay & Lemmon, 2008, p. 38).

In equilibrium, it is not worthwhile for a firm with a bad project to do this, because it will have to resort to outside financing more often and thus will have to bear higher transaction costs. Since extra costs are might be higher than the price gained at time 1. These firms should deal with the tradeoff in model between the transaction costs incurred by committing to a large dividend and the price paid at time 1. It follows that similar results hold when the dividends are taxed and it represents the second period of the model where outside investors have imperfect information about firms' profitability and that cash dividends are taxed at a higher rate than capital gains. Just after the dividends are paid, the firm is sold to a new group of shareholders, which receives the payoff generated by the project at time 2. The price that the new shareholders are prepared to pay at time 1 depends on their beliefs concerning the profitability of the project. Bhattacharya's model is consistent with the observation that firms pay dividends even when these are taxed despite the criticism. However, Bhattacharya's model has been criticized on the grounds that it does not explain why firms use dividends to signal their prospects (Allen & Michaely, 2003, p. 378).

Some theories suggest signaling the future prospects using share repurchases instead of dividends. This way works in the same tradeoff between the transaction costs of resorting to outside financing and the amount received when the firm is sold, but from tax perspective dividends are highly taxed rather than capital gain. Bhattacharya's model considers that dividends and share repurchases are perfect substitutes for one another. Since the end result will be the same and payout increases the possibility of resorting costly outside financing. The strength of Bhattacharya's model is the positive market reaction to dividend increases and to announcements of share repurchases. The model is internally consistent and assumes that both investors and management behave in a rational manner (Allen & Michaely, 2003, p. 379).

It is presumed that the dividend signaling advantage arises from the increase in the liquidation value $V(D)$, which results from a committed and actually disbursed dividend amount D . Our model employs marginal analysis to examine a new project undertaken by a company. This approach serves two main purposes. First, it is about deferring the discussion of dynamic learning issues concerning dividend decisions in relation to existing and new asset cash flows. Second, this analytical method allows us to preserve simplicity and flexibility in modeling costs incurred to cover shortfalls in cash flows compared to promised dividends. One

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approach to addressing such shortfalls is likely delaying investment or replacement plans. However, prudence is recommended to the practice of analyzing dividend decisions within the context of established investment policies. It is posited that insiders or managers acting on behalf of shareholders make dividend decisions. These agents optimize shareholders' after-tax objective function, potentially because their incentive compensation is linked to the same criterion. The insiders are the only people who know the cash flow distributions of their projects (Bhattacharya, 1979, p. 261).

Let X denote the uncertain cash flow expected from the new project by the end of the period, aligned with the current shareholders' planning horizon. It is assumed that dividends paid to shareholders are subject to a personal income tax rate of $(1 - \alpha)$, and capital gains are assumed to be untaxed for simplicity. Let D represent the additional dividend commitment attributable to the new project, and $V(D)$ denote the incremental increase in liquidation value due to this commitment. If X exceeds D , dividends amounting to D are paid out to shareholders after taxes, resulting in an after-tax benefit of αD to current shareholders. Moreover, the need for external financing for reinvestment purposes is reduced by $(X - D)$, compared to a scenario where X equals D (Bhattacharya, 1979, p. 261).

In cases where X is less than D , dividends of D are still disbursed, and it is assumed that covering the shortfall $(D - X)$ imposes costs on current shareholders, amounting to $(1 + \beta)(D - X)$. This expense is incurred relative to a scenario where X equals D . The rationale behind assuming that the cost of covering a cash-flow deficit exceeds the benefit of a surplus of the same magnitude lies in the presumption that access to additional external financing is not frictionless or readily available (Bhattacharya, 1979, p. 261).

Based on the preceding discussion, we can express the additional component of the objective function for existing shareholders and their representatives as (Taleb, 2019, p. 6):

$$E(D) = \frac{1}{1+r} [V(D) + \alpha D + \int_D^X (X - D)f(X)dX + \int_X^D (1 + \beta)(X - D)f(X)dX] = \frac{1}{1+r} [V(D) + M - (1 - \alpha)D - \beta \int_X^D (\beta)F(X)dX] \quad (42)$$

where

$f(X)$ and $F(X)$ represent the density and distribution functions of X assumed to be distributed over $(\bar{X}, X)$,

M represents the mean cash flow, and

r is the per period rate of interest after personal income taxes.

With a single class of investors, the rate r can either represent the interest rate on tax-exempt bonds or a multiple of the before-tax interest rate on taxable bonds. Shareholders' agents currently select dividend D to maximize $E(D)$. At equilibrium, the endogenous $V(D)$ schedule ensures consistent valuation of future cash flows. Consequently, given this equilibrium and optimal dividend policy, all shareholders achieve a competitive after-tax market return on their investments. A critical requirement for achieving a Spence-type signaling equilibrium, as proposed in Spence (1974), is that the marginal cost of signaling—represented in the model as $[(1 - \alpha) + \beta F(D)]$ (see equation 42)—must exhibit a strictly negative correlation with the

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true value indicator, the mean cash flow (M). This condition ensures that firms with higher true values can effectively signal their quality through their dividend decisions, despite the associated costs (Bhattacharya, 1979, p. 262).

If the distribution functions $\{F(Z)\}$ across projects maintain consistent ordering across the entire cross section, with potential weak ordering where some $F(Z) = 1$, then the condition for existence is satisfied when $D < \bar{X}$. This is because the mean cash flow M is lower for projects whose cash-flow distribution function F strictly dominates others in comparison. It should be noted that this condition is sufficient in our model under the assumption that today's dividend decisions have equilibrium implications for future dividends. This assumption hinges on the fact that the true value of future cash flows, adjusted for personal income tax implications on dividends, correlates positively with M (Bhattacharya, 1979, p. 263).

Bhattacharaya further posits that the random cash flow ($\tilde{X}$) follows an even distribution throughout the interval $[0, t]$, averaging (t) over $[t/2]$, and that managers aim to maximize shareholder wealth by maximizing the discounted firm value (Taleb, 2019, p. 6):

$$Max_D V_0(D) = \frac{1}{1+r} \left[\frac{t}{2} + V(D) - (1-\alpha)D - \beta \frac{D^2}{2t} \right] \quad (43)$$

The first-order condition of this maximization problem is as follows:

$$\frac{\delta V_0(D)}{\delta D} = V'(D^*) - (1-\alpha) - \beta \frac{D^*}{t} = 0 \quad (44)$$

D^* represents the optimal dividend payout to shareholders, determined as a function of the time horizon t .

Since this model spans multiple periods (n periods), while investors' investment horizon is limited to one period, the optimal dividend amount $[D^*]$ selected at the outset of period 0 will remain unchanged across the subsequent n periods. Equation (10) suggests that:

$$V'(D^*) - (1-\alpha) + \beta \frac{D^*}{t} = 0 \quad (45)$$

In a stable signaling equilibrium, the dividend signaled at the start of the first period, denoted as $V(D^*(t))$, aligns with the firm's value at the end of that period. Assuming constant and perpetual cash flows generated by the company and a stable dividend policy, the firm's value can be expressed as the discounted sum of these cash flows extended to infinity, represented as follows:

$$V(D^*(t)) = K \left[\frac{t}{2} - (1-\alpha)D^{*2}(t) - \beta \frac{D^{*2}(t)}{2t} \right] \quad (46)$$

Where $K = 1/r$ is the discount rate of a perpetual cash flow

By substituting the value of $V'(D^*(t))$ from the earlier equation, we derive the following differential equation:

$$(1+K) \left[(1-\alpha) + \beta \frac{D^*}{t} \right] \frac{\delta D}{\delta t} = K \left[1/2 + \beta \frac{D^2}{2t^2} \right] \quad (47)$$

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Bhattacharya also assumes that poorly performing firms do not distribute dividends to their shareholders, hence $[D^*(0) = 0]$. Furthermore, it demonstrates that the equation $[D^*(t) = At]$, where A represents the payout ratio, is derived as the solution of the following differential equation:

$$A = - \frac{(1-\alpha)(K+1)}{\beta(K+2)} + \frac{(1-\alpha)}{\beta} \left[\frac{(K+1)}{(K+2)} \sqrt{1 + \frac{\beta K (K+2)}{(1-\alpha)^2 (1+K)^2}} \right] \quad (48)$$

These findings demonstrate that investors, armed with knowledge of their tax rate and the prevailing interest rate, infer the dividend payout ratio and anticipate announcements accordingly. This enables them to estimate anticipated cash flows managed by the firm. Consequently, market participants can accurately evaluate the firm's prospects (Taleb, 2019, p. 7).

The Bhattacharya model holds the distinction of being the pioneering theoretical work that integrates dividend policy into signaling theory. It significantly advances our understanding of firm distribution behavior by introducing fundamental concepts crucial for signaling equilibrium. According to Allen and Michaely (2003), this model effectively outlines both the strengths and weaknesses of dividend signaling models. Its primary strength lies in its ability, particularly in the case of Bhattacharya's model, to explain the market's positive reaction to announcements of dividend increases or repurchases. This explanation hinges on the intuitive notion that dividends can convey information about the current or future state of the firm (the ICH). (Taleb, 2019, p. 8).

However, the model's foundational assumptions, though somewhat restrictive, have sparked several criticisms. A primary critique revolves around its depiction of the economic environment, which is considered overly restrictive. Specifically, the model lacks a precise definition of the balance between job resources. It operates under the assumption that the firm accrues cash flows from its assets at the start of each period, allocating these between a consistent dividend payout and residual funds used for investment projects. Moreover, if the cash flows generated by investments fall short of covering the dividend, the firm resorts to debt financing (Taleb, 2019, p. 8).

The model's limits

Despite its insights, the Bhattacharya model is subject to some criticisms. The main questions about the Bhattacharya's model pertain to why would a management care so much about the stock price next period? Why to increase the firm's value in short period managers burn money in the form of payout especially when the true value will be revealed next period? Finally, firms could burn money in Wall Street and it might be cheaper, so why they use dividends (or repurchases) to signal? (Allen & Michaely, 2003, p. 379).

Some studies based on how informational asymmetries affect firms' dividend policies, examined the relation between a firm's dividend policy and the quality of its information environment. They found that firms that are more subject to information asymmetry are less likely to pay, initiate, or increase dividends, and disburse smaller amounts. They concluded that there is a negative relation between asymmetric information and dividend policy. Thus, the results do not support the signaling theory of dividends (Li & Zhao, 2008, p. 673).

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In Bhattacharya's signaling model (1979), the manager signals the expected profitability of the firm's investment projects by committing ex ante to a dividend policy. For one, Bhattacharya was not specific as to how management would commit to a specific dividend policy. Dividends and external financing do not represent a contractual obligation and market participants will not attach any importance to the existence of dividend payments once they recognize this lack of commitment. Also share repurchase may convey information and functions as valid signaling mechanism. Since share repurchases are more favorable, given a tax perspective, as dividends are more taxed than capital gain (Kalay & Lemmon, 2008, p. 39).

To signal the future prospects of the firm Bhattacharya (1979) asserted that the signaling cost is the cost of external financing. Thus, low-quality firms would have to resort to external capital, which is costly and they could not bear it. Regarding survey evidence led by Brav et al. (2005), among dividend-payers, only 17.9% of companies agree or strongly agree that they use dividends to show that they are strong enough to bear the cost of acquiring external capital if needed. Sixty percent of companies disagree or strongly disagree with this assertion (Brav, Graham, Harvey, & Michael, 2005, p. 512).

II.1.3 Miller and Rock Model (1985)

The dissatisfaction claimed for early models has provided the emergence of a number of alternative signaling theories. Miller and Rock (1985) also developed a signaling explanation for dividends. They took into account the correlation between dividends, investment, and earnings (Kalay & Lemmon, 2008, p. 37), by supposing that the firm's managers know more than outside investors about the true state of the firm's current earnings and the non-consistence of familiar Fisherian criterion for optimal investment once trading of shares is admitted to the model along with asymmetric information. Signaling equilibrium exists under asymmetric information and the trading of shares with lower levels of investment than the optimum achievable under full information and/or no trading (Miller & Rock, 1985, p. 1031).

The model's assumptions (Allen & Michael, 2003, p. 379)

- Asymmetric information and the possibility of trading shares.
- Investors cannot observe either earnings or the new level of investment.
- The firm's earnings are correlated through time.
- Some shareholders want to sell their holdings in the first period.

Description of the model:

In their model, Miller and Rock consider a two period model. In the first period, firms invest in a project which generates earnings at the end of the period. Earnings are used to pay dividends and finance the firm's new investments. Asymmetric information relies on the private information managers possess about the firm's realized earnings and the level of new investment, unlike market participants. The relation between earnings, dividend payments, and investment is governed by the accounting identity that ensures that sources of cash flow are equal to uses of cash flow. The two assumptions regarding shareholders want to sell their stocks provides a motivation to establish the true valuation of the firm and that earnings are correlated through time, implies that shareholders receive a high price for their shares due to the market conviction that the earnings at time 1 are high. Good firms set a high level of dividend and cut investment make it unattractive for bad firms to reduce their investment enough to achieve the same level (Kalay & Lemmon, 2008, p. 39).

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Miller and Rock posit that, under specific assumptions, a signaling equilibrium emerges because managers lack incentive to provide false information. In developing their model, Miller and Rock construct an economic environment that closely mirrors reality. They assume that by the end of the first period (t_1), the firm holds resources which it allocates at the outset of the second period (t_2) between investments (I_1) needed for the second period and dividends paid at the beginning of the second period (t_2). This ensures that the resource-employment equilibrium can be expressed as (Miller & Rock, 1985, p. 1033):

$$X_1 + B_1 = I_1 + D_1 \quad (49)$$

In the context described, B_1 represents the external sources of financing available to the company at date t_1 . At the outset of the first period, the firm initiates an initial investment I_0 in a production process characterized by a distribution function $F(I_0)$ known to all investors. By the end of the period, the firm generates an income (X_1), comprising the invested capital plus a stochastic term ε_1 , which serves as the signaling mechanism. The income generated at the end of the first period, assumed to be random, is defined by Miller and Rock as follows (Miller & Rock, 1985, p. 1033):

$$\tilde{X}_1 = F(I_0) + \tilde{\varepsilon}_1 \quad (50)$$

In the same way:

$$\tilde{X}_2 = F(I_1) + \tilde{\varepsilon}_2 \quad (51)$$

With,

$$E(\tilde{\varepsilon}_1) = E(\tilde{\varepsilon}_2) = 0 \quad ; \quad E(\varepsilon_2/\varepsilon_1) = \varepsilon_1 \gamma \quad (52)$$

The coefficient γ denotes a presumed level of persistence. At the conclusion of the second period (t_1), the actual income (X_2) is distributed among shareholders, after which the firm undergoes liquidation. Managers select a dividend amount to maximize current shareholder income. This dividend is intended to signal the true value of income (X_1). Miller and Rock assume that investors are aware of the adjustment factor's value. By the end of the first period (t_1), the firm's valuation is based on expected profits in the second period (t_2), discounted at the shareholders' required rate of return (i), adjusted for dividends and reduced by external financing (Taleb, 2019, p. 9):

$$V_1 = D_1 + \frac{1}{1+i} [F(I_1) + \gamma \varepsilon_1] - B_1 = D_1 - B_1 + \frac{1}{1+i} [F(I_1) + \gamma \varepsilon_1] \quad (53)$$

Miller and Rock also posit that managers of the firm might be motivated to set an investment level below its optimal point in order to temporarily inflate the stock price. They incorporate two types of investors into their model and assume that a fixed number (k) of shareholders intend to sell their stocks after dividend announcements and just before results are published. These shareholders sell their shares at a market price (V_1), which varies based on the information available to investors. Miller and Rock define the quality of information possessed by executives as (ϕ_d) and that held by market investors as (ϕ_m), depending on who possesses the information (Taleb, 2019, p. 10):

$$\Phi^d = \{X_1, I_1, D_1\} \equiv \{I_0, \varepsilon_1, I_1, D_1\} \quad (54)$$

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$$\Phi^m = \{I_0, D_1\} \quad (55)$$

Depending on the information they possess, managers estimate the value of the firm's associated dividend coupon as:

$$V_1^d = D_1 + \frac{1}{1+i} [F(I_1) + \gamma \varepsilon_1] \quad (56)$$

For investors who do not possess complete information, the value of the firm is expressed as follows:

$$V_1^m = D_1 + \frac{1}{1+i} [E_1^m F(I_1) + \gamma \tilde{\varepsilon}_1 / \Phi^m] \quad (57)$$

The challenge for managers is to maximize the wealth of current shareholders by fairly balancing the interests of both shareholder groups. The decision on the dividend level (D) and the investment level (I) must be made in proportion to each group's stake in the company's interests (Taleb, 2019, p. 11):

$$\begin{aligned} \max_{D, I} W_1 = & k V_1^m + (1-k) V_1^d = k [D_1 + \frac{1}{1+i} [E_1^m F(I) + \gamma \tilde{\varepsilon}_1 / \Phi^m]] + (1-k) [D_1 + \frac{1}{1+i} [F(I_1) + \gamma \varepsilon_1]] \\ & (58) \end{aligned}$$

Under budget constraint: $D_1 + I_1 = X_1$

For investors, the market value of a share depends solely on the announced dividend ($V_1 = V_1(D)$). Conversely, for managers, it hinges on the profit (X), information exclusively accessible to them. Thus, their objective shifts to (Taleb, 2019, p. 11):

$$\max_D W = (X; D, V^m(D)) = k V^m(D) + (1+k) V^d(X, D) \quad (59)$$

Therefore, for every profit level, there exists an optimal dividend amount that maximizes the objective function mentioned earlier. If the relationship between the firm's profit and dividend is singular, and assuming rational shareholders, a stable equilibrium can only be established when:

$$V^m(D) = V^d[X(D), D] = V^d(X, D) \quad (60)$$

By substituting $V(D)$, with $V^d[C(D), D]$ at the signaling equilibrium, the firm must select the dividend amount (D) such that:

$$k \frac{\delta V^d}{\delta X} [X(D), D] X'(D) + k \frac{\delta V^d}{\delta D} [X(D), D] + (1-k) \frac{\delta V^d}{\delta D} (X, D) = 0 \quad (61)$$

This differential equation delineates the optimal trajectory of the values. However, to achieve a maximum, it is essential to satisfy the second-order condition, which is expressed as follows:

$$-\frac{\delta^2 V^d}{\delta X \delta D} = [X, D] X'(D) < 0 \quad (62)$$

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The cost of signaling according to that “good” firms shave investment to pay the dividend. However; find it not profitable to avoid good projects in order to compensate the loss considered for some reasons. In their survey, Brav et al., (2005) found that 9.0% of managers pay dividends to show that their firm is strong enough to miss profitable investments. The score is also lower in growth firms (Brav, Graham, Harvey, & Michael, 2005, p. 512). One of the main limits tied up to Miller and Rock model, is the fact that they passed up the other form of payout which is repurchases; thus, their model also cannot explain why firms would choose to signal using dividends (which are tax disadvantaged) rather than repurchases (Kalay & Lemmon, 2008, p. 39).

Finance experts have long acknowledged that the traditional full-information model of a firm's dividend and investment decisions fails to explain the documented effects of dividend announcements, which indicate information imbalances between investors and decision-makers within the firm. Despite lacking a superior alternative, these specialists have persisted in applying key aspects of the full-information model, particularly its criterion for optimal investment, hoping that any distortions caused by announcement effects will be temporary and rectified once accurate information is disclosed. Recent analyses, however, suggest that such optimism may be unfounded, especially when considering the inclusion of share trading alongside asymmetric information in the model. The consistency of optimal investment and dividend policies assumed by the full-information model can no longer be assumed under these conditions. While inconsistent policies are expected to be resolved, the manner in which this occurs can vary (Miller & Rock, 1985, p. 1048).

One approach involves maintaining assumptions of asymmetric information and share trading while seeking alternative, internally consistent decision-making rules for investments and dividends. Such rules do exist, retaining many features of the standard model and providing a clear rationale for observed announcement effects. However, with only minor exceptions, these rules typically suggest lower investment levels and higher dividend payouts compared to the standard full-information optimum. Alternatively, rather than accept the reduction in profitable investment opportunities implied by these rules, company founders might opt to address the underlying asymmetries and incentives contributing to the issue. Yet, this path also carries its own costs and challenges. Determining the most cost-effective path, or more likely, combination of paths towards a coherent solution, is a matter for future empirical research to explore (Miller & Rock, 1985, p. 1048).

II.1.4 John and Williams Model (1985)

In their dividend signaling theory, John and Williams (1985) have overcome the Miller and Rock and the Bhattacharya models, which imply that dividends and repurchases are perfect substitutes. Since, the same signal could be achieved at a lower cost if the firm were to repurchase shares instead. The main assumption in the John and Williams's model supposed that shareholders need some liquidity, thus they need to sell some of their shares. Managers act in the interest of existing shareholders and outside investors do not have information about the true value of the firm (Allen & Michael, 2003, p. 381).

According to John and Williams, a firm cannot achieve its objective of higher valuation by substituting a dollar of dividends for a dollar of capital gains. Firms do not repurchase shares to avoid taxes, because it is precisely the cost of the taxes that makes dividends desirable. Since, good firms pay dividends to signal to outside investors that they can afford to pay high tax, unlike bad firms, so then the share price will rise. Shareholders will have to sell less equity to meet their liquidity needs and will maintain a higher proportionate share in the firm.

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Bad firms find that paying dividends is costly because they must pay taxes on them (Allen & Michaely, 2003, p. 381).

The identification of a signaling equilibrium involving taxable dividends was led. In this scenario, corporate insiders, possessing more valuable private information, strategically choose to distribute larger dividends. This decision leads to higher stock prices when both the firm and its current stockholders require more cash than is internally available. In this equilibrium, some firms distribute dividends while simultaneously issuing new stock, while others refrain from paying dividends altogether. The issuance of dividends effectively communicates all private information that isn't disclosed through corporate audits. Consequently, current stockholders capture all economic rents, net of signaling costs. Both the announcement effect and the relationship between dividends and cum-dividend market values are derived (John & Williams, 1985, p. 1053)

By design, the model provides an extremely adverse environment for signaling with dividends. Here, taxes are paid only on dividends; no transaction costs are incurred when issuing, retiring, or trading shares; and all sources and uses of firms' funds are fully observed by outsiders through costless public audits. Nevertheless, there exists a signaling equilibrium with dissipative dividends. In this equilibrium, corporate insiders distribute taxable dividends if and only if the demand for cash by both their firm and its current stockholders exceeds the supply of internal funds. Thus, some firms pay dividends, while others do not. Of those firms which pay dividends, many simultaneously sell new shares to outside investors. Still other firms pay dividends, sell no new shares, and, instead, support their stock prices and thereby benefit current claimants who sell outstanding shares to new investors (John & Williams, 1985, p. 1054).

The intuition behind this signalling equilibrium is surprisingly simple. When raising funds for investment, a firm must either issue new shares or retire fewer outstanding shares. Similarly, to raise cash on personal account, current stockholders must sell existing shares. In either case, current stockholders suffer some dilution in their fractional ownership of the firm. Reducing this dilution on either corporate or personal account is clearly more valuable to current stockholders when inside information is more favorable. Consequently, insiders, acting in the interests of their current stockholders, may distribute a taxable dividend if outsiders recognize this relationship, bid up the stock price, and thereby reduce current stockholders' dilution. In the resulting signalling equilibrium, insiders control dividends optimally, while outsiders pay the correct price for the firm's stock (John & Williams, 1985, p. 1054).

This signalling equilibrium exists because the marginal benefit to insiders of distributing dividends differs across firms. For firms with more valuable inside information, the premium paid in the market for stocks with marginally larger dividends, and thereby the reduction in dilution for current shareholders, just compensates stockholders for the incremental personal taxes on dividends. By contrast, for firms with less favorable inside information, the dissipative costs of the same dividend exceed at the margin the gains from reducing dilution. Consequently, there exists in the market a pricing function for stock which separates firms with more favorable inside information from those with less. In the resulting signaling equilibrium, firms with more favorable inside information optimally pay higher dividends; other things equal, and receive appropriately higher prices for their stock (John & Williams, 1985, p. 1054).

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In this equilibrium, corporate insiders distribute larger dividends and receive higher prices for their stock. Thus, many firms distribute dividends and simultaneously issue new stock while other firms pay no dividends. Because dividends reveal what corporate audits do not convey (John & Williams, 1985, p. 1053). In the John and Williams, there are two benefits. First, the shareholders sell their shares at a higher price. Second and more importantly, the existing shareholders sell proportionate shares and maintain a larger fractional of the firm's equity. A "bad" firm will not find it worthy to do so because, once the overvaluation is corrected shareholders will lose on the fractional share retained. The model suggests that firms expecting higher prospects optimally pay higher dividends and can also explain dividends payment and issuing new equity securities as well (Kalay & Lemmon, 2008, p. 40).

II.2 Dividend smoothing and dividend clienteles:

Theories relying on smoothing dividends are based on either asymmetric information or agency considerations. The first shutter is divulged in Kumar (1988); Brennan and Thakor (1990); Fudenberg and Tirole (1995); DeMarzo and Sannikov (2008); Guttman, Kadan, and Kandel (2010). Meanwhile, the second one is alleged by Allen, Bernardo, and Welch (2000); DeAngelo and DeAngelo (2007); Lambrecht and Myers (2010) (Leary & Michaely, 2011, p. 3199). In their study, Leary and Michaely (2011), find that firms facing the most uncertainty and information asymmetry are less to smooth dividends. The same critique noted by Allen and Michaely (2003) and DeAngelo, DeAngelo, and Skinner (2009) to signaling models of payout levels, they alleged that firms facing high asymmetric information pay out the least (Leary & Michaely, 2011, p. 3200).

Among asymmetric information models, Kumar and Spatt (1987) and John and Nachman (1988) present dynamic models with smoothing of dividends. John and Nachman showed that dividend smoothing emerge endogenously and optimal financing and dividend strategies are determined by an endogenous structure of signaling costs, which is related to a permanent component of earnings. Their model is an intertemporal signaling model in which dividends have an adverse tax treatment (Guttman, Kadan, & Kandel, 2010, p. 4459). Kumar and Spatt (1987) conceive a model which in under certain conditions, firms will have incentives to smooth dividends and create a reputation for having low systematic risk (Guttman, Kadan, & Kandel, 2010, p. 4460).

Kumar (1988), Kumar and Lee (2001), and Guttman, Kadan, and Kandel (2010) offer models in which the dividend serves as a signal of managers' private information about current or future cash flows. However, unlike similar models used to explain the existence of dividends (e.g., Bhattacharya 1979; John and Williams 1985; Miller and Rock 1985), these authors show the existence of partially (but not fully) revealing equilibrium. In his model, Kumar (1988) presents a signaling model in which managers and investors differ in their level of risk aversion and points out the connection between dividend stickiness and partition pooling. In his model, dividends serve as a coordination device between managers and investors. Another model explained by Allen, Bernardo, and Welch (2000) in which they suggest an explanation for dividend smoothing relying on the differences in taxation between individuals and institutions. The model is based on clientele effect such as taxable dividends attract informed institutions. Institutional ownership requires high amount of dividend. Firms that benefit from institutional ownership are likely to pay dividends and avoid cutting paying out (Guttman, Kadan, & Kandel, 2010, p. 4460)

II.3 Agency relationships and dividend policy

II.3.1 Managers–stockholders conflict and dividends

Agency issues between managers and shareholders occur when managers tend to act in their own interests at the expense of shareholders by spending cash on benefits, not necessarily shared by shareholders. They may dissipate shareholders wealth on negative-NPV investment projects or spend substantial amounts on perquisites. To control this type of agency problem, dividends may limit the discretionary funds available to managers, which is argued by Easterbrook (1984); Grossman and Hart (1988); Jensen (1986). Jensen alleged that paying higher dividends may reduce the amount of free cash flow controlled by managers, thus managers are less likely to indulge in overinvestment activities, which is consistent to say that when managers have considerable discretion the above agency problem is more likely to prevail. Ownership concentration structure helps shareholders to monitor and discipline managers since they are better equipped. In this way, managers and shareholders conflict is reduced (Mancinelli & Ozkan, 2006, p. 267).

II.3.2 Controlling stockholder–other stockholders conflict and dividends

The main agency conflict to address in agency problem is between the large controlling shareholders and minority shareholders. According to Johnson *et al.* (2000) and later Holderness (2002), Shleifer and Vishny (1997) have stated that large owners prefer to generate private benefits of control that are not shared by minority shareholders when they gain nearly full control of the corporation. Large shareholders tend to increase the amounts of their control and firms with large shareholders are more likely to accumulate more cash than widely held firms by paying out lower amounts of dividends. La Porta, Lopez-de-Silanes *et al.* (2000) have affirmed that most common conflict of interest in modern corporations occurs between and outside investors and that the notion of insiders varies from country to country. Since, ownership is dispersed in common law countries so the role of insiders is played by the managers, while ownership is highly concentrated and the controlling shareholders are the insiders as they can effectively control managers, in civil law countries (Mancinelli & Ozkan, 2006, p. 267).

The former authors have asserted that minority shareholders with different levels of legal protection thus dividend policy differs in countries. According to them firms in civil law countries pay lower dividends than firms in common law countries, which is consistent to say that payout policy is relevant when agency problem. Faccio *et al.* (2001) argue that dividend rates depend on the vulnerability to expropriation of minority shareholders. It is measured by the discrepancy between the controlling shareholder's ownership rights (O) and its control rights (C). A low O/C ratio and by means of intra-group transactions, the controlled firm offers many opportunities for expropriating minority shareholders since controlling shareholders exercise their control via a long chain of intermediate corporations which implies a lower level of dividends (Mancinelli & Ozkan, 2006, p. 267).

II.3.3 Stockholder–Bondholder conflict and dividends

Jensen and Meckling (1976), followed by Myers (1977), have initiated agency relationship between shareholders and bondholders in dividend policy. According to them, the expropriation of bondholders wealth by shareholders using means of excessive dividend payments, financed by reducing investments (investment-financed dividends) or issuing new debt (debt-financed dividends). Thus, agency proxies and dividend payouts are negatively related for those firms that are more susceptible to this type of agency problem. For example, incentives to expropriate bondholders by passing up valuable investment opportunities are

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mostly recorded among shareholders of firms with greater growth options in order to receive higher dividends (Mancinelli & Ozkan, 2006, p. 266).

Minority shareholders would like to see more dividends to avoid the risk of expropriation by insiders, meanwhile, creditors prefer less dividends, as dividends increase creditors' risk of expropriation by shareholders. Dividend change may be viewed favorably by one side while putting the other side on alert. To minimize the total agency costs of equity and debt, insiders should balance shareholders' and creditors' interests by employing an optimal dividend policy. In this way a balancing strategy is operated and insiders are expected to employ dividend policies in favor of creditors to reduce the agency costs of debt when the insider–minority shareholder relationship is sound. However; insiders are expected to choose dividend policies that reduce the agency costs of equity when the shareholder–creditor relationship is sound. The most pertinent question relies on how to capture the balancing strategy (Shao, Kwok, & Guedhami, 2013).

La Porta et al. (2000) find that dividends are an outcome of the extent of shareholders' legal protection, which implies that shareholder rights establish the country level balance of power by paying dividends. For stockholders and creditors relationship, Brockman and Unlu (2009) found that to overcome agency problem firms should reduce dividend. This model is substitute of the previous dividend model which is based on insiders and mini shareholders relationship, thus, it implies that creditor rights establish the country level balance of power between insiders and creditors by reducing dividends (Shao, Kwok, & Guedhami, 2013).

II.3.4 Ownership versus control and the dividend decision

Shleifer and Vishny (1997) have asserted that controlling shareholders can make decisions based on their best interests if they hold almost full control of firms. However, it is an interest conflict between controlling shareholders of other shareholders. Controlling owners keep firms' resources to themselves by making decisions that foster party transactions or investing in affiliated firms. These behaviors may affect and reduce firms' values and according Claessens and Yurtoglu (2013); Shleifer and Vishny (1997) to agency conflicts between controlling shareholders and minority shareholders are mostly found in those firms with concentrated ownership (Setiawan, Bandi, Phua, & Trinugroho, 2016, p. 231).

Claessens and Yurtoglu (2013) provided an overview on corporate governance, with a specific emphasis on emerging markets. The findings reveal that improved corporate governance practices offer numerous benefits to firms, including enhanced access to financing, reduced capital costs, improved overall performance, and more favorable treatment of all stakeholders. Extensive studies indicate that these positive effects are observed at the firm, sector, and country levels and researchers increasingly establish clear causal relationships. The evidence also highlights that the impact of voluntary and market-based corporate governance mechanisms is less significant in countries with weak governance systems (Claessens & Yurtoglu, 2013, p. 1).

Understanding how corporate governance regimes evolve over time and their implications for firms has gained more attention in recent research. However, limited evidence is available concerning the direct links between corporate governance and social and environmental performance. In conclusion, the article identifies several areas that require further investigation. These include exploring the unique corporate governance challenges faced by banks, family-owned businesses, and state-owned enterprises. Additionally, there is a need to examine the nature and determinants of both public and private enforcement mechanisms

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related to corporate governance practices. By addressing these topics, researchers can deepen their understanding of corporate governance dynamics and its broader impacts (Claessens & Yurtoglu, 2013, p. 1).

Jiang and Peng (2011) and Faccio *et al.* (2001) have enclosed dividends focused on dealing with controlling shareholders' decisions. Dividends drive controlling shareholders to share their resources instead of holding onto them and insure to minority shareholders to get dividends as returns from their investments. However, they may also bear higher costs because of a higher probability of expropriation. In their study, Faccio *et al.* (2001) found that controlling owners in East Asia prefer to hold their resources rather than distribute them amongst minority shareholders, thus, firms in East Asia with controlling owners pay lower dividends compared to their counterparts in Western Europe. Therefore, the correlation between ownership concentration and dividend payouts is negative. Studies of DeCesari (2012);Gugler and Yurtoglu (2003);Harada and Nguyen, (2011) ; and Manos *et al.*(2012) confirmed the results. On the other hand, Shleifer and Vishny (1986) argued that large shareholders are more motivated to monitor managers and are also able to bear costs better (Setiawan, Bandi, Phua, & Trinugroho, 2016, p. 231).

Therefore, it is expected that large shareholders have a positive effect on firms' values. In a study of Finnish firms, Maury and Pajuste (2005) have found that multiple large shareholders at firms affect positively dividend payouts. By the same token, higher ownership concentration among Norway's private firms was associated with higher dividend payouts for minority shareholders. To improve their reputation controlling shareholders pay higher dividends to minority shareholders. La Porta et al. (2000) indicated that institutional settings could influence choices about dividends. In weakly governed countries, controlling shareholders are likely to use their funds to pursue their own interests instead of spending them on paying dividends to minority shareholders, thus they receive lower dividends, and as a result corporate governance and institutional development affect dividend payment (Setiawan, Bandi, Phua, & Trinugroho, 2016, p. 231).

According to Nys *et al.* (2015), Indonesia has poor governance and controlling owners may expropriate resources of minority shareholders and pay lower dividends. On the other hand, Faccio *et al.* (2001) noticed that the ratio of ownership rights to cash flow rights is low when shareholders receive lower dividends. In this way, the more firms expropriate funds the more they pay lower dividends to keep their resources inside businesses. LaPorta *et al.* (2000) and Faccio *et al.* (2001) studies have brought to light that minority shareholders are weakly protected from expropriation and subsequently receive lower dividends. In Indonesia, Carney and Child (2013) have pointed out that publicly held companies and foreign-controlled firms are also the dominant forms of ownership structure (Setiawan, Bandi, Phua, & Trinugroho, 2016, p. 231).

II.3.5 Agency Costs and dividend models

As previously mentioned, Easterbrook (1984) and Jensen (1986) have alleged that to reduce agency costs resulting when managers invest shareholders wealth in nonproductive activities, firms need to distribute cash to shareholders by paying dividends as well as share repurchases (Baker, Powell, & Veit, 2002, p. 250). Foreign investors holding a substantial share of the firm and are well-informed, are supposed to reduce manager's expropriation by increasing dividends (Easterbrook, 1984; Jensen, 1986).Thus, a positive relationship was therefore expected between foreign ownership and dividends (Mohd Hasan Abdullah, Ahmad, & Roslan, 2012, p. 80).

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Since, managers might invest cash in projects with negative net present value which increase the personal utility of the managers in some way; dividends are used by shareholders as a device to reduce overinvestment by managers. Thus, a dividend reduces this free cash flow and thus reduces the scope for overinvestment. Studies led by Easterbrook (1984) and Jensen (1986) are the two most cited works in this genre. However, neither of these papers has overcome to model the situation; rather, they put forward plausible hypotheses (Bhattacharyya, 2007, p. 7).

II.3.5.1 Easterbrook's model

According to Easterbrook (1984), firms turn to pay dividends in order to reduce the agency costs between shareholders and managers. In order to avoid increased monitoring that the professional investment community provides, shareholders are willing to accept the higher personal taxes associated with dividends since managers must raise funds more frequently in the capital markets to overcome the scrutiny and the disciplining effects of investment professionals (Baker, Powell, & Veit, 2002, p. 244)

In addition to the first hypothesis, introduced by Easterbrook (1984), which conveys that dividends preserve shareholders wealth from expropriation led by managers and ensures that the managers will have to approach the capital market in order to meet the funding needs for new projects and imposes a discipline on the managers, and thus reduces the cost of monitoring the managers. Easterbrook suggested that the capital market also acts as a counterweight to the managers' own risk aversion (Bhattacharyya, 2007, p. 7).

According to him dividends ensure among the various claimholders of the firm and are part of the solution to the agency relationships between management and stockholders. Firms growing lead to a larger and more diverse group of stockholders but receives only a fraction of the benefits. A small stockholder is unlikely to monitor the actions of management. However, He or she supports the full costs of monitoring unless they organize and spread the monitoring costs proportionally, to stand to gain from improved decisions (Kalay & Lemmon, 2008, p. 32).

Easterbrook (1984) argued that by paying more dividends, firms tend to raise external funds. Hence, paying dividends is associated with more frequent scrutiny and allows professionals such as lawyers, investment bankers, money managers, and public accountants to evaluate the management. Since, managing unsuccessful stock or bond offering may take professionals can lose their reputation and market participants would be reluctant to buy their future security offerings. Consequently, management of dividend-paying firms is scrutinized more frequently and can extract less wealth from their stockholders. Hence, stockholders insist that dividends should be paid, to also overcome the conflicts of interest between the suppliers of capital and management, tensions between bondholders and stockholders (Kalay & Lemmon, 2008, p. 33).

To reduce the likelihood of overinvestment stockholders would like more dividends to be paid and to maintain a reservoir of payable funds. However, management has incentives to pay even less since retaining more earnings reduces the firm's debt/equity ratio. Managers can benefit from a lower debt/equity ratio; other things held constant which reduces the probability of bankruptcy and managers will affect their reputation associated with controlling a bankrupt firm. Furthermore, to reduce reducing firm risk, managers invest a larger fraction of their wealth in the firm they manage than do other stockholders, even at the expense of profitability.

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Easterbrook (1984) theory led to some empirical implications. First, closely held firms, other things held constant, should pay lower dividends. By the same token, a large stockholder in a firm do not need capital market to control managers since he has more incentives to monitor management, and there is less need for dividends. Second, firms with low indebtedness and lower optimal debt/equity ratios, other things constant, are expected to pay less in dividends. In this way, based on Easterbrook's analysis, we expect a positive correlation between dividends and the debt/ equity ratio (Kalay & Lemmon, 2008, p. 33).

However, agency theory urged that by paying dividends from internally generated cash flows which will no longer satisfy the needs of the companies. For this reason companies will visit the capital market more frequently for financing needs and relying on Easterbrook (1984), it will bring them under the greater scrutiny of the capital market. Hence, by paying dividends, firms are likely to reduce the costs associated with the principal/agent relationship (Mohd Hasan Abdullah, Ahmad, & Roslan, 2012, p. 72).

II.3.5.2 Jensen's model

In similar in spirit to Easterbrook, the starting point of Jensen's (1986) analysis is the limited ability of stockholders to control management. Managers can act and make decision as a perquisite to maximize their own utility but are not necessarily consistent with the maximization of shareholders' wealth. They use corporation's free cash flow to depart from shareholders interests (Kalay & Lemmon, 2008, p. 33). Jensen defined free cash flows as excessive cash flow meant for funding NPV investment and is available to be used by management in pursuit of managers' objectives. Management's ability to shift resources away from the stockholders is reduced due the payment of dividends and stockholders should insist that these funds be paid. On the other hand Jensen predicts a negative relationship between dividends and the debt/equity ratio since leverage may reduce the free cash flow with the commitment to periodic interest payments (Kalay & Lemmon, 2008, p. 34).

Jensen (1986) developed a similar argument to Easterbrook model, based on the shareholder–manager agency relationship. Paying dividends reduces the firm's discretionary free cash flow that managers could use to fund investment in their favor and from which they can benefit. The extra cash balances permits to managers to make some investment, which may be detrimental to shareholders (Baker, Powell, & Veit, 2002, p. 244). Dividends solve the conflicting interest between shareholders and managers and mitigate agency problems in a company up to some extent. For shareholder, having cash payment allows him to be secured from expropriation; however, manager prefers to retain earnings, in purpose to sustain higher control over the resources (Arshad, Akram, Amjad, & Usman, 2013, p. 379).

According to Jensen (1986) managers will act for their own interest using resources which are not paid to shareholders. Dividend will serve as a good assessment of the firm to shareholders and not only give a hand in reducing the agency costs. Ownership structure is also crucial and may influence dividend payout by paying a vital role to determining the competence of the market by giving information about two momentous things. First, for shareholders to the extent of risk diversification and the second is that, it may convey information for the management about the possible agency problem. The interest conflicting concerns is not limited only between shareholders and managers; the agency issue may occurs with controlling shareholders and minority ones (Arshad, Akram, Amjad, & Usman, 2013, p. 379).

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Since controlling shareholders may expropriate minority shareholders' wealth. In this case, Dividend of the firm can also be utilized by controlling shareholders to compensate the minority shareholders' concern in an environment where expropriation by controlling shareholders prevails. Jensen and Meckling (1976) followed by Rozeff (1982) have urged that the capital market is not just right, making the dividend policy appropriate and largely affected by the presence of market frictions (Arshad, Akram, Amjad, & Usman, 2013, p. 379).

According to Jensen (1986) managers tend to invest in low return projects in corporations with large cash flows. For mergers and takeovers, Jensen claimed that when either the acquirer has a large quantum of free cash flow or the acquired has a large free cash flow which has not been paid out to stakeholders. Jensen's free cash flow evidence is often used for motivating tests of the free cash flow hypothesis of dividend policy, despite the fact that it does not deal with the issue of dividends (Bhattacharyya, 2007, p. 7).

III. Empirical evidence on payout policy

III.1 Asymmetric information and signaling models

Signaling models support the observation that stock prices tend to move in the same direction as changes in dividends. These models also predicted that changes in future earnings should be positively correlated with the current changes in dividends. Several studies have investigated the relationship between dividend changes and a firm's subsequent earnings to determine if dividends provide valuable information to the market. If dividends convey private information about earnings, forecasts that incorporate dividend information should outperform those without it (Kalay & Lemmon, 2008, p. 42).

In 1973, Watts conducted a study to examine whether information about current dividends improves forecasts of future earnings, using data from 310 firms spanning the period 1946-1967. The results showed limited evidence that information about current dividends enhances the accuracy of future earnings forecasts. Similarly, Gonedes (1978) found weak evidence supporting the idea that current dividend information improves forecasts of subsequent earnings (Kalay & Lemmon, 2008, p. 42).

Penman (1983) also found little evidence suggesting that changes in dividends aid in predicting future changes in earnings. Furthermore, Penman discovered that many firms with improved future earnings did not adjust their dividends accordingly. A more recent study by Benartzi, Michaely, and Thaler (1997) corroborates these findings. They analyzed a large sample of firms over the period 1979-1991 and measured earnings changes following dividend announcements, taking into account industry averages and adjusting for earnings momentum and mean reversion. They observed a strong positive association between lagged and contemporaneous earnings changes and dividend changes. However, they found no consistent relationship between current dividend changes and future earnings changes over the subsequent two years. Interestingly, following dividend decreases, Benartzi et al. reported that earnings actually increased in the following two years (Kalay & Lemmon, 2008, p. 42).

Penman (1983) examined how dividend announcements and management earnings forecasts serve as indicators of future earnings and firm value. Initially, it evaluates these predictors' effectiveness in forecasting earnings. Subsequently, it assesses their contribution to understanding firm value by comparing investment strategies based on each predictor's information. Last, the impact of dividend announcements on stock prices is analyzed (Penman, 1983, p. 1181).

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DeAngelo, DeAngelo, and Skinner (1996) conducted a study involving 145 firms that experienced a decline in earnings growth after at least nine consecutive years of growth. They focused on the dividend decision made in the year of the earnings decline (referred to as year 0) and hypothesized that this decision would provide significant information about whether the decline was permanent or transitory. However, contrary to their predictions, they found no evidence to suggest that dividend increases were associated with positive future earnings performance. Ofer and Siegel (1987) further explored the relationship between dividend and earnings changes by examining whether unanticipated changes in dividends affected the market's expectations of future earnings. Unlike studies that focused on changes in earnings following dividend changes, Ofer and Siegel did find evidence that analysts adjusted their forecasts for current-year earnings in the same direction as the dividend changes (Kalay & Lemmon, 2008, p. 43).

In this paper, the authors established a connection between unexpected changes in financial policy and unexpected changes in a firm's performance. To investigate this relationship, they introduced a novel methodology that combines the analysis of stock price movements and earnings forecast data. Their findings revealed that following the announcement of an unexpected dividend change, analysts adjust their earnings forecasts in proportion to the magnitude of the unexpected dividend change. Moreover, these revisions in earnings forecasts are positively correlated with the change in equity value surrounding the announcement. Importantly, the authors demonstrate that these revisions follow a rational pattern, adding to the credibility of their results. Consequently, the study provides compelling direct evidence that supports the hypothesis that unexpected dividend changes serve as valuable signals of information about firm performance to market participants (Ofer & Siegel, 1987, p. 889).

Other empirical studies have investigated the conditions under which dividends act as costly signals. Tax-based dividend-signaling theories propose that dividends are a more costly payout mechanism compared to share repurchases, and managers intentionally use dividend policy to signal the quality of the firm. Bernheim and Wantz (1995) examined whether the market reaction to dividend changes varied systematically across different tax regimes. Their findings supported the dividend-signaling hypothesis, showing that the market reaction to dividend changes was greater during periods when the relative taxes on dividends compared to capital gains were higher. However, Bernhardt, Robertson, and Farrow (1994) found little evidence in support of dividend signaling when they used nonparametric techniques to account for the nonlinear nature of most signaling models. Similarly, Grullon and Michaely (2001) analyzed data surrounding the Tax Reform Act of 1986 and found that market reactions to dividend increases were larger in the post-1986 period when dividends were taxed less heavily than capital gains (Kalay & Lemmon, 2008, p. 43).

Additionally, Amihud and Murgia (1997) studied the market reaction to dividend changes in Germany, where dividends are favorably taxed relative to capital gains for most investors. Contrary to the predictions of signaling models, they found a market reaction to dividend changes in Germany similar to that observed in the United States. In summary, there is limited evidence supporting the notion that changes in dividends predict future changes in earnings, which is a key prediction of dividend-signaling models. If anything, dividend changes tend to follow rather than precede earnings changes. Additionally, the evidence in favor of the sufficient conditions proposed by tax-based signaling models is at best weak (Kalay & Lemmon, 2008, p. 43).

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The increased taxation of dividends in the United States has led to the development of theories explaining why companies choose to pay dividends. Tax-based signaling models propose that the higher tax on dividends is crucial to make them informative indicators of a company's value. In contrast, Germany does not impose a tax disadvantage on dividends and, in fact, offers lower taxes for most investor classes. According to these models, dividends in Germany should not be informative. Surprisingly, our findings show that the stock price reaction to dividend news in Germany resembles that observed in the United States. This indicates that factors other than taxation contribute to the conveyance of information of dividends in Germany (Amihud & Murgia, 1997, p. 397).

A survey conducted by Graham, Harvey, and Michaely (2004) among 384 executives from 256 U.S. companies also provides little support for the idea that managers consider dividends as a costly mechanism for signaling the true value of their firms. While most executives believe that dividend policy conveys information to investors, only a small percentage suggest using dividend policy to make their firms appear better than competitors, and an even smaller percentage state that dividends are used to demonstrate the ability to bear self-imposed costs as required by costly signaling models (Kalay & Lemmon, 2008, p. 43).

III.2 Agency models

Due to the less structured nature of agency models compared to signaling models, deriving precise empirical implications becomes challenging. In line with the free-cash-flow models, what should happen to earnings after a dividend increase? The answer remains ambiguous. If the board of directors decides to increase dividends after management has already invested in projects with negative net present value (NPV), the payment of dividends may prevent further investment in such "bad" projects, leading to an expectation of increased earnings and profitability. However, if the board decides on dividends before management has the opportunity to overinvest; it becomes difficult to determine the relationship between future and past earnings. If dividends increase when firms face declines in investment opportunities, even a decrease in profitability can be consistent with the free-cash-flow hypothesis. A clearer implication of the free-cash-flow hypothesis is that the problem of overinvestment is likely to be more prominent in stable, cash-rich companies in mature industries with limited growth opportunities (Allen & Michaely, 2003, p. 396).

Lang and Litzenberger (1989) examined the effects of dividend announcements on stock prices, specifically testing two competing explanations: cash flow signalling and free cash flow/overinvestment. To identify overinvestors, they used "Robin's Q ratios" that are less than unity. Notably, they found that firms with Q ratios less than unity experienced significantly higher average returns following announcements of large dividend changes compared to other firms. Further analysis, including a more detailed data breakdown and an investigation into changes in analysts' earnings forecasts surrounding dividend announcements, provided additional support for the overinvestment hypothesis as opposed to the cash flow signalling hypothesis (Lang & Litzenberger, 1989, p. 181).

The researchers conducted a study to test the free-cash-flow hypothesis and compare it with the information-signaling hypothesis. They focused on the idea that an increase in dividends should have a greater positive impact on the stock price of overinvesting firms compared to firms that do not overinvest. They identified overinvesting firms as those with a Tobin's Q value less than one. Their findings showed that when examining dividend changes greater than 10% in absolute value, firms with Q values less than one experienced a larger price

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appreciation for dividend-increase announcements, while firms with Q values greater than one showed a smaller effect (Allen & Michaely, 2003, p. 396).

For dividend-decrease announcements, firms with Q values lower than one experienced a more significant price drop. These results, with a greater effect on firms with lower Q values, align with the free-cash-flow hypothesis. Conversely, the information-signaling hypothesis would have predicted a symmetric effect regardless of the market value to replacement value ratio. Yoon and Starks (1995) replicated the experiment conducted by Lang and Litzenberger over an extended time period. They found that the reaction to dividend decreases was the same for both high and low Tobin's-Q firms. The fact that the market reacted negatively to dividend-decrease announcements by value-maximizing firms (high Q) is not consistent with the free-cash-flow hypothesis (Allen & Michaely, 2003, p. 396).

Similar to Lang and Litzenberger (1989), Yoon and Starks investigated the reasons behind the changes in wealth that occur when companies announce dividend adjustments. They discovered that the dividend announcements do not reveal any new information about managers' investment policies. However, they did find that dividend increases (decreases) are followed by significant increases (decreases) in capital expenditures over the three years after the dividend change. Additionally, the study observed that analysts' forecasts of current earnings were revised following dividend change announcements. Based on these findings, the evidence supports the cash flow signaling hypothesis rather than the free cashflow hypothesis as the explanation for the stock price reactions observed during dividend change announcements (Yoon & Starks, 1995, p. 995).

In this study, the authors also observed a differential reaction to dividend increase announcements. However, when they accounted for factors such as dividend yield level, firm size, and the magnitude of the change in dividend yield through regression analysis, they found a symmetric reaction to dividend changes (both increases and decreases) among high and low Tobin's Q firms. Once again, this evidence contradicts the free-cash-flow hypotheses. Grullon, Michaely, and Swaminathan's findings of declining return on assets, cash levels, and capital expenditures in the years following significant dividend increases suggest that firms anticipating a decline in investment opportunities are the ones more likely to increase dividends. This supports the free-cash-flow hypothesis (Allen & Michaely, 2003, p. 397).

Lie (2000) extensively investigated the relationship between excess funds and firms' payout policies. He found that firms increasing dividends (or engaging in repurchases) had more cash in excess compared to their industry peers. Lie also demonstrated that the market reaction to the announcement of special dividends (and repurchases) was positively associated with the firm's amount of excess cash and negatively associated with the firm's investment opportunity set, as measured by Tobin's Q. These results align with the notion that distributing cash, especially for firms with limited investment opportunities, can enhance shareholder wealth by limiting potential overinvestment (Allen & Michaely, 2003, p. 397).

In 1936, the Federal Government unexpectedly introduced a tax on corporate profits that were not distributed to shareholders. Despite the direct financial burden imposed by the tax, its announcement led to a positive reassessment of corporate value, especially among companies that typically retained a larger portion of their earnings. This phenomenon indicates a divergence between the preferences of company managers and shareholders regarding the distribution of dividends, suggesting the existence of agency costs. In other words, there was a misalignment of interests between managers and shareholders, potentially resulting in

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inefficiencies or conflicts. Interestingly, even though the tax was intended to incentivize higher dividend payouts, Christie and Nanda (1994) observed that the actual growth in dividends during 1936 was lower for companies considered more likely to face higher agency costs. They took into account factors such as liquidity, debt levels, and earnings growth to make this assessment (Christie & Nanda, 1994, p. 1727).

Christie and Nanda (1994) examined the stock market's reaction to President Roosevelt's unexpected announcement of taxes on undistributed corporate profits in 1936. This tax change made dividends more attractive relative to retained earnings. According to the free-cash-flow hypothesis, firms would have had a greater incentive to reduce retained earnings and mitigate potential overinvestment issues. Christie and Nanda found that share prices increased in response to the tax change announcement, supporting the idea that paying dividends could alleviate some free-cash-flow problems (Allen & Michaely, 2003, p. 397).

They also discovered that firms more susceptible to free-cash-flow problems experienced a more positive price reaction to the announcement. The ability to monitor and the rights of outside shareholders vary across countries, indicating differences in the potential severity of conflicts of interest. La Porta, Lopez-De Silanes, Shleifer, and Vishny (2000) examined the relationship between investors' protection and dividend policy in 33 countries. They tested two hypotheses. The first suggested that in countries with stronger investor protection, investors would exert more pressure on management to distribute more cash. The second hypothesis proposed that due to market forces (such as management's desire to raise more capital or maintain a high stock price for other reasons), management would actually pay higher dividends in countries with weaker investor protection (Allen & Michaely, 2003, p. 397).

Research has extensively studied the significant variations between countries concerning ownership concentration in publicly traded firms, the characteristics of capital markets, dividend policies, and the availability of external finance for companies. A key factor influencing these differences is the level of protection that investors, including shareholders and creditors, receive from potential expropriation by managers and controlling shareholders of firms. In a seminal work, La Porta, Lopez-De Silanes, Shleifer, and Vishny (2000) delved into the contrasting legal frameworks and the effectiveness of their enforcement across different countries (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 2000, p. 1).

They analyzed the potential origins of these legal disparities, outline their repercussions on corporate behavior, and evaluate potential strategies for corporate governance reform. Their findings led them to propose that the legal approach provides a more insightful perspective for comprehending corporate governance and its reform compared to the traditional classification of financial systems as either bank-centered or market-centered (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 2000, p. 1).

III.3 Empirical findings of asymmetric information and agency models

What are the key predictions of the agency and signaling models? One of the most prominent predictions is that the market's response to changes in payouts should align with the direction of the change. An unexpected dividend increase should lead to a positive market response, while an unexpected dividend decrease should result in a negative market response. This pattern has been documented by empirical researchers. For instance, Grullon, Michaely, and Swaminathan (2002) found that the average abnormal return to dividend increases is 1.34% (with a median of 0.95%), while the average abnormal market reaction to dividend decreases

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is -3.71% (with a median of -2.05%). The market reaction to dividend initiations and omissions is even more pronounced, as shown by Healy and Palepu (1988). More recent research by Michaely, Thaler, and Womack (1995) estimated an average excess return of 3.4% for initiations and -7% for omissions. Similarly, repurchase announcements exhibit a similar pattern, with a larger magnitude of market response compared to dividend increases. Grullon and Michaely (2004), analyzing a sample of share repurchases between 1980 and 1997, found an average market response of 2.7% to repurchase announcements (Farre-Mensa, Michaely, & Schmalz, 2014, p. 107).

In contrast to the expectations of many payout theories, a study revealed that the announcement of open-market share repurchase programs does not lead to an improvement in operating performance. However firms engaging in repurchase experience a significant reduction in systematic risk and cost of capital compared to firms that do not repurchase shares. Moreover, consistent with the free cash-flow hypothesis, we find that the market response to share repurchase announcements is more positive for firms that are prone to overinvest. Finally, our findings suggest that investors initially under react to repurchase announcements, potentially due to their underestimation of the subsequent decrease in the cost of capital (Grullon & Michael, 2004, p. 651).

The market reaction is positively correlated with the change in the announced amount of dividends or repurchases. While this empirical observation is consistent with both agency and signaling explanations, it is also compatible with alternative explanations, including behavioral ones. However, the studies mentioned above do not differentiate between these various explanations. The second significant implication of payout signaling theories is that increases in payout should be accompanied by improvements in operating performance (Farre-Mensa, Michaely, & Schmalz, 2014, p. 107).

It is well-known that firms that raise their dividends (or engage in share repurchases) have performed well in the past, both in terms of operating and stock performance, while firms that have reduced dividends have fared poorly. For instance, Benartzi, Michaely, and Thaler (1997) documented an average abnormal return of 8.6% (-28%) in the year prior to a dividend increase (decrease). Therefore, dividends clearly signal past performance, but the question remains whether they also signal future performance, as the theory suggests. This issue has been a subject of debate for some time (Farre-Mensa, Michaely, & Schmalz, 2014, p. 107).

Brickley (1983), Healy and Palepu (1988), and Nissim and Ziv (2001) found a significant increase in earnings in the year of and the year after a dividend increase. However, Watts (1973), Gonedes (1978), and Penman (1983) found little evidence of dividend changes conveying information about future earnings. The somewhat mixed results regarding the relationship between current changes in dividends and future changes in earnings may be attributed to the small sample sizes used in most of these studies. Another challenging aspect is the difficulty in modeling unexpected earnings (Farre-Mensa, Michaely, & Schmalz, 2014, p. 108).

Benartzi, Michaely, and Thaler (1997) investigated the relationship between dividend changes and future changes in earnings using various definitions of earnings innovations. They measured earnings changes relative to the industry average of earnings changes, adjusted for earnings momentum and mean reversion. Two robust findings emerged. Firstly, there was a strong correlation between lagged and contemporaneous dividend changes and earnings changes. When dividends increased, earnings also showed an increase. However, there was no

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evidence of a positive relationship between dividend changes and future earnings changes. In the two years following a dividend increase, earnings changes were unrelated to the sign and magnitude of the dividend change (Farre-Mensa, Michaely, & Schmalz, 2014, p. 108).

Numerous theories regarding dividends suggest that changes in dividend payouts hold valuable information about a firm's future earnings. To investigate this claim, we conducted a study and discovered limited evidence supporting it. When firms raise dividends in year 0, they tend to experience notable increases in earnings for both years -1 and 0. However, this elevated growth in earnings does not persist in subsequent periods, indicating no unexpected earnings expansion. Surprisingly, the magnitude of the dividend increase does not serve as a predictor of future earnings. On the other hand, firms that reduce dividends in year 0 show a decline in earnings for both year 0 and year -1 (Benartzi, Michaely, & Thaler, 1997, p. 1007).

Nonetheless, these firms demonstrate significant earnings increases in year 1. This observation aligns with Lintner's dividend policy model, which suggests that firms increasing dividends are less likely to encounter a drop in future earnings, implying that their concurrent earnings growth is somewhat stable. Despite the absence of notable future earnings growth, firms that increase dividends exhibit significant (albeit modest) positive excess returns over the following three years. This suggests that investors still perceive dividend-increasing firms as favorable investment opportunities despite the lack of substantial future earnings growth (Benartzi, Michaely, & Thaler, 1997, p. 1007).

In a different context, DeAngelo, DeAngelo, and Skinner (1996) examined firms that experienced a decade of earnings growth followed by a year of decline. They focused on the year zero dividend decision, which could assist the market in assessing whether the earnings decline was permanent or temporary. Their findings revealed no evidence that a favorable dividend decision (i.e., a dividend increase) served as a reliable signal of superior future earnings performance. However, the results concerning dividend decreases were strong but unexpected: both Healy and Palepu (1988) and Benartzi, Michaely, and Thaler (1997) found a clear pattern of earnings increases in the two years following a dividend cut (Farre-Mensa, Michaely, & Schmalz, 2014, p. 108).

Similar to studies on dividend changes, Grullon and Michaely (2004) found that announcements of open-market share repurchase programs were not followed by an increase in operating performance. Overall, the accumulated evidence does not support the notion that dividend changes provide information about future earnings. As Miller (1987) summarized, "dividends are better described as lagging earnings than as leading earnings." Current research continues to support Miller's assertion (Farre-Mensa, Michaely, & Schmalz, 2014, p. 108).

The third significant empirical finding is that the majority of dividends are paid by large and relatively stable firms. These firms also tend to experience slower growth (Grullon, Michaely, & Swaminathan, 2002; DeAngelo, DeAngelo, & Stulz, 2006). Grullon, Michaely, and Swaminathan (2002) examined the relationship between changes in dividend policy and changes in the risk and growth characteristics of firms. They discovered that firms that increase dividends experience a significant decrease in systematic risk, while firms that decrease dividends experience a significant increase in systematic risk. Firms that increase dividends also see a significant decline in their return on assets, indicating a decline in systematic risk (Farre-Mensa, Michaely, & Schmalz, 2014, p. 109).

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Additionally, the capital expenditures of firms that increase dividends remain stable, while the levels of cash and short-term investments on their balance sheets decline, aligning with the decreasing risk hypothesis. DeAngelo, DeAngelo, and Stulz (2006) further investigated the relationship between dividend policy and firm maturity or lifecycle stage. They found a monotonic relationship between the fraction of dividend-paying firms in the economy and growth opportunities, which is consistent with the changing role of dividends throughout the lifecycle of firms. Interestingly, these large, mature firms that are not in the growth cycle are more likely to be concerned with agency and free cash flow problems rather than asymmetric information and signaling (Farre-Mensa, Michaely, & Schmalz, 2014, p. 109).

In accordance with the life-cycle theory of dividends, the likelihood of publicly traded industrial firms paying dividends is high when a significant portion of their total equity (and total assets) comes from retained earnings. Conversely, this probability drops nearly to zero when most of their equity is obtained through contributions rather than earned profits. DeAngelo, DeAngelo, and Stulz (2006) have observed a highly significant correlation between the decision to pay dividends and the mix of earned versus contributed capital. This correlation remains robust even after controlling for factors such as profitability, growth, firm size, total equity, cash balances, and dividend history (DeAngelo, DeAngelo, & Stulz, 2006, p. 227).

Notably, this relationship holds true for both dividend initiations and omissions. The regression analyses reveal that the proportion of earned versus contributed capital has a more substantial impact on dividend decisions compared to measures of profitability and growth opportunities. Additionally, they have documented a significant rise in firms with negative retained earnings over time, increasing from 11.8% of industrials in 1978 to 50.2% in 2002 (DeAngelo, DeAngelo, & Stulz, 2006, p. 227).

Interestingly, when they control for the mix of earned/contributed capital, firms with negative retained earnings display almost no change in their likelihood of paying dividends from the mid-1970s to 2002. On the other hand, firms with earned equity, which makes them logical candidates for paying dividends, experience a propensity reduction that is twice the overall reduction reported by Fama and French in 2000. Finally, through simulations, DeAngelo, DeAngelo, and Stulz (2006) demonstrate that if well-established firms had refrained from paying dividends, their cash balances would be exceptionally large, and their long-term debt would be minimal. This scenario would grant managers of these mature firms an extraordinary level of discretion in managing their resources (DeAngelo, DeAngelo, & Stulz, 2006, p. 227).

The increased taxation of dividends in the United States sparked theories aiming to understand why companies choose to pay dividends. Tax-based signaling models suggested that the higher tax rate on dividends was essential to make them meaningful indicators of companies' values. In contrast, Germany, with its lower taxes on dividends for most investor classes, it was predicted by these models to have non-informative dividends. Surprisingly, our findings reveal that the stock price response to dividend-related news in Germany is comparable to that observed in the United States. This indicates that dividends are informative in Germany despite the tax advantages, suggesting that there are other factors beyond taxation that contribute to the informative nature of dividends (Amihud & Murgia, 1997, p. 397).

There have also been several direct tests of dividend signaling, particularly using the model proposed by John and Williams (1985). Differential taxes between dividends and capital gains

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are the reason why dividends can serve as a costly signal in that model. Bernheim and Wantz (1995) investigated the market reaction to dividend changes during different tax regimes. According to the signaling hypothesis, in periods when the relative taxes on dividends are higher, the market reaction to dividend increases should be stronger because paying dividends becomes more costly. Consistent with this signaling hypothesis, Bernheim and Wantz found that during periods of higher relative taxes on dividends, the market reaction to dividend payments is more favorable. However, applying nonparametric techniques that account for the nonlinear properties common to many dividend signaling models, Bernhardt, Douglas, and Robertson (2005) did not find evidence supporting the notion that taxes serve as a costly signal (Farre-Mensa, Michaely, & Schmalz, 2014, p. 109).

An empirical study examined a fundamental property common to dividend signaling models: the impact of differential tax rates on dividend versus capital gains income. It distinguished between the hypothesis that dividends function purely as signaling devices and the alternative view that dividends convey information but are not strictly Spencian signals. Using robust nonparametric methods, the study tested these monotonicity conditions. While the expected monotonic relationship predicted by signaling theory is initially observed, a detailed analysis shows that it does not consistently hold across different levels of the dividend signal as posited by signaling theory. This finding strongly suggested that current signaling models fail to fully explain firms' choices regarding dividend policy (Bernhardt, Douglasb, & Robertson, 2005, p. 77).

Amihud and Murgia (1997) examined dividend policy in Germany, where dividends are not tax-disadvantaged. They found that dividend changes in Germany generate a stock price reaction similar to what is typically found in the United States, despite the difference in relative tax treatment. Hence, their findings are inconsistent with tax-based dividend signaling theories. The aforementioned papers propose an intriguing thought experiment that can be further explored. For example, significant tax changes over the past 30 years could potentially serve as exogenous shocks to investigate the implications of both signaling and agency theories on the market response and the supply of dividends before and after the tax changes. These avenues present promising directions for future research. Following the work of La Porta et al. (2000), research has started to pay closer attention to the interaction between dividends and other governance mechanisms (Farre-Mensa, Michaely, & Schmalz, 2014, p. 109).

A key objective is to determine whether dividends and other governance mechanisms act as substitutes or if shareholders require these additional governance mechanisms to impose a dividend policy that disciplines management. In the latter case, dividends and these governance mechanisms can be seen as complements. Grullon and Michaely (2001) examined the link between product market competition, managerial incentives, and corporate payout policy. There are several potential reasons for the relationship between product market competition and payout policy. One significant reason is the interaction between competition and agency conflicts. Product market competition may serve as an enforcement mechanism that pressures managers to distribute cash to shareholders by increasing the risk and cost associated with overinvesting (e.g., higher likelihood of liquidation, greater transparency). Alternatively, payout policy can act as a substitute for competition, where managers use dividends as a substitute for the discipline imposed by competition to establish a good reputation in the capital markets and raise capital on more favorable terms (Farre-Mensa, Michaely, & Schmalz, 2014, p. 109).

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Conclusion of the chapter

In imperfect markets, payout policy theories diverge significantly from those based on idealized, perfect market conditions. In such environments, factors like information asymmetry, transaction costs, and agency conflicts introduce complexities that shape the decision-making processes around dividends and share repurchases. The tax preference theory, which builds on Modigliani and Miller's (1961) dividend irrelevance theory, posits that in a world without taxes or transaction costs, dividend policy would not influence a firm's value. However, in real-world markets, where tax structures impact investor returns, some shareholders may prefer share repurchases over dividends due to the typically lower tax rates associated with capital gains as compared to dividends. This discrepancy reflects the role of taxes as a determinant in payout preference, underscoring the departure of actual market behaviors from theoretical ideals.

Signaling theory presents another influential perspective, positing that firms may use dividends or share repurchases to convey signals about their financial stability and growth prospects to investors. A firm might increase dividends as an indicator of strong, anticipated future cash flows and overall confidence in its financial health, whereas a dividend reduction may signal financial constraints or declining earnings. Empirical studies have found that dividend announcements frequently lead to notable stock price reactions, further supporting the idea that investors interpret changes in dividend policies as predictive indicators of future performance.

Additionally, agency theory provides insights into how conflicts of interest between management (agents) and shareholders (principals) can impact payout policy in markets with imperfections. In these cases, agency problems—particularly those related to free cash flow—can shape firms' approaches to distributing earnings. Empirical research suggests that firms with significant free cash flow are more inclined to distribute higher dividends or engage in share repurchases as a means of reducing agency costs. By returning excess capital to shareholders, firms can reduce the risk of inefficient allocation of resources by management, aligning with shareholder interests.

These theories highlight how payout policy decisions are shaped by market realities. Imperfect market conditions introduce layers of strategic considerations that inform how firms manage dividends and share repurchases, making payout policy a complex and nuanced element of corporate finance strategy. The interplay between signaling, tax preference, and agency theories reflects the adaptive strategies firms employ to navigate market imperfections, balancing the demands of investors and the practicalities of financial management in a non-ideal world.

CHAPTER 3:
ECONOMETRIC
MODELING FOR PANEL
DATA

CHAPTER III: Econometric modeling for panel data

Introduction of chapter

Panel data, frequently referred to as longitudinal data, represents a unique type of dataset that consists of observations recorded over time on the same subjects or entities. This data structure integrates elements of both cross-sectional data, which is collected at a single point in time across various subjects, and time-series data, which captures information over time for a single subject. Essentially, panel data encompasses two dimensions: a temporal dimension and a cross-sectional dimension. For instance, one may collect data on multiple countries across several years or observe various companies over multiple quarters.

In the field of finance, panel data is widely utilized due to its substantial value in conducting diverse financial analyses. It serves as a powerful analytical tool that enhances researchers' capacity to analyze trends, forecast future outcomes, and comprehend the complex interrelationships among financial variables over time. Within panel data analysis, models are generally classified into static and dynamic categories, depending on how they account for time-related changes and dependencies.

Static models focus on relationships either at a specific point in time or across several time periods, without explicitly modeling the dynamics of variable evolution. These models do not incorporate past values of the dependent variable as predictors, thereby providing a snapshot of relationships without capturing temporal progression. The estimation of static panel data typically employs three distinct methods: the ordinary least squares (OLS) method, known as pooled regression (Pooled OLS); the fixed effects model; and the random effects model. Each of these methodologies offers different advantages depending on the nature of the data and the research questions posed.

In contrast, dynamic models explicitly account for the time dimension by incorporating lagged values of the dependent variable or other time-dependent variables into the analysis. These models are designed to capture the dynamics and temporal dependencies inherent in the data, allowing for a more nuanced understanding of how relationships evolve over time.

The Generalized Method of Moments (GMM) is a robust statistical technique employed to estimate model parameters in contexts where traditional methods, such as Ordinary Least Squares, may be inadequate. GMM is particularly advantageous for panel data models, especially in situations involving potential endogeneity issues or when the model incorporates dynamic elements. By leveraging GMM, researchers can obtain more reliable estimates and improve the overall validity of their analyses.

This chapter is structured into three distinct sections. Section 1 provides a comprehensive definition of panel data, elucidating its characteristics and significance. Section 2 delves into the analysis of static panel data, detailing the estimation methods employed in this context. Lastly, Section 3 examines econometric modeling for dynamic panel models, introducing the GMM estimator and discussing its application in financial research. Through this structured approach, the chapter aims to provide a thorough understanding of panel data and its critical role in financial analysis.

I. Panel data

A substantial portion of empirical studies in the field of corporate finance relies on panel data, which involves observing a set of N firms over a series of T time periods. Typically, the number of time periods (T) is much smaller than the number of firms (N). These datasets are sourced from various outlets such as financial statements, market data, and managerial

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reports, with the primary goal of establishing relationships between variables and understanding to what extent independent variables (often referred to as explanatory variables or regressors) influence the behavior of dependent variables (Barros, Bergmann, Castro, & Di Miceli da Silveira, 2020, p. 438).

I.1 Definition of Panel Data

Panel data typically consist of time series observations collected from multiple individuals. Therefore, observations in panel data are characterized by two dimensions: a cross-sectional dimension denoted by subscript i , representing individual entities, and a time series dimension denoted by subscript t , representing sequential periods. However, panel data may exhibit a more complex clustering or hierarchical structure. For example, a variable y could measure air pollution levels at station s in city j of country i at time t (e.g., Antweiler, 2001; Davis, 1999). To simplify, let focus on presenting balanced panel data, which involves N cross-sectional units ($i=1, \dots, N$) observed over T time periods (Hsiao, 2005, p. 144).

Panel data, also known as longitudinal or cross-sectional time-series data, refer to datasets that encompass observations on the same entities over several distinct time periods. These longitudinal datasets consist of multiple entities, each with recurring measurements across different time periods. Such datasets might exhibit individual (group) effects, time effects, or both, which are analyzed through fixed effect and/or random effect models (Park, 2011, p. 1).

Panel data studies have proliferated significantly, whether in terms of methodology or empirical research. According to the Social Sciences Citation Index, the number of studies using keywords like "panel data" or "longitudinal data" rose from 29 in 1986 when Hsiao's first edition of Panel Data Analysis was published, to 580 in 2003, and 687 in 2004. This growth in applied studies and the development of new econometric tools for panel data has been remarkable since the seminal work of Balestra and Nerlove in 1966 (Hsiao, 2005, p. 144).

Several factors contribute to this rapid growth: (i) increased availability of data, (ii) enhanced ability to model the complexity of human behavior compared to single cross-section or time series data, and (iii) the challenges posed by the methodology itself. In the following sections, we will briefly discuss each of these factors. However, due to the extensive nature of the literature on panel data, a comprehensive review is beyond the scope here. For further reading, references such as Arellano (2003), Baltagi (2001), Hsiao (2003), Mátyás and Sevestre (1996), and Nerlove (2002) are recommended (Hsiao, 2005, p. 144).

Two of the most prominent longitudinal studies are the National Surveys of Labor Market Experience (NLS) conducted by Ohio State University and the Panel Study of Income Dynamics (PSID) from the University of Michigan. Initiated in the 1960s during the intensification of research on poverty and the United States' anti-poverty efforts, these studies were motivated by broad distributional concerns. They aimed to monitor and elucidate changes in economic well-being, as well as to investigate the impacts of economic and social policies. These longitudinal investigations were specifically designed to provide insights into household economic behaviors crucial for understanding economic well-being and poverty. Data collection efforts focused not only on employment, earnings, and incomes but also encompassed housing and food consumption patterns (Klevmarken, 1989, p. 523).

These two surveys continue to be active. For example, the PSID has collected annual data since 1968 and is currently funded for several more years. The meticulous documentation and

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widespread dissemination of these data account for their enduring influence on economic research. Numerous studies, authored by both the NLS and PSID teams as well as independent researchers, have been published. These studies encompass diverse topics such as labor supply, earnings, family economic status, the impact of income support programs, changes in family composition, residential mobility, food consumption, and housing. The NLS and PSID have also served as models for recent European longitudinal surveys. Several longitudinal surveys are now operational across various European countries, including the German Socio-Economic Panel, the Swedish Study of Household Market and Nonmarket Activities, and a Dutch household panel, all of which are represented in this session (Klevmarken, 1989, p. 523).

As the availability of panel data continues to grow, a considerable interest has been piqued among scholars, practitioners, and students in the realm of panel data modeling. This is primarily due to the increased variability present in these longitudinal datasets, offering a broader exploration of issues compared to cross-sectional or time-series data alone. According to Baltagi (2001), "Panel data provide more informative data, greater variability, less collinearity among variables, more degrees of freedom, and higher efficiency". Given well-structured panel data, panel data models are undeniably attractive as they offer methods to address heterogeneity and explore fixed and/or random effects within longitudinal data. However, the process of panel data modeling is not as straightforward as it may seem (Park, 2011, p. 1).

Panel data has significantly enhanced our understanding of economic behavior, particularly in the labor market dynamics, due to the availability of longitudinal micro data. This improvement underscores the importance of emphasizing the contribution of panel data to advancing knowledge in economics (Klevmarken, 1989, p. 527).

A comparison between the points of differences and similarities of the two fixed effects and random effects models is presented in the table below:

Table 7: Fixed Effect and Random Effect Models

	Fixed Effect Model	Random Effect Model
Functional form	$y_{it} = (\alpha + u_i) + X'_{it} \beta + v_{it}$	$y_{it} = \alpha + X'_{it} \beta + (u_i + v_{it})$
Assumption	-	Individual effects are not correlated with regressors
Intercepts	Varying across group and/or time	Constant
Error variances	Constant	Randomly distributed across group and/or time
Slopes	Constant	Constant
Estimation	LSDV, within effect estimation	GLS, FGLS (EGLS)
Hypothesis test	F test	Breusch-Pagan LM test

Source: Hun Myoung PARK, «Practical guides to panel data modeling: a step by step analysis using stata», International university of Japan, Public Management & Policy Analysis Program working paper, 2011, p 08.

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When considering a panel data sample, the very first thing to verify is whether the data-generating process is homogeneously or heterogeneously specified. In econometrics, this involves testing the equality of coefficients in the model studied within the individual dimension. Economically, specification tests aim to determine whether it is reasonable to assume that the theoretical model under study is perfectly identical for all countries or, conversely, whether there are specific characteristics unique to each country. (Hurlin, 2012, p. 8).

A common misconception is that fixed and/or random effect models should invariably be applied whenever data are organized in a panel format. Challenges in panel data modeling largely stem from 1) the nature of the panel data themselves, 2) the modeling process, and 3) the interpretation and presentation of the results. Some studies examine poorly organized panel data (which may not strictly qualify as longitudinal in an econometric sense), while others hastily apply fixed and/or random effect models without considering the relevance of such models. Careless researchers often struggle to interpret the results accurately and present them suitably (Park, 2011, p. 1).

Standard statistical methodology assumes that outcomes (denoted as $\tilde{y}$), conditional on certain variables (denoted as $\tilde{x}$), are random results from a probability distribution defined by a parameter vector of fixed dimensions, $\tilde{\theta}$, $f(\tilde{y}|\tilde{x}, \tilde{\theta})$. As an example, the standard linear regression model assumes a specific form for $f(\tilde{y}|\tilde{x}, \tilde{\theta})$, where (Hsiao, 2005, p. 149):

$$E(y|\tilde{x}) = \alpha + \tilde{\beta}'\tilde{x} \quad (63)$$

And

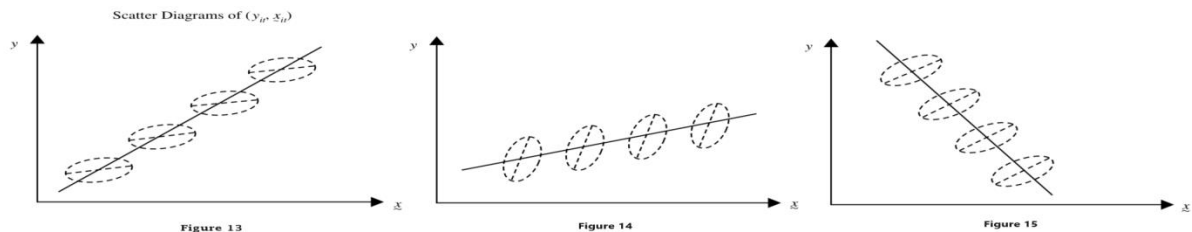
$$Var(y|\tilde{x}) = \sigma^2; \quad (64)$$

Where, $\tilde{\theta}' = (\alpha, \tilde{\beta}'\tilde{x})$

Typical panel data studies concentrate on individual outcomes, which are influenced by numerous factors. A common conditional probability density function of y on $\tilde{x}$ across all cross-sectional units i and all time points t is rare to assume. For example, besides $\tilde{x}$, individual outcomes may also be influenced by unobserved individual abilities (represented by α_i). Thus, the observed data (y_{it}, x_{it}) for $i=1, \dots, N$ and $t=1, \dots, T$ are generated as (Hsiao, 2005, p. 149):

$$y_{it} = \alpha_i + X_{it}\tilde{\beta}' + u_{it} \quad i \in \{1, 2, \dots, N\}, \quad t \in \{1, 2, \dots, T_i\} \quad (65)$$

Figures13-15: Scatter Diagrams of (y_{it}, x_{it})



Source: Hsiao, "Why Panel Data?", 2005, p. 150

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Figures 13-15 depict broken-line ellipses illustrating the scatter of individual observations around the mean, represented by broken straight lines. If an investigator incorrectly imposes the assumption of homogeneity (expressed in equations (63)–(64)), the solid lines in these figures would portray the estimated relationships between y and $\tilde{x}$. Such an imposition can lead to significantly misleading interpretations (Hsiao, 2005, p. 149).

If the conditional density of y given $\tilde{x}$ varies across different units i and over time t , implementing the fundamental theorems of statistical inference—such as the laws of large numbers and central limit theorems—becomes challenging. One approach to reintroduce homogeneity across units i and/or time t is to introduce additional conditional variables, denoted as $\tilde{z}$ (Hsiao, 2005, p. 149),

$$f(y_{it} | \tilde{x}_{it}, \tilde{z}_{it}, \tilde{\theta}) \quad (66)$$

The methodological literature on panel data suggests potential frameworks for $\tilde{\theta}_{it}$ (Hsiao, 2003). One approach to impose structure on $\tilde{\theta}_{it}$ it involves decomposing it into $(\tilde{\beta}, \tilde{\gamma}_{it})$, where $\tilde{\beta}$ remains consistent across both i and t , known as structural parameters, while $\tilde{\gamma}_{it}$ represents incidental parameters. As the number of cross-sectional units (N) and/or time series observations (T) increases, the dimensionality of $\tilde{\gamma}_{it}$ it also increases. The primary focus of panel data research is to draw conclusions about $\tilde{\beta}$ after accounting for the effects of $\tilde{\gamma}_{it}$. (Hsiao, 2005, p. 151)

Individual time-invariant variables are characteristics that remain constant for a specific cross-sectional unit over time but differ across different units. Examples include individual-level factors like management style, ability, gender, and socio-economic background. Period individual-invariant variables are characteristics that are consistent across all cross-sectional units at a particular point in time but can change over time. Examples include prices, interest rates, and prevailing market sentiments like optimism or pessimism. Individual time-varying variables are characteristics that vary across different cross-sectional units at a given point in time and also change over time. Examples include variables such as firm profits, sales figures, and capital stock. The impact of unobserved heterogeneity can be addressed by either assuming these effects to be random variables, which forms the basis of the random effects model, or as fixed parameters, which defines the fixed effects model (Hsiao, 2005, p. 151).

The primary challenge in panel methodology is to mitigate the influence of unobserved heterogeneity, denoted by the incidental parameters $\tilde{\gamma}_{it}$, in order to achieve reliable inference on the structural parameters $\tilde{\beta}$. To simplify the discussion, let assume $\gamma_{it} = \alpha_i$, indicating the presence of unobserved individual-specific effects only. These unobserved heterogeneities can impact the outcomes in either a linear or nonlinear manner. Model (65) exemplifies a scenario of linear unobserved heterogeneity, where $\gamma_{it} = \alpha_i$. In cases where y_{it} is not directly observable, the available data instead consist of $(d_{it}, \tilde{x}_{it})$, where i ranges from 1 to N and t ranges from 1 to T , where (Hsiao, 2005, p. 151):

$$d_{it} = \begin{cases} 1, & \text{if } y_{it} > 0 \\ 0, & \text{if } y_{it} \leq 0 \end{cases} \quad (67)$$

Then, conditional on $\tilde{x}_{it}$ and α_i ,

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$$E(d_{it}|\tilde{x}_{it}, \alpha_i) = \text{Prob}(d_{it}|\tilde{x}_{it}, d_i) = \int_{-(\tilde{\beta}'\tilde{x}_{it} + \alpha_i)}^{\infty} f(u)du, \quad (68)$$

In cases where $f(u)$ represents the probability density of u , it exemplifies how unobserved individual-specific effects nonlinearly influence the outcome. Since α_i is unobserved, there are two approaches. One approach assumes α_i to be a random variable (RE model). If the conditional density of α_i given $\tilde{x}_i = (\tilde{x}_{i1}, \dots, \tilde{x}_{iT})$ is known, α_i can be integrated out to derive the marginal conditional density of $\tilde{y}_i' = (y_{i1}, \dots, y_{iT})$ or $\tilde{d}_i' = (d_{i1}, \dots, d_{iT})$ given $\tilde{x}_i$. The other approach treats α_i as unknown parameters (FE model) (Hsiao, 2005, p. 151).

The random effects (RE) specification offers the advantage of maintaining a constant number of unknown parameters as the sample size increases. However, it has several disadvantages. Firstly, deriving the (marginal) conditional density of $\tilde{y}_i$ or $\tilde{d}_i$ given $\tilde{x}_i$ involves high-dimensional integrations over T , which can be computationally cumbersome. Additionally, the individual-specific effects α_i are unobserved, and if the conditional density of α_i given $\tilde{x}_i$ is misspecified, the marginal likelihood of $\tilde{y}_i$ given $\tilde{x}_i$ will also be inaccurate. Inferences based on a mis-specified likelihood function may lead to misleading conclusions (Hsiao, 2005, p. 152).

In contrast, the fixed effects (FE) specification avoids the need to specify the conditional density of α_i given $\tilde{x}_i$, thus eliminating the requirement for T -dimensional integration. However, in many panel datasets with large N (cross-sectional units) and small T (time periods); there may not be enough degrees of freedom to precisely estimate the individual-specific parameters α_i . This imprecision in estimating α_i , known as incidental parameters, can adversely affect the accuracy of inference on the structural parameters β (Hsiao, 2005, p. 152).

I.2 Panel data benefits

Panel data is very practical for research work in finance, such as dividend policy. The benefits of panel models are varied. Hsiao (2003) and Klevmarken (1989) list several benefits from using panel data presented as follow (Baltagi, 2005, p. 4) :

(1) Addressing individual heterogeneity: Panel data reveals that heterogeneity is present among individuals, firms, states, or countries. Failing to address this variation in time-series and cross-sectional studies poses the risk of producing biased outcomes (Moulton, 1986, p. 385). To demonstrate this, consider the empirical case analyzed by Baltagi and Levin (1992). They explored cigarette demand across 46 American states from 1963 to 1988. This paper develops a dynamic demand model for cigarettes using panel data spanning 46 American states from 1963 to 1988. It aims to highlight the limitations of studies that rely solely on time series regression within individual states or cross-sectional regression for specific years. Additionally, it updates the findings of Baltagi and Levin (1986) for the period 1980 to 1988, exploring different approaches to modeling the bootlegging effect and controlling for fixed or random state effects. The study identifies several key results: a notable habit persistence effect, a modest yet significant impact from 'border purchasing,' a significant but inelastic effect of own price and a minor yet significant income effect (Baltagi & Levin, 1992, p. 321).

The model for consumption is based on lagged consumption, price, and income, all of which vary across states and over time. Yet, there exist additional variables, Z_i and W_i , which might remain invariant within states or over time and could impact consumption. Examples of Z_i include religion and education. Religion, for instance, might involve the percentage of the

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population following the Mormon faith in each state annually, a figure expected to show minimal change over time. Similar constancy might apply to the percentage of the population completing high school or obtaining a college degree. Meanwhile, W_t includes nationwide advertising on TV and radio, which doesn't vary across states. However, the challenge arises as some of these variables are challenging to measure or access, rendering not all Z_i or W_t variables available for inclusion in the consumption equation (Baltagi & Levin, 1992, p. 325).

Failure to include these variables introduces bias into the resulting estimates. Panel data holds the capability to manage these variables invariant over time and state, a task beyond the scope of time-series or cross-sectional studies. For instance, from the data, one can observe that Utah exhibits less than half the average per capita cigarette consumption in the USA, largely due to being a predominantly Mormon state where smoking is prohibited. In a cross-section regression, controlling for Utah might entail using a dummy variable, which effectively eliminates Utah's observations from the regression. However, this approach does not align with panel data methodologies. Panel data allows for the differentiation of the data, effectively controlling for all state-specific characteristics linked to Z_i -type variables, whether these variables are observable or not. Conversely, employing a dummy variable for Utah in panel data analysis accommodates control over all state-specific effects distinctive to Utah without excluding Utah's observations (Baltagi & Levin, 1992, p. 328).

(2) Panel data provides richer information, greater variability, reduced collinearity among variables, increased degrees of freedom, and enhanced efficiency. Time-series studies often encounter issues with multicollinearity. For instance, in the case of the cigarette demand discussed earlier, there exists a notable collinearity between price and income in the overall time series data for the USA. However, this issue is less prevalent in a panel dataset that spans across American states, as the inclusion of the cross-sectional dimension introduces considerable variability, offering more insightful data regarding price and income. Indeed, the variability in the data can be separated into two components: variation between states of diverse sizes and characteristics, and variation within states. Typically, the former variation is more prominent. With additional and more informative data, one can generate more reliable parameter estimates. Naturally, this relationship needs to be consistent across each state, meaning that the data should be amenable to pooling. This is an assumption that can be tested and will be addressed in due course (Baltagi, 2005, p. 5).

Panel data sets used in economic research offer significant advantages over traditional cross-sectional or time-series data sets (e.g., Hsiao (1985a, 1995, 2000)). They typically provide a larger number of data points, which increases the degrees of freedom and reduces collinearity among explanatory variables, thereby enhancing the precision of econometric estimates. Importantly, longitudinal data enable researchers to address critical economic questions that are inaccessible with cross-sectional or time-series data alone (Hsiao, 2003, p. 3).

For example, consider the scenario described by Ben-Porath (1973): Suppose a cross-sectional sample of married women shows an average annual labor-force participation rate of 50 percent. This could suggest two extremes in interpretation. In one scenario, within a homogeneous population, each woman has a 50 percent chance of being in the labor force in any given year. In contrast, in a heterogeneous population, 50 percent of women may always work and 50 percent may never work. These interpretations have distinct implications: in the first case, women would be expected to spend equal durations in and out of the labor force, leading to frequent job turnover with an average job duration of two years. In the second case, there would be no turnover, and current work status would perfectly predict future work

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status. To differentiate between these models, it is essential to analyze individual labor-force histories over time to estimate participation probabilities across various stages of the life cycle. Such analysis is only feasible with sequential observations of individuals, highlighting the unique analytical power provided by longitudinal panel data (Hsiao, 2003, p. 4).

Recurring encounters with time-series data characterized by trends and multicollinearity illustrate the challenges in distinguishing between hypotheses. Models that imply significantly different behaviors and propose various policy options often exhibit similar goodness of fit with the data. Longitudinal data collected over extended periods may offer richer variability and, consequently, more informative insights (Klevmarken, 1989, p. 524).

(3) Panel data excel in examining the dynamics of adjustment. While cross-sectional distributions may appear relatively stable, they conceal a plethora of changes. Instances of unemployment, job turnover, residential and income mobility find better analysis with panel data. Moreover, panel data are apt for studying the duration of economic conditions like unemployment and poverty. Over extended periods, they can illuminate the pace of adjustments following alterations in economic policies. For instance, in measuring unemployment, cross-sectional data estimates the percentage of the population unemployed at a specific time. Repeated cross-sections illustrate how this percentage changes over time. Only panel data can estimate what percentage of those unemployed in one period remain so in another period. Crucial policy inquiries, such as determining whether families' encounters with poverty, unemployment, and reliance on welfare are transient or chronic, necessitate panel data (Baltagi, 2005, p. 5).

Deaton (1995) argues that, unlike cross-sectional studies, panel surveys offer data on changes in individuals or households, enabling observation of shifts in living standards during the developmental process. This methodology aids in identifying who benefits from development and whether poverty and deprivation are momentary or enduring—a question concerning income dynamics. Panels are also indispensable for estimating intertemporal relations, lifecycle, and intergenerational models. Essentially, they connect an individual's experiences and behavior at one point in time to other experiences and behavior at subsequent periods. For instance, in assessing training programs, observations are made on both participants and nonparticipants before and after the program implementation. This forms a panel comprising at least two time periods and serves as the foundation for the "difference in differences" estimator commonly applied in these studies; refer to Bertrand, Duflo, and Mullainathan (2004) (Baltagi, 2005, p. 6).

(4) Panel data offer superior capabilities in identifying and quantifying effects that remain undetectable in pure cross-sectional or pure time-series data. Consider a cross-section of women displaying a 50% average yearly labor force participation rate. This rate might arise from either (a) each woman having a 50% chance of being in the labor force in any given year or (b) half the women consistently working and the other half not working at all. Case (a) signifies high turnover, whereas case (b) demonstrates no turnover. Distinguishing between these scenarios is achievable solely with panel data. Another instance arises in determining whether union membership leads to wage increases or decreases. This question is better addressed when observing a worker transitioning between union and nonunion jobs. By holding an individual's characteristics constant, researchers gain a more robust understanding of whether union membership influences wages and to what extent (Baltagi, 2005, p. 6).

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This analytical approach extends to estimating other types of wage differentials while maintaining the constancy of individual characteristics, such as determining wage premiums in hazardous or unpleasant job settings. Economists studying workers' satisfaction levels encounter anchoring problems in cross-sectional studies. Typically, surveys inquire about life satisfaction levels, but each individual tends to anchor their scale at varying levels, making inter-individual comparisons of responses inconclusive. However, in a panel study where individuals maintain a consistent metric over the observation period, this issue can be circumvented. Utilizing a difference (or fixed effects) estimator allows for inferences based solely on intra-individual rather than inter-individual satisfaction comparisons. This significantly mitigates the problem of anchoring (Baltagi, 2005, p. 6).

Certain significant issues necessitate longitudinal data or can only be effectively analyzed under highly restrictive assumptions using other data types. Among these, studies focusing on the distributional impacts of economic and social policies are particularly demanding. While repeated cross-sectional surveys, conducted before and after a policy shift, can provide insights into changes such as shifts in unemployment rates or the proportion of households living below the poverty line, longitudinal data are essential for understanding the dynamics of adjustment processes (Klevmarken, 1989, p. 524).

For example, longitudinal data enable researchers to examine phenomena such as the likelihood of entering or exiting unemployment, as well as aspects of income mobility, job transitions, and residential mobility. A notable illustration is the German study led by Hujer and Schneider. Longitudinal data uniquely offer insights into the duration of economic conditions like unemployment and poverty. Over sufficiently extended periods, they also tend to yield more precise estimates than aggregate time-series data regarding the speed at which economies adapt to changes in economic policies (Klevmarken, 1989, p. 524).

Moreover, longitudinal data are well-suited for estimating intertemporal relationships, life-cycle models, and intergenerational effects. An application of a life-cycle model to panel data is demonstrated in the Dutch study conducted by Rob Alessie, Arie Kapteyn, and Bertrand Melenberg (Klevmarken, 1989, p. 524).

(5) Panel data models enable the construction and examination of more intricate behavioral models compared to solely cross-sectional or time-series data. For instance, panels provide an enhanced platform for studying and modeling technical efficiency, as evidenced in research by Baltagi and Griffin (1988b), Cornwell, Schmidt, and Sickles (1990), Kumbhakar and Lovell (2000), Baltagi, Griffin, and Rich (1995), and Koop and Steel (2001). Additionally, panels impose fewer limitations on distributed lag models compared to pure time-series studies, as illustrated in Hsiao (2003) (Baltagi, 2005, p. 6).

(6) Micro panel data, collected on individuals, firms, and households, may offer more precise measurements compared to similar variables obtained at the macro level. Biases arising from the aggregation over firms or individuals could be minimized or eliminated, as exemplified in studies by Blundell (1988) and Klevmarken (1989). For specific insights into the advantages and disadvantages of estimating life cycle models using micro panel data, refer to Blundell and Meghir (1990) (Baltagi, 2005, p. 6).

(7) Conversely, macro panel data possess an extended time series and, unlike the issues typically encountered in unit roots tests in time-series analysis, these data show standard distributions. Longitudinal data has a much better chance to control for individual

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heterogeneity than with cross-sectional data or repeated cross sections, i.e. with repeated measurements on the same individual we can (under certain assumptions of additivity) control for unmeasured characteristics which influence economic behavior. The methods for doing this have been much discussed in the econometric literature. [See, for instance, Chamberlain (1984) and Hsiao (1985, 1986).] Estimates from cross-sectional data without the proper control in general give biased estimates of economic responses. This will be demonstrated in the Swedish paper by Anders Bjiirklund (Klevmarken, 1989, p. 525).

I.3 Panel data limitations

However, panel data unveil some limitations. Limitations of panel data include:

(1) Challenges related to design and data collection: Kasprzyk et al. (1989) extensively discuss various issues encountered when designing panel surveys, including matters of coverage (incomplete representation of the target population), non response (due to lack of respondent cooperation or interviewer error), recall difficulties (respondent memory lapses), frequency and spacing of interviews, reference periods, and the utilization of bounding as well as time-in-sample bias (Kasprzyk, Duncan, Kalton, & Singh, 1989, p. 2).

(2) Errors in measurement leading to distortions: Measurement errors can emerge due to unclear questions leading to faulty responses, memory lapses, intentional distortion of responses (e.g., prestige bias), inappropriate informants, misrecording of responses, and interviewer effects (outlined in Kalton, Kasprzyk, and McMillen, 1989). As an example, Herriot and Spiers (1975) perform a comparison between CPS and Internal Revenue Service data on earnings from the same individuals, revealing discrepancies of at least 15% between the two sources of earnings for nearly 30% of the matched sample (Baltagi, 2005, p. 7).

(3) Problems associated with selectivity encompass the following:

(a) Self-selectivity: Individuals opt not to work because their reservation wage surpasses the offered wage. In such cases, we can observe the characteristics of these individuals but not their wage. The sample is considered censored if the wage data is missing. However, if we lack all information on these individuals, it becomes a truncated sample. For instance, consider the New Jersey negative income tax experiment where individuals with incomes exceeding 1.5 times the poverty level were excluded from the sample. Making inferences from this truncated sample introduces bias that cannot be resolved by gathering more data due to the truncation (Hausman & Wise, 1979, p. 455).

(b) Nonresponse: This occurs at the initial panel wave due to refusal to participate, absence of individuals at home, untraceable sample units, or other reasons. Item (or partial) nonresponse takes place when one or more questions are left unanswered or provide an inadequate response. Complete non response arises when no information is available from the sampled household. Beyond the efficiency loss caused by missing data, non response can result in significant identification challenges for population parameters (Horowitz & Manski, 1998, p. 214).

(c) Attrition presents a more significant challenge in panel studies compared to cross-sectional studies. Subsequent waves of the panel are susceptible to nonresponse, where respondents might die, relocate, or find the cost of participating in the study too high. Björklund (1989) and Ridder (1990, 1992) explore the repercussions of attrition. The degree of attrition varies based on the specific panel under investigation; refer to Kalton, Kasprzyk, and McMillen (1989) for several instances (Baltagi, 2005, p. 7).

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(3) **Limited time-series dimension:** Typical micro panels contain annual data covering a brief time span for each individual. Consequently, arguments leaning on asymptotic considerations significantly rely on the number of individuals moving towards infinity. Extending the panel's time span comes with its own costs, including increased potential for attrition and heightened computational complexities, particularly for limited dependent variable panel data models (Baltagi, 2005, p. 7).

(5) **Cross-section dependence:** Macro panels focusing on countries or regions with extended time series, without accounting for cross-country dependence, may lead to errors with conclusions. Several panel unit root tests in the literature assume cross-sectional independence. However, acknowledging cross-section dependence proves to be vital and directly impacts inference. Alternative panel unit root tests that consider this dependence are recommended (Baltagi, 2005, p. 7).

II. Estimation of static panel data

A static panel model is an econometric model used for analyzing panel data, which combines cross-sectional and time-series data. In this model, the relationship between the dependent and independent variables is assumed to be constant over time, without including lagged dependent variables as predictors (Park, 2011, p. 5).

II.1 Methods of estimation of static panel data

Static panel data is estimated using three methods related to the three models previously discussed, namely: the estimation method using ordinary least squares (OLS) or pooled regression (Pooled OLS); estimation with fixed effects (Fixed effect model); and finally, the estimation method with random effects (Random effect model) (Park, 2011, p. 5).

In our research we are interested in discerning causal relationship between the variables of interest, thus, linear regression has been the method of choice for this purpose. Panel data models examine group effects, time effects, or both in order to deal with heterogeneity or individual effect that may or may not be observed. These effects are either fixed or random effects. A fixed effect model examines if intercepts vary across group or time period, whereas a random effect model explores differences in error variance components across individual or time period. However; one of the most core assumption needed is exogeneity of regressors. Based on previous studies, we have identified a set of factors that may explain dividend distribution within large Algerian companies. In the following, the model to be estimated to test the validity of the previously stated hypotheses, presented in equation 69 (Park, 2011, p. 8):

$$y_{it} = \alpha + X_{it}\beta_1 + Z_i\beta_2 + u_i + \varepsilon_{it} \quad i \in \{1, 2, \dots, N\}, \quad t \in \{1, 2, \dots, T_i\} \quad (69)$$

The fixed effect is tested by F-test, while random effect is examined by Breusch and Pagan's (1980) Lagrange multiplier (LM) test. The former compares a fixed effect model and OLS to see how much the fixed effect model can improve the goodness-of-fit, whereas the latter contrast a random effect model with OLS. If both fixed and random effects are accepted, we perform the Hausman's test to choose the most appropriate model. The estimators of fixed and random effects rely on the absence of serial correlation. From this Wooldridge use the residual from the regression of equation (69) but in first-differences, this is the form of (Park, 2011, p. 8):

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$$y_{it} - y_{it-1} = (X_{it} - X_{it-1})\beta_1 + \varepsilon_{it} - \varepsilon_{it-1}$$

$$\Delta y_{it} = \Delta X_{it}\beta_1 + \Delta \varepsilon_{it} \quad (70)$$

Notice that such differentiating procedure eliminates the individual effects contained in μ , leading us to think that level-effects are time-invariant, hence if we analyze the variations, we conclude there's non-existing variation over time of the individual effects. Once we got the regression in first differences (and assuming that individual-level effects are eliminated) we use the predicted values of the residuals of the first difference regression. Then we double-check the correlation between the residual of the first difference equation and its first lag, if there's no serial correlation then the correlation should have a value of -0.5 as the next expression states:

$$\text{Corr}(\Delta \varepsilon_{it} + \Delta \varepsilon_{it-1}) = -0.5. \quad (71)$$

Therefore, if the correlation is equal to -0.5 the original model in (69) will not have serial correlation. However, if it differs significantly, we have a serial correlation problem of first-order in the original model in (69) (Park, 2011, p. 8).

In applications of FE and RE, it is typically useful to compute the pooled OLS estimates as well. Comparing the three sets of estimates can help us understand the nature of the biases introduced by leaving the unobserved effect u_i entirely in the error term (as pooled OLS does) or partially in the error term (as the RE transformation does). However, we must remember that even if u_i is uncorrelated with all explanatory variables across all time periods, the pooled OLS standard errors and test statistics are generally invalid because they ignore the often substantial serial correlation in the composite errors $\varepsilon_{i,t} = u_i + v_{it}$, (Wooldridge, 2012, p. 494).

II.1.1 The method of ordinary least squares or pooled regression (Pooled OLS)

It is considered as the simplest and most straightforward estimation method because it disregards the panel structure of the data and assumes the lack of serial correlation in observations for a given individual. It assumes that errors across individuals and over time are homoscedastic. This method is used when there are no significant individual or time effects, implying the absence of any individual or time effects. Also, it assumes that coefficients are constant, meaning parameters are identical for all individuals, thereby implying the absence of any specific characteristics among individuals, in other words, assuming homogeneity in the data being used. In this case, we could pool all the data and run an ordinary least squares regression model. However, despite the simplicity of this method, it may not provide an accurate depiction of the relationship between Y and the X variables across different individuals as it assumes homogeneity. For this reason, the specific nature of each individual is considered by the following method, which takes into account the heterogeneity among these individuals (Johnson & Dinardo, 1997, p. 637).

***Assumptions for Pooled OLS Using First Differences** (Wooldridge, 2012, p. 481):

Assumption 1:

For each i , the model is:

$$y_{it} = \beta_1 x_{it1} + \dots + \beta_k x_{itk} + \alpha_i + u_{it}, \quad t = 1, \dots, T, \quad (72)$$

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where, the β_j are the parameters to estimate and α_i is the unobserved effect.

Assumption 2:

The sample from the cross section is random.

Assumption 3:

Each explanatory variable changes over time for at least some i , and no perfect linear relationships exist among the explanatory variables. For the next assumption, let X_i represent the explanatory variables across all time periods for the cross-sectional observation i ; hence, X_i includes x_{ijt} , $t = 1, \dots, T$, $j = 1, \dots, k$.

Assumption 4:

For each t , the expected value of the idiosyncratic error, given the explanatory variables across all time periods and the unobserved effect, is zero, $E(\varepsilon_{it} | X_i, \alpha_i) = 0$.

When Assumption 4 holds, the x_{ijt} are often described as strictly exogenous conditional on the unobserved effect. This means that, after controlling for α_i , there is no correlation between the x_{ijs} and the idiosyncratic error ε_{it} for all s and t .

Assumption 4, as stated, is stronger than necessary. We use this form of the assumption to emphasize our focus on the equation:

$$E(y_{it} | X_i, \alpha_i) = E(y_{it} | X_{it}, \alpha_{it}) = \beta_1 x_{it1} + \dots + \beta_k x_{itk} + \alpha_i \quad (73)$$

The β_j values measure the partial effects of the observed explanatory variables while holding the unobserved effect α_i constant. However, a significant implication of assumption 4, which is sufficient for the unbiasedness of the estimator, is that $E(\Delta \varepsilon_{it} | X_i) = 0$, for $t = 2, \dots, T$. In fact, for consistency, we only need to assume that Δx_{ijt} is uncorrelated with $\Delta \varepsilon_{is}$, $t = 2, \dots, T$ and $j = 1, \dots, k$.

Under the first four assumptions, the first-difference estimators are unbiased. The critical assumption is 4, which ensures strict exogeneity of the explanatory variables. Under these same assumptions, we can also demonstrate that the estimator is consistent when T is fixed and $N \rightarrow \infty$ (and possibly more generally). The next two assumptions ensure that the standard errors and test statistics resulting from pooled OLS on the first differences are asymptotically valid.

Assumption 5 :

The variance of the differenced errors, given all explanatory variables, remains constant:

$$\text{Var}(\Delta \varepsilon_{it} | X_i) = \sigma^2, t = 2, \dots, T \quad (74)$$

Assumption 6 :

For all $t \neq s$, the *differences* in the idiosyncratic errors are uncorrelated (conditional on all explanatory variables): $\text{Cov}(\Delta \varepsilon_{it}, \Delta \varepsilon_{is} | X_i) = 0$, $t \neq s$.

Assumption 5 ensures that the differenced errors, $\Delta \varepsilon_{it}$, are homoskedastic. Assumption 6 states that the differenced errors are serially uncorrelated, indicating that the ε_{it} follow a random walk over time. Under Assumption 1 through 6, the estimator of the β_j is the best linear unbiased estimator (conditional on the explanatory variables).

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Assumption 7:

Conditional on X_i , the $\Delta \varepsilon_{it}$ are independent and identically distributed normal random variables. When we include Assumption 7, the estimators follow a normal distribution, and the t and F statistics from pooled OLS on the differences have exact t and F distributions. Without Assumption 7, we must rely on the usual asymptotic approximations.

II.1.2 The fixed effects method

This method takes α_i to be a specific constant term for the group in the regression model, which is written as follows: $y_{it} = (\alpha + u_i) + X'_{it}\beta + v_{it}$, and this term "fixe" is used here to indicate that this term does not vary with time. So, this method takes into account the "individuality" of each cross-sectional unit (individual, company) since it allows the constant to vary for each company, given that the constant α is followed by the index (i) meaning that the constants of individuals can be different due to the particularities of each individual. In other words, this method assumes and takes into account the existing heterogeneity among individuals (Greene, 2003, p. 285).

To run up the model, we experience panel data. One issue that may arise is whether individual effect is considered to be fixed or random. Fixed group effect model examines individual differences in intercepts, where individual specific effect (u_i) is cross-sectional unit and time invariant, also considered a part of intercept allowed to be correlated with other regressors, so the fixed effect model is presented (Park, 2011, p. 9):

$$y_{it} = (\alpha + u_i) + X'_{it}\beta + v_{it}, \quad (75)$$

Where, $\varepsilon_{i,t} = u_i + v_{it}$,

The dependent variable, Y , varies with both firm (*denoted by subscript i*) and time (t). In our study, time is measured in years, making each observation correspond to one firm-year. The independent variable, X , also varies across firms and years. The parameter α , represents the intercept. The term ε denotes the residual from the regression for each firm-year observation. The parameter β , which is not italicized here to indicate it as an estimate rather than a true β , is the focal point of my analysis (DeHaan, 2021, p. 6).

The variable u_i captures all unobserved, time-invariant factors that influence y_{it} . The absence of a t subscript in u_i indicates that it does not change over time. This variable is generally referred to as an unobserved effect. In applied work, u_i is often called a fixed effect, highlighting that it remains constant over time. The model in (76) is known as an unobserved effects model or a fixed effects model. In practical applications, u_i might also be described as unobserved heterogeneity, individual heterogeneity, firm heterogeneity, city heterogeneity, and so on. The error term v_{it} is frequently called the idiosyncratic error or time-varying error because it represents unobserved factors that vary over time and affect y_{it} . These errors are similar to those found in a typical time series regression equation (Wooldridge, 2012, p. 460).

In the literature, model (75) is referred to as the Fixed Effects Model (FEM). The term "fixed effects" originates from the fact that while the intercept may vary across individuals (such as different companies in this case), each individual's intercept remains constant over time; thus, it is time-invariant. If we denote the intercept of each company or individual as u_i , it emphasizes that these intercepts do not change with time. Importantly, the FEM specified in (76) assumes that the coefficients of the regressors (or explanatory variables) do not vary across individuals or over time (Gujarati, 2003, p. 642).

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To introduce variability in the intercepts across companies, we can employ the technique of dummy variables, specifically using differential intercept dummies. Thus, we rewrite model (64) as follows (Gujarati, 2003, p. 642):

$$Y_{it} = u_1 + u_2D_{2i} + u_3D_{3i} + u_4D_{4i} + \beta_2X_{2it} + \beta_3X_{3it} + v_{it} \quad (76)$$

where:

- $D_{2i}=1$ if the observation belongs to its respective company, and 0 otherwise.
- D_{3i} and D_{4i} are similarly defined for the other companies.
- We use three dummy variables (D_{2i} , D_{3i} , and D_{4i}) for four companies to avoid perfect collinearity among the dummy variables.

This formulation allows us to account for individual-specific intercepts that vary across companies, thereby capturing differences in baseline levels between these entities while controlling for time-invariant effects (Gujarati, 2003, p. 642).

For this, in the literature, this method is also known as the Least Squares Dummy Variables (LSDV) estimator. Furthermore, the fixed effects method exhibits a residual structure that satisfies the standard assumptions of Ordinary Least Squares (OLS) and thus represents a classical model with individual indicator variables (Goaied & Sassi, 2012, p. 19).

There are several strategies for estimating a fixed model such as “within” estimation. It applies deviations from group means by using variation within each individual which is presented (Park, 2011, p. 9):

$$(y_{it} - \bar{y}_{i\bullet}) = (x_{it} - \bar{x}_{i\bullet})'\beta + (\varepsilon_{it} - \bar{\varepsilon}_{i\bullet}) \quad (77)$$

Caution should be exercised when using the Fixed Effects, or LSDV, model due to several inherent limitations. Firstly, a large number of dummy variables are introduced, such as 3 company dummies and 19 year dummies, the degrees of freedom can become constrained. For instance, in a dataset with 80 observations, only 55 degrees of freedom may remain available after accounting for these dummies, along with 2 slope coefficients and 1 common intercept. Secondly, including numerous variables in the model increases the risk of multicollinearity, potentially complicating the precise estimation of one or more parameters. Thirdly, if time-invariant variables like sex, color, and ethnicity are included in the Fixed Effects Model (FEM) as well, the LSDV approach may not effectively capture the impact of these variables since they do not vary over time. Lastly, careful consideration must be given to the nature of the error term, ε_{it} . While the results are typically based on the assumption that ε_{it} follows classical assumptions ($\varepsilon_{it} \sim N(0, \sigma^2)$), adjustments may be necessary (Gujarati, 2003, p. 646).

For instance:

1. The error variance may need to be assumed uniform across cross-sectional units or could exhibit heteroscedasticity.
2. Autocorrelation assumptions could vary across individuals or time periods, affecting the error structure.
3. Correlations between error terms across different units or time periods may need to be addressed or assumed absent.

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Addressing these complexities often requires adopting more sophisticated models, such as the random effects model, which can offer more flexibility in handling these issues (Gujarati, 2003, p. 646).

II.1.3 The random effects method

This method assumes that the unobserved heterogeneity resulting from the presence of individual effects is uncorrelated with the included explanatory variables, and for this, the model is written as: $y_{it} = \alpha + X'_{it}\beta + u_i + v_{it}$. The estimation of the parameter for the dummy variable that controls individual variations among individuals is an error component in this method: $y_{it} = \alpha + X'_{it}\beta + (u_i + v_{it})$, contrary to the fixed effects method, where this parameter is part of the constant as follows: $y_{it} = (\alpha + u_i) + X'_{it}\beta + v_{it}$ (Park, 2011, p. 11).

So this method is characterized by the existence of random constants. The difference between cross-sectional units (individuals or time periods) lies at the level of the error term, unlike the fixed effects method where this difference is at the level of the constant. In this model, (u_i) is considered as a specific random element to individuals, or a component of the composite error term, thus, it reflects the cross-sectional or individual error component; in other words, it is a specific constant for individual (i) and is random. That's why this random effects model is also referred to as the composite errors model (Park, 2011, p. 11).

On the other hand, a random effect model assumes that individual effect is not correlated with any regressor and then estimates error variance specific to groups. Hence, u_i is an individual specific random heterogeneity or a component of the composite error term, and is assumed independent of traditional error term v_{it} and regressors X_{it} , the model is presented (Park, 2011, p. 11):

$$y_{it} = \alpha + X'_{it}\beta + u_i + v_{it}, \text{ Where } u_i \sim IID(0, \sigma_u^2), \text{ and } v_{it} \sim IID(0, \sigma_v^2). \quad (78)$$

Equation (78) becomes a random effects model when we assume that the unobserved effect u_i is uncorrelated with each explanatory variable (Wooldridge, 2012, p. 492):

$$Cov(x_{itj}, u_i) = 0, \quad t=1, \dots, T; j=1, \dots, k \quad (79)$$

The ideal random effects assumptions encompass all fixed effects assumptions, plus the additional requirement that u_i is independent of all explanatory variables across all time periods. (Refer to the chapter appendix for the detailed assumptions.) If we believe the unobserved effect u_i is correlated with any explanatory variables, we should use first differencing or fixed effects. Under equation (79) and the random effects assumptions, how should we estimate the β_j ? It's important to note that if u_i is uncorrelated with the explanatory variables, the β_j can be consistently estimated using a single cross-section, without the need for panel data. However, this approach disregards valuable information from other time periods. Alternatively, we can use pooled OLS by regressing y_{it} on the explanatory variables and possibly including time dummies. This method also produces consistent estimators of the β_j under the random effects assumption, but it overlooks a key feature of the model (Wooldridge, 2012, p. 493).

Since u_i is part of the composite error in each time period, the ε_{it} are serially correlated over time. In fact, under the random effects assumptions, this serial correlation is inherent in the model (Wooldridge, 2012, p. 493):

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$$\text{Corr}(\varepsilon_i, \varepsilon_s) = \sigma_u^2 / \sigma_u^2 + \sigma_v^2, t \neq s \quad (80)$$

Where: $\sigma_u^2 = \text{Var}(u_i)$ and $\sigma_v^2 = \text{Var}(v_{it})$ This necessarily positive serial correlation in the error term can be substantial. Because the usual pooled OLS standard errors ignore this correlation, they will be incorrect, as will the usual test statistics (Wooldridge, 2012, p. 493).

The estimation of the model is conducted by feasible generalized least squares method, so we need to estimate θ using σ_u^2 and σ_v^2 . The σ_u^2 comes from the between estimation and σ_v^2 is derived from the sum of squared errors SSE of the within effect estimation or the deviations of residuals from group means residuals (Park, 2011, p. 11).

Deriving the GLS transformation to eliminate serial correlation in the errors involves advanced matrix algebra (Wooldridge, 2012, p. 493).

$$\theta = 1 - \sqrt{\frac{\hat{\sigma}_v^2}{T\hat{\sigma}_u^2 + \hat{\sigma}_v^2}} = 1 - \sqrt{\frac{\hat{\sigma}_v^2}{T\hat{\sigma}_{between}^2}} \quad (81)$$

where, $\hat{\sigma}_u^2 = \hat{\sigma}_{between}^2 \frac{\hat{\sigma}_v^2}{T}$, where $\hat{\sigma}_{between}^2 = \frac{SSE_{between}}{n-k-1}$

$$\hat{\sigma}_v^2 = \frac{SSE_{within}}{nT-n-k} = \frac{e'e_{within}}{nT-n-k} = \frac{\sum_{1 \leq i \leq T} (v_{it} - \bar{v}_i)^2}{\sum_{1 \leq j \leq n} nT-n-k},$$

where, v_{it} are residuals of the LSDV.

Then the dependent variable, independent variable, and the intercept term need to be transformed as follows,

$$y^*_{it} = y_{it} - \theta \bar{y}_i \quad (81)$$

$$x^*_{it} = x_{it} - \theta \bar{x}_i, \text{ for all } x_k, \quad \alpha^* = 1 - \theta \quad (82) \quad (83)$$

Finally, we run OLS on those transformed variables with the traditional intercept suppressed:

$$y^*_{it} = \alpha^* + x^{*'}_{it} \beta^* + \varepsilon^*_{it} \quad (84)$$

The transformation in (81) permits the inclusion of explanatory variables that remain constant over time, highlighting an advantage of random effects (RE) models compared to fixed effects or first differencing approaches. This advantage arises because RE models assume that the unobserved effect is uncorrelated with all explanatory variables, regardless of whether these variables change over time. For example, in a wage equation, a variable such as education can be included even if it does not vary over time. However, this approach assumes that education is uncorrelated with the unobserved effect u_i , which encompasses factors like ability and family background. In many applications, the primary reason for using panel data is to account for the correlation between the unobserved effect and the explanatory variables (Wooldridge, 2012, p. 493).

From the above, we have noticed that using panel data in estimation presents particularities because the phase of identifying the existence or non-existence of heterogeneity, as well as identifying its source, is considered the first and most crucial step in establishing the model to

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be used for a panel data sample. This is achieved through the specification test of the panel data-generating process, which we will address in the next section (Zayati, 2014/2015, p. 4).

The random effects estimator is appealing when we believe that the unobserved effect is uncorrelated with all explanatory variables. If our equation includes effective controls, we might assume that any remaining unaccounted heterogeneity only introduces serial correlation in the composite error term, without causing correlation between the composite errors and the explanatory variables. Estimating random effects models using generalized least squares is relatively straightforward and is commonly performed by many econometric software packages (Wooldridge, 2012, p. 484).

II.2 Specification test of the panel data-generating process

During this initial stage, the researcher must verify the homogenous or heterogeneous specification of the data-generating process by testing the equality of the coefficients of the model studied in the individual dimension. This is done to determine whether the model and the regression function can be considered homogenous, meaning identical for all individuals (Hurlin, 2012, p. 8).

In this case, the data-generating process is considered homogeneous—in other words, it is identical for all individuals (absence of specific characteristics for each individual). If it appears to be heterogeneous due to the existence of specific characteristics for each individual, then the data-generating process is considered heterogeneous. Therefore, this test of coefficient equality helps identify the presence or absence of specific effects resulting from the presence or absence of specific characteristics unique to each individual (Zayati, 2014/2015, p. 4).

II.2.1 Homogeneity test of the constant u_i

Numerous studies have investigated slope homogeneity and poolability in panel data. Notable contributions include works by Pesaran, Smith, and Im (1996), Phillips and Sul (2003), Pesaran and Yamagata (2008) (henceforth PY), Blomquist (2010), Lin (2010), and Jin and Su (2013). Pesaran et al. (1996) introduced a Hausman-type test comparing the standard fixed effects estimator with the mean group estimator. Phillips and Sul (2003) developed a similar Hausman-type test for slope homogeneity in AR(1) panel data models considering cross-sectional dependence (Su & Chen, 2013, p. 1080).

Recently, PY standardized Swamy's test for slope homogeneity in large panel data models with fixed effects and unconditional heteroskedasticity. Blomquist (2010) proposed a bootstrap version of PY's test, which is robust against various forms of cross-sectional dependence and serial correlation. Lin (2010) introduced a test for slope homogeneity in linear panel data models with fixed effects and conditional heteroskedasticity. Jin and Su (2013) proposed a nonparametric test for poolability in nonparametric regression models with a multifactor error structure. However, to our knowledge, no test currently exists for slope homogeneity in large-dimensional panel data models with interactive fixed effects (Su & Chen, 2013, p. 1080).

Consider a heterogeneous panel data model that includes interactive fixed effects:

$$Y_{it} = \beta_i^0 X_{it} + \lambda_i^0 F_t^0 + \varepsilon_{it} \quad i \in \{1, 2, \dots, N\}, \quad t \in \{1, 2, \dots, T\} \quad (85)$$

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Where,

X_{it} is a $K \times 1$ vector of strictly exogenous regressors,

β_i^0 is an $K \times 1$ vector of unknown slope coefficients,

λ_i^0 is an $r \times 1$ vector of factor loading,

F_t^0 is an $r \times 1$ vector of common factors,

ε_{it} is an idiosyncratic error term, and, β_i^0 , λ_i^0 , F_t^0 , and ε_{it} are unobserved. Here, $\{\lambda_i^0\}$ and $\{F_t^0\}$ may be potentially correlated with $\{X_{it}\}$.

The null hypothesis of interest is

$$H_0: \beta_i^0 = \beta^0 \text{ for some } \beta^0 \in R^K \quad \text{for all } i \in 1, 2, \dots, N. \quad (86)$$

The alternative hypothesis is

$$H_1: \beta_i^0 \neq \beta_j^0 \quad \text{for some } i \neq j \quad (87)$$

To develop a residual-based test for the aforementioned null hypothesis, we suggest estimating the model under the null hypothesis and then obtaining the regression residuals. Under the null hypothesis, the vector X_{it} should not provide any useful information about these residuals, but it should under the alternative hypothesis (Su & Chen, 2013, p. 1082).

To proceed, let $X_{it,k}$ denote the k th element of X_{it} for $k=1, 2, \dots, K$. Define

$$Y_i \equiv (Y_{i1}, \dots, Y_{iT})', \quad X_i \equiv (X_{i1}, \dots, X_{iT})', \quad \varepsilon_i \equiv (\varepsilon_{i1}, \dots, \varepsilon_{iT})', \\ F^0 \equiv (F^0_1, \dots, F^0_T)', \quad \lambda^0 \equiv (\lambda^0_1, \dots, \lambda^0_T)', \quad X_{i,k} \equiv (X_{i1,k}, \dots, X_{iT,k})',$$

$$Y \equiv (Y_1, \dots, Y_T)', \quad X \equiv (X_1, \dots, X_T)', \quad \varepsilon \equiv (\varepsilon_1, \dots, \varepsilon_T)',$$

Apparently Y , X_k , and ε all denote $N \times T$ matrices. Then, under H_0 , $Y_i = \beta_i^0' X_i + \lambda_i^0' F^0 + \varepsilon_i$, and we can rewrite the model (85) in matrix form:

$$Y = \sum_{k=1}^K \beta_k^0 X_k + \lambda^0' F^0 + \varepsilon, \quad (88)$$

$$\text{Where } \beta^0 = (\beta^0_1, \dots, \beta^0_K)',$$

For the restricted model in (88), with the identification restrictions that $F'F/T = I_r$ and $\lambda'\lambda$ is a diagonal matrix, Bai (2009a) examines the PCA estimates of β_0 , λ_0 , and F^0 . These estimates are derived from the solutions to the following set of nonlinear equations (Su & Chen, 2013, p. 1084):

$$\tilde{\beta} = (\sum_{i=1}^N X_i' M_{\tilde{F}} X_i)^{-1} \sum_{i=1}^N X_i' M_{\tilde{F}} Y_i, \quad (89)$$

$$[\frac{1}{NT} \sum_{i=1}^N (Y_i - X_i \tilde{\beta})(Y_i - X_i \tilde{\beta})'] \tilde{F} = \tilde{F} V_{NT}, \quad (90)$$

And

$$\tilde{\lambda}' = \frac{1}{T} [\tilde{F}'(Y_1 - X_1 \tilde{\beta}), \dots, \tilde{F}'(Y_N - X_N \tilde{\beta})], \quad (91)$$

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where V_{NT} is a diagonal matrix containing the r largest eigenvalues of the matrix in (90), sorted in descending order. For a robust iteration scheme to obtain the estimates $(\tilde{\beta}, \tilde{F}, \tilde{\lambda})$, refer to Bai (2009a). Moon and Weidner (2010a, 2010b) reexamine Bai's (2009a) PCA estimation and contextualize it within the framework of Gaussian QMLE (Su & Chen, 2013, p. 1084). Let:

$$(\hat{\beta}, \hat{\lambda}, \hat{F}) = \arg \min_{(\beta, \lambda, F)} L_{NT}(\beta, \lambda, F) \quad (92)$$

Where

$$L_{NT}(\beta, \lambda, F) = \frac{1}{NT} \text{tr} [(Y - \sum_{i=1}^K \beta_k X_i - \lambda F')' (Y - \sum_{i=1}^K \beta_k X_k - \lambda F')'], \quad (93)$$

$\beta \equiv (\beta_1, \dots, \beta_K)'$, $F \equiv (F_1, \dots, F_T)'$, and $\lambda \equiv (\lambda_1, \dots, \lambda_N)'$. In particular, β^0 can be estimated by

$$\hat{\beta} = \arg \min_{(\beta)} L_{NT}(\beta) \quad (94)$$

where the negative profile quasi log-likelihood function L_{NT} is given by

$$\begin{aligned} L_{NT}(\beta) &= \min_{(\lambda, F)} \min_{(\beta)} L_{NT}(\beta) \\ &= \min_F \frac{1}{NT} \text{tr} \left[(Y - \sum_{i=1}^K \beta_k X_k) M_F (Y - \sum_{i=1}^K \beta_k X_k)' \right], \\ &= \frac{1}{NT} \sum_{t=r+1}^T \mu_t [(Y - \sum_{i=1}^K \beta_k X_k) (Y - \sum_{i=1}^K \beta_k X_k)'] \end{aligned} \quad (95)$$

Refer to MW for a demonstration of the equivalence of the last three expressions. It is evident that $L_{NT}(\beta)$ is not guaranteed to be a convex function, and there is no closed-form solution for minimizing it. Therefore, numerical optimization must be used to obtain the QMLE of β_0 . If both $\hat{\beta}$ and $\tilde{\beta}$ are global solutions, they should be identical since the objective functions considered by Bai (2009a) and Moon and Weidner (2010a, 2010b) are the same. Simulations suggest that using Bai's (2009a) estimator $\tilde{\beta}$ of β^0 as an initial estimator in the numerical optimization process is advantageous. Once the QMLE $\hat{\beta}$ is obtained, the QMLE $(\hat{\lambda}, \hat{F})$ of (λ^0, F^0) can be secured according to (90) and (91). Subsequently, we can estimate ε_i by $\hat{\varepsilon}_i = Y_i - X_i \hat{\beta} - \hat{F} \hat{\lambda}_i$ under the null, where, $\hat{F} \equiv (\hat{F}_1, \dots, \hat{F}_T)'$ and $\hat{\varepsilon}_i \equiv (\hat{\varepsilon}_{i1}, \dots, \hat{\varepsilon}_{iT})'$, it is easy to verify that:

$$\hat{\varepsilon}_i = M_{\hat{F}} \varepsilon_i + M_{\hat{F}} X_i (\beta^0 - \tilde{\beta}) + M_{\hat{F}} F^0 \lambda_i^0 + M_{\hat{F}} X_i (\beta^0 - \tilde{\beta}) \quad (96)$$

The homogeneity tests aims at testing the homogeneity of the constants, assumes the null hypothesis that equals the constants u_i as follows: $H_0 : u_i = u_1 = u_2 = \dots = u_n$. The alternative hypothesis is that at least one dummy parameter is not zero. This hypothesis is tested by an F test, which is based on loss of goodness-of-fit. This test contrasts LSDV (robust model) with the pooled OLS (efficient model) and examines the extent that the goodness-of-fit measures (SSE or R^2) changed. This statistic is written in the following form (Park, 2011, p. 12):

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$$F(n-1, nT-n-k) = \frac{(e'e_{pooled} - e'e_{LSDV})/(n-1)}{(e'e_{LSDV})/(nT-n-k)} = \frac{(R_{LSDV}^2 - R_{pooled}^2)/(n-1)}{(1-R_{LSDV}^2)/(nT-n-k)}$$

If the null hypothesis is rejected (at least one group/time specific intercept u_i is not zero), you may conclude that there is a significant fixed effect or significant increase in goodness-of-fit in the fixed effect model; therefore, the fixed effect model is better than the pooled OLS. We proceed with estimation using the individual effects model. To choose between fixed or random effects, we need to perform the Hausman test (Park, 2011, p. 12).

II.2.2 Hausman Test for Comparing Fixed and Random Effects

How can we determine the most pertinent and impactful effect (fixed or random) in panel data analysis? The Hausman specification test compares fixed and random effect models based on the assumption that individual effects have no correlation with any regressor in the model (Hausman, 1978). If this assumption holds, the Least Squares Dummy Variables (LSDV) and Generalized Least Squares (GLS) methods are both reliable, but LSDV is less efficient. However, if the assumption is violated, LSDV remains reliable, while GLS becomes inconsistent and biased (Greene, 2008, p. 208). Under the null hypothesis, the estimates derived from LSDV and GLS should not consistently differ. The Hausman test relies on the idea that "the covariance between an efficient estimator and its discrepancy from an inefficient estimator is zero" (Greene, 2008).

$$LM = (b_{LSDV} - b_{random})' \hat{W}^{-1} (b_{LSDV} - b_{random}) \sim \chi^2(k), \quad (98)$$

where $\hat{W} = Var[b_{LSDV} - b_{random}] = Var(b_{LSDV}) - Var(b_{random})$ is the difference in the estimated covariance matrices of LSDV (robust model) and GLS (efficient model). Keep in mind that an intercept and dummy variables should be excluded in computation. This test statistic follows the chi-squared distribution with k degrees of freedom. The Hausman test assesses whether "the insignificant difference exists between the random effects estimate and the unbiased fixed effects estimate" (Kennedy, 2008: 286). If the null hypothesis of no correlation is disproved, it suggests that individual effects (u_i) are significantly linked to at least one regressor in the model, rendering the random effects model problematic. Consequently, opting for the fixed effect model is favored over its random effect counterpart. However, a limitation of this test is that the difference in covariance matrices W might not be positively definite. Therefore, assuming the similarity of the covariance matrices when faced with this issue leads to the non-rejection of the null hypothesis (Greene, 2008, p. 209).

For cases where $N > T$, Pesaran et al. (1996) suggested using the Hausman (1978) test with the standard Fixed Effects (FE) estimator of β (Pesarana & Yamagatab, 2008, p. 52),

$$\hat{\beta}_{FE} = (\sum_{i=1}^N X_i' M_{\tilde{\tau}} X_i)^{-1} \sum_{i=1}^N X_i' M_{\tilde{\tau}} y_i, \quad (99)$$

is compared to the MG estimator defined by:

$$\hat{\beta}_{MG} = N^{-1} \sum_{i=1}^N \hat{\beta}_i, \quad (100)$$

Where $M_i = I_T - \tilde{\tau}_i (\tilde{\tau}_i' \tilde{\tau}_i)^{-1} \tilde{\tau}_i'$, I_T is an identity matrix of order T , and

$$\hat{\beta}_i = (X_i' M_{\tilde{\tau}} X_i)^{-1} X_i' M_{\tilde{\tau}} y_i, \quad (101)$$

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For the Hausman test to have the correct size and be consistent, two conditions must be satisfied:

- (a) Under H_0 , $\hat{\beta}_{FE}$ and $\hat{\beta}_{MG}$ must both be consistent, with $\hat{\beta}_{FE}$ being asymptotically more efficient such that

$$A \text{ Var } (\hat{\beta}_{MG} - \hat{\beta}_{FE}) = A \text{ Var } (\hat{\beta}_{MG}) - A \text{ Var } (\hat{\beta}_{FE}) > 0,$$

Where,

$A \text{ Var } (.)$ stands for the asymptotic variance operator.

- (b) Under H_1 , $\hat{\beta}_{MG} - \hat{\beta}_{FE}$ and should tend to a non-zero vector.

In the context of dynamic panel data models with exogenous regressors, both of these conditions are met as long as the exogenous regressors are not drawn from the same distribution. In such cases, a Hausman-type test based on the difference $(\hat{\beta}_{FE} - \hat{\beta}_{MG})$ would be valid and is shown to have reasonable small sample properties (see Pesaran et al. (1996) and Hsiao and Pesaran (2007)). However, it is well known that the Hausman procedure might lack power for certain parameter values, as its implicit null hypothesis does not necessarily align with the null hypothesis of interest. Holly (1982) provides a general discussion on this point. This issue is particularly problematic in the application of the Hausman procedure to the testing problem we are concerned with here. For instance, in the case of panel data models containing only strictly exogenous regressors, a test of slope homogeneity based on $(\hat{\beta}_{FE} - \hat{\beta}_{MG})$ will lack power in all directions if, under the alternative hypothesis, the slopes are random draws from the same distribution. To illustrate this, suppose that under H_1 the slopes follow the familiar random coefficient specification (Pesarana & Yamagatab, 2008, p. 53)

$$\beta_i = \beta + u_i, \quad u_i \sim \text{IID } (0, \Sigma_0),$$

where Σ_0 is a non-negative definite matrix, and $E(X_j' u_i) = 0$ for all i and j . Then

$$(\hat{\beta}_{FE} - \hat{\beta}_{MG}) = (\sum_{i=1}^N X_i' M_{\tau} X_i)^{-1} \sum_{i=1}^N (X_i' M_{\tau} X_i) u_i - N^{-1} \sum_{i=1}^N u_i + (\sum_{i=1}^N X_i' M_{\tau} X_i)^{-1} \sum_{i=1}^N X_i' M_{\tau} \varepsilon_i - N^{-1} (\sum_{i=1}^N X_i' M_{\tau} X_i)^{-1} \sum_{i=1}^N X_i' M_{\tau} \varepsilon_i,$$

It readily follows that under the random coefficients alternatives and strictly exogenous regressors, we have $E(\hat{\beta}_{FE} - \hat{\beta}_{MG} | H_1) = 0$. This result holds for fixed N and T as well as when N and $T \rightarrow \infty$, and thus, condition (b) of Hausman's procedure is not satisfied. Another significant case where the Hausman test is not applicable is when testing the homogeneity of slopes in pure autoregressive panel data models. To simplify the explanation, consider the following stationary AR(1) panel data model (Pesarana & Yamagatab, 2008, p. 53):

$$y_{it} = \alpha_i(1 - \beta_i) + \beta_i y_{i,t-1} + \varepsilon_{it}, \quad (102)$$

It is now easily seen that with N fixed and as $T \rightarrow \infty$, under H_0 ($\beta_i = \beta$) we have:

$$\sqrt{NT} = (\hat{\beta}_{FE} - \beta) \rightarrow_d N(0, 1 - \beta^2)$$

And

$$\sqrt{NT} = (\hat{\beta}_{MG} - \beta) \rightarrow_d N(0, 1 - \beta^2)$$

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Therefore, the variance inequality part of condition (a), specifically (101), is not satisfied, and as a result, applying the Hausman test to autoregressive panels will not yield the correct size (Pesarana & Yamagatab, 2008, p. 53).

II.3 Econometric Tests in the Random model

In this section, we will present the various econometric tests used to analyze the impact of governance mechanisms on the financial performance of Algerian firms.

II.3.1 Random Individual Effects Test

Breusch and Pagan's (1980) Lagrange Multiplier (LM) test evaluates whether the individual (or time) specific variance components are zero under the null hypothesis $H_0: \sigma_u^2 = 0$, which follows a chi-squared distribution with one degree of freedom (Park, 2011, p. 12).

$$LM_u = \frac{nT}{2(T-1)} \left[\frac{T^2 \bar{e}' \bar{e}}{e' e} - 1 \right]^2 \sim \chi^2(1), \quad (103)$$

where $\bar{e}$ is the $n \times 1$ vector of the group means of pooled regression residuals, and $e'e$ is SSE of the pooled OLS regression.

Baltagi (2001) presents the same LM test in a different way.

$$LM_u = \frac{nT}{2(T-1)} \left[\frac{\sum (\sum e_{it})^2}{\sum \sum e_{it}} - 1 \right]^2 = \frac{nT}{2(T-1)} \left[\frac{\sum (T \bar{e}_{it})^2}{\sum \sum e_{it}} - 1 \right]^2 \sim \chi^2(1), \quad (104)$$

If the null hypothesis is rejected, it indicates that there is a significant random effect in the panel data, suggesting that the random effects model handles heterogeneity better than the pooled OLS model (Park, 2011, p. 12).

II.3.2 Multicollinearity Test

Multicollinearity, which signifies the existence of a linear relationship between some or all of the explanatory variables in a regression model, is common since many explanatory variables are highly collinear in real life. This is especially true for regressors in time series, which often share a common trend. Multicollinearity can bias the estimation of regression coefficients, making precise estimation difficult. Additionally, the t-ratio of one or more coefficients tends to be statistically insignificant, which greatly increases the overall measure of fit quality. Multicollinearity can be detected through statistical correlation, a technique used to see if two independent variables are related by examining their correlation value. According to Kennedy, if this value exceeds 0.8, a multicollinearity problem among the explanatory variables is confirmed (Toumi, 2016, p. 128).

Another method to detect multicollinearity is by calculating the Variance Inflation Factors (VIFs). This involves regressing each explanatory variable on the others. By calculating $(1-R^2)$ from each of these regressions, we can determine the portion of the variance of an explanatory variable that is independent of the others. The calculation $1/(1-R^2)$ gives us the VIF statistic for each variable. A VIF value equal to or greater than 10 indicates the presence of multicollinearity among the independent variables (De Bourmont, 2012, p. 6). Another method to detect multicollinearity is by calculating tolerance, which is equal to $(1-R_i^2)$. A tolerance value should not exceed 0.2 to indicate the absence of a multicollinearity problem (Wepukhulu, 2016, p. 92).

II.3.3 Error Autocorrelation Test (Wooldridge Serial Correlation Test):

Although there are numerous ways in which the error terms in a multiple regression model can be serially correlated, the most popular and simplest model to work with is the AR(1) model, as shown in equations below (105) and (106) (Wooldridge, 2012, p. 416):

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$$\varepsilon_t = \rho \varepsilon_{t-1} + e_t, \quad t=1,2,\dots,n \quad (105)$$

$$|\rho| < 1, \quad (106)$$

First, let's derive a large-sample test under the assumption that the explanatory variables are strictly exogenous, meaning the expected value of ε_t is zero, given the entire history of the independent variables. Additionally, in equation (105), we must assume that (Wooldridge, 2012, p. 417):

$$E(e_t | \varepsilon_{t-1}, \varepsilon_{t-2}, \dots) = 0 \quad (107)$$

And

$$\text{Var}(e_t | \varepsilon_{t-1}) = \text{Var}(e_t) = \sigma_e^2 \quad (108)$$

These are standard assumptions in the AR(1) model, which follow when $\{e_t\}$ is an *i.i.d.* sequence. As with testing for heteroskedasticity, the null hypothesis is that the appropriate Gauss-Markov assumption holds true. In the AR(1) model, the null hypothesis that the errors are serially uncorrelated is (Wooldridge, 2012, p. 417):

$$H_0 : \rho = 0 \quad (109)$$

To test this hypothesis, consider if ε_t were observed; then, under equations (107) and (108), we could directly apply the asymptotic normality results from Theorem (110) :

$$y_t = \rho_1 y_{t-1} + e_t, \quad t=1,2,\dots \quad (110)$$

to the dynamic regression mode (Wooldridge, 2012, p. 417):

$$\varepsilon_t = \rho \varepsilon_{t-1} + e_t, \quad t=2,\dots,n \quad (111)$$

Under the null hypothesis that $\rho=0$, the series $\{\varepsilon_t\}$ is weakly dependent. To estimate ρ , we can regress ρ_t on ρ_{t-1} for $t=2,\dots,n$ without an intercept and use the usual t-statistic for $\hat{\rho}$. However, this approach fails because ε_t is unobserved. Instead, we replace ε_t with the corresponding OLS residual $\hat{\varepsilon}_t$, similar to the method used in testing for heteroskedasticity. Since $\hat{\varepsilon}_t$ depends on the OLS estimators $\hat{\beta}_0, \hat{\beta}_1, \dots, \hat{\beta}_k$, it is not immediately clear that substituting $\hat{\varepsilon}_t$ for ε_t in the regression does not affect the distribution of the t statistic. Fortunately, due to the strict exogeneity assumption, the large-sample distribution of the t statistic remains unaffected when using the OLS residuals instead of the errors. Although a proof is beyond this text's scope, it is derived from Wooldridge's work (1991b). Thus, we can summarize the asymptotic test for AR(1) serial correlation simply (Wooldridge, 2012, p. 417).

To test AR(1) Serial Correlation with Strictly Exogenous Regressors (Wooldridge, 2012, p. 417):

- Run the OLS regression of y_t on $x_{t1}, \dots, x_{tk}$ and obtain the OLS residuals, $\hat{\varepsilon}_t$, for all $t= 1, 2, \dots, n$.
- Run the regression of

$$\hat{\varepsilon}_t \text{ on } \hat{\varepsilon}_{t-1}, \text{ for all } t=2,\dots,n \quad (112)$$

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Obtain the coefficient $\hat{\rho}_t$ from the regression of $\hat{\varepsilon}_{t-1}$ and calculate its t statistic, $t_{\hat{\rho}}$. This regression can include an intercept or not; although the t statistic for $\hat{\rho}$ will be slightly affected, it remains asymptotically valid in either case.

- Use $t_{\hat{\rho}}$ to test $H_0: \rho=0$ against $H_1: \rho \neq 0$ in the standard manner. Given that $\rho>0$ is often anticipated, the alternative hypothesis can be $H_1: \rho>0$. Serial correlation is typically considered a problem to address only if H_0 is rejected at the 5% significance level. It is always best to report the p-value for the test. When deciding whether serial correlation requires attention, it is important to distinguish between practical and statistical significance. With a large sample size, significant serial correlation might be detected even if $\hat{\rho}$ is practically small. If $\hat{\rho}$ is near zero, the usual OLS inference procedures remain fairly accurate. However, such outcomes are relatively uncommon in time series applications because these data sets are usually small.

The Durbin-Watson test is an alternative method for detecting AR(1) serial correlation. It relies on the OLS residuals to calculate the Durbin-Watson (DW) statistic (Wooldridge, 2012, p. 418):

$$DW = \frac{\sum_{t=2}^n (\hat{\varepsilon}_t - \hat{\varepsilon}_{t-1})^2}{\sum_{t=1}^n \hat{\varepsilon}_t^2} \quad (113)$$

Simple algebra shows that DW and $\hat{\rho}$ from (112) are closely linked:

$$DW \approx 2(1 - \hat{\rho}) \quad (114)$$

One reason this relationship is not exact is that $\hat{\rho}$ includes $\sum_{t=1}^n \hat{\varepsilon}_t^2$ in its denominator, whereas the DW statistic uses the sum of squares of all OLS residuals in its denominator. Even with moderate sample sizes, the approximation in (114) is often quite accurate. Consequently, tests based on the DW statistic and the t-test based on $\hat{\rho}$ are conceptually equivalent (Wooldridge, 2012, p. 419).

Durbin and Watson (1950) derived the distribution of the DW statistic (conditional on X) under the full set of classical linear model assumptions, including the normality of error terms. Unfortunately, this distribution is influenced by the values of the independent variables, the sample size, the number of regressors, and the presence of an intercept in the regression. While some econometric packages provide tables for critical values and p-values for the DW statistic, many do not. Moreover, these values are dependent on the full set of classical linear model assumptions. Several econometrics texts provide upper and lower bounds for the critical values of the DW test, which depend on the desired significance level, the alternative hypothesis, the number of observations, and the number of regressors, assuming the model includes an intercept. Typically, the DW test is calculated for the alternative hypothesis (Wooldridge, 2012, p. 419).

$$H_1: \rho > 0 \quad (115)$$

From the estimate in (114), when $\hat{\rho} \approx 0$, it drives to $DW < 2$, and if $\hat{\rho} > 0$ then $DW < 2$. Therefore, to reject the null hypothesis (109) in favor of (115), we look for a DW value significantly less than two. However, due to challenges in obtaining the null distribution of DW, we must compare DW with two sets of critical values, labeled d_U (upper) and d_L (lower).

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If $DW < d_L$, we reject H_0 in favor of (115); if $DW > d_U$, we fail to reject H_0 . If $d_L \leq DW \leq d_U$, the test is inconclusive (Wooldridge, 2012, p. 419).

II.3.4 Heteroscedasticity Test

The presence of heteroskedasticity in the errors of an otherwise correctly specified linear model results in consistent but inefficient parameter estimates and inconsistent covariance matrix estimates. Consequently, statistical hypothesis tests may lead to incorrect inferences when heteroskedasticity is present. If the researcher has a formal model describing the process that generates the varying variances, these issues can be resolved by applying an appropriate linear transformation to the data based on this model (White, 1980, p. 817).

However, even with such a model, there is no guarantee it is accurate. Often, multiple models are considered, but none may be definitively correct. In such cases, each alternative transformed model can be tested for remaining heteroskedasticity using available tests, and those that fail can be discarded. But what if all models fail the heteroskedasticity test? In this scenario, while the researcher may have a good estimate of the parameter values of the linear model, significant challenges remain in evaluating the precision of these estimates and testing hypotheses due to the potential inconsistency of the usual covariance matrix estimator (White, 1980, p. 817).

To detect the presence of heteroskedasticity in a regression model (White, 1980, p. 822):

1/Run the Original Regression:

- ☐ Estimate the regression model: $y = X\beta + \varepsilon$
- ☐ Obtain the residuals $\hat{\varepsilon}$ from this regression.

2/Create the Auxiliary Regression:

- Regress the squared residuals $\hat{\varepsilon}^2$ on the original explanatory variables X , their squares, and their cross-products. The auxiliary regression model is: $\hat{\varepsilon}^2 = \gamma_0 + \gamma_1 X_1 + \gamma_2 X_2 + \dots + \gamma_k X_k + \gamma_{k+1} X_1^2 + \dots + \gamma_{k+m} X_k^2 + \gamma_{k+m+1} (X_1 X_2) + \dots + u$;
- Here, $X_1, X_2, \dots, X_k$ are the original explanatory variables, and u is the error term of the auxiliary regression.

3/Calculate the Test Statistic:

- The test statistic is based on the R-squared value R^2 from the auxiliary regression.
- Compute the test statistic nR^2 , where n is the number of observations.

4/Determine the Degrees of Freedom:

The degrees of freedom for the test are equal to the number of regressors in the auxiliary regression, excluding the constant term. This equals the number of terms in the auxiliary regression.

5/Conduct the Test:

- Under the null hypothesis of homoskedasticity (i.e., no heteroskedasticity), nR^2 follows a chi-squared (χ^2) distribution with degrees of freedom equal to the number of regressors in the auxiliary regression.

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- Compare the nR^2 value to the critical value from the chi-squared distribution with the appropriate degrees of freedom.

Decision Rule:

- If nR^2 exceeds the critical value, reject the null hypothesis of homoskedasticity, indicating the presence of heteroskedasticity.
- If nR^2 does not exceed the critical value, do not reject the null hypothesis, indicating no evidence of heteroskedasticity.

III. Econometric Modeling for Dynamic Panel Model

The primary advantage of using panel data regressions (incorporate both cross-sectional and longitudinal dimensions) lies in the ability to account for unobserved heterogeneity. This unobserved heterogeneity, also referred to as firm fixed effects or specific effects when the firm is the primary unit of analysis, captures enduring characteristics linked to the nature of a firm's economic activities or the quality of its management. Depending on the research context, it becomes possible to mitigate or entirely address the endogeneity issue stemming from omitted variables by controlling for the unobserved heterogeneity of the observed entities. However, there is a trade-off involved in models that isolate unobserved heterogeneity. The consistency of the estimator relies on the condition of strict exogeneity, which necessitates the absence of correlation between the explanatory variables and the error term of the model at every single point in time. This condition, known as strict exogeneity, is frequently overlooked in empirical studies within the field of corporate finance (Barros, Castro, Di Miceli da Silveira, & Bergm, 2020, p. 438).

III.1 Dynamic models

Panel data is now extensively used to estimate dynamic econometric models due to its significant advantages over cross-sectional data. Dynamic models cannot be estimated from observations at a single point in time, and single cross-sectional surveys rarely provide sufficient information about earlier periods to investigate dynamic relationships. Compared to aggregate time series data, panel data offers the advantage of avoiding aggregation biases that can obscure underlying microeconomic dynamics. Additionally, panel data allows for the investigation of heterogeneity in adjustment dynamics among different individuals, households, or firms. While repeated cross-section or cohort data can be used to construct pseudo-panel data on grouped observations, genuine panel data—with repeated observations on the same individuals—typically enables the use of more of the variation in the micro data for parameter estimates. It also allows for the application of relatively simple econometric techniques (Bond, 2002, p. 141).

III.1.1 Definition of dynamic models

Dynamic models are crucial in various economic applications, such as Euler equations for household consumption, adjustment cost models for firms' factor demands, and empirical models of economic growth. Even if the coefficients on lagged dependent variables are not of primary interest, incorporating dynamics in the underlying process is often essential for obtaining consistent estimates of other parameters. For instance, this is important in estimating production functions when productivity shocks are serially correlated and factor inputs adjust in response to these shocks (Bond, 2002, p. 142).

The dynamic model is characterized with the potential direct impact of previous values of the response variable on its current values. However, many indicators relevant in corporate

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finance exhibit strong inertia or persistence which suggests that static models may not be suitable. To explicitly model this dynamic component, we define equation (Barros, Bergmann, Castro, & Di Miceli da Silveira, 2020, p. 449):

$$y_{it} = \alpha_i y_{it-1} + \beta x_{it} + u_i + v_{it} \quad (116)$$

If the true model is accurately represented by equation (116), which includes lagged variables represented by $\alpha_i \neq 0$ then neglecting y_{it-1} in the regression would lead to inconsistent estimation of β if y_{it-1} (which would be part of the error term in the estimated model) is correlated with x_{it} . This correlation can occur when x exhibits time-persistence, creating a substantial correlation between x_{it} and x_{it-1} . Furthermore, a more direct source of inconsistency would be the presence of feedback from y to x (Barros, Bergmann, Castro, & Di Miceli da Silveira, 2020, p. 449).

The individual effects (u_i) is considered to be stochastic. It implies they are necessarily correlated with the lagged dependent variable ($y_{i,t-1}$) unless the distribution of u_i is degenerate. Initially, we also assume that the disturbances (v_{it}) are serially uncorrelated. Together, these assumptions imply that the Ordinary Least Squares (OLS) estimator of α in the levels equation (116) is inconsistent because the explanatory variable ($y_{i,t-1}$) is positively correlated with the error term ($u_i + v_{it}$) due to the presence of the individual effects. This correlation does not disappear as the sample size increases. According to standard results for omitted variable bias, the OLS levels estimator is biased upwards, at least in large samples (Bond, 2002, p. 144).

One sign that a static specification may be inadequate is the existence of a significant autocorrelation in v_{it} which can be empirically tested by the researcher using autocorrelation tests on the residuals of the original static regression. In many cases, including the first lag of the response variable among the regressors is sufficient to capture this phenomenon, although, in theory, other lags may also be pertinent to account for the dynamic nature of y (e.g., y_{it-1} , y_{it-2} , ..., y_{it-p}) (Barros, Bergmann, Castro, & Di Miceli da Silveira, 2020, p. 449).

Model (116) cannot be adequately estimated using procedures that rely on the assumption of strict exogeneity of the regressors, such as the traditional fixed effects (FE) and random effects (RE) estimators. This is because, by definition, y_{it-1} is not a strictly exogenous variable. To assume strict exogeneity in this model would imply a lack of correlation between y_{it} and y observed at any given point in time. Consequently, it would necessitate a lack of correlation between y_{it} and y_{it-1} , which is impossible by construction. However, if the regressors are sequentially exogenous, meaning that they do not exhibit contemporaneous correlation with the error term, the parameters of equation (116) can be consistently estimated using the generalized method of moments (GMM)-based methods (Barros, Bergmann, Castro, & Di Miceli da Silveira, 2020, p. 449).

III.1.2 Static and dynamic models

A study highlighted the ongoing debate regarding the influence of environmental performance on firm performance. While prior research has yielded mixed results, many of these studies are compromised by model misspecification and/or inadequate data. A notable gap in the literature is the failure to account for firm heterogeneity and dynamic effects. This study addresses these issues by conducting both static and dynamic panel data analyses to assess the impact of environmental performance on financial performance (Elsayed & Paton, 2005, p. 395).

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To examine firm performance as a function of environmental performance, incorporating various controls where necessary, the previous study estimated static panel data regression models. Both fixed and random effects models are estimated. The fixed effects model estimates a parameter for each firm, while the random effects model assumes that firm-specific terms are randomly distributed. Since the random effects model does not require estimating a parameter for each firm, it can offer significant efficiency gains. However, if there is correlation between the fixed effects and any independent variables, the random effects estimator becomes inconsistent (Baltagi, 1995). To assess the consistency of the random effects estimator in our analysis, the standard Hausman test is applied. A significant Hausman test statistic would indicate that the random effects estimator is inconsistent, making the fixed effects model more suitable (Elsayed & Paton, 2005 , p. 399).

A straightforward method to account for dynamic effects in panel data models is to include a lagged dependent variable, a common approach in firm performance studies within industrial organization (e.g., Geroski and Machin, 1997; Machin and Van Reenen, 1993). However, it is well known that introducing a lagged dependent variable typically results in inconsistent standard estimators. Consistent estimators can be obtained using the Generalized Method of Moments (GMM) approach, as described by Arellano and Bond (1991). This method involves transforming the equation into first differences and using lagged values of the endogenous variables as instruments, with the number of instruments varying across time periods. We apply this GMM procedure to estimate the dynamic model using Stata, version 8.0. It's important to note that GMM estimates may become inconsistent if serial correlation is present. This issue would manifest as second-order serial correlation in the differenced model. Therefore, we provide diagnostic tests for first and second-order serial correlation, along with the Sargan test to validate the instruments (Elsayed & Paton, 2005 , p. 399).

III.2 Dynamic models Conditions

Panel data is now extensively used for estimating dynamic econometric models, offering clear advantages over cross-sectional data: dynamic models cannot be estimated from single-point-in-time observations, and it is uncommon for individual cross-sectional surveys to provide adequate information on earlier periods to analyze dynamic relationships. Compared to aggregate time series data, panel data allows for uncovering underlying microeconomic dynamics that may be hidden due to aggregation biases and offers the opportunity to explore heterogeneity in adjustment dynamics across different individuals, households, or firms. While repeated cross-sectional or cohort data can be used to create pseudo-panel data for grouped observations, true panel data—featuring repeated observations on the same individuals—typically enables more extensive use of the variation in micro data for parameter estimation and supports the application of relatively simple econometric techniques (Bond, 2002, p. 141).

Dynamic models are relevant in various economic applications, such as Euler equations for household consumption, adjustment cost models for firms' factor demands, and empirical models of economic growth. Even if the coefficients on lagged dependent variables are not the primary focus, incorporating dynamics in the underlying process can be essential for obtaining consistent estimates of other parameters (Bond, 2002, p. 142).

III.2.1 The strict and sequential exogeneity assumptions

The assumption of strict exogeneity becomes inevitably compromised when the model incorporates lagged values of the dependent variable, a scenario that is likely to be quite common, as argued in this paper. This prevalence stems from the dynamic nature of the

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phenomena of interest in corporate finance. This violation leads to a distortion known as "short panel bias," which is more pronounced when the number of time periods (T) is considerably smaller than the number of entities (N), a characteristic feature of studies in this field. In many previous studies, researchers aim to uncover causal relationships between the variables of interest using real-world data. Traditionally, linear regression has been the preferred method for this purpose. Among all the assumptions necessary for a regression analysis to provide valid insights into causal relationships, the most critical one is the assumption of exogeneity of the regressors (Barros, Castro, Di Miceli da Silveira, & Bergm, 2020, p. 449).

For a fixed effect model, both the fixed effects (FE) estimator and the first-difference (FD) estimator, which use within-group and first-difference transformations to eliminate u_i , respectively, have been widely employed in empirical research. A standard assumption to ensure the $\sqrt{N}$ -consistency of these estimators in the large N and fixed T framework is the strict exogeneity of x_{it} . Examples of recent empirical applications adopting this strict exogeneity assumption include studies by Boumparis et al. (2015), Earnhart (2004), and Papageorgiadis and Sharma (2016), among others. However, in many applications, strict exogeneity of x_{it} may not hold due to potential feedback effects or economic periodicity. Wooldridge (2010, p. 324) demonstrated that the FE estimator is generally biased and inconsistent, with its probability limit differing from the FD estimator when x_{it} is not strictly exogenous (Sua, Zhangb, & Weic, 2016, p. 27).

Given the crucial role of this assumption, it is necessary to develop a formal test to detect its violation. The only available test in the literature for linear panel data models is by Wooldridge (2010), who introduced a simple test based on an augmented regression. In this test, a subset ($w_{i,t+1}$) of the first-order leading term $x_{i,t+1}$ is included in the level equation as additional regressors. Under the null hypothesis of strict exogeneity, the coefficient of $w_{i,t+1}$ should be zero. A Wald test can then be constructed, which is robust to arbitrary serial correlation and heteroskedasticity of unknown form. However, this test only includes a subset of the first leading explanatory variables, implying that it may have power only when $x_{i,t+1}$ is correlated with u_{it} . It may not detect a more general structure of intertemporal correlation between $\{u_{it}\}$ and $\{x_{it}\}$ (Sua, Zhangb, & Weic, 2016, p. 28).

The fundamental assumption for accurately estimating the parameters in models with unobservable heterogeneity through traditional FE and RE procedures might be more constrained than it initially seems, necessitating a closer examination. To simplify the explanation, expressions relating to the correlation between errors and regressors will be replaced with statements concerning the conditional expectation of the errors. As a result, the essential assumptions for estimating the parameters in Equation (78) through the FE and RE procedures can be formalized as follows (Barros, Bergmann, Castro, & Di Miceli da Silveira, 2020, p. 444):

$$E(v_{it} | x_{i1}, x_{i2}, \dots, x_{iT}, u_i) = 0 \quad (117)$$

In which $E(\cdot)$ represents the expected value operator, this is referred to as the assumption of strict exogeneity of the regressors. It serves as a sufficient condition for the absence of correlation between v_{it} and $x_{i1}, x_{i2}, \dots, x_{iT}$. The strict exogeneity assumption essentially eliminates any correlation between the present errors and the past, present, or future values of the explanatory variables. While this assumption is acceptable in certain research scenarios, it is

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often unrealistic in many others (Barros, Castro, Di Miceli da Silveira, & Bergm, 2020, p. 444).

To overcome endogeneity problem, we assume the sequential exogeneity. On the one hand, sequential exogeneity implies that current shocks are independent of past values of the dependent variable. However, it allows for the possibility that current and future values of the dependent variable may adjust to current shocks (simultaneity and dynamic endogeneity, respectively). The sequential exogeneity assumption (Wintoki, Linck, & Netter, 2012, p. 604):

$$E(v_{it} | X_{i,t-1}, X_{i,t-2}, \dots, X_{i1}) = 0 \quad (118)$$

The assumption of sequential exogeneity suggests the following set of orthogonality conditions for Eq. (118) (Wintoki, Linck, & Netter, 2012, p. 604):

$$E(X_{is}' \Delta E_{it}) = 0, \quad s=1, \dots, t-2 \quad (119)$$

The assumption of strong exogeneity provides more orthogonality conditions than those utilized by current estimators. These additional moment conditions are found in the 'deviations from means' space and are irrelevant for the static model but are pertinent for the dynamic model. We will demonstrate how to categorize and apply these conditions (Ahn & Schmidt, 1995, p. 6).

III.2.2 Source of endogeneity

Consider a correlated unobserved effects panel data model (Wooldridge, 2010, p. 376):

$$y_{it} = \beta x_{it} + u_{i1} + v_{it1} \quad (117)$$

where x_{it} is a $1 \times K$ vector of explanatory variables, u_{i1} is the unobserved effect (which may be correlated with x_{it}), and v_{it1} is an idiosyncratic error. Assume that $E[v_{it1} | x_{i1}, \dots, x_{iT}, c_{i1}] \neq E[v_{it1} | x_{i1}, c_{i1}] \neq 0$ for some element(s) of x_{it} , as occurs in simultaneous equations models, models with measurement error, and models with time-varying omitted variables. Additionally, define a $L1 \times L$ ($L > K$) vector of instruments, z_{it} , which is strictly exogenous conditional on u_{i1} : $E[v_{it1} | z_{i1}, \dots, z_{iT}, u_{i1}] \equiv E[v_{it1} | z_i, u_{i1}] = 0$. This allows for unspecified correlation between v_{it1} and u_{i1} to be uncorrelated with $\{u_{ir1} \text{ for } r = 1, \dots, T\}$. Unless stated otherwise, vectors x_{it} and z_{it} always include a (possibly time-specific) intercept. In fact, z_{it} includes all the variables in x_{it} that are exogenous in (117). All variables in x_{it} and z_{it} are assumed to be time-varying (Wooldridge, 2010, p. 376).

We introduce selection (or incidental truncation) by defining a latent variable, s_{it}^* :

$$s_{it}^* = z_{it} \delta_t + \mu_{i2} + v_{it2} \quad t=1, \dots, T \quad (118)$$

where, μ_{i2} is an unobserved effect and v_{it2} is an idiosyncratic error. We also define:

$$s_{it} = 1[s_{it}^* > 0] = 1[z_{it} \delta_t + \mu_{i2} + v_{it2} > 0] \quad (119)$$

where, $1[\cdot]$ is the indicator function. By definition, s_{it} is a selection indicator that equals one if y_{it} is observed, and zero otherwise. We assume that z_{it} is always observed, while endogenous variables in x_{it} may have missing values when $s_{it}=0$ (Wooldridge, 2010, p. 376).

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III.2.2.1 Simultaneity

Econometrically, simultaneity exists in Eq.(117) if $E(v_{it} / X_{it}, Z_{it}) \neq 0$. From an economic perspective, simultaneity can occur in the performance/dividend relationship. According to theory, if firms adjust their performance in any given period to reach a specific dividend level, then dividends may be influenced by performance. Conversely, performance will also be affected by dividends. This mutual influence means that performance and dividends are simultaneously determined, leading to biased OLS and fixed-effects estimates of Eq. (117) (Wintoki, Linck, & Netter, 2012, p. 586).

A common source of endogeneity problems in corporate finance research is the likely simultaneous determination of most firm-level outcomes and characteristics. Given the complex interdependency of corporate decisions, this issue should be a primary concern for empirical researchers in the field. One example is the relationship between a firm's leverage and market value. Various theoretical arguments suggest that market value measures, such as proxies for future investment opportunities, can simultaneously influence a firm's financing policy (Fama & French, 2002). Conversely, other arguments propose that leverage can affect organizational performance by reducing available cash, which might otherwise be misused by self-interested managers, thus partially determining the firm's market value (McConnell & Servaes, 1995; Stulz, 1990). This reasoning can be extended to many other corporate variables, making the direction of expected causal relationships ambiguous (Barros, Bergmann, Castro, & Di Miceli da Silveira, 2020, p. 442).

III.2.2.2 Endogeneity and the bias of fixed-effects estimation econometrically, unobservable heterogeneity

Econometrically, unobservable heterogeneity exists in Eq. (117) if $E(\mu_i / X_{it}, Z_{it}) \neq 0$. Economically, unobservable heterogeneity becomes a source of endogeneity if there are unobserved factors that affect both performance and the explanatory variables. In the context of board structure and performance, theory suggests this is the case. For example, consider managerial ability, which, while generally unobservable, certainly affects performance. Hermalin and Weisbach (1998) suggest that firms with high-ability managers will require less monitoring and therefore have less independent boards. As a result, an OLS regression of performance on board structure that ignores this unobservable heterogeneity may find a negative relationship between board independence and performance. A potential solution to address the time-invariant or "fixed" part of unobservable heterogeneity, if panel data are available, is a fixed-effects or "within" estimation. Consider the linear model (Wintoki, Linck, & Netter, 2012, p. 586):

$$y_{it} = \beta x_{it} + u_i + v_{it} \quad (120)$$

where μ represents an unobserved fixed effect. Applying a fixed-effects transformation, which involves time-demeaning, all variables, results in (Wintoki, Linck, & Netter, 2012, p. 587):

$$\dot{y}_{it} = \beta \dot{x}_{it} + \tilde{v}_{it} \quad (121)$$

Where $\dot{x} = x_{it} - \bar{x}_i$ and $\dot{y} = y_{it} - \bar{y}_i$

However, what is often not recognized are the conditions under which a fixed-effects regression would be consistent and unbiased. A fixed-effects regression of the model in Eq. (117) would be consistent only if the current values of the explanatory variables (governance) were completely independent of past realizations of the dependent variable (performance), i.e., if $E(u_{is} / X_{it}, Z_{it}) = 0$ for all s and t . This implies that fixed-effects estimates would be biased if

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past performance affects current values of governance. What happens if we inadvertently apply fixed-effects estimation in the presence of this dynamic relationship? According to Wooldridge (2002), the potential bias from a fixed-effects estimate of Eq. (120) is:

$$\frac{1}{T} \sum_{t=1}^T E(\ddot{X}'_{it} \varepsilon_{it}) = -\frac{1}{T} \sum_{t=1}^T E(\bar{X}'_i \varepsilon_{it}) = -E(\bar{X}'_i \varepsilon_{it}) \quad (122)$$

Eq. (122) suggests that if the explanatory variable x is positively (negatively) related to past values of the dependent variable y , then a fixed-effects estimate of current values of y on current values of x will be negatively (positively) biased. It also indicates that even if there is no causal relationship from x to y , a fixed-effects regression could yield a spurious estimate of the effect of x on y (Wintoki, Linck, & Netter, 2012, p. 587).

III.3 Generalized method of moments

According to Mileva (2007), the inefficiency of Generalized Least Squares (GLS) can arise from several factors beyond just the inclusion of lagged dependent variables and endogenous regressors (i.e., variables correlated with the error terms). Additional contributors to inefficiency include the correlation between fixed effects (such as geographic and demographic factors) and explanatory variables, which leads to issues like autocorrelation. Furthermore, the duration of the time periods—whether short or long—can also impact efficiency (Zarra-Nezhad, Hasanvand, & Akbarzadeh, 2014, p. 48).

Baum et al. (2003), Roodman (2006), and Wooldridge (2006) have highlighted heteroscedasticity as another significant factor contributing to the inefficiency of these estimation methods, including Two-Stage Least Squares (2SLS), Ordinary Least Squares (OLS), fixed effects, and random effects models. To address the issues mentioned, Arellano and Bond (1991) introduced a Generalized Method of Moments (GMM) estimator as an instrumental variable (IV) estimator. In some cases, the instruments used in the Difference GMM approach can be weak, leading to biased coefficient estimates in finite samples. To address this issue, the System Generalized Method of Moments (System-GMM) approach introduces additional instruments (Zarra-Nezhad, Hasanvand, & Akbarzadeh, 2014, p. 48).

The difference and system generalized method of moments (GMM) estimators are becoming increasingly popular. When used with widely available software, these estimators can produce a large number of instruments, which, in the case of system GMM, may sometimes be problematic. A large set of instruments can overfit endogenous variables and compromise the Hansen test's ability to assess the joint validity of these instruments (Roodman, 2009, p. 135).

III.3.1 Difference GMM

The Difference GMM utilizes the lags of endogenous regressors and the current values of exogenous variables as instruments. The process involves differencing the variables, which is why it is referred to as the Difference Generalized Method of Moments (Difference GMM) (Zarra-Nezhad, Hasanvand, & Akbarzadeh, 2014, p. 48)

The most basic model without strictly exogenous variables is an autoregressive specification, expressed as in equation 116, the AR (1) model (Arellano & Bond, 1991, p. 278):

$$y_{it} = \alpha_i y_{it-1} + \beta x_{it} + u_i + v_{it} \quad |\alpha| < 1 \quad (123)$$

We assume the availability of a random sample of N individual time series ($y_{i1}, \dots, y_{iT}$), where T is small and N is large. The error terms v_{it} are assumed to have finite moments, specifically

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$E(v_{it})=E(v_{it}v_{is})=0$ for $t \neq s$, indicating no serial correlation, though not necessarily independence over time. Under these assumptions, values of y lagged by two or more periods serve as valid instruments in the first-difference equations. Specifically, for $T \geq 3$, the model leads to $m=(T-2)(T-1)/2$ linear moment restrictions expressed as (Arellano & Bond, 1991, p. 278):

$$E[(\bar{y}_{it} - \alpha \bar{y}_{i(t-1)})y_{i(t-j)}] = 0 \quad \text{for } j=2, \dots, (t-1) \text{ and } t=3, \dots, T \quad (124)$$

where for simplicity $Y_i = Y_i - Y_{i(t-i)}$. We wish to obtain the optimal estimator of α as $N \rightarrow \infty$ for fixed T on the basis of these moment restrictions alone. That is, in the absence of any other knowledge concerning initial conditions or the distributions of the v_{it} , and the u_i . Note that our assumptions also imply quadratic moment restrictions, for example $E(\bar{v}_{it}\bar{v}_{i(t-2)}) = 0$, which however we shall not exploit in order to avoid iterative procedures. This estimation problem is an example of those analyzed by Hansen (1982) and White (1982), and an optimal GMM or two-stage instrumental variables estimator should be available. The moment equations in (2) can be conveniently written in vector form as $E(Z_i' \bar{v}_i) = 0$ where $\bar{v}_i = (\bar{v}_{i3} \dots \bar{v}_{iT})'$ and Z_i is a $(T-2) \times m$ block diagonal matrix whose s^{th} block is given by $(y_{i1} \dots y_{is})$ (Arellano & Bond, 1991, p. 278).

The GMM estimator $\hat{\alpha}$ is derived from the sample moments $N^{-1} \sum_{i=1}^N Z_i' \bar{v}_i = N^{-1} Z_i' \bar{v}$, where $\bar{v} = \bar{y} - \alpha \bar{y}_{-1} = (\bar{v}'_1, \dots, \bar{v}'_N)'$ is $N(T-2) \times 1$ vector and $Z = (Z'_1, \dots, Z'_N)'$ is an $N(T-2) \times m$ matrix. The estimator $\hat{\alpha}$ is determined by the following equation (Arellano & Bond, 1991, p. 278):

$$\hat{\alpha} = \argmin_{\alpha} = (\bar{v}'Z) A_N (Z'\bar{v}) = \frac{\bar{y}'_{-1} Z A_N Z' \bar{y}}{\bar{y}'_{-1} A_N Z' \bar{y}_{-1}} \quad (125)$$

The multivariate Central Limit Theorem (CLT) implies that $\bar{V}_N^{-1/2} N^{-1/2} Z' \bar{v}$ is asymptotically standard normal, where $\bar{V}_N = N^{-1} \sum_i E(Z_i' \bar{v}_i \bar{v}_i' Z_i)$ represents the average covariance matrix of $Z_i' \bar{v}_i$. According to the assumptions, $\bar{V}_N$ can be approximated by $\hat{V}_N = N^{-1} \sum_i Z_i' \hat{v}_i \hat{v}_i' Z_i$ are residuals from a preliminary consistent estimator $\hat{\alpha}_1$. The one-step estimator $\hat{\alpha}_1$ is obtained by setting $A_N = (N^{-1} \sum_i Z_i' H Z_i)^{-1}$, where H is a $(T-2)$ matrix with twos on the main diagonal, minus ones on the first subdiagonals, and zeros elsewhere. A consistent estimate of the asymptotic variance of $\hat{\alpha}$ for any arbitrary A_N is given by (Arellano & Bond, 1991, p. 278):

$$\text{avar}(\hat{\alpha}) = N \frac{\bar{y}'_{-1} Z A_N \hat{V}_N A_N Z' \bar{y}_{-1}}{(\bar{y}'_{-1} A_N Z' \bar{y}_{-1})^2} \quad (126)$$

Maximum Likelihood estimators for the AR(1) panel data model have been developed, but a challenging aspect of dynamic models in short T panels is that the distribution of y_{it} for $t=2,3,\dots,T$ is significantly influenced by the assumptions made about the distribution of the initial conditions y_{i1} . In specifying model (123), we have not imposed restrictions on the process that generates these initial conditions, allowing for various possibilities. For instance, y_{i1} could be stochastic or non-stochastic, correlated or uncorrelated with the individual effects μ_i , or specified such that the mean of the y_{it} series for individual i remains stationary at $\mu_i/(1-\alpha)$ for each observation $t=1,2,\dots,T$, or satisfies higher-order stationarity properties. Different assumptions about the initial conditions will lead to different likelihood functions, and mis-specifying this process can result in inconsistent Maximum Likelihood estimators of α (Bond, 2002, p. 145).

Instrumental Variables estimators, which impose much weaker assumptions about the initial conditions, have become appealing in this context. The foundational first-differenced Two

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Stage Least Squares (2SLS) estimator for the AR(1) panel data model was introduced by Anderson and Hsiao (1981, 1982) as an initial method for obtaining a consistent starting value for computing Maximum Likelihood estimators. The first-differencing transformation also removes the individual effects μ_i from the model (Bond, 2002, p. 145):

$$\Delta y_{it} = \alpha \Delta y_{it-1} + \Delta v_{it} ; |\alpha| < 1 \quad (123)$$

Additional instruments become available when the panel includes more than three time series observations. While y_{i1} is the only instrument available for the first-differenced equation in period $t=3$, both y_{i1} and y_{i2} can be used in the equation for period $t=4$, and the vector $(y_{i1}, y_{i2}, \dots, y_{iT-2})$ can be used in the equation for period $t=T$. When $T > 3$, the model is overidentified, and since the first-differenced error term Δv_{it} exhibits first-order moving average serial correlation if the assumption that the v_{it} are serially uncorrelated holds, 2SLS is not asymptotically efficient, even with the full set of available instruments and homoskedastic disturbances v_{it} . The Generalized Method of Moments (GMM), as developed by Hansen (1982), offers a useful approach for obtaining asymptotically efficient estimators in this setting. First-differenced GMM estimators for the AR(1) panel data model were introduced by Holtz-Eakin, Newey, and Rosen (1988) and Arellano and Bond (1991). These estimators use an instrument matrix of the form (Bond, 2002, p. 146):

$$Z_i = \begin{bmatrix} y_{i1} & 0 & 0 & \cdots & 0 & \cdots & 0 \\ 0 & y_{i1} & y_{i2} & \cdots & 0 & \cdots & 0 \\ 0 & & 0 & \cdots & y_{i1} & \cdots & y_{iT-2} \end{bmatrix} \quad (124)$$

Here is a reformulated version of the given text: "where each row represents the first-differenced equations for periods $t=3, 4, \dots, T$ for individual i , and utilizes the moment conditions."

$$E[Z_i' \Delta v_i] = 0 \text{ for } i = 1, 2, \dots, N \quad (125)$$

Where $\Delta v_i = (\Delta v_{i3}, \Delta v_{i4}, \dots, \Delta v_{iT})'$

Generally, the asymptotically efficient GMM estimator, which relies on this set of moment conditions, minimizes the criterion function.

$$J_N = \left(\frac{1}{N} \sum_{i=1}^N \Delta v_i' Z_i \right) W_N \left(\frac{1}{N} \sum_{i=1}^N Z_i' \Delta v_i \right) \quad (126)$$

using the weight matrix

$$W_N = \left[\frac{1}{N} \sum_{i=1}^N Z_i' \widehat{\Delta v_i} \widehat{\Delta v_i}' Z_i \right]^{-1}, \quad (127)$$

where the $\widehat{\Delta v_i}$ represent consistent estimates of the first-differenced residuals derived from an initial consistent estimator. This process is referred to as a two-step GMM estimator. When the disturbances (v_{it}) are homoskedastic, the specific structure of the first-differenced model allows for an asymptotically equivalent GMM estimator to be obtained in a single step by using the weight matrix directly

$$W_{1N} = \left[\frac{1}{N} \sum_{i=1}^N Z_i' H Z_i \right]^{-1}, \quad (128)$$

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where H is a $(T - 2)$ square matrix with 2's on the main diagonal, -1's on the first off-diagonals, and zeros elsewhere. It is important to note that W_{1N} does not rely on any estimated parameters.

III.3.2 System GMM

System GMM can significantly mitigate the weaknesses of Difference GMM and enhance the efficiency of the coefficient estimates. As a result, System-GMM is often preferred over Difference GMM. Arellano and Bond also introduced two types of estimators: the one-step and the two-step estimators, with the two-step estimator proving to be more efficient. For proper implementation of these approaches, it is essential to conduct diagnostic tests, such as the Sargan and Hansen tests (Zarra-Nezhad, Hasanvand, & Akbarzadeh, 2014, p. 48).

Sargan and Hansen tests assess the predetermined restrictions, with their null hypothesis asserting the validity of the instruments, specifically that there is no autocorrelation between the instruments and the error terms. Additionally, first-order and second-order correlation tests examine whether there is serial correlation of the first and second order in the first-differenced error terms. Both Difference GMM and System GMM are considered consistent when there is no second-order serial correlation in the error terms of the first-differenced equations (Zarra-Nezhad, Hasanvand, & Akbarzadeh, 2014, p. 49).

To conduct system GMM, a stacked dataset is created by combining a copy of the original dataset in levels with another in differences. The instruments from the Holtz-Eakin, Newey, and Rosen (HENR) method (1988) and any additional instruments specific to the differenced equation are set to zero for the levels equation. Conversely, new instruments are introduced for the levels equation and set to zero for the differenced data. Specifically, while lagged variables in levels serve as instruments for the differenced equation, lagged differences now serve as instruments for the levels. This approach assumes that past changes in the dependent variable (or other instrumental variables) are uncorrelated with current errors in the levels equation, which includes fixed effects. Given this assumption, an expanded HENR-style instrument set can be constructed by instrumenting the dependent variable for each period with all available lags as described in equation (124). However, most of the moment conditions derived are mathematically redundant with the HENR instruments used for the differenced equation (Blundell and Bond, 1998; Roodman, forthcoming). Therefore, typically, only one lag is used for each period and instrument variable. For example, to instrument the dependent variable, the standard instrument set consists of blocks that resemble (Roodman, 2009, p. 138):

$$\begin{pmatrix} y_{i1} & 0 & 0 & 0 & 0 & 0 & \dots \\ 0 & y_{i2} & y_{i1} & 0 & 0 & 0 & \dots \\ 0 & 0 & 0 & y_{i3} & y_{i2} & y_{i1} & \dots \\ \dots & \dots & \dots & \dots & \dots & \dots & \dots \end{pmatrix} \quad (127)$$

in the rows for the levels equation. This corresponds to the moment conditions

$$E[\Delta y_{i,t-1} \varepsilon_{it}] = 0 \quad \text{for } t \geq 3 \quad (128)$$

A collection that increases linearly with, therefore, in terms of the number of instruments, the situation remains similar when transitioning from difference GMM to system GMM: the total number of instruments generally grows quadratically with T (Roodman, 2009, p. 138).

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Blundell and Bond (1998) leverage additional moment conditions based on assumptions about the initial conditions, which suggest that (Bun & Windmeijer, 2010, p. 98):

$$E[\mu_i, \Delta y_{i2}] = 0, \quad (129)$$

which holds when the process is mean stationary:

$$y_{it} = \frac{\mu_i}{1-\alpha} + \varepsilon_i \quad (130)$$

with $E(\varepsilon_i) = E(\varepsilon_i \mu_i) = 0$ and then the following $(T-1)(T-2)/2$ moment conditions are valid equation (128).

Where, $\Delta y_i^{t-1} = (\Delta y_{i2}, \Delta y_{i3}, \dots, \Delta y_{iT-1})'$. Defining:

$$Z_{li} = \begin{bmatrix} \Delta y_{i2} & 0 & 0 & \dots & 0 & \dots & 0 \\ 0 & \Delta y_{i2} & \Delta y_{i3} & \dots & 0 & \dots & 0 \\ 0 & 0 & 0 & \dots & \Delta y_{i3} & \dots & \Delta y_{iT-1} \end{bmatrix}; \quad \mu_i = \begin{bmatrix} \mu_{i3} \\ \mu_{i4} \\ \mu_{it} \end{bmatrix}$$

moment conditions (128) can be written as:

$$E[Z_{li} \mu_i] = 0, \quad (131)$$

with the GMM estimator based on these moment conditions given by:

$$\widehat{\alpha}_1 = \frac{y'_{-1} Z_l W_n^{-1} Z_l' y}{y'_{-1} Z_l W_n^{-1} Z_l' y_{-1}}, \quad (132)$$

Where $\widehat{\alpha}_1$ is the LEV-GMM estimator, with the moment conditions specified in (128) or (129) as the LEV moment conditions. The complete set of linear moment conditions under assumption (127) is given by (Bun & Windmeijer, 2010, p. 99):

$$E[\Delta y_{i,t-2} \mu_{it}] = 0 \quad \text{for } t \geq 3 \quad (133)$$

$$E[\mu_{it} \Delta y_{i,t-1}] = 0 \quad \text{for } t \geq 3 \quad (134)$$

or

$$E[Z_{si} p_i] = 0, \quad (135)$$

Where

$$Z_{si} = \begin{bmatrix} Z_{di} & 0 & \dots & 0 \\ 0 & \Delta y_{i2} & & \vdots \\ & \dots & \ddots & \Delta y_{it} \end{bmatrix}; \quad p_i = \begin{bmatrix} \Delta \mu_i \\ \mu_i \end{bmatrix}$$

The GMM estimator based on these moment conditions is:

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$$\widehat{\alpha}_s = \frac{q'_{-1} Z_s W_n^{-1} Z_s' q}{q'_{-1} Z_s W_n^{-1} Z_s' q_{-1}}, \quad (136)$$

With $q_i = (\Delta y_i', y_i')$, this estimator is known as the system or SYS-GMM estimator, as described by Blundell and Bond (1998). We refer to the moment conditions in (133) and (134) or (135) as the SYS moment conditions. In most of the derivations that follow, we further assume that the initial observation is drawn from a covariance stationary distribution, which implies that $E(\varepsilon_i^2) = \frac{\alpha^2}{1-\alpha^2}$ in (130) (Bun & Windmeijer, 2010, p. 99).

Conclusion of the chapter

Panel data, often referred to as longitudinal data, constitutes a powerful analytical framework that integrates both cross-sectional and time series dimensions. This dual structure allows researchers to collect and analyze observations from multiple entities—such as individuals, firms, countries, or other units of analysis—over various time periods. As a result, panel data provides a comprehensive view of temporal changes within the same entities, yielding insights that surpass those available from purely cross-sectional or time series datasets.

The estimation of static panel data models necessitates the application of statistical techniques that appropriately account for both the cross-sectional and time series dimensions inherent in the data. The choice of estimation method is contingent upon several factors, including the specific characteristics of the dataset and the assumptions made regarding unobserved heterogeneity—referring to the individual-specific effects that are not directly observable. Recognizing these nuances is crucial for the accurate interpretation of results and the overall validity of the analysis.

When engaging in the estimation of panel data models, researchers must possess a thorough understanding of the data structure and the fundamental assumptions related to individual-specific effects. The selection of the estimation method—whether employing simple Ordinary Least Squares (OLS), Fixed Effects, Random Effects, or advanced techniques such as Generalized Method of Moments (GMM)—is primarily driven by the context of the research question, the nature of the dataset, and the presence of complications like endogeneity. Each method comes with its own set of advantages and limitations, and the appropriateness of a particular approach should be assessed in light of the specific analytical goals.

Additionally, robust model selection, hypothesis testing, and appropriate estimation techniques are imperative for achieving reliable and valid results in panel data analysis. By meticulously considering the characteristics of the data and the methodological choices available, researchers can derive meaningful conclusions that enhance our understanding of the phenomena under investigation. This rigorous approach not only enriches the empirical findings but also contributes to the broader field of research by fostering more nuanced interpretations of complex relationships over time.

In summary, the versatility and richness of panel data make it an invaluable tool in empirical research, particularly in fields such as finance, economics, and social sciences. By effectively leveraging the unique advantages offered by panel data, researchers can gain deeper insights into temporal dynamics and individual behaviors, ultimately leading to more informed decision-making and policy formulation. Thus, the continued exploration and application of panel data analysis remain essential for advancing knowledge across various disciplines.

CHAPTER 4:
EMPIRICAL EVIDENCE
OF THE
DETERMINANTS OF
PAYOUT POLICY IN
ALGERIA

Chapter IV: Empirical evidence of the determinants of payout policy in Algeria

Introduction of chapter

The determinants of payout policy, particularly dividend policy, reflect a complex interaction of microeconomic and macroeconomic factors that shape corporate financial strategies in Algeria. A thorough understanding of these determinants is essential for analyzing how firms design their payout policies and for anticipating how such policies may adjust to evolving economic conditions. In the context of a developing economy such as Algeria, identifying these drivers provides valuable insights into corporate behavior with respect to dividend distributions and capital allocation.

The legal and tax framework governing dividend distribution constitutes a fundamental determinant of corporate payout decisions in Algeria. This framework encompasses corporate legislation, fiscal regulations, and specific provisions related to the appropriation of profits. It is designed to ensure regulatory compliance, protect shareholder interests, and define the tax obligations associated with profit distribution. Consequently, firms must operate within a structured institutional environment that both constrains and guides their payout strategies.

In practice, Algerian firms face a complex set of corporate governance requirements and tax constraints when determining dividend payments. Compliance with these regulations may significantly influence payout decisions. Furthermore, shareholders are subject to withholding taxes that differ according to residency status, which can affect investor preferences between dividend payments and alternative distribution mechanisms, such as share repurchases.

To provide a comprehensive analysis of dividend policy determinants among private Algerian firms, this chapter examines a set of explanatory variables commonly identified in the corporate finance literature. These include profitability, cash flow, leverage, firm size, and growth opportunities. The objective is to evaluate the extent to which these factors influence dividend payout behavior and to identify the underlying relationships within the Algerian context.

The chapter is structured into three main sections. The first section analyses the legal and fiscal framework governing profit distribution in Algeria, with the aim of identifying the institutional constraints and incentives affecting corporate payout behavior. The second section presents a comparative sector analysis, highlighting differences in payout policies across industries and emphasizing sector-specific dynamics. The third section provides an empirical investigation of dividend policy determinants using a sample of 88 private Algerian firms over the period 2010–2020. This analysis employs panel data econometric techniques, specifically the Generalized Method of Moments (GMM), and applies Lintner's partial adjustment model to capture the dynamic nature of dividend decisions.

I. Legal and Tax Framework of Dividend Distribution in Algeria

In Algeria, dividend distributions are governed by specific regulatory and tax provisions. This section outlines the legal and fiscal treatment of dividends as defined by the direct tax code, with the aim of assessing how taxation influences corporate decisions regarding dividend distribution.

I.1 Dividend Payment in Algeria

Under Algerian law, dividends are defined as distributions of a company's profits to its shareholders. The legal framework governing dividend distributions is primarily set out in the Algerian Commercial Code, complemented by applicable tax legislation and regulatory provisions.

I.1.1 Dividends in Algerian Law

Under Algerian corporate law, the distribution of dividends is governed by a comprehensive legal framework established by the Commercial Code, which defines both the conditions and procedures for profit allocation. Article 723 provides that, following the approval of the financial statements and the verification of distributable profits, the General Assembly is responsible for determining the share of earnings to be distributed to shareholders in the form of dividends. Any distribution carried out in violation of these provisions is deemed a fictitious dividend and may give rise to legal sanctions. Nevertheless, the law allows for advances on dividends relating to the current or previous financial year, provided that strict conditions are met. Specifically, such advances are permissible if the company holds sufficient distributable reserves exceeding the amount advanced, or if an interim balance sheet, certified by a statutory auditor, demonstrates the existence of adequate net profits after accounting for depreciation, provisions, prior losses, and statutory deductions.

The legal framework further establishes that dividend distribution is contingent upon the prior determination of net profits and the fulfillment of mandatory allocations. In accordance with Article 722, net income is calculated after deducting all operating expenses, financial charges, and any accumulated losses from previous financial years. Before any distribution to shareholders can occur, a portion of these profits must be allocated to reserves, in particular the legal reserve defined under Article 721. This reserve, generally set at 5% of annual net profits, must be accumulated until it reaches 10% of the company's share capital. In addition to the legal reserve, firms may also be required to constitute statutory or contractual reserves as specified in their articles of association or imposed by law. Only the residual amount, commonly referred to as distributable earnings, may be allocated for dividend payments.

From a governance perspective, the decision to distribute dividends lies with the shareholders, who exercise this authority during the Annual General Meeting based on a proposal submitted by the board of directors. This process ensures that dividend policy reflects both managerial recommendations and shareholder approval. Dividends are distributed proportionally to shareholdings, thereby preserving fairness among investors. However, the distribution of dividends is subject to prudential constraints: firms are prohibited from distributing dividends when prior losses remain unabsorbed, as this would undermine the financial integrity of the company and potentially harm creditors' interests.

Article 724 complements this framework by regulating the modalities of dividend payment. It specifies that shareholders are entitled to receive dividends derived from distributable profits once these have been duly approved. Furthermore, it establishes that dividend payments must be executed within a reasonable timeframe, generally not exceeding nine months following the closing of the financial year. This provision reinforces corporate discipline and ensures the timely remuneration of shareholders.

Overall, the Algerian legal framework governing dividend distribution reflects a balance between shareholder remuneration and financial prudence. By imposing strict conditions on profit allocation, mandating reserve requirements, and regulating the timing and legitimacy of dividend payments, the law aims to safeguard corporate stability while protecting the rights of shareholders. These legal constraints constitute a key institutional determinant of dividend policy and play a crucial role in shaping corporate payout behavior in Algeria.

I.1.2 Dividends' Taxation in Algeria

The legal and fiscal framework constitutes a key determinant in the processes of dividend distribution, share transfers, and equity participation, as it governs the practices associated with these operations and defines the constraints that may influence corporate financial decisions. In Algeria, taxation plays a central role in shaping payout behavior. According to Article 104-4 of the Code of Direct Taxes and Related Taxes (2024), income derived from movable capital—particularly dividends and similar income from shares or equity interests, as defined in Articles 45 to 48—is subject to a withholding tax of 15%, which is considered final and thus exempt from further taxation under the Personal Income Tax (IRG). However, significant reforms have been introduced in recent years. Articles 30 and 45 of the Finance Law for 2022 repealed Articles 87 bis and 147 bis of the Code, thereby eliminating the exemption previously granted on income derived from profit distributions that had already been subject to the Corporate Income Tax (IBS) or explicitly exempted. In addition, dividends distributed to resident legal entities are now subject to a withholding tax of 5%. These legislative changes reflect a shift toward a more comprehensive taxation of distributed profits and highlight the importance of fiscal policy as a determining factor in corporate dividend decisions.

I.2 Dividends and Capital Gains in Algeria

Under Algerian tax law, capital gains derived from the disposal of shares, equity interests, and similar securities are subject to specific fiscal provisions. Pursuant to Article 104-II-5-b of the Code of Direct Taxes and Related Taxes, such gains are taxed at a rate of 15%, which constitutes a final levy and exempts them from the Personal Income Tax (IRG). A preferential rate of 5% applies where the proceeds are reinvested, defined as the subscription of an amount equivalent to the realized capital gains into the capital of one or more companies, resulting in the acquisition of equity securities. For non-resident taxpayers, Article 150-3 provides for a higher withholding tax rate of 20% on capital gains realized from similar transactions.

Significant fiscal reforms introduced by the Finance Law for 2022 have further reshaped the taxation of corporate profits. Notably, the preferential regime previously granted to fiscal groups has been abolished. Consequently, where companies within a fiscal group engage in activities subject to different tax rates, consolidated profits are now taxed proportionally according to the revenue generated by each activity segment, replacing the earlier reduced rate of 19% applied when production activities were predominant. In parallel, Article 44 of the same law introduced a preferential corporate tax rate of 10% applicable to reinvested profits, aimed at encouraging productive investment. This reduced rate applies to companies that reinvest their profits in production-related equipment or in equity participations representing at least 90% of the capital of another production-oriented entity, subject to full capital subscription.

In addition, Article 113 of the 2022 Finance Law established a 2% advance payment on corporate income tax applicable to imports of goods intended for resale in their original condition. This prepayment is calculated on the total value of imported goods, inclusive of duties and taxes (excluding provisional safeguard duties), and is collected by customs under procedures similar to those applicable to Value Added Tax. The amount paid is deductible from the final corporate tax liability, and importers are required to obtain a payment certificate from customs, which must be submitted with the annual corporate tax declaration.

I.2.1 Taxation of Profits

According to Article 150 of the Code of Direct Taxes and Related Taxes (2024), the corporate income tax (IBS) in Algeria is structured according to the nature of the activity. The applicable rates are set at 19% for goods production activities, 23% for activities related to construction, public works, hydraulics, tourism, and thermal services (excluding travel agencies), and 26% for all other activities. In cases where a company engages in multiple activities subject to different tax rates, it is required to maintain separate accounting records to determine the share of profits attributable to each activity, to which the corresponding tax rate is applied. Failure to comply with this requirement results in the automatic application of the standard rate of 26% to total profits.

In addition, Articles 136 and 148 of the Code provide complementary provisions governing the taxation of corporate income and capital income. These provisions specify the applicable rules concerning the treatment of distributed profits, including dividends and similar income, as well as the procedures for taxation and reporting. Notably, income derived from profit distributions that have already been subject to the corporate income tax (IBS), or are expressly exempt, is excluded from the taxable base of IBS, thereby preventing double taxation at the corporate level. However, this tax treatment is conditional upon proper declaration in accordance with existing legal requirements. Any undeclared income is reintegrated into the taxable base and becomes subject to corporate taxation.

I.2.2 Taxation of distributed income

A clear definition of distributed income is essential for understanding the taxation of dividends within the Algerian fiscal framework. According to Article 45 of the Code of Direct Taxes and Related Taxes, income derived from shares, equity interests, and similar securities qualifies as distributed income when generated by joint-stock companies, limited liability companies, civil companies constituted in the form of joint-stock companies, as well as partnerships and joint ventures that have opted for the corporate income tax regime.

Article 46 further broadens this definition by specifying the categories of income deemed to be distributed. These include profits not allocated to reserves or capitalized, amounts or assets made available to partners or shareholders outside the framework of distributable profits, and income derived from investment funds. The provision also covers loans, advances, or installments granted to partners, whether directly or through intermediaries, as well as hidden or undeclared remunerations and benefits. In addition, excessive compensation granted to partners or executives without corresponding services, directors' fees and attendance allowances, and profits transferred by Algerian branches to non-resident parent companies are all treated as distributed income for tax purposes.

From a fiscal perspective, income distributed to individuals is generally subject to withholding tax. However, income that has already been subject to Corporate Income Tax (IBS), or is expressly exempt, is excluded from the overall taxable income of recipients, provided that it originates from properly declared profits. In contrast, undeclared or irregularly distributed income is subject to tax reassessment in accordance with prevailing legislation. Furthermore, and subject to the provisions of applicable tax treaties, distributed income paid to non-resident individuals is also subject to withholding taxation.

I.2.3 Taxation of Capital Gains from the Sale of Shares and Equity

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Article 77 bis of the Code of Direct Taxes and Related Taxes (2024) defines capital gains from the disposal of shares, equity interests, and similar securities as gains realized by individuals who, outside the scope of professional activity, transfer all or part of the financial securities they hold. These gains are included in the taxable base of the Global Income Tax (IRG), thereby subjecting private investment income to personal taxation under the applicable regime.

In a similar vein, Article 104-5-b provides that capital gains derived from the sale of shares, equity interests, and comparable securities are also integrated into the IRG taxable base when realized by non-professional individual investors. Together, these provisions establish the principle that capital gains on securities are taxable at the level of personal income when they fall outside professional trading activities.

However, the Algerian fiscal framework also provides a set of tax incentives aimed at promoting financial market development and long-term investment. In particular, income derived from listed shares and similar securities, as well as from bonds and equivalent instruments with a maturity of five (5) years or more—whether traded on a stock exchange or an organized market—is exempt from both the Personal Income Tax (IRG) and the Corporate Income Tax (IBS) for a period of five years starting from 1 January 2024. This exemption also extends to income from shares or units in collective investment undertakings in transferable securities.

Furthermore, capital gains arising from the transfer of bonds, similar securities, and Treasury bonds with a minimum maturity of five (5) years, issued within the five-year period beginning on 1 January 2024, are likewise exempt from IRG and IBS. This exemption applies for the entire duration of validity of the securities issued during this period, thereby reinforcing the fiscal attractiveness of long-term financial instruments and supporting the development of capital markets.

I.3 Regulation of Dividend Distribution Transfers in Algeria

Dividends represent the portion of corporate profits distributed to shareholders or partners at the end of a financial year, in accordance with a resolution adopted by the General Assembly. In the Algerian context, a key concern for foreign investors has not only been the generation of returns but also the ability to repatriate dividends and capital gains to their home countries. The secure transfer of investment income therefore constitutes a critical determinant of foreign investment decisions. In response, Algerian authorities have established a regulatory framework governing the transfer of investment-related income, including dividends and proceeds from the sale of shares or equity stakes, to non-resident beneficiaries.

This framework is primarily based on Regulation No. 05-03 of June 6, 2005 on foreign investments, as well as instructions issued by the Bank of Algeria. Notably, Instruction No. 03-2000 of April 25, 2000 defines the documentation required for transfer requests relating to dividends, profits, and proceeds from the liquidation or sale of foreign investments, while Instruction No. 01-09 of February 15, 2009 further clarifies supporting documents for such operations.

Under Article 3 of Regulation 05-03, banks and authorized financial intermediaries are empowered to process and execute transfer requests for dividends, profits, capital gains, attendance fees, and remuneration of foreign directors. Exchange control operations in Algeria are centrally supervised by the Bank of Algeria, reflecting a longstanding regulatory

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framework aimed at controlling capital outflows. In this context, Article 4 of Instruction 03-2000 provides that dividend transfers are subject to prior authorization by the foreign exchange authority, which must be granted within a maximum period of two months upon submission of a complete file.

A key principle governing this regime is the guarantee of transferability. Article 2 of Regulation 05-03 stipulates that investments financed through freely convertible currencies, duly imported and certified by the Bank of Algeria, benefit from a transfer guarantee covering both invested capital and generated income. This guarantee extends to dividends, net proceeds from sales or liquidation, and may exceed the initially invested capital. Proof of currency import is typically provided through a bank certificate issued by the authorized intermediary, confirming the external origin of the funds.

However, this guarantee does not apply uniformly to all activities. Instruction 01-2009 explicitly excludes import-and-resale operations from the benefit of Regulation 05-03, except where substantial investment efforts are demonstrated. The assessment of such efforts remains under the exclusive jurisdiction of the Bank of Algeria, based on financial statements and firm-level analysis. As a result, foreign shareholders in trading-oriented firms faced restrictions on profit repatriation between 2005 and 2009, often requiring prior authorization.

Finally, Instruction No. 03-2000 sets out the procedural requirements for dividend transfer applications submitted to the Directorate-General of Exchange Control. The required documentation includes, inter alia, the commercial register, articles of association, investment financing plan, evidence of external contributions, certified financial statements, and the General Assembly resolution approving dividend distribution. Once submitted, transfer requests must be processed within a maximum period of two months, while supporting documents are retained by authorized intermediaries for a period of five years, in accordance with Article 5 of Regulation 05-03.

II. Comparative analysis of payout policy in Algeria

In this section, we present an empirical comparative analysis of dividend policy in Algeria, focusing on the dividend trends of large private firms across three sectors: manufacturing, agribusiness, and retail and other services.

II.1 Presentation of the dividend framework and model

To conduct the statistical analysis, we construct a random sample of large private firms to examine dividend distribution patterns.

II.1.1 Data

In order to achieve the objective of identifying the determinants of dividend policy among large private Algerian firms, a sample was constructed based on specific size and financial criteria. The selected firms are those with total assets exceeding 1 billion Algerian dinars and employing more than 300 employees in the last closed twelve-month financial year. The analysis is conducted over an 11-year period, from 2010 to 2020, using firms for which complete financial statements are available.

The classification of large enterprises in Algeria is derived from the legal definition of small and medium-sized enterprises (SMEs) as specified in Chapter 2 of the Official Journal dated 11 January 2017. According to Article 5, an SME is defined, regardless of its legal form, as a production entity of goods and/or services employing between one (1) and 250 employees,

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with an annual turnover not exceeding four (4) billion Algerian dinars or a total balance sheet not exceeding one (1) billion dinars, and satisfying the independence criterion, whereby no more than 25% of its capital is held by enterprises that do not meet the SME definition.

Employee numbers are measured in full-time equivalent (FTE) units, while turnover and balance sheet thresholds refer to the last closed financial year. The independence criterion ensures that firms are not controlled by larger corporate entities.

For data collection purposes, the sample of large private firms was constructed using information provided by the Directorate of Large Enterprises (DGE), the institution responsible for the tax monitoring of large Algerian enterprises. Financial and accounting data were further obtained from firms' annual reports and the National Centre of the Commercial Register. Ultimately, a dataset of 88 private firms operating across different sectors was compiled for empirical analysis.

II.1.2 Variables of the model

Building on prior empirical literature, several determinants have been identified as influencing corporate dividend distributions. In the present study, the explanatory variables include lagged dividends ($Dividend_{t-1}$), profitability, liquidity, leverage, firm size, working capital requirements, investment intensity, and revenue growth. In addition, two macroeconomic variables—GDP growth and inflation—are incorporated in order to capture the broader economic environment affecting payout decisions.

Regarding the dependent variable, the literature commonly employs either the dividend yield or the dividend payout ratio to measure dividend policy. In this study, the dividend payout ratio is retained as the primary indicator for large private firms, as it more directly reflects the proportion of earnings distributed to shareholders. Dividend amounts are derived from the profit appropriation process, based on the following accounting identity: changes in reserves, net income, and changes in retained earnings. Accordingly, DIV represents the share of corporate earnings distributed as dividends and is computed as follows:

$$DIV = \frac{Dividend}{Netincome}$$

This ratio also captures the trade-off between retaining earnings and distributing cash to shareholders. The following section presents the variables selected for this study. The selection of these variables is primarily driven by data availability.

- **Lag DIV**

The inclusion of a lagged dependent variable in dividend models is widely used in empirical studies of dividend dynamics, as it captures the persistence and gradual adjustment behavior of payout policies over time. Its use reflects the idea that firms do not instantaneously adjust dividends to their target levels, but instead follow a partial adjustment process. In this context, Glen, Karmokolias, Miller, and Shah (1995), in their study of firms in developing countries, provide evidence that dividend policies are significantly influenced by past dividends, thereby supporting the partial adjustment hypothesis and suggesting that such behavior is consistent across different institutional environments. Similarly, Denis and Osobov (2008) document that previous dividend levels play a significant role in explaining current payout decisions across a range of countries, reinforcing the notion of gradual dividend adjustment. Consistent

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evidence is also provided by Al-Najjar and Hussainey (2009) for UK firms, confirming that dividend decisions exhibit strong persistence over time.

Overall, the lagged dependent variable is an essential component in modeling dividend policy, as it captures the inertia inherent in corporate payout decisions. Its inclusion is theoretically justified by the partial adjustment model, and it is further supported by signaling theory and agency cost considerations, all of which suggest that firms adjust dividends cautiously in response to changes in earnings and financial conditions.

$$L1DIV : DIV_{t-1}$$

• Profitability

Profitability is widely recognized as one of the key determinants of corporate dividend policy. The majority of empirical studies report a positive relationship between profitability and dividend distribution, suggesting that more profitable firms are better positioned to remunerate shareholders. In this regard, Myers and Majluf (1984) argue that higher profitability increases the availability of internal funds, thereby facilitating dividend payments. Similarly, Fama and French (2001) provide empirical evidence that firm size, profitability, and growth opportunities significantly influence dividend decisions. Booth and Cleary (2001) further confirm that profitability, along with leverage, risk, tangibility, and growth prospects, plays a central role in shaping payout policies. DeAngelo, DeAngelo, and Skinner (2004) also identify profitability as a fundamental determinant of dividend distributions, showing that highly profitable firms tend to sustain higher payout levels.

Additional theoretical and empirical contributions reinforce this relationship. Gordon's work supports the view that profitability is positively associated with dividend payments, while Marsh and Jensen (2005) highlight that firms with strong profitability and substantial free cash flow are more likely to distribute dividends, particularly in the presence of capital market imperfections. Collectively, these studies provide robust evidence that profitable firms possess greater financial flexibility, enabling them to maintain stable and higher dividend payouts across different institutional and market environments.

In this study, profitability is measured using a performance ratio that captures the firm's capacity to generate earnings during the fiscal period, serving as a key indicator of financial efficiency and operating performance.

$$ROA = \frac{NetIncome}{TotalAssets}$$

• Liquidity

Another important determinant of dividend policy is liquidity. Liquidity represents a key indicator of a firm's short-term financial strength, reflecting its ability to meet current obligations as they fall due. A higher liquidity position indicates stronger financial flexibility and a lower risk of default, thereby enhancing the firm's capacity to sustain dividend payments.

Empirical literature consistently highlights the relevance of liquidity in shaping dividend decisions. Almeida and Campello (2007), using a large sample of U.S. firms, show that companies with higher cash holdings are more likely to distribute larger dividends, although the magnitude of this relationship depends on other firm-specific characteristics. In a related study, Banerjee, Gatchev, and Spindt (2007) find that greater market liquidity is associated

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with higher dividend payouts, suggesting that firms operating in more liquid environments tend to adopt more generous distribution policies.

From a broader financial perspective, Brunnermeier and Pedersen (2009) demonstrate that liquidity constraints, both at the funding and market levels, can significantly affect corporate financial decisions, including dividend distributions. Similarly, Liu and Mauer (2011), focusing on U.S. banks during periods of financial distress, find that institutions with stronger liquidity positions are more likely to maintain or increase dividend payments, indicating that liquidity plays a stabilizing role in payout policy, particularly under conditions of financial uncertainty.

In this study, liquidity is measured using a financial ratio that captures the firm's short-term ability to cover its current liabilities, serving as an indicator of its financial flexibility and capacity to sustain dividend distributions.

$$LIQ = \frac{Cash}{Total\ Assets}$$

• Leverage

Leverage is a key financial determinant of corporate payout policy, as it reflects a firm's degree of indebtedness relative to its equity base and its capacity to sustain external financing. Firms are therefore expected to maintain leverage at a level that ensures debt remains consistent with their financial structure and repayment ability. From a theoretical perspective, Jensen (1986), within the free cash flow framework, argues that debt can mitigate agency problems by reducing managerial discretion over excess cash flows. In this sense, debt and dividends may act as alternative mechanisms for controlling free cash flow, thereby aligning managerial decisions more closely with shareholder interests. Leverage is also closely associated with financial risk, as higher debt levels increase the probability of financial distress. Empirical evidence from U.S. corporations (Jensen et al., 1992) indicates a negative relationship between leverage and dividend payments.

A substantial body of literature supports this inverse relationship. For instance, Jensen et al. (1992) and Aivazian et al. (2003) find that highly leveraged firms tend to prioritize debt repayment over dividend distribution, thereby reducing payout levels. This behavior is generally explained by the need to preserve liquidity and meet contractual obligations. However, some studies also report a positive relationship between leverage and dividends, suggesting that in certain contexts firms may rely on debt financing as a substitute for equity and benefit from associated tax advantages, thereby sustaining dividend payments.

The dividend payout ratio, defined as the proportion of earnings distributed to shareholders, is inherently linked to a firm's financial capacity and cash availability. Since dividends constitute cash outflows, firms must ensure sufficient liquidity to sustain such payments. In this regard, Mahmud (2003) suggests that a positive relationship between leverage and dividend payouts may emerge when firms rely more heavily on debt financing, although this relationship remains context-dependent and sensitive to institutional and market conditions.

Long- and medium-term debt ratio

$$LMD = \frac{Long\ and\ mid\ Term\ Debt}{Total\ Assets}$$

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Short-term debt ratio

$$SD = \frac{\text{Short Term Debt}}{\text{Total Assets}}$$

- **Size**

Overall, empirical evidence on the relationship between firm size and dividend policy remains mixed, with studies reporting positive, negative, or statistically insignificant effects. This heterogeneity is often attributed to differences in industry structures, institutional environments, and macroeconomic conditions that shape corporate financial behavior across countries. Ferri and Jones (1979) and Titman and Wessels (1988) argue that larger firms generally benefit from better access to external capital markets and are able to obtain financing on more favorable terms. Moreover, agency conflicts between creditors and shareholders tend to be more pronounced in smaller firms, which may further influence their payout decisions.

A significant body of literature highlights a positive association between firm size and dividend payments. Fama and French (2001), in their seminal study, show that larger and more profitable firms are more likely to distribute dividends, thereby establishing a positive relationship between firm size, profitability, and payout behavior. DeAngelo, DeAngelo, and Skinner (2004) extend this analysis by emphasizing dividend concentration, confirming that large firms with higher earnings account for a substantial proportion of total dividend distributions. Similarly, Denis and Osobov (2008) and Skinner and Soltes (2011) also document a positive relationship between firm size and dividend payouts.

However, some studies present contrasting evidence. Grullon, Michaely, and Swaminathan (2002) report an inverse relationship between profitability and dividend payouts when profitability is measured using return on assets, suggesting that alternative performance indicators may yield different empirical outcomes. Overall, these mixed findings indicate that the relationship between firm size and dividend policy is context-dependent and influenced by firm-specific characteristics and measurement choices.

The variable size is defined as follows:

$$SIZE = \text{the natural logarithm of turnover.}$$

- **Working Capital Requirements**

Working Capital Requirements (WCR) represent the level of short-term capital required to finance a firm's day-to-day operations, including accounts payable, accounts receivable, and inventory management. As such, WCR is closely linked to liquidity management and may significantly influence dividend policy by affecting the availability of internal cash flows for distribution.

Al-Najjar and Hussainey (2009) examine the relationship between corporate governance and dividend policy, with particular emphasis on the managerial entrenchment hypothesis. This framework suggests that managers with substantial control over corporate decisions may use dividend payments strategically either to reduce shareholder monitoring or to secure their own position within the firm. Their findings indicate that stronger corporate governance mechanisms—such as higher board independence and stronger shareholder rights—are associated with more disciplined dividend policies. In contrast, weak governance structures

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may lead managers either to distribute higher dividends to mitigate shareholder pressure or to retain earnings for projects that enhance managerial control rather than shareholder value.

Bhabra and Shanmugam (2011) further highlight the importance of working capital management in shaping dividend decisions. Their study shows that efficient management of working capital improves liquidity, thereby enabling firms to distribute dividends without compromising operational requirements. Conversely, inefficient working capital management can restrict cash flows, forcing firms to retain earnings instead of distributing them to shareholders.

Similarly, Wasiuzzaman (2015), using data from Malaysian firms over the period 1999–2008, investigates the relationship between working capital efficiency and firm value in emerging markets. The study finds that improvements in working capital efficiency—particularly reductions in excessive working capital investment—enhance firm value. This effect is more pronounced for financially constrained firms, for which efficient liquidity management significantly improves financial performance, while the impact is comparatively weaker for unconstrained firms.

$$WCR = \frac{\text{Working Capital Requirements}}{\text{Total Assets}}$$

- **Investment**

Investment opportunities constitute a key determinant of corporate dividend policy, reflecting the trade-off between distributing earnings to shareholders and retaining them to finance future growth. In the seminal work of Miller and Modigliani (1961), it is argued that, under perfect capital market assumptions—characterised by the absence of taxes, transaction costs, and information asymmetries—investment decisions are the primary driver of firm value, while dividend policy is irrelevant.

In contrast, the Pecking Order Theory developed by Myers and Majluf (1984) suggests that firms prioritize financing sources in a hierarchical order, favouring internal funds (retained earnings) over debt, and external equity as a last resort. Within this framework, firms with strong investment opportunities are more likely to reduce dividend payments in order to retain earnings and avoid costly external financing, which may also convey adverse signals to the market regarding firm valuation.

Similarly, Jensen's (1986) free cash flow hypothesis posits that firms with higher growth and investment opportunities tend to distribute lower dividends, as retained earnings are allocated to value-creating projects. This view highlights the role of dividends as a mechanism to mitigate agency problems arising from excess cash holdings.

Empirically, Fama and French (2001) find that firms with higher profitability and fewer investment opportunities tend to exhibit higher dividend payouts, supporting the negative relationship between investment prospects and dividends. However, Aivazian, Booth, and Cleary (2003) show that in emerging markets, the relationship between investment opportunities and dividend policy is more complex, as firms often face financial constraints and limited access to external capital markets, which significantly shape their payout decisions.

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$$INV = \frac{Gross\ invest_t - Gross\ invest_{t-1}}{Gross\ invest_{t-1}}$$

- **Growth**

Growth opportunities constitute a key determinant of corporate dividend policy, reflecting the firm's trade-off between distributing earnings and financing future expansion. Rozeff (1982) argues that firms with higher growth rates tend to exhibit lower payout ratios, as they retain a larger share of earnings to finance investment and expansion projects.

Similarly, Fama and French (2001) provide empirical evidence that firms with high profitability but limited investment opportunities are more likely to distribute dividends, whereas firms with strong growth prospects tend to retain earnings, resulting in lower dividend payouts. This supports the view that internal financing is prioritised when firms face attractive investment opportunities.

In the context of emerging markets, Aivazian, Booth, and Cleary (2003) highlight that firms with high growth opportunities often encounter significant constraints in accessing external capital markets. Consequently, these firms rely more heavily on retained earnings to finance their expansion, which further reinforces the negative relationship between growth opportunities and dividend distributions. Compared to firms in developed markets, this constraint amplifies the tendency to reduce dividend payouts in favor of internal financing.

$$GROW = \frac{turnover_t - turnover_{t-1}}{turnover_{t-1}}$$

II.2 Descriptive analysis of dividend

The descriptive analysis of the sample and dividend distribution behavior is essential for examining the evolution of these variables over the period 2010–2020.

II.2.1 Descriptive analysis of the dividend distribution of the companies in the sample

The sample comprises data from 88 firms observed over an 11-year period (2010–2020), thereby generating a longitudinal dataset with both cross-sectional and temporal dimensions. For the descriptive analysis, the time dimension is first fixed in order to examine the cross-sectional behavior of firms with respect to dividend distribution. Subsequently, the individual dimension is held constant to analyze the temporal evolution of dividend policy (DIV) over the study period.

To facilitate interpretation, the analysis relies on the average payout ratio (DIVavg), which provides a smoothed measure of dividend behavior across time and reduces the influence of short-term fluctuations. DIVavg is computed as follows:

$$DIVavg = \sum \frac{(\sum_{t=2010}^{2020} DIV_t / 11)_i}{88}$$

According to Table 8, the average payout ratio for each firm over the period 2010–2020 indicates that none of the companies in the sample recorded a negative average payout ratio.

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Table 8: The average dividend payout ratio of the companies in the sample

<i>DIVav</i>	<i>Number of firms</i>	<i>Percentage</i>
0	21	23,86%
0-0.2	25	28,41%
0.2 -0.4	17	19,32%
0.4 -0.6	11	12,5%
0.6 -0.8	7	7,95%
0.8 -1	7	7,95%
Sum	88	100%

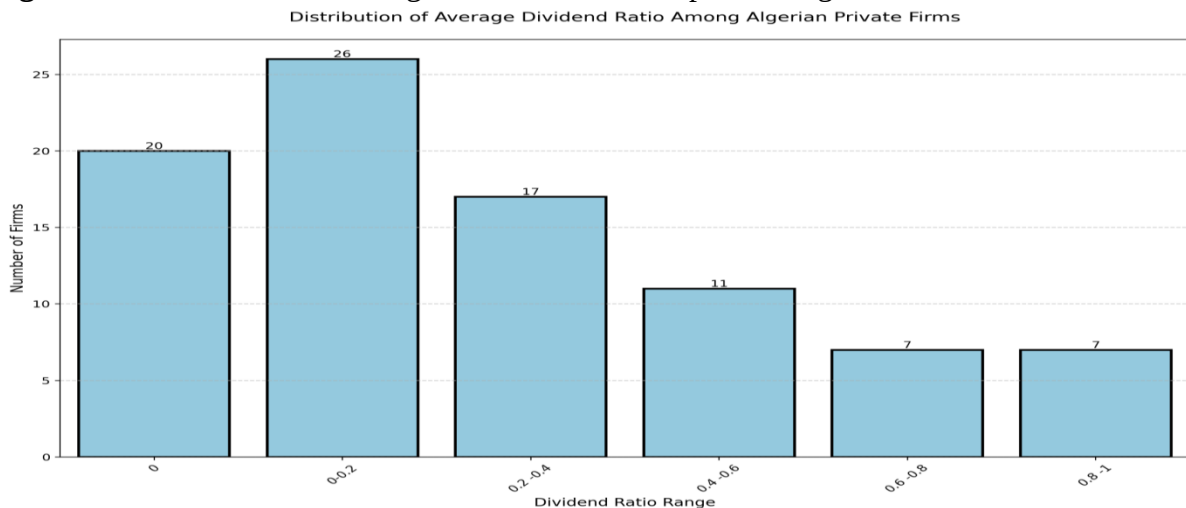
Source: established using the STATA14 software

Additionally, no firm in the sample recorded an average payout ratio exceeding one. This suggests that, on average, dividend distributions over the period 2010–2020 remained proportionate to firms' earnings, without exceeding generated profits. These findings are illustrated in Table 8 and Figure 16.

Figure 16 shows that 23.86% of firms distribute zero dividends, indicating that a significant proportion of companies retain all earnings, potentially for reinvestment purposes or due to financial constraints. This pattern is particularly relevant in the context of dividend policy among Algerian private firms.

Further analysis reveals that 67 firms, representing 76.13% of the sample, distribute positive dividends, confirming that the majority of firms still engage in profit-sharing with shareholders. However, within this group, 25 firms fall within the low payout range (0–0.2), suggesting a generally conservative dividend distribution policy.

Figure 16: Distribution of average dividends ratios in private Algerian firms



Source: established using the STATA14 software

Furthermore, firms classified as zero dividend payers and those with low payout ratios jointly represent 52.77% of the sample, highlighting a generally conservative dividend policy. This

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pattern suggests that a substantial share of firms prioritize earnings retention, potentially to support growth and investment needs, or as a response to constrained access to external financing, as well as a strategic effort to reinforce their financial stability.

To analyze the temporal evolution of dividend policy over the period 2010–2020, the average dividend payout ratio at time t ($DIV_{avg,t}$) is computed as follows:

$$DIV_{avg,t} = \frac{\sum_{i=1}^{88} DIV_{i/88,t}}{11}$$

Table 9: Evolution over time of the average dividend distribution ratio of the companies in the sample

<i>Year</i>	<i>DIV_{avg,t}</i>
2010	0,27
2011	0,27
2012	0,31
2013	0,28
2014	0,29
2015	0,27
2016	0,28
2017	0,31
2018	0,24
2019	0,25
2020	0,20

Source: established using the STATA14 software

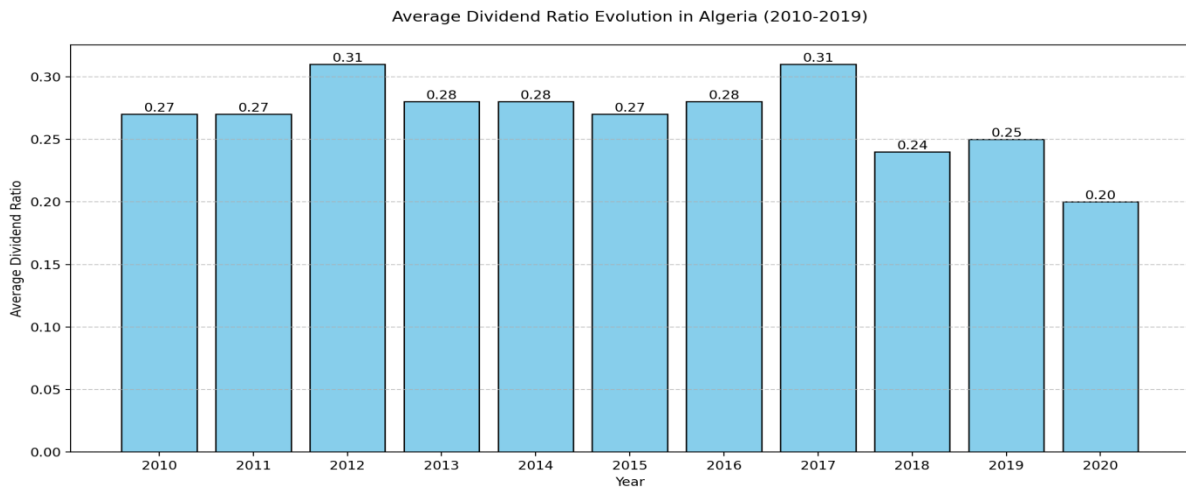
Both Figure 17 and Table 9 highlight several important patterns in dividend distribution in Algeria over time. First, a phase of relative stability is observed between 2010 and 2011, during which the average payout ratio remains constant at 27%. This stability is followed by two notable peaks in 2012 and 2017, when the average dividend ratio reaches 31%.

In contrast, a clear downward adjustment is observed after 2017. The ratio declines sharply from 31% in 2017 to 24% in 2018, and the decreasing trend continues until it reaches its lowest level of 20% in 2020, corresponding to an overall decline of approximately 35% from the peak values. More broadly, the dividend payout ratio exhibits moderate volatility over the period, with most fluctuations remaining within a relatively narrow band of 27% to 31% until 2017. After this point, volatility increases and the downward trend becomes more pronounced.

Overall, the analysis of dividend trends between 2010 and 2020 reveals two distinct phases. The first period (2010–2017) is characterized by relative stability, with an average payout ratio of around 27% and limited fluctuations, punctuated by temporary increases in 2012 and 2017. The second period (post-2017) is marked by greater instability and a sustained decline in dividend payouts, culminating in the lowest observed level in 2020.

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Figure 17: Average Dividend ratio evolution 2010-2020



Source: established using the STATA14 software

This decline is particularly pronounced in 2018 (–22.58%) and 2020 (–20%), indicating a substantial adjustment in dividend policy over the period. Such a contraction may reflect changing macroeconomic and firm-specific conditions, as well as a shift towards a more conservative dividend policy prioritizing liquidity preservation and internal financing. Overall, the observed pattern suggests a transition from a relatively stable payout policy in the earlier years to a more flexible and cautious dividend strategy in response to evolving economic and financial constraints.

II.2.2 Descriptive analysis of the variables

The dataset encompasses 968 observations across multiple financial metrics.

Table10: Descriptive analysis of the variables

Variable	Obs	Mean	Std.Dev.	Min	Max
<i>DIV</i>	968	0.2716219	0.4339396	-1.5	2.69
<i>L1DIV</i>	968	0.2772107	0.4326524	-1.5	2.69
<i>ROA</i>	968	0.0513533	0.0821866	-0.63	0.5
<i>LIQ</i>	968	0.0841942	0.0958701	0	0.65
<i>LMD</i>	968	0.1432645	0.1666957	0	1.14
<i>SD</i>	968	0.4129959	0.2556155	0.01	1.11
<i>SIZE</i>	968	21.48475	1.327505	16.43626	25.90351
<i>WCR</i>	968	0.1727583	0.2754955	-0.72	0.85
<i>INV</i>	968	0.1619215	0.4142196	-0.99	5.74
<i>GROW</i>	968	0.137407	0.3926104	-0.98	5.26

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Source: established using the STATA14 software

The dividend payout ratio (DIV) exhibits a mean value of 0.27 with a standard deviation of 0.43, indicating considerable heterogeneity in dividend distribution practices across firms. The lagged dividend variable (L1DIV) displays similar statistical properties, suggesting persistence and temporal stability in dividend behavior. Over the study period, return on assets (ROA) records an average value of 0.051, reflecting moderate profitability with relatively low dispersion (standard deviation = 0.082).

Regarding liquidity (LIQ), the average value is 0.084, indicating generally limited short-term liquidity levels among firms. Debt structure variables, namely long- and medium-term debt (LMD) and short-term debt (SD), reveal heterogeneous leverage profiles across the sample. Firm size (SIZE) records a mean value of 21.48, while working capital requirements (WCR) average 0.173. Investment intensity (INV) shows a mean of 0.162, suggesting moderate levels of capital expenditure relative to total assets. Similarly, the growth variable (GROW) presents a mean of 0.137 with a standard deviation of 0.39, indicating substantial variability in growth dynamics across firms.

Table 11 presents the correlation matrix, providing an overview of the relationships among the key financial variables. The correlation between current dividends (DIV) and lagged dividends (L1DIV) is moderately strong (0.531), confirming the persistence of dividend policy over time and the importance of past payout decisions in shaping current distributions.

Return on assets (ROA) is positively correlated with both DIV (0.2376) and L1DIV (0.2184), suggesting that more profitable firms tend to distribute higher dividends, thereby confirming the central role of profitability in payout decisions. Liquidity (LIQ) exhibits generally weak correlations with the other variables, with its highest association observed with ROA (0.2331), indicating a limited direct influence on dividend policy.

Leverage variables (LMD and SD) show negative correlations with ROA, suggesting that higher indebtedness is associated with lower profitability. They also exhibit weak negative relationships with dividend variables, implying that leverage may constrain dividend distribution due to financial commitments and risk considerations.

Firm size (SIZE) is negatively correlated with dividends (-0.1754 with DIV and -0.1939 with L1DIV), suggesting that larger firms may retain a greater share of earnings for reinvestment purposes rather than distributing them as dividends. Its negligible correlation with ROA indicates that size does not systematically explain profitability in this sample.

Investment (INV) and growth opportunities (GROW) display weak correlations with both dividends and profitability, suggesting that, within this dataset, these variables do not exert a strong direct influence on payout policy. Finally, macroeconomic variables (GDP growth and inflation) show generally weak correlations with firm-level variables, except for a moderate positive correlation between inflation and GDP growth (0.4572), indicating limited direct transmission of macroeconomic conditions to firm-specific financial decisions.

Overall, the correlation analysis underscores the central role of profitability and dividend persistence in shaping payout policy, while suggesting that leverage may exert a constraining effect. In contrast, macroeconomic variables appear to play a relatively limited direct role, highlighting the predominance of firm-specific determinants in explaining dividend behavior.

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Table11: Correlation matrix of the variables

	<i>DIV</i>	<i>L1DIV</i>	<i>ROA</i>	<i>LIQ</i>	<i>LMD</i>	<i>SD</i>	<i>SIZE</i>	<i>WCR</i>	<i>INV</i>	<i>GROW</i>	<i>Growth GDP</i>	<i>INF</i>
<i>DIV</i>	1											
<i>L1DIV</i>	0.5307	1										
<i>ROA</i>	0.2376	0,2184	1									
<i>LIQ</i>	0.1222	0,0956	0.2331	1								
<i>LMD</i>	-0.0745	-0.0742	-0.1674	-0.2503	1							
<i>SD</i>	-0.0522	-0.0232	-0.2864	-0.0747	-0.2603	1						
<i>SIZE</i>	-0.1754	-0.1939	0.0090	-0.0730	0.0402	0.0082	1					
<i>WCR</i>	0.0073	-0.0098	0.0367	-0.1912	0.0329	-0.2392	0.0963	1				
<i>INV</i>	-0.0068	0.0306	0.0443	0.0252	0.0275	0.0422	0.0506	-0.0710	1			
<i>GROW</i>	0.0316	0.0091	0.0599	-0.0079	0.0524	0.0584	0.0443	-0.0408	0.1884	1		
<i>Growth GDP</i>	0.0536	0.0219	0.1015	-0.0096	0.0175	-0.0009	-0.1056	-0.0348	0.1169	0.1671	1	
<i>INF</i>	0.0490	0.0117	0.0698	0.0215	0.0125	-0.0088	-0.0649	-0.0112	0.0231	0.0610	0.4572	1

Source: established using the STATA14 software

II.3 Descriptive Analysis of dividend payment across sectors

To enhance the descriptive analysis of dividend policy in Algeria, the sample is disaggregated into three sector groups: Manufacturing, Agribusiness, and Retail & Other Services. The Manufacturing sector comprises 33 firms, Agribusiness includes 25 firms, while Retail & Other Services consists of 30 firms. This sector classification allows for a more detailed examination of dividend policy heterogeneity across industries and provides clearer insights into sector-specific payout behaviors in the Algerian context.

II.3.1 Manufacturing sector

To conduct a descriptive analysis of firms in the manufacturing sector, we compute the average dividend ratio. First, the time dimension is fixed in order to examine the cross-sectional behavior of firms with respect to dividend distribution. The average dividend ratio (DIVavg) is then calculated as follows:

$$DIV_{avg} = \sum \frac{(\sum_{t=2010}^{2020} DIV_{t/11})_i}{33}$$

The analysis of dividend ratios in the manufacturing sector reveals several notable patterns in corporate payout policies. The sample comprises 33 firms distributed across different dividend ratio intervals. As shown in Table 12 and Figure 18, the largest group consists of 12 firms (36.4% of the sample) that do not distribute dividends, indicating that a substantial share of manufacturing companies prefers full earnings retention rather than shareholder distribution.

The second-largest category includes 11 firms (33.3%) with dividend ratios in the 0–0.2 range, reflecting a generally conservative dividend policy within the sector. Overall, the distribution across intermediate ranges exhibits a declining trend in the number of firms as dividend ratios increase, suggesting that higher payout levels are relatively uncommon among manufacturing firms.

Table12: The average dividend payout ratio of the companies in manufacturing group

	<i>DIVav Number of firms</i>	<i>Percentage</i>
0	12	36,36%
0 -0.2	11	33,33%
0.2 -0.4	3	9,09%
0.4 -0.6	2	6,06%
0.6 -0.8	1	3,03%
0.8 -1	4	12,12%
Sum	33	100,00%

Source: established using the STATA14 software

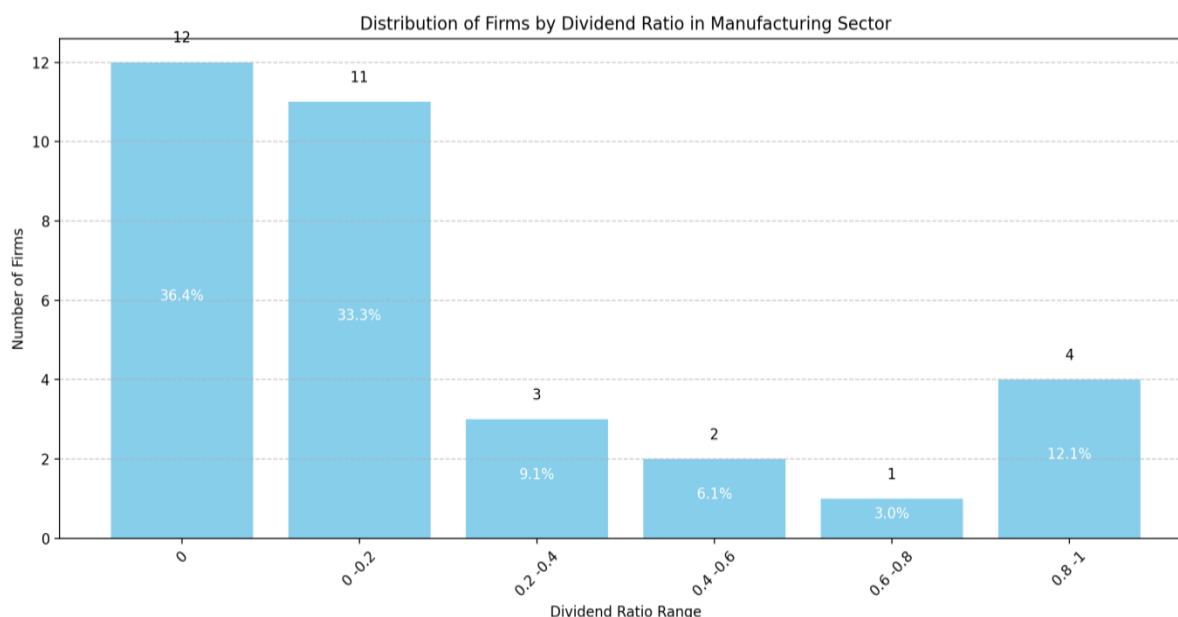
This indicates that relatively few firms adopt medium-range dividend payout policies. Interestingly, a modest concentration is observed in the highest payout interval, where 4 firms

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(12.1%) distribute dividends between 0.8 and 1.0, suggesting the existence of a small group of firms maintaining consistently high dividend policies.

Overall, this distribution may reflect heterogeneity in firms' life-cycle stages, capital intensity, and strategic financial choices within the manufacturing sector. The predominance of low or zero payout policies (69.7% of firms in the 0–0.2 range) indicates that most manufacturing firms prioritize earnings retention, likely to support reinvestment needs, sustain operational capacity, or preserve financial flexibility.

Figure 18: Distribution of average dividends ratios in manufacturing sector



Source: established using the STATA14 software

II.3.2 Agribusiness sector

For the 25 firms in the agribusiness sector, Table 13 reports the distribution of dividend payers across different payout intervals, based on the average dividend ratio.

Table13: The average dividend payout ratio of the companies in agribusiness group

<i>DIVav</i>	<i>Number of firms</i>	<i>Percentage</i>
0	5	20,00%
0-0.2	9	36,00%
0.2 -0.4	5	20,00%
0.4 -0.6	2	8,00%
0.6 -0.8	2	8,00%
0.8 -1	2	8,00%
Sum	25	100,00%

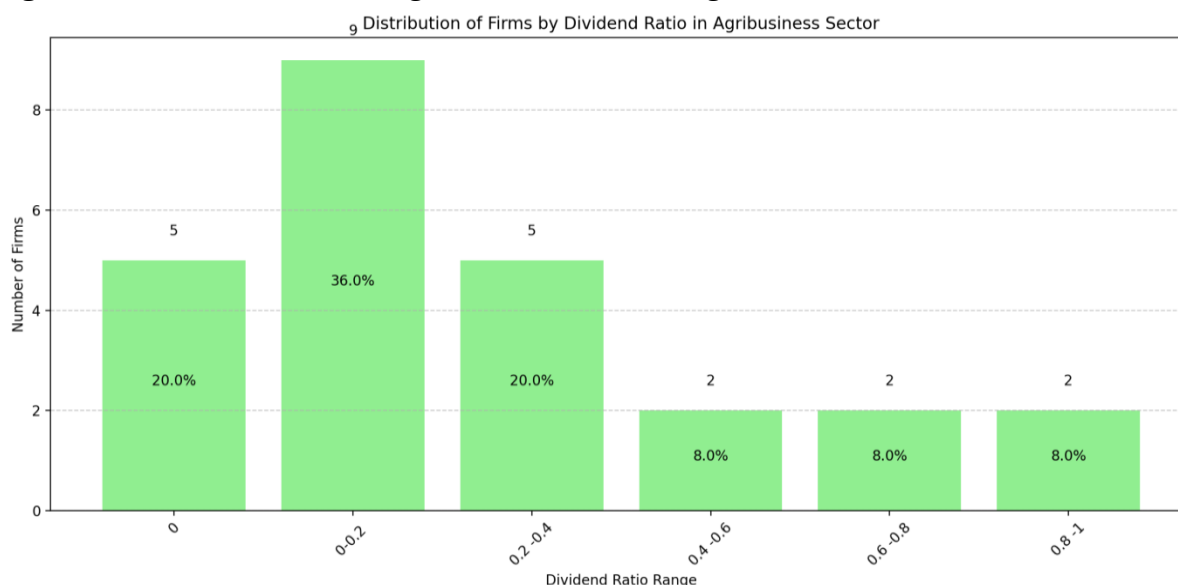
Source: established using the STATA14 software

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The analysis of dividend distribution in the agribusiness sector reveals heterogeneous dividend policies across firms. The distribution indicates that a substantial proportion of firms either do not distribute dividends or maintain low payout ratios, reflecting a generally conservative dividend policy. This pattern may be associated with a stronger emphasis on earnings retention, potentially driven by reinvestment needs and sector-specific growth requirements.

At the same time, the presence—albeit limited—of firms with relatively high dividend ratios suggests that a subset of companies prioritizes shareholder remuneration. Overall, this distribution points to a marked divergence in financial strategies within the agribusiness sector, with firms adopting either retention-oriented or shareholder-oriented payout policies.

Figure 19: Distribution of average dividends ratios in agribusiness sector



Source: established using the STATA14 software

Based on the analysis of 25 agribusiness firms, the results indicate a concentrated distribution toward lower dividend payout levels. Overall, 56% of firms exhibit dividend ratios below 0.2, reflecting a generally conservative payout policy. More specifically, 20% of firms (5 observations) do not distribute dividends, while 36% (9 firms) fall within the 0–0.2 range. The intermediate category (0.2–0.4) accounts for 20% of the sample, whereas higher payout intervals (0.4–1.0) are less frequent, each representing 8% of firms (2 firms per bracket).

This distribution suggests a predominantly cautious dividend behavior within the agribusiness sector, likely driven by strong reinvestment needs and sector-specific capital intensity. The presence of a relatively large share of zero-dividend firms further reinforces this interpretation, indicating that a substantial subset of companies prioritizes earnings retention. Overall, the observed pattern is consistent with a sector-wide preference for internal financing and financial flexibility over shareholder distribution.

II.3.3 Retail & other services

The same descriptive analysis was conducted for the retail and other services sector. Table 14 presents the distribution of dividend payout ratios across different intervals, along with the corresponding proportions of dividend-paying firms.

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The analysis reveals a relatively balanced distribution of dividend policies across the sector, with a noticeable concentration in the 0.2–0.4 range. This suggests that, on average, firms in the retail and services sector tend to adopt a moderate dividend policy. The histogram further confirms this pattern, illustrating a more diversified payout behavior compared to the other sectors, and highlighting the heterogeneity of dividend strategies within the industry.

Table14: The average dividend payout ratio of the companies in retail & other services sector group

<i>DIVav</i>	<i>Number of firms</i>	<i>Percentage</i>
0	4	13%
0-0.2	5	17%
0.2 -0.4	9	30%
0.4 -0.6	7	23%
0.6 -0.8	4	13%
0.8 -1	1	3%
Sum	30	100%

Source: established using the STATA14 software

The retail and other services sector exhibits a more balanced distribution of dividend ratios compared to the agribusiness sector, which is more heavily skewed toward lower payout levels. The relatively higher concentration of firms in the 0.2–0.4 and 0.4–0.6 ranges suggests a more moderate to relatively aggressive dividend policy. This pattern may reflect differences in industry maturity, capital intensity, and operational models compared to more capital-constrained sectors.

Overall, the results indicate a more diversified payout behavior within the retail and services sector. The distribution peaks in the 0.2–0.4 interval, which includes approximately 30% of firms, while a non-negligible share of firms (around 40%) maintains dividend ratios above 0.4. This suggests comparatively stronger cash flow generation and a greater capacity to sustain higher dividend payments relative to sectors such as agribusiness. Consequently, the findings highlight clear sector differences in payout strategies, reflecting underlying variations in financial structure and business dynamics.

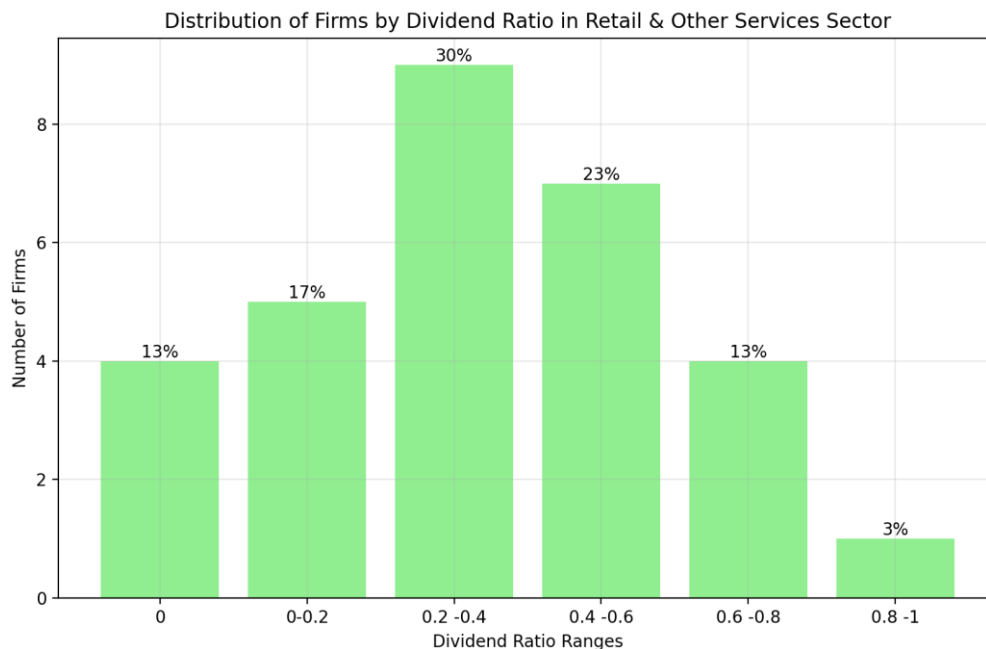
The data indicates a moderately right-skewed distribution, reflecting substantial heterogeneity in dividend payout practices within the retail and services sector. The largest share of firms (30%) falls within the 0.2–0.4 range, suggesting a prevailing preference for moderate dividend policies and a balanced approach between earnings retention and shareholder distribution. In contrast, 17% of firms distribute dividends within the 0–0.2 interval, while 13% adopt a zero-dividend policy, potentially reflecting either reinvestment-oriented strategies or liquidity and financing constraints.

This distribution contrasts sharply with the agribusiness sector, where a majority of firms (approximately 60%) are concentrated in the lowest payout ranges (0–0.2). Such differences suggest that retail and services firms generally exhibit higher dividend payout levels, which

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may be attributed to lower capital intensity, more stable cash flows, and differing investment requirements relative to agribusiness.

Figure 20: Distribution of average dividends ratios in retail & other services sector



Source: established using the STATA14 software

II.3.4 Summary comparison of the three sectors

Table 15 provides a comprehensive overview of dividend policies across the three sectors, highlighting differences in average dividend ratios, payout participation rates, and variability, thereby offering valuable insights for sector comparison and strategic interpretation.

The analysis of dividend behavior across sectors reveals notable heterogeneity in payout policies. The Retail and Other Services sector records the highest average dividend ratio (0.333), reflecting a relatively more generous and consistent dividend distribution strategy. This sector also exhibits the highest proportion of dividend-paying firms, with 61.8% of companies distributing dividends, indicating a stronger orientation toward shareholder remuneration compared to the other sectors.

Table15: Summary descriptive analysis across sectors

Sector	Average Dividend Ratio	Percentage of Dividend Payers	Mean	Median	Min	Max	Std Dev
Manufacturing	0,221	44,4	0,221	0	-0,82	2,64	0,409
Agribusiness	0,265	52	0,265	0,03	-1,5	1,72	0,421
Retail & Other Services	0,333	61,8	0,333	0,15	0	2,69	0,464

Source: established using the STATA14 software

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In contrast, the Manufacturing sector records the lowest average dividend ratio (0.221) and the smallest proportion of dividend-paying firms (44.4%). This pattern suggests a more conservative payout policy, potentially driven by higher reinvestment requirements, capital intensity, or sector-specific operational constraints.

The Agribusiness sector, with an average dividend ratio of 0.265 and 52% of firms distributing dividends, occupies an intermediate position. This balanced behavior may reflect a combination of moderate financial stability and ongoing investment needs, resulting in a mixed payout strategy that lies between the more conservative manufacturing sector and the more generous retail and services sector.

Across all sectors, the standard deviation of dividend ratios ranges between 0.409 and 0.464, indicating substantial heterogeneity in dividend policies. This dispersion reflects differences in firm-level financial strategies, liquidity conditions, and sector market environments.

The maximum dividend ratios are particularly high in the Retail and Other Services sector (2.69), followed by Manufacturing (2.64) and Agribusiness (1.72). These extreme values suggest that while average payout behavior differs across sectors, certain firms are capable of distributing exceptionally high dividends, potentially due to strong profitability or non-recurring financial events.

Overall, the descriptive evidence highlights clear sector differences in dividend policy: Retail and Other Services firms exhibit more generous payout behavior, Manufacturing firms adopt a more conservative stance, and Agribusiness firms maintain a middle-ground approach. These differences reflect variations in strategic priorities, capital needs, and operating conditions across sectors.

Figure 20 presents a comparative overview of the average annual dividend ratio across the three sectors. The evolution of the sector average dividend payout ratio over the period 2010–2020 is computed as follows:

$$DIV_{avg,t} = \sum \frac{(\sum_{i=1}^n DIV_{it}/n)_t}{11}$$

The graphs in Figure 21 illustrate the evolution of average dividend ratios across the three sectors—Manufacturing, Agribusiness, and Retail & Services—over the period 2010–2020. Each panel provides a sector-specific perspective on the dynamics of dividend policy over time.

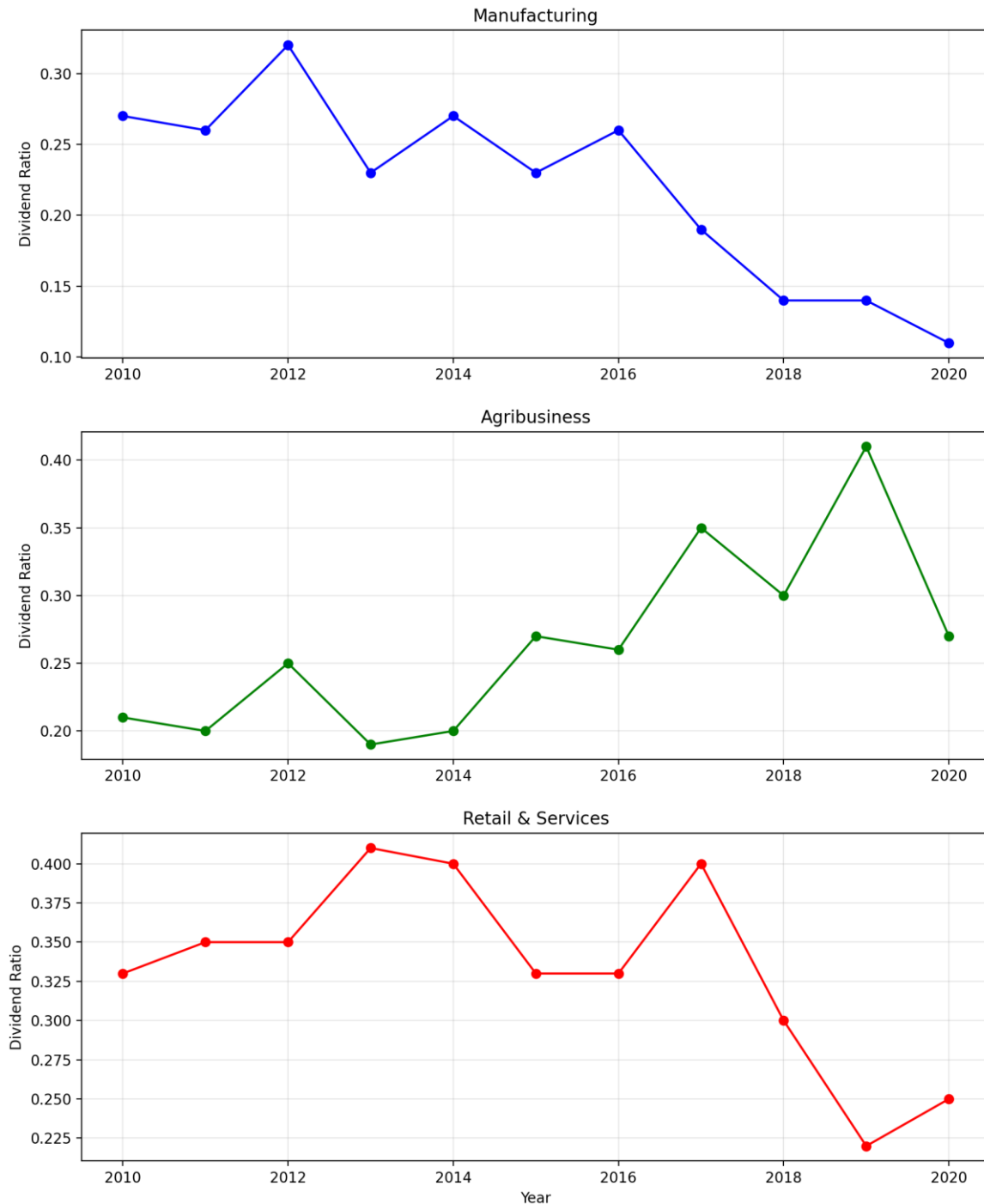
In the Manufacturing sector, the results reveal an overall downward trend in dividend ratios, accompanied by noticeable fluctuations. The early years of the period are characterized by relatively stable payout levels; however, a clear decline emerges after 2015, culminating in the lowest observed level in 2020. This pattern may reflect broader economic pressures, sector-specific constraints, or strategic adjustments by firms, such as increased reinvestment in productive capacity or a shift toward internal financing to support operational needs.

The Agribusiness sector exhibits a more volatile pattern, characterized by pronounced fluctuations in dividend ratios over the study period. The series shows a marked increase around 2017, followed by a decline and a subsequent recovery toward the end of the period. This variability may be linked to external shocks affecting the sector, including commodity

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price volatility, changes in regulatory frameworks, and fluctuations in global demand, all of which can significantly influence firms' financial performance and payout decisions.

Figure 21: Annual average dividend ratio in the three sectors



Source: established using the STATA14 software

In contrast, the Retail and Services sector displays a comparatively stable evolution of dividend ratios, with only minor fluctuations over time. Moreover, dividend levels in this sector remain consistently higher than those observed in Manufacturing and Agribusiness,

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indicating a stronger and more stable commitment to shareholder remuneration. This stability may reflect more resilient cash flow generation, less cyclical demand patterns, and more established business models that support regular dividend distributions.

Overall, the graph provides valuable insights into the strategic financial choices and external factors shaping dividend policies across sectors. The distinct trajectories observed underline the importance of sector-specific analysis in explaining differences in payout behavior, as well as in capturing the heterogeneous impact of economic conditions on corporate financial decisions. These results also enhance the understanding of dividend dynamics within the broader Algerian economic context and may serve as a useful reference for investment analysis and policy evaluation.

III. Determinants of dividend payments in Algeria

This section aims to analyze the dividend behavior of large private firms through the application of the Lintner model, with a view to identifying the key determinants of payout policy.

III.1 Application of Lintner Model in Algeria

The Lintner dividend model is a classical framework developed by John Lintner (1956) to explain corporate dividend behavior. Based on his empirical investigation, Lintner shows that firms adjust their dividends through a partial adjustment mechanism, whereby current dividend decisions depend both on current earnings and on previously paid dividends. This approach reflects firms' preference for dividend stability, as companies tend to avoid abrupt changes in payout levels.

Accordingly, firms gradually move toward a target payout ratio while smoothing dividend adjustments over time. This behavior implies that dividend policy is not fully responsive to short-term fluctuations in profitability, but instead follows a more stable and persistent adjustment path aimed at maintaining investor confidence.

III.1.1 Lintner's Model application

The Lintner dividend model (1956) has been extensively applied in empirical research across different countries to explain corporate dividend behavior. In his original formulation, Lintner proposes that firms operate with a long-run target payout ratio and adjust their actual dividends gradually toward this target rather than implementing abrupt changes in dividend payments. The model is characterized by two key components:

1. **Target Dividend Payout Ratio:** the target dividend payout ratio represents the long-term proportion of earnings that firms aim to distribute as dividends.
2. **Speed of Adjustment:** the speed of adjustment captures the extent to which firms close the gap between current dividends and the target level. A higher speed of adjustment (closer to 1) indicates rapid convergence toward the target payout, whereas a lower value (closer to 0) reflects a more gradual and smoother adjustment process.

III.1.1.1 Lintner's Original Findings (1956)

The Lintner dividend model offers a simple yet powerful framework for explaining how firms determine their dividend policies. It emphasizes dividend smoothing and stability, highlighting why companies tend to adjust dividends gradually rather than responding immediately and proportionally to fluctuations in earnings. This behavior reflects managerial

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preferences to avoid frequent dividend cuts or increases, which could be interpreted negatively by investors and signal instability in financial performance.

A large body of empirical literature has subsequently confirmed the robustness of the Lintner model in explaining dividend behavior across different industries, institutional settings, and countries. The model is typically expressed in the following form:

$$D_{i,t} - D_{i,t-1} = \alpha + c_i(D_{i,t}^* - D_{i,t-1}) + \varepsilon_{i,t} \quad \text{with } D_{i,t}^* = r^*E_{i,t} \quad (137)$$

where: $E_{i,t}$ are the current year's profits after taxes,
 $D_{i,t}$ and $D_{i,t-1}$ are the paid dividends at time t and $t-1$,
 c_i is the speed of adjustment, and r^* is the target dividend payout ratio.

Alternatively, the model can be rewritten as:

$$D_{i,t} = \alpha + c_i r^* E_{i,t} + (1 - c_i) D_{i,t-1} + \varepsilon_{i,t} \quad (138)$$

By combining the two expressions above, Lintner's model can be rewritten as:

$$D_{i,t} = \alpha + \beta E_{i,t} + \delta D_{i,t-1} + \varepsilon_{i,t} \quad \text{with } \beta = c_i r^* \text{ and } \delta = 1 - c_i \quad (139)$$

Lintner's results show that:

- **Target payout ratio:** Approximately **50%** of earnings were paid out as dividends.
- **Speed of adjustment:** Around **0.30** (meaning firms adjust about 30% of the gap between current dividends and the target payout in a given period).

III.1.1.2 Results from Other Studies

Many studies have replicated Lintner's findings across different time periods and geographical contexts, with only minor variations in the estimated target payout ratio and speed of adjustment. These differences are typically attributable to variations in market conditions, macroeconomic environments, institutional frameworks, and prevailing corporate governance norms across countries and regions.

Table 16: Lintner's findings across different time periods

The study	Target payout ratio	Speed of adjustment
Fama & Babiak (1968) - U.S. Firms	46%	0.36
This study supported Lintner's conclusions and found similar results for U.S. companies over the 1946-1964 period.		
Brittain (1966) - U.S. Firms	50-70%	0.25
Brittain found results consistent with Lintner's findings, particularly for mature firms.		
Aivazian, Booth, & Cleary (2003) - Emerging Markets	25-50%	0.19-0.40
Firms in emerging markets were found to adjust much more slowly and had lower payout ratios than firms in developed markets, indicating more cautious dividend policies.		

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Pandey (2001) - Malaysian Firms	5%-30%	0.55- 0.93
Similar to Lintner's original findings, Malaysian firms showed a comparable payout ratio and speed of adjustment.		
Leary & Michaely (2011) - U.S. Firms	/	0.09-0.55
This study found that while Lintner's model still applied, the speed of adjustment had declined over time, potentially due to the changing financial landscape and increased reliance on stock repurchases.		
Anil & Kapoor (2008) - Indian Firms	25-40%	1,089
This study found a lower payout ratio and slower speed of adjustment for Indian firms compared to Lintner's original findings, suggesting a more conservative approach to dividends in India.		

Source: Literature Review by the author

Generally, emerging markets tend to exhibit lower dividend payout ratios and slower speeds of adjustment compared to developed markets such as the United States.

Table 16 reports Lintner's findings across different time periods and regional contexts. Overall, target payout ratios vary considerably across regions: U.S. firms often maintain target payout ratios broadly consistent with Lintner's original estimates of approximately 50–60%, whereas firms in emerging markets or more conservative institutional environments (such as GCC countries) generally display lower target payout levels.

In addition, the speed of adjustment tends to be lower in emerging markets, reflecting more gradual dividend smoothing and greater financial constraints. While recent empirical evidence suggests a slight decline in adjustment speeds for U.S. firms, the parameter typically remains within the range of 0.20–0.30 across most studies, broadly consistent with Lintner's original estimate of approximately 0.30.

III.1.2 Lintner's Model in Algeria

To estimate both the target payout ratio and the speed of adjustment within the Lintner dividend framework in the Algerian context, we employ Tobit and Generalized Method of Moments (GMM) estimations on a sample of large private firms. The sample is based on the selection criteria defined in Section II.1.1; however, the company CEVITAL is excluded from the analysis due to its outlier characteristics, which may bias the overall estimations.

The dataset comprises two key variables—current earnings and lagged dividends—collected over an eleven-year period from 2010 to 2020. The final sample includes 87 large private companies operating across the manufacturing, agribusiness, and retail & other services sectors. Data were compiled from firms' financial statements obtained through the Directorate of Large Enterprises (DGE), which is responsible for the tax monitoring of large Algerian enterprises, as well as the National Centre of the Commercial Register (CNRC).

III.1.2.1 Econometric analysis

To analyze the application of Lintner model, we run Tobit and GMM analysis.

III.1.2.1.1 Tobit analysis

Tobit analysis is employed to model censored dependent variables, where observations are only partially observed within a restricted range due to censoring at a lower or upper threshold. Unlike ordinary least squares (OLS), which assumes full observability of the dependent variable, the Tobit model explicitly accounts for limited dependent variable structures and provides consistent parameter estimates under censoring conditions.

The Tobit specification is particularly appropriate when:

- the dependent variable is censored at a specific limit (e.g., zero or another threshold), meaning that values below or above this limit are unobserved or clustered at the boundary;
- a non-negligible proportion of observations are concentrated at the censoring point, which may bias OLS estimates if not properly addressed.
-

In the context of the Lintner dividend model, the Tobit approach is especially relevant because a substantial number of firms do not distribute dividends. These observations generate a left-censoring problem at zero, as dividend payments cannot take negative values and are frequently observed as zero for non-paying firms. The Tobit model therefore allows for a more appropriate treatment of dividend behavior by incorporating both paying and non-paying firms within a unified estimation framework.

Formally, within the Lintner framework, the observed dividend payout D_i can be expressed as:

$$D_i = \begin{cases} D_i^*, & \text{if } D_i^* > 0 \\ 0 & , \text{if } D_i^* \leq 0 \end{cases} \quad (140)$$

The basic Tobit version of Lintner's dividend model can be written as formula (139).

III.1.2.1.2 GMM analysis

Most empirical models, including growth models, frequently encounter substantial endogeneity problems, arising either from the endogenous nature of explanatory variables, the presence of lagged dependent variables, or the simultaneous occurrence of both issues (Eugenio et al., 2004). Given that the econometric issues in the present study are comparable to those typically observed in growth regressions, the Arellano and Bond dynamic panel estimator is employed to address these concerns, as outlined in the previous chapter.

Accordingly, the baseline regression model used to examine the relationships between variables is specified in Equation (116):

$$y_{it} = \alpha_i y_{it-1} + \beta x_{it} + u_i + v_{it}$$

Where y represents the dependent variable for country i in year t , y_{it-j} denotes the lags of the dependent variable, and x_{it} represents the explanatory variables.

In this model, it is assumed that $\varepsilon_{it} = u_i + v_{it}$, where u_i represents the unobserved place effect and v_{it} represents the disturbance term. Both components are independently and identically distributed, with $u_i \sim N(0, \sigma_u^2)$, $v_{it} \sim N(0, \sigma_v^2)$. Since y_{it} is a function of u_i , y_{it-j} is also influenced

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by u_i , y_{it-j} becomes correlated with the disturbance term, making y_{it-j} an endogenous variable. Baltaji (1995) contends that when endogenous and dynamic regressors are present, fixed effect estimators and Generalized Least Squares (GLS) estimators do not yield consistent estimates.

Baum et al. (2003), Roodman (2006), and Wooldridge (2006) highlight heteroscedasticity as a potential source of inefficiency in several estimation frameworks. To address these econometric limitations, Arellano and Bond (1991) developed the Generalized Method of Moments (GMM) estimator, an instrumental variable approach that exploits lagged values of endogenous variables along with current values of strictly exogenous variables as instruments. This procedure is implemented in first differences, giving rise to the Difference GMM estimator.

However, Difference GMM may suffer from weak instrumentation, particularly when variables are highly persistent, which can lead to biased and imprecise estimates in finite samples. To overcome this limitation, Arellano and Bover (1995) and Blundell and Bond (1998) proposed the System GMM estimator, which augments the instrument set by incorporating additional moment conditions in levels. This extension improves efficiency and reduces bias, making System GMM generally preferable in applied empirical work.

Both estimation strategies are implemented using either a one-step or two-step procedure, with the two-step estimator typically providing greater efficiency under robust standard errors. The validity of the instruments must be assessed using specification tests, notably the Sargan or Hansen tests of overidentifying restrictions. These tests examine whether the instruments are uncorrelated with the error term under the null hypothesis of instrument validity.

In addition, tests for first-order and second-order serial correlation in the differenced residuals are essential. While first-order autocorrelation is expected due to the transformation of the data, the absence of second-order serial correlation is a critical condition for the consistency of both Difference and System GMM estimators.

III.1.3 Results of Lintner model in Algeria

Table 17 presents the estimation results of the Lintner model for Algeria. The Hansen test associated with the GMM estimation yields a p-value of 0.2, which supports the validity of the selected instruments and confirms the overall robustness of the model specification.

The empirical results indicate that, over the full sample period, both earnings and lagged dividends (LD) constitute key determinants of dividend payouts among private Algerian firms, thereby confirming the central hypothesis of the study. In particular, earnings exert a positive and statistically meaningful effect on dividend distributions, suggesting that improvements in profitability are systematically translated into higher dividend payments.

Overall, these findings provide empirical support for the applicability of Lintner's dividend smoothing framework in the Algerian context, highlighting the joint role of current earnings and past dividend behavior in shaping corporate payout decisions.

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Table 17: Results of the estimation of Lintner Model

	<i>GMM Model</i>			<i>Tobit Analysis</i>	
	<i>Coeff</i>	<i>AR(1) AR(2) Tests</i>	<i>Hansen Test</i>	<i>Coeff</i>	<i>LR chi2(2)</i>
EAR	0.2796023 ***	AR(1): z = -1.92 (p-value=0.055)	chi2(64)=75.31 (p-value =0.158)	0.2901256 ***	chi2(2)=1238.97 (p-value =0.000)
L1DIV	0.6498316 ***	AR(2): z = 1.54 (p-value=0.123)		0.7146373 ***	

*, **, and *** define statistical significance at the 1%, 5%, and 10% levels.

Source: established using the STATA14 software

The likelihood ratio (LR) test in the Tobit model compares the estimated specification with a restricted model excluding all explanatory variables. The test statistic, reported as LR $\chi^2(2)$ along with its corresponding p-value, assesses the joint significance of the regressors. A low p-value (typically below 0.05) leads to the rejection of the null hypothesis that all coefficients are jointly equal to zero, thereby confirming the overall statistical significance of the model.

The Tobit estimation results indicate a strong probability that profitable firms are more likely to distribute dividends, particularly when they exhibit a prior history of dividend payments. In addition, the speed of adjustment captures the extent to which firms align their actual dividends with their target payout ratio over time; a higher adjustment speed implies a faster convergence and, consequently, less dividend smoothing and lower stability in payout behavior. In general, an adjustment coefficient exceeding 0.5 is interpreted as relatively high.

Overall, both the Tobit and GMM results underscore the central role of earnings and lagged dividends in shaping dividend policy in Algeria. The strong significance of these variables suggests that firms rely heavily on both current profitability and past dividend behavior when making payout decisions. The GMM specification satisfies the required diagnostic tests, confirming the robustness of the dynamic panel estimates, while the Tobit results further support the explanatory power of the model. Collectively, these findings suggest that dividend policy among Algerian firms is predominantly stable, earnings-driven, and characterized by gradual adjustment dynamics.

The results in table 17 show that in Algeria:

- **Target payout ratio:** Approximately **76%**.
- **Speed of adjustment:** is **0.385** around Lintner's one (**30%**).

We conclude that the estimated target payout ratio of the Lintner model is approximately 76%, implying that firms, in the long run, aim to distribute nearly three-quarters of their earnings as dividends. The estimated speed of adjustment, equal to 0.385, indicates a moderate convergence process toward the target, suggesting that firms adjust their dividends gradually rather than instantaneously in response to changes in earnings. This result reflects a balance between responsiveness to profitability and the objective of maintaining dividend stability.

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However, the estimated target payout ratio appears relatively high when compared to the observed mean dividend ratio (0.27), indicating a substantial gap between desired and actual payout behavior. This divergence can be interpreted through the lens of the adjustment mechanism embedded in the Lintner model. The estimated speed of adjustment (0.385) suggests that firms close only a fraction of the gap between actual and target dividends each period. As a result, despite a high long-run target, firms adjust cautiously and incrementally, which explains why the observed payout ratio remains significantly lower over time.

The coexistence of a high target payout ratio and a relatively low average dividend ratio provides meaningful insight into dividend behavior in the Algerian context. It suggests that firms may aspire to high long-term payout levels while remaining conservative in their short-run dividend decisions. This discrepancy may also reflect structural features of Algerian firms, particularly the prevalence of family ownership structures, where dividend decisions may be influenced by internal governance considerations rather than the systematic payout adjustment process assumed in Lintner's framework. In such settings, dividend policies may be less rigid and more discretionary, contributing to deviations from the theoretical target.

Furthermore, the estimated negative constant term, in the presence of a high target payout ratio, may indicate that firms are not immediately positioned to achieve their long-run dividend objectives. Instead, dividend adjustments occur progressively, consistent with the moderate speed of adjustment. This gradual convergence reflects managerial prudence and liquidity considerations, whereby firms prefer to smooth dividend payments over time rather than implement abrupt increases. Consequently, the negative constant can be interpreted as evidence of a transitional adjustment process toward the target payout level rather than an inconsistency in the model itself.

III.2 Dividend Model analysis across sectors

To further examine differences in dividend behavior across the three sectors—Manufacturing, Agribusiness, and Trade & Other Services—we estimate separate Tobit models for each sector. This sector disaggregation allows for a more precise assessment of payout dynamics in the presence of censored observations (i.e., zero dividend payments).

The empirical specification retains the two core explanatory variables of the Lintner framework, namely current earnings and lagged dividends, in order to maintain consistency with the baseline model while capturing sector-specific adjustment mechanisms.

III.2.1 Manufacturing sector

Table 18 presents the Tobit regression results for the manufacturing sector. The findings indicate that both current earnings and lagged dividends are statistically significant determinants of dividend payouts. The high level of significance of both coefficients confirms the robustness of these variables in explaining dividend behavior within this sector.

The positive coefficient associated with earnings is consistent with theoretical expectations, suggesting that higher profitability enables firms to distribute larger dividends. This result reinforces the view that dividend payments in the manufacturing sector are closely linked to internal financial performance. In addition, the significant positive effect of lagged dividends highlights the persistence of dividend policies over time and underscores the importance of historical payout patterns in shaping current decisions.

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More specifically, manufacturing firms tend to increase dividend distributions in response to higher earnings, although adjustments remain gradual. The strong influence of the lagged dividend variable reflects a clear pattern of dividend smoothing, whereby firms use past dividend levels as a reference point to maintain stability in payout policies. This behavior indicates a preference for predictable dividend streams, which may enhance investor confidence and support long-term shareholder relationships.

Overall, the results suggest that manufacturing firms place considerable emphasis on both profitability and historical dividend behavior when determining payout levels. The statistical significance of the model, as reflected in the chi-square statistic and associated p-value, further confirms the explanatory power of the specification. Collectively, these findings highlight a dividend policy in the manufacturing sector that is characterized by stability, gradual adjustment, and a strong reliance on past payout decisions.

Table 18: Results of the estimation of Tobit Model in manufacturing

<i>Tobit Analysis</i>		
	<i>Coeff</i>	<i>LR chi2(2)</i>
EAR	0.0830898 ***	chi2(2)= 121.80 (p-value =0.000)
L1DIV	0.6432432 ***	

*, **, and *** define statistical significance at the 0.1%, 1%, and 5% levels.

Source: established using the STATA14 software

III.2.2 Agribusiness

The Tobit regression results for the agribusiness sector are broadly consistent with those observed in the manufacturing sector. The estimates confirm that both current earnings and lagged dividends remain key determinants of dividend payouts, reinforcing the explanatory power of the Lintner framework across sectors. Overall, these findings provide meaningful insights into the determinants of dividend behavior in the agribusiness sector, highlighting the central role of profitability and past dividend policy in shaping current payout decisions.

Table 19: Results of the estimation of Tobit Model in agribusiness

<i>Tobit Analysis</i>		
	<i>Coeff</i>	<i>LR chi2(2)</i>
EAR	0.0745208***	chi2(2)= 195.47 (p-value =0.000)
L1DIV	1.012532***	

*, **, and *** define statistical significance at the 0.1%, 1%, and 5% levels.

Source: established using the STATA14 software

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The analysis focuses on two key explanatory variables: earnings (EAR) and the lagged dividend (L1DIV). The earnings coefficient (0.0745208), significant at the 1% level, indicates a positive relationship between profitability and dividend payouts. This suggests that, as agribusiness firms experience higher earnings, they tend to increase dividend distributions, although the magnitude of this response remains relatively moderate.

More importantly, the coefficient associated with the lagged dividend (1.012532), also significant at the 1% level, reveals an exceptionally strong degree of dividend persistence within the sector. This near-unity coefficient indicates that current dividend payments are almost entirely anchored to the previous year's dividend level, reflecting an extremely high degree of dividend smoothing. In practical terms, agribusiness firms place substantial emphasis on maintaining stable and predictable dividend policies, with limited deviation from past payout levels.

Such strong smoothing behavior suggests that firms in this sector prioritize dividend stability over responsiveness to short-term fluctuations in earnings. This strategy may be particularly relevant in an industry characterized by cyclical and seasonal variability, where earnings can be volatile due to factors such as weather conditions, commodity price fluctuations, and exposure to international trade dynamics. As a result, firms appear to decouple dividend decisions from short-term earnings shocks in favor of long-term consistency.

This approach may be especially attractive to income-oriented investors seeking stable cash flows. However, it also implies that dividend adjustments are slow to reflect improvements in profitability, as firms prefer to preserve continuity in payout patterns rather than react immediately to earnings changes. Overall, the findings suggest that the agribusiness sector adopts a dividend policy strongly oriented toward stability, predictability, and investor confidence, consistent with the long-term and uncertain nature of agricultural activity.

III.2.3 Retail & other services

The negative coefficient on L1DIV reported in Table 20 is unexpected, as it departs from the standard dividend smoothing pattern typically documented in the literature. Accordingly, this result does not provide robust evidence that past dividends exert a systematic positive influence on current dividend payments in the retail and other services sector.

One possible interpretation is that firms in this sector rely more heavily on current earnings when determining dividend distributions, rather than mechanically adjusting dividends based on past payout levels. This may reflect a more flexible or earnings-driven payout policy, where dividend decisions respond primarily to contemporaneous profitability conditions.

Despite this result, the overall model remains statistically significant, as indicated by the chi-square statistic of 122.16 and a p-value of 0.000. This confirms that, jointly, earnings (EAR) and lagged dividends (L1DIV) contribute significantly to explaining the variation in dividend payouts within the sector.

The strong positive relationship between earnings and dividend payouts indicates that firms in the retail and services sector tend to adjust their dividends in line with current financial performance. This suggests a relatively flexible payout policy, whereby dividend decisions respond promptly to changes in profitability.

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In contrast, the coefficient on lagged dividends is statistically insignificant and slightly negative, implying that past dividend levels do not play a systematic role in determining current payouts. This result suggests that firms in this sector do not strongly prioritize dividend smoothing or the maintenance of stable payout trajectories over time. Instead, dividend decisions appear to be more discretionary and closely linked to contemporaneous earnings.

This behavior may be explained by the inherent volatility of revenues and earnings in retail and service activities, which are often sensitive to shifts in consumer demand, macroeconomic conditions, and competitive pressures. As a result, firms may adopt a more adaptive dividend policy that prioritizes financial flexibility over stability. Consequently, investors in this sector may reasonably anticipate greater variability in dividend payments, with payouts fluctuating in response to short-term performance rather than following a stable historical pattern.

Table 20: Results of the estimation of Tobit Model in retail & other services

<i>Tobit Analysis</i>		
	<i>Coeff</i>	<i>LR chi2(2)</i>
<i>EAR</i>	0.2858453 ***	<i>chi2(2)=118.19(p-value =0.000)</i>
<i>L1DIV</i>	-0.0232671	

*, **, and *** define statistical significance at the 0.1%, 1%, and 5% levels.

Source: established using the STATA14 software

In conclusion, the Tobit regression results for the retail and other services sector indicate a dividend policy that is strongly driven by current earnings, with limited reliance on past dividend behavior. This pattern suggests that firms in this sector adopt a more flexible and opportunistic payout strategy, adjusting dividends in line with contemporaneous profitability rather than maintaining long-run payout stability.

Such a structure is consistent with the inherently dynamic nature of retail and service activities, where cash flows and earnings are often exposed to rapid changes in consumer demand, competitive conditions, and broader macroeconomic fluctuations. In this context, dividend policy appears to function as an adaptive financial instrument, allowing firms to preserve liquidity and adjust distributions in response to evolving market conditions.

III.3 Determinants of payout policy in private Algerian firms

This analysis aims to identify the key explanatory variables of the dividend payout ratio among private Algerian firms, while also examining their likely relationships and predictive relevance within a unified empirical framework.

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To achieve this objective, the study employs a dynamic panel data estimation approach, which is particularly suited to capturing both cross-sectional heterogeneity and temporal dynamics in dividend behavior. This section outlines the econometric methodology adopted, along with the statistical tools and estimation techniques used to ensure robust inference.

III.3.1 Presentation of dividend model

The presence of an endogenous explanatory variable, namely the lagged dependent variable, renders conventional panel data estimators (pooled OLS, fixed effects, and random effects) inconsistent due to dynamic panel bias.

Table 21: Definition of variables

Factors	Variables	Description	Variable abbreviation	Predicted sign
Dividend decision	Dividend Payout Ratio	Dividend Payout /Net earnings	DIV	
Lag DV	Lag dependant variable	Dividend Payout (t-1)	L1DIV	+
Profitability	Earnings to Assets	Net earnings/Assets	ROA	+
Liquidity	Cash to Assets	Cash/Total Assets	LIQ	+
Leverage	Long and Medium Term Debt	Long and Medium Term Debt/Total Liabilities	LMD	-
	Short Term Debt	Short Term Debt/Total Liabilities	SD	-
Size	Revenue	the Natural log of Revenue	SIZE	-
Working Capital Requirements	Working Capital Requirements	Working Capital Requirements / Total Assets	WCR	-
Investment	Gross Investment	$\frac{\text{Gross Invest}_t - \text{Gross Invest}_{t-1}}{\text{Gross Invest}_{t-1}}$	INV	-
Growth Opportunities	the growth rate of Revenue	$\frac{\text{Revenue}_t - \text{Revenue}_{t-1}}{\text{Revenue}_{t-1}}$	GROW	+

Source: formulated using STATA14 software

To address this issue, the study employs Generalized Method of Moments (GMM) estimators based on internal instrumentation strategies. These methods are particularly appropriate in dynamic panel settings where endogeneity arises from persistence effects and potential simultaneity. The dataset, comprising 88 firms observed over the period 2010–2020, yields a balanced panel of 968 observations across all model variables.

Table 21 summarizes the variables included in the empirical specification, along with their expected signs in relation to dividend payouts. In addition to the firm-level explanatory variables, the model incorporates two macroeconomic controls to account for broader economic conditions affecting dividend policy in Algeria.

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The first is the GDP growth rate over the 2010–2020 period, which captures overall economic performance and business cycle effects. The second is the inflation rate, which reflects macroeconomic stability and may influence firms' distribution decisions through its impact on real profitability and financial planning. The equation below defines our model:

$$DIV_{i,t} = \beta_0 + \beta_1 L1DIV_{i,t} + \beta_2 ROA_{i,t} + \beta_3 LIQ_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 WCR_{i,t} + \beta_6 LMD_{i,t} + \beta_7 SD_{i,t} + \beta_8 INV_{i,t} + \beta_9 GROW_{i,t} + \beta_{10} GrowthGDP_t + \beta_{11} INF_t + \varepsilon_{i,t} \quad (141)$$

III.3.2 Results of the econometric model

Before presenting the GMM estimation results, it is essential to conduct a series of diagnostic and validity tests to assess potential econometric issues affecting the model. These tests are necessary to ensure the reliability and consistency of the estimates, particularly with respect to instrument validity, serial correlation, and overall model specification.

III.3.2.1 The Results of the Diagnostic Tests

To assess the adequacy and robustness of the model, three diagnostic tests are performed: a multicollinearity test, followed by tests for autocorrelation and heteroscedasticity. These tests are conducted under two specifications—first including the endogenous variable (the lagged dependent variable), and then excluding it—in order to evaluate the sensitivity of the model to endogeneity and to ensure the stability of the results.

III.3.2.1.1 Multicollinearity Test:

Table 22: Variance Inflation Factor (VIF) Test

Without L1DIV			With L1DIV		
Variable	VIF	1/VIF	Variable	VIF	1/VIF
<i>SD</i>	1.34	0.747772	<i>SD</i>	1.34	0.746465
<i>GrowthGDP</i>	1.33	0.751403	<i>GrowthGDP</i>	1.33	0.751127
<i>INF</i>	1.27	0.788340	<i>ROA</i>	1.29	0.777914
<i>LMD</i>	1.25	0.802469	<i>INF</i>	1.27	0.788295
<i>ROA</i>	1.23	0.813000	<i>LMD</i>	1.25	0.802405
<i>LIQ</i>	1.19	0.841467	<i>LIQ</i>	1.19	0.840628
<i>WCR</i>	1.14	0.879207	<i>WCR</i>	1.14	0.878854
<i>GROW</i>	1.08	0.928983	<i>L1DIV</i>	1.10	0.909179
<i>INV</i>	1.06	0.945876	<i>SIZE</i>	1.08	0.926656
<i>SIZE</i>	1.04	0.966004	<i>GROW</i>	1.08	0.928981
			<i>INV</i>	1.06	0.944861
<i>Mean VIF</i>	1.19		<i>Mean VIF</i>	1.19	

Source: established using the STATA14 software

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The multicollinearity test assesses whether the explanatory variables are sufficiently independent from one another. To this end, the Variance Inflation Factor (VIF) is employed to detect potential collinearity among regressors. As a rule of thumb, VIF values below 10 indicate the absence of serious multicollinearity.

The results reported in Table 22 show that all VIF statistics are well below this threshold, while the corresponding tolerance values ($1/\text{VIF}$) exceed 0.1. These findings confirm that multicollinearity is not a concern in the model. Moreover, this conclusion remains unchanged when the endogenous variable (L1DIV) is included, suggesting that the introduction of the lagged dependent variable does not distort the independence structure of the explanatory variables.

III.3.2.1.2 Serial correlation Test:

To examine the presence of serial correlation in the error terms, the Wooldridge test for autocorrelation in panel data is employed. This test evaluates the null hypothesis of no first-order autocorrelation in the residuals.

The results reported in Table 23 indicate that, in the baseline specification excluding the endogenous variable, the null hypothesis cannot be rejected, suggesting the absence of serial correlation. However, once the lagged dependent variable (L1DIV) is introduced into the model, the null hypothesis is rejected, indicating the presence of first-order autocorrelation in the error terms.

This outcome is consistent with the nature of dynamic panel models, where the inclusion of a lagged dependent variable often induces serial correlation due to the mechanical relationship between current and past values. Consequently, this finding further justifies the use of GMM estimators, which are specifically designed to address such issues through appropriate instrumentation and transformation techniques.

Table23: Results of the Autocorrelation Test for Panel Data

<i>F</i> <i>statistic</i> 1.818	<i>Without L1DIV</i>		<i>With L1DIV</i>		
	<i>Degrees of freedom</i> (1,87)	<i>P-value</i> 0.1811	<i>F statistic</i> 113.894	<i>Degrees of freedom</i> (1,87)	<i>P-value</i> 0.000

Source: established using the STATA14 software

III.3.2.1.3 Heteroscedasticity Test:

The results of the heteroscedasticity tests for panel data, reported in Table 24. The probability associated with the test statistic is below the 5% threshold, leading to the rejection of the null hypothesis of homoscedasticity in both model specifications—with and without the endogenous variable (L1DIV). This indicates the presence of heteroscedasticity in the data.

Given the simultaneous presence of endogeneity, heteroscedasticity, and serial autocorrelation, the use of conventional panel data estimators would result in inconsistent and inefficient estimates. Accordingly, the System GMM estimator is adopted, as it is specifically designed to address these econometric issues by employing appropriate instrumentation and ensuring robustness to such violations.

Table 24: Results of the Heteroscedasticity test for Panel Data

<i>Without L1DIV</i>			<i>With L1DIV</i>		
<i>chi2</i>	<i>Degrees of freedom</i>	<i>P-value</i>	<i>chi2</i>	<i>Degrees of freedom</i>	<i>P-value</i>
115.73	1	0.000	9.21	1	0.0024

Source: established using the STATA14 software

III.3.2.2 The Results of GMM method

This study aims to empirically assess the determinants of dividend policy in Algeria by estimating a dynamic model using the two-step System GMM approach. The empirical results are subsequently analyzed and interpreted to evaluate the influence of key firm-level characteristics—namely profitability, liquidity, firm size, working capital requirements, growth, and investment opportunities—on dividend policy, proxied by the dividend-to-earnings ratio. In addition, two macroeconomic variables, GDP growth and inflation, are incorporated to capture the broader economic environment.

Table 25: Results of the GMM Model

	<i>DIV</i>	<i>Coef</i>	<i>Std Err</i>
	<i>L1DIV</i>	0.2395345***	0.0792373
	<i>ROA</i>	0.7408067 ***	0.2439798
	<i>LIQ</i>	0.3302192 **	0.1585097
	<i>SIZE</i>	-0.0325032**	0.0168557
	<i>GROW</i>	0.0352617 **	0.0180265
	<i>INV</i>	-0.0195617	0.0223009
	<i>WCR</i>	0.0545547	0.0575773
	<i>SD</i>	-0.0697588	0.0574139
	<i>LMD</i>	-0.0610441	0.1585097
	<i>GrowthGDP</i>	0.0066623	0.0045483
	<i>INF</i>	0.4198376	0.5504328
<i>AR(1) test</i>	<i>z</i> = -3.61 (<i>p-value</i> =0.000)		
<i>AR(2) test</i>	<i>z</i> = 1.88 (<i>p-value</i> =0.060)		
<i>Hansen Test</i>	<i>chi2</i> (64) = 74.50 (<i>p-value</i> = 0.174)		

*, **, and *** define statistical significance at the 1%, 5%, and 10% levels.

Source: established using the STATA14 software

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The analysis focuses on the sign, magnitude, and statistical significance of the estimated coefficients in order to verify their consistency with the underlying theoretical predictions and research hypotheses.

Prior to estimation, the assumption of sequential exogeneity is considered to justify the use of lagged variables as valid instruments. Within this framework, the lagged dependent variable (L1DIV) is treated as endogenous, while the remaining explanatory variables are assumed to be exogenous and are used as instruments. Table 25 reports the results of the System GMM estimation, along with the associated diagnostic tests assessing instrument validity and overall model adequacy.

Thus, for our study, we retain the estimated model:

$$DIV = 0.8180137 + 0.2395345 \text{ L1DIV} + 0.7408067 \text{ ROA} + 0.3302192 \text{ LIQ} - 0.0325032 \text{ SIZE} + 0.0352617 \text{ GROW} - 0.0195617 \text{ INV} - 0.0610441 \text{ LMD} - 0.0697588 \text{ SD} + 0.0545547 \text{ WCR} + 0.0066623 \text{ GrowthGDP} + 0.4198376 \text{ INF}.$$

III.3.2.2.1 The Results of tests of validity of GMM

The results of the Arellano–Bond autocorrelation tests indicate that the null hypothesis of no first-order autocorrelation (AR(1)) is rejected. This outcome is expected in dynamic panel data models, as first-differencing induces a mechanical correlation between the transformed error terms at time t and $t-1$. Therefore, the presence of AR(1) does not invalidate the model.

More critically, the AR(2) test fails to reject the null hypothesis of no second-order autocorrelation. The absence of AR(2) in the differenced residuals is a key requirement for the validity of the instruments, as it implies that the lagged variables used as instruments are not correlated with the error term. Consequently, this result supports the consistency of the GMM estimator and the overall adequacy of the model specification.

In addition, the Hansen test of overidentifying restrictions, as discussed by David Roodman (2009), is employed to further assess instrument validity. Unlike the Sargan test, the Hansen test is robust to heteroscedasticity and is therefore more appropriate in the context of two-step GMM estimation. The test results indicate that the null hypothesis cannot be rejected, confirming that the instruments are valid, properly specified, and uncorrelated with the error term.

Taken together, the outcomes of the AR(1), AR(2), and Hansen tests provide strong empirical support for the validity of the instruments and the reliability of the estimated dynamic panel model.

III.3.2.2.2 The Results of GMM

In the following, we provide a detailed interpretation of the estimated coefficients associated with the explanatory variables, focusing on their sign, magnitude, and statistical significance, in order to assess their impact on the dividend payout ratio and their consistency with the theoretical predictions.

- **Lag DIV**

The coefficient of the lagged dependent variable (L1DIV) is positive and statistically significant, with a p-value of 0.003. This result indicates a strong persistence in dividend behavior, suggesting that firms adjust their dividend payouts gradually over time rather than

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implementing abrupt changes. Such a pattern is consistent with the partial adjustment mechanism proposed by Lintner, whereby current dividends are anchored to past distributions.

From a theoretical perspective, a significant and positive lagged dividend coefficient reflects dividend smoothing behavior. Firms tend to maintain stable and predictable dividend policies, using past payouts as a benchmark for current decisions. This approach reduces volatility in dividend payments and aligns with managerial preferences for stability.

The empirical literature further supports this interpretation, emphasizing the signaling role of dividends in financial markets. A high coefficient on the lagged dividend variable may indicate management's intention to convey confidence regarding future earnings and financial stability. By maintaining consistent dividend payments, firms send positive signals to investors, thereby enhancing credibility and potentially strengthening shareholder trust.

• Profitability

The coefficient associated with the profitability variable is statistically significant, with a p-value of 0.002, and exhibits a positive sign. This indicates a direct relationship between firm profitability and the dividend payout ratio, consistent with established empirical findings in the dividend policy literature.

From an economic standpoint, more profitable firms generate higher internal cash flows, which enhance their capacity to distribute dividends after covering operational costs and investment expenditures. Consequently, profitability increases the financial flexibility available to management, making dividend payments more sustainable and potentially more generous.

The estimated coefficient further suggests that a 1% increase in profitability is associated, ceteris paribus, with a 0.74% increase in the dividend payout ratio. This elasticity highlights the sensitivity of dividend decisions to changes in earnings performance, confirming that profitability is a central determinant of dividend policy in large Algerian firms.

• Liquidity

The System GMM results indicate a positive and statistically significant relationship between liquidity and dividend payouts. The liquidity variable is significant at the 5% level (p-value = 0.037), with an estimated coefficient of 0.33. This implies that, ceteris paribus, a 1% increase in liquidity is associated with a 0.33% increase in the dividend payout ratio.

From an economic perspective, liquidity reflects a firm's ability to meet short-term obligations using its most liquid assets. Firms with stronger liquidity positions possess greater internal cash availability, which facilitates dividend distributions without compromising operational needs or financial commitments such as interest payments and supplier obligations.

Moreover, higher liquidity reduces financial constraints and enhances managerial flexibility in payout decisions. It allows firms to distribute dividends without resorting to external financing or the liquidation of long-term assets, both of which may be costly or strategically

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undesirable. In this sense, liquidity acts as an enabling condition for dividend payments, supporting smoother and more sustainable distribution policies.

- **Size**

The results indicate an inverse relationship between firm size and dividend payouts. The size variable is statistically significant at the 10% level ($p\text{-value} = 0.054$) and exhibits a negative coefficient of -0.033 . This suggests that, *ceteris paribus*, an increase in firm size is associated with a reduction in the dividend payout ratio.

This finding implies that larger firms in the sample tend to distribute relatively lower dividends or exhibit a lower propensity to increase payouts as they expand. One plausible explanation is that larger firms may prioritize internal financing to support expansion strategies, including investment in capacity growth, acquisitions, and innovation activities. In such cases, retained earnings are preferred over cash distributions to shareholders.

Additionally, firms operating in capital-intensive industries often face substantial financing needs to maintain and upgrade infrastructure or to support long-term strategic projects. These requirements can reduce the availability of free cash flow for dividend distribution, thereby reinforcing a lower payout tendency among larger firms.

- **Growth**

The GMM results indicate that growth has a statistically significant positive effect on dividend payouts. The coefficient on the growth variable is positive, suggesting that firms with higher growth rates tend to distribute higher dividends, all else being equal.

Quantitatively, the estimated coefficient implies that a one-unit increase in the growth variable is associated with a 0.035% increase in the dividend payout ratio. This result suggests that, within the sample, growth opportunities are associated with higher rather than lower dividend distributions.

However, this empirical finding departs from the standard theoretical expectation derived from dividend irrelevance and pecking order considerations, which generally predict a negative relationship between growth opportunities and dividends. Under these frameworks, firms with stronger growth prospects are expected to retain earnings in order to finance investment projects internally, thereby reducing dividend payouts.

The positive coefficient observed here may reflect specific characteristics of the Algerian corporate environment, where firms with stronger growth may simultaneously generate higher cash flows, allowing them to finance both investment and dividend distributions. It may also suggest that growth in this context is not strictly associated with binding financing constraints, enabling firms to maintain or even increase payout levels alongside expansion.

- **Investment**

The analysis of the investment variable indicates a negative but statistically insignificant relationship with dividend payouts. This suggests that, although higher levels of investment are associated with a marginal reduction in dividends, the effect is not statistically robust and therefore cannot be considered a significant determinant of dividend policy within the model.

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From an economic perspective, the negative sign is broadly consistent with theoretical expectations, which posit a trade-off between investment and dividend distribution. Firms facing higher investment opportunities may retain earnings to finance capital expenditures, thereby limiting the scope for dividend payments. However, the lack of statistical significance implies that this trade-off is not systematically strong across the sample of Algerian firms.

Overall, while the direction of the coefficient aligns with existing literature, the empirical evidence suggests that investment does not play a decisive role in explaining dividend behavior in this context.

- **Growth of GDP**

Table 25 indicates that the coefficient of GDP growth is positive but only weakly significant (p -value = 0.143), suggesting that macroeconomic growth has a limited and statistically inconclusive impact on dividend policy in the estimated model.

From an economic standpoint, periods of stronger GDP growth are generally associated with improved business conditions, including higher aggregate demand, increased sales, and stronger corporate profitability. In such environments, firms may experience an expansion in cash flows, which can potentially translate into higher dividend distributions.

Moreover, GDP growth may influence dividend decisions through expectations and confidence effects. A favorable macroeconomic outlook can enhance firms' perceptions of future cash flow stability, thereby supporting higher or more stable dividend payments. Conversely, slower economic growth tends to increase uncertainty, which may lead firms to adopt more conservative payout policies.

However, the limited statistical significance of the coefficient suggests that GDP growth does not play a strong or systematic role in explaining dividend behavior in the Algerian context once firm-specific factors are controlled for.

- **Leverage**

The results indicate a negative relationship between long- and medium-term debt as well as short-term debt and the dividend payout ratio. This suggests that higher leverage is associated, in principle, with lower dividend distributions. However, the estimated coefficients reported in Table 25 are not statistically significant, limiting the strength of this inference.

From an economic perspective, the negative signs are broadly consistent with theoretical expectations. Higher indebtedness typically increases financial obligations and interest burdens, which can reduce the availability of free cash flow for dividend payments. In addition, firms with higher leverage may prioritize debt servicing and financial stability over shareholder distributions, leading to lower payout ratios.

Nevertheless, the absence of statistical significance implies that leverage does not exert a systematic or robust effect on dividend policy within the sample once other determinants are controlled for. This suggests that, in the Algerian context, dividend decisions may be driven more strongly by internal factors such as earnings and past dividend behavior than by capital structure considerations.

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• Working Capital Requirements and Inflation

The GMM model results indicate the positive relationship between investment Working Capital Requirements and Inflation variables and payout ratio. However, the coefficients of these variables are insignificant.

The relationship between dividend policy and corporate decisions is a central focus of debate in numerous studies within financial literature. However, dividends remain under debate and theories not yet reached a common pattern on payout behavior. This study highlights some determinants that may influence the dividend policy of Algerian firms by investigating the firm-level factors of dividends. Excluding financial-sector firms from the data, 88 large firms are included in the dataset to conduct panel data analysis during the period from 2010 to 2020. To sum up the results, we conclude that past dividends, profitability, liquidity, size, and growth opportunities are determinants of payout policy of the 88 firms of the sample. Furthermore, the growth of Algeria's Gross Domestic Product (GDP) impacts positively dividend payments. However, dividends change negatively with the size of the firms.

Conclusion of the chapter

The objective of this chapter was to conduct a thorough investigation of the dividend distribution policy among a sample of 88 large private Algerian companies over the period from 2010 to 2020. This quantitative study aimed to identify the key factors influencing dividend distribution policies in the context of the Algerian economy. Through a structured analysis, the chapter explored the regulatory framework governing dividend distribution, provided empirical insights into the determinants of payout policies, and examined trends in dividend behavior across various sectors.

The first section outlined the regulatory environment for dividend distribution in Algeria. It highlighted that retained earnings, when reinvested in the company, are taxed at a reduced rate. This tax structure may incentivize companies to reinvest profits rather than distribute them as dividends. The findings indicated that the payment of dividends does not incur a tax disadvantage, as they are not subject to higher tax rates compared to capital gains. This regulatory framework supports the notion that companies might favor retention over distribution, particularly in an environment where reinvestment is encouraged.

Sections two and three presented an empirical analysis of the determinants of payout policy in Algeria. The results revealed that dividend policies vary significantly across different sectors. The majority of firms in the sample were identified as either zero or low dividend payers. Furthermore, the analysis of dividend trends from 2010 to 2020 uncovered a dynamic pattern characterized by two distinct periods. The initial period from 2010 to 2017 exhibited relative stability in dividend payouts, while the post-2017 period marked a significant shift towards increased volatility, culminating in the lowest dividend ratio of 20% in 2020. This transition indicates a shift from a stable dividend policy to a more adaptive and conservative approach in response to changing market conditions.

The analysis also highlights distinct financial strategies shaped by sector-specific dynamics. For instance, the manufacturing sector demonstrated a strong and stable dividend policy, in stark contrast to the volatility observed in the agribusiness sector. Meanwhile, the retail and services sectors maintained a balanced approach to dividend payouts. These findings emphasize the importance of aligning dividend policies with sector characteristics. The application of the Lintner model to the Algerian context provided valuable insights into the factors driving dividend policy decisions. The results highlighted the significance of earnings

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and lagged dividends as critical determinants of payout policy. The strong correlation between past dividend decisions, current profitability, liquidity, company size, and growth opportunities indicates that Algerian firms heavily rely on historical data when making dividend payout decisions. Additionally, the growth of Algeria's Gross Domestic Product (GDP) was found to positively impact dividend payments. Conversely, large firms tended to experience a negative relationship with dividend payouts, suggesting that large firms are likely reluctant to pay dividends to shareholders.

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GENERAL CONCLUSION

General Conclusion

This research examines the determinants of payout policies in Algeria. The study also explores different forms of payout mechanisms while identifying the key determinants of dividend payments in private Algerian firms and comparing the dividend payments in different sectors. The initial problematic of this analysis was formulated as follow: **What are the determinants of the payout policy of large private firms operating in Algeria?**

To answer this question we divided our work in four chapters. The first chapter presents a thorough examination of payout policy models and their evolution, structured into three main sections. Section 01 introduces seminal theories that form the foundation of payout policy analysis. It begins with Linter's Model (1956), which is widely regarded as a cornerstone in understanding corporate dividend behavior. Lintner's model posits that firms adjust their dividend payout ratios gradually in response to changes in earnings, with a focus on maintaining stable dividends. Following this, Gordon's Model (1956) is examined, which emphasizes the role of dividends in the valuation of firms, arguing that investors prefer dividends over capital gains due to perceived certainty. The section concludes with Modigliani and Miller's dividend irrelevance theory (1961), a revolutionary concept that asserts in a perfect market without taxes or costs, dividend policy is irrelevant to a firm's valuation.

Section 02 provides an analytical comparison of the different payout theories. The first subsection compares Gordon's Model and Modigliani and Miller's irrelevance theory, highlighting the key differences in their assumptions and implications for firm valuation. While Gordon advocates for the importance of dividends in reducing uncertainty for investors, Modigliani and Miller argue that in an ideal market, how a firm structures its dividends has no impact on its value. The second subsection extends the analysis by exploring how payout policies differ between private and public firms, considering the varying objectives, ownership structures, and market pressures that influence payout decisions in these contexts. The final subsection in this section explores recent trends in payout policy, examining how contemporary factors, such as technological advances, changes in investor preferences, and shifts in global economic conditions, have impacted firms' approaches to dividend payouts and share repurchases.

Section 03 shifts the focus to the forms and measurement of payout policies. It begins by discussing the two primary mechanisms through which firms return value to shareholders: dividends and share repurchases. The section examines the circumstances under which firms prefer one form over the other and the theoretical underpinnings behind these choices. The second subsection delves into the theories of share repurchases, exploring why repurchases have become a popular alternative to dividends and their signaling effect to the market. Finally, the third subsection addresses the measurement of payout policies, outlining the different financial metrics used to evaluate a firm's payout decisions, such as the dividend payout ratio, dividend yield, and total shareholder return. This section highlights the importance of these metrics in assessing a firm's commitment to returning value to its shareholders and its overall financial health.

The second chapter delves into the determinants of payout policy in imperfect markets, offering a detailed examination of how market inefficiencies influence corporate dividend strategies. Section 01 focuses on the relationship between payout policy and taxes, analyzing the impact of taxation on dividend distributions. The first subsection investigates the impact of dividend taxation on stock prices and returns, exploring how taxes influence investor behavior and market valuation. The second subsection examines static and dynamic tax

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clienteles, discussing how different groups of investors respond to tax changes and how firms adjust their payout policies accordingly. The final subsection in this section addresses the effects of tax changes on payout policy, focusing on how shifts in tax policy impact dividend distributions and the overall corporate financial strategy.

Section 02 explores the role of asymmetric information and agency relationships in shaping payout policy decisions. The first subsection introduces the dividend-signaling model, which posits that firms use dividend announcements to signal their financial health and future prospects to investors. This is followed by a discussion on dividend smoothing and dividend clienteles, examining how firms aim to maintain stable dividend payments over time to cater to specific groups of investors. The third subsection addresses agency relationships and dividend policy, highlighting the potential conflicts between managers and shareholders and how dividends are used to mitigate these agency costs by reducing excess cash within the firm and aligning managerial incentives with shareholder interests.

Section 03 provides an empirical analysis of payout policy, presenting evidence on the relationship between asymmetric information and signaling models. The first subsection evaluates empirical studies that test the validity of signaling models in explaining dividend behavior in firms. The second subsection reviews agency models, assessing the extent to which agency theory can explain corporate dividend policies in various market contexts. Finally, the third subsection consolidates the empirical findings on asymmetric information and agency models, offering a comprehensive overview of how these theories hold up in real-world markets and the degree to which they explain firm behavior in imperfect markets.

The third chapter addresses the econometric modeling techniques used for panel data analysis, with a focus on both static and dynamic models. Section 01 begins with an introduction to panel data, outlining its definition and explaining its unique structure, which involves observations of multiple entities over time. The first subsection provides a formal definition of panel data, emphasizing its ability to capture both cross-sectional and time-series dimensions. The second subsection explores the benefits of panel data, highlighting its advantages in controlling for unobserved heterogeneity, improving efficiency in estimation, and allowing for more complex modeling of dynamic processes. However, the third subsection addresses the limitations of panel data, discussing potential issues such as data attrition, measurement errors, and the complexity of managing large datasets.

Section 02 focuses on the estimation of static panel data models, starting with an overview of the various methods of estimation. This subsection details techniques such as fixed effects and random effects models, emphasizing their applicability and assumptions. The second subsection covers the specification tests used to assess the panel data-generating process, including tests for choosing between fixed and random effects models, such as the Hausman test. The final subsection in this section discusses the econometric tests used in the random model, explaining the criteria for model selection and how random effects models are applied in different empirical contexts.

Section 03 delves into econometric modeling for dynamic panel models, providing an advanced treatment of models that account for the temporal dependencies of data. The first subsection introduces dynamic models, explaining their formulation and relevance in capturing the persistence of economic behaviors over time. The second subsection outlines the conditions required for dynamic models, discussing issues like endogeneity and the importance of accounting for lagged dependent variables. The final subsection introduces the

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Generalized Method of Moments (GMM), a robust estimation technique commonly used for dynamic panel models, and elaborates on its application in dealing with endogeneity and autocorrelation.

The fourth chapter provides an empirical analysis of the determinants of payout policy in Algeria, focusing on the specific factors that influence dividend distribution in the context of the country's economic and regulatory environment. Chapter 4 seeks to uncover the key drivers of dividend behavior among firms in Algeria, examining how legal frameworks, taxation, and market conditions shape corporate payout decisions. It emphasizes the role of local regulations and policies in determining how firms approach dividend distribution, share repurchases, and capital gains.

The first section offers a detailed examination of the legal and tax framework of dividend distribution in Algeria, outlining the regulatory structures that govern corporate payout policies. The first subsection explores dividend payment practices in Algeria, providing insights into how local firms determine dividend levels, the frequency of payments, and the overall approach to shareholder returns. The second subsection focuses on the relationship between dividends and capital gains in Algeria, comparing the taxation policies applied to both types of shareholder returns. Finally, the third subsection addresses the regulation of dividend distribution and the transfer of shares and equity stakes in Algeria.

The second section presents a comparative analysis of payout policy in Algeria, focusing on the structure and distribution of dividends across different sectors. A comparative analysis of dividend policy across sectors reveals notable differences in payout patterns, emphasizing the influence of industry-specific characteristics. The variations highlight the interplay between the sectors dynamics and corporate strategies in shaping dividend behavior. Furthermore, the last section provides both theoretical insights and empirical observations to enhance understanding of how payout policies vary within the Algerian market. Based on the primary results, we note the significant role played by several financial and macroeconomic factors in shaping the payout policies of private firms in Algeria. Our study confirms the presence of these determinants across various sectors. Therefore, strengthening the understanding and application of these payout determinants is crucial for Algerian firms to effectively manage their dividend policies and ensure long-term financial stability.

Profitability, liquidity, firm size, and growth emerge as essential determinants of payout policy in the 89 firms analyzed. Additionally, Algeria's Gross Domestic Product (GDP) growth positively impacts dividend payments. However, we observe that dividend payouts tend to decrease as the size and growth of the firm increases, highlighting that large and growing firms prefer to reinvest rather than paying dividends.

To address these findings, we conclude there is a strong positive relationship between earnings and dividends, indicating that Algerian firms adjust their payouts based on current financial performance. This dynamic reflects a flexible dividend policy that responds quickly to profitability changes. In sectors like retail and services, the volatile nature of earnings means that companies do not prioritize maintaining stable dividend patterns over time, leading to fluctuating payout levels. Therefore, firms in these sectors should tailor their payout strategies to be more adaptive to financial performance, while maintaining investor confidence.

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Although past dividends play a critical role in shaping current decisions in sectors like agribusiness and manufacturing, the retail and services sector shows a lower degree of smoothing. This suggests that firms in the latter industry may focus more on current profitability and less on maintaining stable year-over-year payouts. The varying patterns of dividend payouts across sectors highlight the significant role that industry characteristics play in influencing dividend decisions. The manufacturing sector demonstrates stability and predictability in its payout patterns, with earnings and past dividends being significant predictors. In contrast, the retail and services sector tends to exhibit more flexibility. Firms in these industries should ensure that their payout policies reflect both sector characteristics and broader economic trends.

The positive impact of GDP growth on dividend payouts indicates that firms respond to the broader economic environment when determining their payout policies. As Algeria's economy expands, firms are more likely to distribute dividends, reflecting increased confidence in the stability of their financial performance. Our findings indicate that growth and firm size also play important roles in determining payout policies. Notably, larger firms tend to retain more earnings, resulting in lower dividend payouts. This pattern reflects a cautious approach to capital management, possibly driven by greater reinvestment needs. Firms must strike a balance between reinvesting for growth and maintaining sufficient dividend payouts to satisfy investor expectations.

Hypothesis Evaluation:

- **H1:** The results provide strong support for the applicability of the Lintner model in the Algerian context. The empirical evidence confirms that firms exhibit dividend smoothing behavior, as past dividends are found to be a significant determinant of current dividend payouts in most sectors. In particular, manufacturing and agribusiness firms show a strong tendency to adjust dividends gradually toward a target payout ratio, reflecting stability-oriented dividend policies. However, in the retail and services sector, this smoothing behavior is less pronounced, indicating a more flexible and earnings-driven approach to dividend decisions. Overall, H1 is accepted, as Algerian firms, on average, demonstrate adjustment toward a target dividend policy consistent with Lintner's framework.
- **H2:** The hypothesis that industry characteristics significantly influence dividend payouts is fully supported. The findings reveal clear sector differences in dividend behavior across manufacturing, agribusiness, and retail & services. Manufacturing firms tend to adopt more stable and conservative payout policies, agribusiness firms exhibit moderate stability with some volatility, while retail & services firms show more flexible and responsive dividend policies. These patterns confirm that sector-specific characteristics play a decisive role in shaping payout behavior in the Algerian economy.
- **H3:** The empirical results confirm that the Retail & Services sector records the highest average dividend ratio, followed by the Agribusiness sector, while the Manufacturing sector ranks last in terms of dividend generosity. This ordering is consistent with observed sector differences in financial structure and payout behavior. Therefore, H3 is accepted, as the evidence clearly supports the proposed ranking of dividend distribution intensity across sectors in Algeria.
- **H4:** The results strongly support the hypothesis that dividend policy in Algerian firms is driven by multiple determinants, including profitability, liquidity, firm size, growth

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opportunities, and macroeconomic conditions such as GDP growth. Profitability and liquidity emerge as significant positive determinants of dividend payouts, while firm size shows a negative effect. Growth and GDP growth exhibit positive but weaker or mixed effects depending on the specification. Overall, H4 is accepted, confirming that dividend policy is shaped by a combination of firm-specific and macroeconomic factors, with profitability playing a central role.

Key Findings and Recommendations:

In Algeria, the determinants of dividend policy, including profitability, liquidity, firm size, growth, and GDP growth, were identified as the main influencing factors in the sample of 88 firms. Additionally, it is notable that GDP growth has a positive impact on dividend payments, reflecting the broader influence of the economic environment on corporate financial decisions. However, the analysis reveals a negative correlation between firm the size with dividends, suggesting that larger firms while more profitable, tend to distribute fewer dividends, potentially due to higher reinvestment needs or sector-specific growth strategies.

Recommendations for improving payout policy in Algerian firms include several strategic actions that companies and policymakers should consider to enhance the alignment of dividend policies with financial performance:

- The results emphasize the importance of profitability as a key determinant of dividend payouts. The strong positive relationship between earnings and dividends suggests that Algerian firms adjust their dividend payouts in response to changes in financial performance. In particular, sectors like retail and services show a more flexible approach to dividends, where payouts fluctuate more with company performance rather than remaining stable year-over-year. This volatility could be explained by the rapid changes in consumer behavior and economic conditions that characterize these sectors. Thus, firms should tailor their payout strategies to be more responsive to profitability, while still maintaining a level of predictability to support long-term investor confidence.
- In line with Lintner's model, the findings indicate that Algerian firms approximately adhere to a target payout ratio of 76%, with a moderate speed of adjustment (0.385). This suggests that firms strive to align their payouts with a target ratio, albeit at a measured pace that balances responsiveness to profitability with the need for payout stability. The manufacturing sector demonstrates a strong adherence to this model, with past dividend payments playing a significant role in current decisions. Firms in the agribusiness sector exhibit similar patterns, where past dividends influence current payouts, reinforcing stability. In contrast, the retail and services sector shows less reliance on past dividends, indicating that firms in this sector place a higher emphasis on current earnings when determining payouts. This divergence suggests that Algerian firms, particularly in volatile sectors, may benefit from refining their dividend smoothing strategies to better balance investor expectations and financial performance.
- The analysis of sectors highlights distinct payout patterns across the retail, agribusiness, and manufacturing sectors, underlining the significant role that industry characteristics play in shaping payout policies. The manufacturing sector shows the most stable and predictable payout patterns, with a strong reliance on both earnings and past dividend payments. Firms in this sector consistently adjust their payouts in

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line with profitability, suggesting that stability and long-term planning are key factors. The agribusiness sector, while more volatile, also shows a strong relationship between earnings and dividends, further emphasizing the importance of financial performance. Conversely, the retail and services sector tends to exhibit more flexible payout behavior, where dividend decisions are more closely tied to current earnings and less influenced by past patterns. This sector's lower dividend ratios reflect the rapidly changing consumer dynamics and economic conditions that define it, suggesting that firms must adopt more adaptive payout strategies to remain competitive in this environment.

Algerian firms face a complex set of challenges when determining their payout policies. The findings of this study emphasize the importance of profitability, liquidity, firm size, and industry-specific factors in shaping these policies. While sectors such as manufacturing and agribusiness demonstrate stability in their dividend strategies, the retail and services sector shows greater flexibility and responsiveness to short-term profitability. By understanding and addressing these determinants, Algerian firms can optimize their payout policies to enhance financial performance, support investor confidence, and contribute to the overall economic growth of the country.

Due to the difficulties we encountered during data collection, we recommend to strengthen transparency and disclosure by firms, which often make access to various data and financial statements information difficult or even impossible, claiming confidentiality. However, such information, which pertains to balance sheet, off-balance sheet, etc. is general in nature and in no way infringes on professional secrecy that must be respected. Therefore, we urge these firms to publish such information on their websites or in specialized periodic journals, making it accessible to the general public and, consequently, increasing the transparency. For future research, we propose a deeper exploration of sector analysis in dividend policy by expanding the sample size of each sector in terms of the number of companies. This approach would provide a broader and more comprehensive perspective on each sector.

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ANNEXES

ANNEXES

ANNEX N 1 : Sample data														
ID	Firm	year	DIV	L1DIV	ROA	LIQ	SIZE	WCR	LMD	SD	INV	GROW	Growth GDP	INF
1	SARL AGRO ALIMENTAIRE IZDIHAR	2010	0,39	0,26	0,08	0,04	21,31	0,04	0,28	0,53	1,66	-0,41	3,60	0,04
1	SARL AGRO ALIMENTAIRE IZDIHAR	2011	0,66	0,39	0,05	0,01	21,56	0,59	0,21	0,61	0,00	0,28	2,90	0,05
1	SARL AGRO ALIMENTAIRE IZDIHAR	2012	0,08	0,66	0,08	0,00	21,27	0,70	0,13	0,61	0,00	-0,25	3,40	0,09
1	SARL AGRO ALIMENTAIRE IZDIHAR	2013	1,93	0,08	0,08	0,11	21,30	0,57	0,05	0,62	0,01	0,03	2,80	0,03
1	SARL AGRO ALIMENTAIRE IZDIHAR	2014	0,78	1,93	0,07	0,06	21,56	0,75	0,09	0,72	0,00	0,30	3,80	0,03
1	SARL AGRO ALIMENTAIRE IZDIHAR	2015	0,67	0,78	0,07	0,00	21,52	0,68	0,07	0,71	0,07	-0,04	3,70	0,05
1	SARL AGRO ALIMENTAIRE IZDIHAR	2016	0,55	0,67	0,08	0,01	21,59	0,75	0,05	0,71	0,01	0,07	3,20	0,06
1	SARL AGRO ALIMENTAIRE IZDIHAR	2017	0,60	0,55	0,07	0,01	21,61	0,70	0,03	0,71	0,17	0,02	1,30	0,06
1	SARL AGRO ALIMENTAIRE IZDIHAR	2018	0,42	0,60	0,08	0,01	21,83	0,63	0,01	0,73	0,01	0,25	1,20	0,04
1	SARL AGRO ALIMENTAIRE IZDIHAR	2019	0,43	0,42	0,06	0,00	22,09	0,66	0,00	0,77	0,10	0,30	1,00	0,02
1	SARL AGRO ALIMENTAIRE IZDIHAR	2020	0,70	0,43	0,12	0,00	21,61	0,64	0,00	0,55	-0,04	-0,38	-5,10	0,02
2	SARL AGRO DEEL	2010	1,00	1,25	0,02	0,04	20,67	0,17	0,15	0,32	0,38	0,67	3,60	0,04
2	SARL AGRO DEEL	2011	0,65	1,00	0,03	0,02	20,73	0,24	0,16	0,33	0,14	0,06	2,90	0,05
2	SARL AGRO DEEL	2012	0,21	0,65	0,06	0,01	20,83	0,21	0,18	0,32	0,16	0,11	3,40	0,09
2	SARL AGRO DEEL	2013	0,16	0,21	0,08	0,01	20,93	0,15	0,12	0,35	0,12	0,11	2,80	0,03
2	SARL AGRO DEEL	2014	0,13	0,16	0,09	0,01	21,12	0,21	0,10	0,39	0,05	0,21	3,80	0,03
2	SARL AGRO DEEL	2015	1,00	0,13	0,01	0,04	21,19	0,15	0,07	0,45	0,04	0,07	3,70	0,05
2	SARL AGRO DEEL	2016	0,16	1,00	0,06	0,00	21,36	0,21	0,07	0,47	0,06	0,19	3,20	0,06
2	SARL AGRO DEEL	2017	0,10	0,16	0,05	0,02	21,35	0,27	0,06	0,45	-0,06	-0,01	1,30	0,06
2	SARL AGRO DEEL	2018	0,15	0,10	0,06	0,01	21,43	0,31	0,04	0,45	0,01	0,08	1,20	0,04
2	SARL AGRO DEEL	2019	0,10	0,15	0,06	0,00	21,56	0,36	0,04	0,45	0,00	0,14	1,00	0,02
2	SARL AGRO DEEL	2020	0,08	0,10	0,03	0,05	21,56	0,29	0,01	0,46	0,02	0,00	-5,10	0,02
3	SARL BATICERAM	2010	0,00	0,00	0,01	0,02	21,13	0,10	0,33	0,01	0,32	0,60	3,60	0,04
3	SARL BATICERAM	2011	0,00	0,00	0,02	0,02	21,21	0,03	0,27	0,11	0,06	0,08	2,90	0,05
3	SARL BATICERAM	2012	0,00	0,00	0,07	0,04	21,16	0,00	0,14	0,14	-0,01	-0,05	3,40	0,09
3	SARL BATICERAM	2013	0,00	0,00	0,07	0,02	21,36	0,07	0,17	0,17	0,12	0,22	2,80	0,03

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3	SARL BATICERAM	2014	0,00	0,00	0,07	0,03	21,36	0,13	0,12	0,15	0,02	0,00	3,80	0,03
3	SARL BATICERAM	2015	0,00	0,00	-0,03	0,03	21,32	0,15	0,16	0,11	0,05	-0,04	3,70	0,05
3	SARL BATICERAM	2016	0,00	0,00	0,05	0,01	21,33	0,23	0,12	0,11	0,00	0,01	3,20	0,06
3	SARL BATICERAM	2017	0,00	0,00	0,03	0,02	21,42	0,26	0,15	0,11	0,09	0,09	1,30	0,06
3	SARL BATICERAM	2018	0,00	0,00	0,03	0,00	21,50	0,17	0,16	0,13	0,10	0,08	1,20	0,04
3	SARL BATICERAM	2019	0,00	0,00	0,02	0,00	21,51	0,17	0,15	0,14	0,03	0,01	1,00	0,02
3	SARL BATICERAM	2020	0,00	0,00	0,00	0,05	21,58	0,25	0,13	0,21	0,01	0,07	-5,10	0,02
4	SARL CAPSU PLAST	2010	0,05	0,11	0,08	0,04	20,11	0,10	0,17	0,66	-0,98	-0,98	3,60	0,04
4	SARL CAPSU PLAST	2011	0,32	0,05	0,23	0,22	19,95	0,19	0,20	0,38	-0,39	-0,15	2,90	0,05
4	SARL CAPSU PLAST	2012	0,24	0,32	0,15	0,14	20,39	0,16	0,14	0,48	0,76	0,55	3,40	0,09
4	SARL CAPSU PLAST	2013	0,21	0,24	0,10	0,11	20,58	0,04	0,31	0,31	0,30	0,21	2,80	0,03
4	SARL CAPSU PLAST	2014	0,08	0,21	0,07	0,07	20,56	0,13	0,28	0,29	-0,06	-0,02	3,80	0,03
4	SARL CAPSU PLAST	2015	0,04	0,08	0,04	0,03	20,04	0,05	0,10	0,14	-0,10	-0,41	3,70	0,05
4	SARL CAPSU PLAST	2016	0,06	0,04	0,04	0,05	20,91	0,14	0,13	0,51	0,62	1,39	3,20	0,06
4	SARL CAPSU PLAST	2017	0,09	0,06	0,09	0,08	20,55	0,28	0,12	0,27	-0,36	-0,30	1,30	0,06
4	SARL CAPSU PLAST	2018	0,04	0,09	0,03	0,03	20,72	0,23	0,08	0,38	0,31	0,19	1,20	0,04
4	SARL CAPSU PLAST	2019	0,10	0,04	0,09	0,09	20,73	0,15	0,03	0,19	-0,07	0,01	1,00	0,02
4	SARL CAPSU PLAST	2020	0,02	0,10	0,01	0,01	20,60	0,14	0,00	0,10	-0,07	-0,12	-5,10	0,02
5	SARL CERAL	2010	0,00	0,00	0,00	0,02	20,98	0,13	0,22	0,19	0,53	1,92	3,60	0,04
5	SARL CERAL	2011	0,00	0,00	0,03	0,04	20,96	0,10	0,19	0,17	0,05	-0,02	2,90	0,05
5	SARL CERAL	2012	0,00	0,00	0,02	0,02	21,05	0,13	0,24	0,15	0,12	0,09	3,40	0,09
5	SARL CERAL	2013	0,00	0,00	0,03	0,03	21,02	0,19	0,20	0,15	0,00	-0,03	2,80	0,03
5	SARL CERAL	2014	0,00	0,00	0,04	0,03	21,01	0,21	0,17	0,13	0,03	-0,01	3,80	0,03
5	SARL CERAL	2015	0,00	0,00	0,02	0,06	21,03	0,19	0,14	0,16	0,07	0,02	3,70	0,05
5	SARL CERAL	2016	0,00	0,00	0,02	0,04	21,07	0,22	0,12	0,18	0,03	0,04	3,20	0,06
5	SARL CERAL	2017	0,00	0,00	0,02	0,05	21,14	0,21	0,16	0,17	0,07	0,07	1,30	0,06
5	SARL CERAL	2018	0,00	0,00	0,03	0,04	21,13	0,19	0,15	0,14	0,03	-0,01	1,20	0,04
5	SARL CERAL	2019	0,00	0,00	0,02	0,04	21,20	0,19	0,15	0,17	0,06	0,07	1,00	0,02
5	SARL CERAL	2020	0,00	0,00	-0,02	0,06	21,19	0,19	0,16	0,17	0,00	-0,01	-5,10	0,02

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6	SARL CERAMIQUE DE BOUMERDES	2010	0,00	0,00	0,02	0,14	21,36	-0,67	0,06	0,86	0,37	1,30	3,60	0,04
6	SARL CERAMIQUE DE BOUMERDES	2011	0,00	0,00	0,03	0,19	21,43	-0,71	0,03	0,86	0,12	0,07	2,90	0,05
6	SARL CERAMIQUE DE BOUMERDES	2012	0,00	0,00	0,03	0,08	21,47	-0,65	0,01	0,86	0,17	0,04	3,40	0,09
6	SARL CERAMIQUE DE BOUMERDES	2013	0,00	0,00	0,04	0,05	21,52	-0,58	0,00	0,84	0,08	0,05	2,80	0,03
6	SARL CERAMIQUE DE BOUMERDES	2014	0,00	0,00	0,04	0,13	21,57	-0,57	0,00	0,81	0,06	0,05	3,80	0,03
6	SARL CERAMIQUE DE BOUMERDES	2015	0,00	0,00	0,07	0,14	21,75	-0,56	0,00	0,77	0,18	0,20	3,70	0,05
6	SARL CERAMIQUE DE BOUMERDES	2016	0,00	0,00	0,04	0,15	21,80	-0,49	0,00	0,74	0,06	0,05	3,20	0,06
6	SARL CERAMIQUE DE BOUMERDES	2017	0,00	0,00	0,08	0,24	21,95	-0,42	0,00	0,70	0,02	0,16	1,30	0,06
6	SARL CERAMIQUE DE BOUMERDES	2018	0,00	0,00	0,15	0,36	22,11	-0,33	0,00	0,59	0,04	0,17	1,20	0,04
6	SARL CERAMIQUE DE BOUMERDES	2019	0,00	0,00	0,09	0,11	22,25	-0,26	0,01	0,54	0,46	0,15	1,00	0,02
6	SARL CERAMIQUE DE BOUMERDES	2020	0,00	0,00	0,07	0,12	22,35	-0,05	0,03	0,29	0,13	0,11	-5,10	0,02
7	SARL CIOMAT	2010	0,00	0,00	0,02	0,24	19,17	0,04	0,10	0,32	0,32	0,28	3,60	0,04
7	SARL CIOMAT	2011	0,00	0,00	0,01	0,24	19,45	-0,11	0,34	0,22	0,72	0,32	2,90	0,05
7	SARL CIOMAT	2012	0,33	0,00	0,01	0,02	19,86	0,00	0,53	0,16	0,30	0,51	3,40	0,09
7	SARL CIOMAT	2013	0,00	0,33	0,01	0,09	19,88	0,01	0,49	0,20	0,01	0,02	2,80	0,03
7	SARL CIOMAT	2014	0,00	0,00	0,01	0,08	19,78	0,04	0,45	0,19	0,00	-0,10	3,80	0,03
7	SARL CIOMAT	2015	0,16	0,00	0,01	0,03	19,72	0,15	0,45	0,16	0,01	-0,06	3,70	0,05
7	SARL CIOMAT	2016	0,00	0,16	0,02	0,05	19,60	0,16	0,40	0,14	-0,01	-0,11	3,20	0,06
7	SARL CIOMAT	2017	0,00	0,00	0,02	0,03	19,54	0,23	0,31	0,19	-0,03	-0,06	1,30	0,06
7	SARL CIOMAT	2018	0,06	0,00	0,03	0,05	19,47	0,27	0,23	0,19	0,00	-0,07	1,20	0,04
7	SARL CIOMAT	2019	0,00	0,06	-0,01	0,03	19,51	0,38	0,23	0,23	0,00	0,04	1,00	0,02
7	SARL CIOMAT	2020	0,00	0,00	0,00	0,04	19,49	0,40	0,25	0,19	0,04	-0,02	-5,10	0,02
8	SARL CRDS	2010	0,21	0,77	0,03	0,11	21,15	0,49	0,49	0,41	0,39	1,11	3,60	0,04
8	SARL CRDS	2011	0,15	0,21	0,02	0,05	21,27	0,56	0,48	0,40	0,24	0,13	2,90	0,05
8	SARL CRDS	2012	0,10	0,15	0,01	0,00	21,42	0,65	0,52	0,37	-0,16	0,16	3,40	0,09
8	SARL CRDS	2013	0,20	0,10	0,02	0,10	21,69	0,65	0,56	0,34	0,01	0,31	2,80	0,03
8	SARL CRDS	2014	0,19	0,20	0,02	0,09	21,82	0,77	0,70	0,20	0,51	0,14	3,80	0,03
8	SARL CRDS	2015	0,11	0,19	0,01	0,01	21,98	0,85	0,80	0,11	0,18	0,17	3,70	0,05
8	SARL CRDS	2016	0,08	0,11	0,00	0,07	22,06	0,79	0,68	0,23	0,03	0,08	3,20	0,06

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8	SARL CRDS	2017	0,07	0,08	0,00	0,06	22,60	0,79	0,80	0,15	0,25	0,72	1,30	0,06
8	SARL CRDS	2018	0,06	0,07	0,04	0,05	21,61	0,47	0,21	0,61	0,02	-0,63	1,20	0,04
8	SARL CRDS	2019	0,41	0,06	0,01	0,31	21,50	0,24	0,12	0,68	0,00	-0,10	1,00	0,02
8	SARL CRDS	2020	0,20	0,41	0,00	0,10	21,57	0,45	0,11	0,70	0,00	0,07	-5,10	0,02
9	SARL DERMOUNE FRERES	2010	0,00	0,07	0,11	0,04	20,48	0,08	0,03	0,30	0,26	-0,37	3,60	0,04
9	SARL DERMOUNE FRERES	2011	0,03	0,00	0,11	0,04	20,64	0,15	0,00	0,32	0,00	0,17	2,90	0,05
9	SARL DERMOUNE FRERES	2012	0,01	0,03	0,15	0,22	20,81	0,10	0,00	0,27	0,04	0,19	3,40	0,09
9	SARL DERMOUNE FRERES	2013	0,01	0,01	0,17	0,19	21,02	0,24	0,00	0,25	-0,13	0,23	2,80	0,03
9	SARL DERMOUNE FRERES	2014	0,01	0,01	0,21	0,29	21,25	0,27	0,00	0,19	1,45	0,26	3,80	0,03
9	SARL DERMOUNE FRERES	2015	0,00	0,01	0,19	0,23	21,42	0,42	0,00	0,13	-0,44	0,19	3,70	0,05
9	SARL DERMOUNE FRERES	2016	0,15	0,00	0,18	0,48	21,65	0,20	0,00	0,13	0,08	0,26	3,20	0,06
9	SARL DERMOUNE FRERES	2017	0,00	0,15	0,15	0,35	21,80	0,16	0,00	0,12	0,84	0,16	1,30	0,06
9	SARL DERMOUNE FRERES	2018	0,00	0,00	0,11	0,31	21,89	0,28	0,00	0,09	0,01	0,09	1,20	0,04
9	SARL DERMOUNE FRERES	2019	0,00	0,00	0,11	0,36	22,03	0,24	0,00	0,10	0,10	0,15	1,00	0,02
9	SARL DERMOUNE FRERES	2020	0,00	0,00	0,06	0,18	22,18	0,36	0,00	0,11	0,29	0,16	-5,10	0,02
10	SARL EL GUEDRA	2010	0,23	0,22	0,02	0,14	21,72	0,52	0,00	0,72	1,46	-0,62	3,60	0,04
10	SARL EL GUEDRA	2011	0,22	0,23	0,01	0,08	21,82	0,68	0,02	0,71	0,06	0,11	2,90	0,05
10	SARL EL GUEDRA	2012	0,17	0,22	0,01	0,13	22,15	0,67	0,01	0,78	0,04	0,39	3,40	0,09
10	SARL EL GUEDRA	2013	0,20	0,17	0,01	0,12	22,18	0,54	0,01	0,77	0,27	0,03	2,80	0,03
10	SARL EL GUEDRA	2014	0,25	0,20	0,01	0,10	22,24	0,64	0,02	0,77	0,01	0,06	3,80	0,03
10	SARL EL GUEDRA	2015	0,24	0,25	0,01	0,07	22,36	0,57	0,01	0,79	0,00	0,13	3,70	0,05
10	SARL EL GUEDRA	2016	0,41	0,24	0,02	0,01	22,19	0,54	0,02	0,73	0,16	-0,16	3,20	0,06
10	SARL EL GUEDRA	2017	0,20	0,41	0,01	0,14	22,55	0,35	0,01	0,81	0,08	0,43	1,30	0,06
10	SARL EL GUEDRA	2018	0,17	0,20	0,01	0,03	22,57	0,41	0,01	0,81	0,00	0,02	1,20	0,04
10	SARL EL GUEDRA	2019	0,13	0,17	0,01	0,04	22,48	0,38	0,00	0,80	0,06	-0,09	1,00	0,02
10	SARL EL GUEDRA	2020	0,03	0,13	0,00	0,05	22,56	0,31	0,00	0,81	0,06	0,08	-5,10	0,02
11	SARL ERGOSOTS	2010	0,00	0,00	0,04	0,11	21,11	0,13	0,02	0,76	0,81	0,71	3,60	0,04
11	SARL ERGOSOTS	2011	0,00	0,00	0,03	0,05	21,35	0,21	0,02	0,78	0,23	0,27	2,90	0,05
11	SARL ERGOSOTS	2012	0,00	0,00	0,01	0,03	21,53	0,25	0,01	0,80	-0,18	0,20	3,40	0,09
11	SARL ERGOSOTS	2013	0,00	0,00	0,01	0,06	21,77	0,22	0,00	0,80	0,47	0,27	2,80	0,03
11	SARL ERGOSOTS	2014	0,00	0,00	0,00	0,04	22,03	0,16	0,00	0,84	-0,03	0,30	3,80	0,03
11	SARL ERGOSOTS	2015	0,00	0,00	0,02	0,04	22,08	0,13	0,00	0,83	0,04	0,05	3,70	0,05

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11	SARL ERGOSOTS	2016	0,00	0,00	0,00	0,06	22,03	0,18	0,05	0,76	0,02	-0,05	3,20	0,06
11	SARL ERGOSOTS	2017	0,00	0,00	0,00	0,07	21,73	0,40	0,03	0,70	0,36	-0,26	1,30	0,06
11	SARL ERGOSOTS	2018	0,00	0,00	-0,05	0,00	21,73	0,56	0,05	0,71	-0,06	0,00	1,20	0,04
11	SARL ERGOSOTS	2019	0,00	0,00	-0,01	0,00	21,77	0,50	0,07	0,71	-0,01	0,04	1,00	0,02
11	SARL ERGOSOTS	2020	0,00	0,00	-0,05	0,00	21,75	0,49	0,09	0,73	-0,01	-0,02	-5,10	0,02
12	SARL FADERCO	2010	0,00	0,00	0,02	0,07	21,75	-0,12	0,11	0,29	0,30	0,43	3,60	0,04
12	SARL FADERCO	2011	0,00	0,00	0,05	0,11	21,99	-0,07	0,24	0,23	0,03	0,27	2,90	0,05
12	SARL FADERCO	2012	0,01	0,00	0,04	0,04	22,32	0,01	0,37	0,18	1,57	0,39	3,40	0,09
12	SARL FADERCO	2013	0,00	0,01	0,04	0,08	22,43	0,03	0,38	0,15	0,25	0,12	2,80	0,03
12	SARL FADERCO	2014	0,00	0,00	0,04	0,06	22,96	-0,07	0,43	0,22	-0,15	0,70	3,80	0,03
12	SARL FADERCO	2015	0,00	0,00	0,04	0,07	23,09	-0,03	0,48	0,16	0,16	0,14	3,70	0,05
12	SARL FADERCO	2016	0,58	0,00	0,05	0,04	23,22	0,01	0,45	0,19	0,11	0,14	3,20	0,06
12	SARL FADERCO	2017	0,00	0,58	0,05	0,04	23,43	-0,08	0,38	0,29	0,14	0,23	1,30	0,06
12	SARL FADERCO	2018	0,00	0,00	0,05	0,02	23,40	-0,01	0,35	0,25	0,09	-0,03	1,20	0,04
12	SARL FADERCO	2019	0,73	0,00	0,07	0,03	23,63	-0,04	0,25	0,33	0,16	0,26	1,00	0,02
12	SARL FADERCO	2020	0,75	0,73	0,11	0,04	23,40	0,00	0,26	0,18	0,09	-0,21	-5,10	0,02
13	SARL FAIENCERIE ALGERIENNE	2010	0,00	0,00	0,02	0,02	22,24	0,26	0,03	0,09	0,18	0,43	3,60	0,04
13	SARL FAIENCERIE ALGERIENNE	2011	0,00	0,00	0,11	0,02	22,36	0,26	0,02	0,09	0,07	0,13	2,90	0,05
13	SARL FAIENCERIE ALGERIENNE	2012	0,00	0,00	0,07	0,02	22,44	0,29	0,03	0,07	0,09	0,08	3,40	0,09
13	SARL FAIENCERIE ALGERIENNE	2013	0,00	0,00	0,09	0,05	22,61	0,23	0,03	0,12	0,13	0,19	2,80	0,03
13	SARL FAIENCERIE ALGERIENNE	2014	0,00	0,00	0,11	0,02	22,79	0,18	0,10	0,09	0,24	0,20	3,80	0,03
13	SARL FAIENCERIE ALGERIENNE	2015	0,00	0,00	0,11	0,04	23,06	0,11	0,15	0,11	0,25	0,31	3,70	0,05
13	SARL FAIENCERIE ALGERIENNE	2016	0,00	0,00	0,12	0,04	23,17	0,14	0,13	0,09	0,11	0,12	3,20	0,06
13	SARL FAIENCERIE ALGERIENNE	2017	0,00	0,00	0,07	0,08	23,28	0,09	0,08	0,16	0,07	0,12	1,30	0,06
13	SARL FAIENCERIE ALGERIENNE	2018	0,00	0,00	0,09	0,16	23,41	0,05	0,05	0,19	0,08	0,14	1,20	0,04
13	SARL FAIENCERIE ALGERIENNE	2019	0,00	0,00	0,10	0,10	23,45	0,21	0,01	0,07	0,08	0,04	1,00	0,02
13	SARL FAIENCERIE ALGERIENNE	2020	0,00	0,00	0,00	0,02	23,44	0,33	0,01	0,06	0,03	-0,01	-5,10	0,02
14	SARL FAMILI SHOP HYPERMARCHE	2010	0,96	0,56	0,12	0,01	19,98	0,10	0,11	0,55	0,45	-0,70	3,60	0,04
14	SARL FAMILI SHOP HYPERMARCHE	2011	0,05	0,96	0,15	0,01	20,23	0,11	0,13	0,51	0,49	0,28	2,90	0,05
14	SARL FAMILI SHOP HYPERMARCHE	2012	1,55	0,05	0,13	0,04	20,38	0,18	0,10	0,47	0,12	0,16	3,40	0,09
14	SARL FAMILI SHOP HYPERMARCHE	2013	0,00	1,55	0,19	0,02	20,32	0,05	0,06	0,50	0,04	-0,06	2,80	0,03
14	SARL FAMILI SHOP HYPERMARCHE	2014	0,00	0,00	0,19	0,04	20,45	0,16	0,02	0,41	0,35	0,14	3,80	0,03
14	SARL FAMILI SHOP HYPERMARCHE	2015	0,00	0,00	0,09	0,20	21,41	-0,42	0,13	0,56	2,13	1,61	3,70	0,05

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14	SARL FAMILI SHOP HYPERMARCHE	2016	0,00	0,00	0,05	0,03	21,82	-0,41	0,12	0,63	1,08	0,51	3,20	0,06
14	SARL FAMILI SHOP HYPERMARCHE	2017	0,00	0,00	0,07	0,04	21,86	-0,23	0,20	0,48	0,18	0,04	1,30	0,06
14	SARL FAMILI SHOP HYPERMARCHE	2018	0,00	0,00	0,02	0,03	22,17	-0,38	0,18	0,56	0,16	0,36	1,20	0,04
14	SARL FAMILI SHOP HYPERMARCHE	2019	0,00	0,00	-0,02	0,01	22,32	-0,54	0,11	0,65	0,25	0,16	1,00	0,02
14	SARL FAMILI SHOP HYPERMARCHE	2020	0,00	0,00	-0,09	0,01	22,17	-0,68	0,05	0,75	0,00	-0,14	-5,10	0,02
15	SARL GALVA TUBES	2010	0,00	0,00	0,04	0,05	21,98	0,01	0,16	0,41	0,74	1,69	3,60	0,04
15	SARL GALVA TUBES	2011	0,00	0,00	0,01	0,01	22,17	0,14	0,04	0,60	0,00	0,21	2,90	0,05
15	SARL GALVA TUBES	2012	0,00	0,00	0,01	0,18	22,35	-0,16	0,09	0,60	0,03	0,20	3,40	0,09
15	SARL GALVA TUBES	2013	0,00	0,00	0,01	0,01	22,51	0,10	0,04	0,69	0,02	0,17	2,80	0,03
15	SARL GALVA TUBES	2014	0,00	0,00	0,01	0,02	22,42	0,03	0,04	0,66	0,01	-0,09	3,80	0,03
15	SARL GALVA TUBES	2015	0,00	0,00	0,01	0,17	22,33	-0,15	0,00	0,66	0,01	-0,09	3,70	0,05
15	SARL GALVA TUBES	2016	0,00	0,00	0,01	0,27	22,19	-0,20	0,00	0,59	0,01	-0,13	3,20	0,06
15	SARL GALVA TUBES	2017	0,00	0,00	0,01	0,07	22,13	0,11	0,00	0,56	0,01	-0,06	1,30	0,06
15	SARL GALVA TUBES	2018	0,00	0,00	0,02	0,19	21,85	0,05	0,00	0,39	0,00	-0,24	1,20	0,04
15	SARL GALVA TUBES	2019	0,00	0,00	0,01	0,08	22,01	0,17	0,00	0,47	0,00	0,17	1,00	0,02
15	SARL GALVA TUBES	2020	0,00	0,00	0,01	0,14	22,06	0,14	0,00	0,49	0,00	0,05	-5,10	0,02
16	SARL HYDRABEL	2010	0,08	0,15	0,31	0,07	20,64	0,51	0,00	0,35	0,96	-0,22	3,60	0,04
16	SARL HYDRABEL	2011	0,33	0,08	0,25	0,23	20,85	0,26	0,00	0,24	1,38	0,23	2,90	0,05
16	SARL HYDRABEL	2012	0,37	0,33	0,25	0,27	20,85	0,34	0,00	0,08	0,00	0,00	3,40	0,09
16	SARL HYDRABEL	2013	0,34	0,37	0,20	0,24	21,29	0,48	0,00	0,26	-0,55	0,55	2,80	0,03
16	SARL HYDRABEL	2014	0,14	0,34	0,11	0,04	21,46	0,49	0,00	0,33	1,79	0,19	3,80	0,03
16	SARL HYDRABEL	2015	0,02	0,14	0,21	0,01	21,67	0,63	0,00	0,26	0,13	0,23	3,70	0,05
16	SARL HYDRABEL	2016	0,05	0,02	0,13	0,04	21,91	0,62	0,03	0,23	-0,04	0,27	3,20	0,06
16	SARL HYDRABEL	2017	0,18	0,05	0,03	0,08	21,84	0,65	0,04	0,15	0,05	-0,07	1,30	0,06
16	SARL HYDRABEL	2018	0,21	0,18	0,04	0,11	21,85	0,66	0,04	0,13	0,02	0,01	1,20	0,04
16	SARL HYDRABEL	2019	0,18	0,21	0,05	0,08	21,91	0,74	0,02	0,15	-0,14	0,06	1,00	0,02
16	SARL HYDRABEL	2020	0,21	0,18	0,03	0,11	21,77	0,78	0,02	0,01	0,05	-0,13	-5,10	0,02
17	SARL LES MOULINS AMOR BENAMOR	2010	0,00	0,00	0,09	0,33	22,23	-0,39	0,01	0,73	0,30	1,13	3,60	0,04

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17	SARL LES MOULINS AMOR BENAMOR	2011	0,00	0,00	0,04	0,00	22,51	-0,24	0,13	0,63	0,53	0,32	2,90	0,05
17	SARL LES MOULINS AMOR BENAMOR	2012	0,00	0,00	0,02	0,05	22,94	-0,20	0,07	0,75	0,21	0,54	3,40	0,09
17	SARL LES MOULINS AMOR BENAMOR	2013	0,49	0,00	0,03	0,12	23,16	-0,33	0,00	0,83	0,12	0,25	2,80	0,03
17	SARL LES MOULINS AMOR BENAMOR	2014	0,00	0,49	0,01	0,08	23,17	-0,32	0,00	0,83	0,13	0,01	3,80	0,03
17	SARL LES MOULINS AMOR BENAMOR	2015	0,00	0,00	0,01	0,01	23,26	-0,02	0,14	0,69	0,32	0,09	3,70	0,05
17	SARL LES MOULINS AMOR BENAMOR	2016	1,16	0,00	0,01	0,00	23,31	0,05	0,18	0,65	0,16	0,05	3,20	0,06
17	SARL LES MOULINS AMOR BENAMOR	2017	0,00	1,16	0,01	0,01	23,22	-0,10	0,21	0,61	0,06	-0,09	1,30	0,06
17	SARL LES MOULINS AMOR BENAMOR	2018	0,00	0,00	0,02	0,05	23,39	-0,15	0,18	0,65	0,02	0,19	1,20	0,04
17	SARL LES MOULINS AMOR BENAMOR	2019	0,00	0,00	0,03	0,03	23,30	-0,25	0,20	0,59	0,09	-0,09	1,00	0,02
17	SARL LES MOULINS AMOR BENAMOR	2020	0,00	0,00	0,01	0,21	23,24	-0,41	0,19	0,57	-0,01	-0,06	-5,10	0,02
18	SARL LITERIE MAGHREBINE LIT.MAG	2010	0,00	0,00	0,00	0,01	20,46	-0,09	0,41	0,54	0,23	0,43	3,60	0,04
18	SARL LITERIE MAGHREBINE LIT.MAG	2011	0,00	0,00	0,02	0,00	20,55	-0,01	0,32	0,61	0,02	0,09	2,90	0,05
18	SARL LITERIE MAGHREBINE LIT.MAG	2012	0,00	0,00	0,01	0,01	20,52	0,06	0,36	0,55	0,03	-0,03	3,40	0,09
18	SARL LITERIE MAGHREBINE LIT.MAG	2013	0,00	0,00	0,01	0,04	20,27	0,17	0,27	0,61	-0,25	-0,22	2,80	0,03
18	SARL LITERIE MAGHREBINE LIT.MAG	2014	0,00	0,00	0,02	0,06	20,00	0,23	0,00	0,82	-0,53	-0,24	3,80	0,03
18	SARL LITERIE MAGHREBINE LIT.MAG	2015	0,00	0,00	0,02	0,05	20,07	0,24	0,00	0,81	0,08	0,07	3,70	0,05
18	SARL LITERIE MAGHREBINE LIT.MAG	2016	0,00	0,00	0,01	0,04	20,22	0,43	0,00	0,82	0,03	0,16	3,20	0,06
18	SARL LITERIE MAGHREBINE LIT.MAG	2017	0,00	0,00	0,01	0,04	20,13	0,39	0,03	0,77	-0,05	-0,09	1,30	0,06
18	SARL LITERIE MAGHREBINE LIT.MAG	2018	0,00	0,00	0,01	0,05	20,08	0,38	0,00	0,78	-0,02	-0,05	1,20	0,04
18	SARL LITERIE MAGHREBINE LIT.MAG	2019	0,00	0,00	0,00	0,09	20,25	0,39	0,07	0,75	0,01	0,19	1,00	0,02
18	SARL LITERIE MAGHREBINE LIT.MAG	2020	0,00	0,00	0,00	0,07	20,48	0,53	0,05	0,80	0,04	0,26	-5,10	0,02
19	SARL MAGHREB PIPE INDUSTRIE	2010	1,07	0,23	0,00	0,00	21,99	0,10	0,79	0,08	0,06	0,43	3,60	0,04
19	SARL MAGHREB PIPE INDUSTRIE	2011	0,00	1,07	0,03	0,01	22,03	0,13	0,80	0,04	0,00	0,04	2,90	0,05
19	SARL MAGHREB PIPE INDUSTRIE	2012	1,13	0,00	0,00	0,01	22,20	0,09	0,73	0,14	0,25	0,19	3,40	0,09
19	SARL MAGHREB PIPE INDUSTRIE	2013	0,11	1,13	0,02	0,00	22,52	0,00	0,50	0,38	0,22	0,38	2,80	0,03
19	SARL MAGHREB PIPE INDUSTRIE	2014	0,24	0,11	0,01	0,00	22,64	-0,01	0,38	0,51	0,02	0,13	3,80	0,03
19	SARL MAGHREB PIPE INDUSTRIE	2015	0,16	0,24	0,01	0,00	22,75	0,06	0,37	0,53	0,16	0,12	3,70	0,05
19	SARL MAGHREB PIPE INDUSTRIE	2016	0,52	0,16	0,00	0,00	22,90	0,04	0,46	0,45	0,14	0,16	3,20	0,06

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19	SARL MAGHREB PIPE INDUSTRIE	2017	0,00	0,52	0,00	0,00	22,90	0,04	0,46	0,45	0,00	0,00	1,30	0,06
19	SARL MAGHREB PIPE INDUSTRIE	2018	0,17	0,00	0,01	0,00	23,08	-0,06	0,47	0,45	0,28	0,20	1,20	0,04
19	SARL MAGHREB PIPE INDUSTRIE	2019	0,15	0,17	0,01	0,00	23,05	-0,02	0,44	0,46	0,00	-0,03	1,00	0,02
19	SARL MAGHREB PIPE INDUSTRIE	2020	0,00	0,15	0,00	0,00	23,03	-0,03	0,73	0,17	-0,04	-0,02	-5,10	0,02
20	SARL MALPACO	2010	1,00	1,00	0,12	0,18	17,90	0,14	0,00	0,12	0,20	1,00	3,60	0,04
20	SARL MALPACO	2011	1,00	1,00	0,20	0,32	17,91	0,09	0,00	0,04	0,01	0,01	2,90	0,05
20	SARL MALPACO	2012	1,00	1,00	0,02	0,27	17,92	-0,03	0,01	0,22	0,00	0,01	3,40	0,09
20	SARL MALPACO	2013	1,00	1,00	0,01	0,25	17,91	-0,02	0,00	0,23	0,00	-0,01	2,80	0,03
20	SARL MALPACO	2014	1,00	1,00	0,01	0,22	17,93	0,05	0,00	0,25	0,00	0,02	3,80	0,03
20	SARL MALPACO	2015	1,00	1,00	0,01	0,21	17,92	0,02	0,00	0,24	0,03	-0,01	3,70	0,05
20	SARL MALPACO	2016	1,00	1,00	0,01	0,16	17,91	0,06	0,00	0,23	0,00	-0,01	3,20	0,06
20	SARL MALPACO	2017	1,00	1,00	0,01	0,27	17,89	-0,04	0,00	0,22	0,00	-0,02	1,30	0,06
20	SARL MALPACO	2018	0,00	1,00	0,00	0,09	17,89	-0,06	0,00	0,23	0,05	0,00	1,20	0,04
20	SARL MALPACO	2019	1,00	0,00	0,05	0,10	17,94	-0,09	0,00	0,22	0,09	0,05	1,00	0,02
20	SARL MALPACO	2020	1,00	1,00	0,09	0,12	18,01	-0,08	0,00	0,23	0,02	0,07	-5,10	0,02
21	SARL MATEG	2010	0,39	0,19	0,29	0,29	20,21	0,03	0,00	0,37	0,53	-0,59	3,60	0,04
21	SARL MATEG	2011	0,30	0,39	0,20	0,20	20,32	-0,04	0,07	0,27	0,00	0,12	2,90	0,05
21	SARL MATEG	2012	0,09	0,30	0,08	0,08	20,82	-0,06	0,09	0,47	-0,01	0,65	3,40	0,09
21	SARL MATEG	2013	0,11	0,09	0,10	0,10	20,49	0,25	0,07	0,23	0,49	-0,28	2,80	0,03
21	SARL MATEG	2014	0,28	0,11	0,18	0,18	20,78	0,17	0,01	0,09	0,12	0,34	3,80	0,03
21	SARL MATEG	2015	0,22	0,28	0,22	0,12	21,22	0,00	0,01	0,22	0,60	0,55	3,70	0,05
21	SARL MATEG	2016	0,06	0,22	0,05	0,05	21,28	0,10	0,06	0,22	0,06	0,06	3,20	0,06
21	SARL MATEG	2017	0,06	0,06	0,05	0,05	21,41	0,08	0,05	0,27	0,12	0,14	1,30	0,06
21	SARL MATEG	2018	0,09	0,06	0,08	0,08	21,36	0,11	0,06	0,15	0,07	-0,05	1,20	0,04
21	SARL MATEG	2019	0,09	0,09	0,09	0,08	21,53	0,23	0,03	0,21	-0,05	0,19	1,00	0,02
21	SARL MATEG	2020	0,10	0,09	0,09	0,09	21,64	0,23	0,02	0,23	0,23	0,12	-5,10	0,02
22	SARL MERIPLAST	2010	0,00	0,00	0,03	0,09	20,83	0,48	0,11	0,75	-0,98	0,22	3,60	0,04
22	SARL MERIPLAST	2011	0,00	0,00	0,02	0,06	21,00	0,59	0,05	0,75	0,17	0,19	2,90	0,05

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22	SARL MERIPLAST	2012	0,00	0,00	0,02	0,06	21,34	0,40	0,03	0,80	0,26	0,40	3,40	0,09
22	SARL MERIPLAST	2013	0,00	0,00	0,03	0,03	21,60	0,42	0,06	0,78	1,00	0,30	2,80	0,03
22	SARL MERIPLAST	2014	0,00	0,00	0,03	0,03	21,93	0,51	0,06	0,80	0,08	0,39	3,80	0,03
22	SARL MERIPLAST	2015	0,00	0,00	0,04	0,02	21,95	0,56	0,06	0,76	0,05	0,02	3,70	0,05
22	SARL MERIPLAST	2016	0,00	0,00	0,09	0,02	22,24	0,61	0,09	0,62	0,55	0,34	3,20	0,06
22	SARL MERIPLAST	2017	0,00	0,00	0,03	0,00	22,42	0,65	0,10	0,62	0,24	0,20	1,30	0,06
22	SARL MERIPLAST	2018	0,00	0,00	0,01	0,02	22,57	0,63	0,08	0,67	0,63	0,16	1,20	0,04
22	SARL MERIPLAST	2019	0,00	0,00	0,02	0,01	22,65	0,56	0,12	0,55	0,09	0,08	1,00	0,02
22	SARL MERIPLAST	2020	0,00	0,00	0,05	0,07	22,67	0,54	0,06	0,57	0,03	0,02	-5,10	0,02
23	SARL MEXICALI	2010	0,00	0,00	0,02	0,00	20,70	-0,12	0,32	0,35	0,51	0,07	3,60	0,04
23	SARL MEXICALI	2011	0,00	0,00	-0,03	0,00	20,65	-0,12	0,28	0,40	0,03	-0,05	2,90	0,05
23	SARL MEXICALI	2012	0,00	0,00	0,01	0,02	20,73	0,10	0,20	0,50	0,00	0,08	3,40	0,09
23	SARL MEXICALI	2013	0,00	0,00	0,05	0,00	20,69	0,02	0,25	0,38	0,07	-0,04	2,80	0,03
23	SARL MEXICALI	2014	0,00	0,00	-0,02	0,00	21,01	0,18	0,22	0,53	0,09	0,38	3,80	0,03
23	SARL MEXICALI	2015	0,00	0,00	-0,03	0,00	20,76	0,07	0,24	0,47	0,00	-0,22	3,70	0,05
23	SARL MEXICALI	2016	0,00	0,00	0,05	0,00	20,76	-0,03	0,19	0,46	0,00	0,00	3,20	0,06
23	SARL MEXICALI	2017	0,00	0,00	-0,02	0,00	20,91	0,32	0,13	0,60	0,01	0,16	1,30	0,06
23	SARL MEXICALI	2018	0,00	0,00	-0,12	0,00	20,76	0,37	0,12	0,68	0,02	-0,14	1,20	0,04
23	SARL MEXICALI	2019	0,00	0,00	-0,17	0,01	20,63	0,17	0,07	0,87	0,00	-0,12	1,00	0,02
23	SARL MEXICALI	2020	0,00	0,00	0,00	0,10	20,57	0,04	0,59	0,35	0,00	-0,06	-5,10	0,02
24	SARL MIZOU WORLD TRADING	2010	0,76	0,65	0,07	0,52	19,63	-0,34	0,00	0,63	0,61	0,17	3,60	0,04
24	SARL MIZOU WORLD TRADING	2011	0,81	0,76	0,09	0,50	19,77	-0,06	0,00	0,50	0,00	0,15	2,90	0,05
24	SARL MIZOU WORLD TRADING	2012	0,96	0,81	0,11	0,23	19,83	0,16	0,00	0,48	-0,13	0,06	3,40	0,09
24	SARL MIZOU WORLD TRADING	2013	0,79	0,96	0,09	0,06	19,97	0,33	0,03	0,46	0,41	0,15	2,80	0,03
24	SARL MIZOU WORLD TRADING	2014	0,00	0,79	0,10	0,23	19,93	0,17	0,02	0,42	0,19	-0,04	3,80	0,03
24	SARL MIZOU WORLD TRADING	2015	0,32	0,00	0,08	0,13	20,22	0,33	0,01	0,41	0,09	0,34	3,70	0,05
24	SARL MIZOU WORLD TRADING	2016	0,23	0,32	0,07	0,14	20,36	0,52	0,06	0,35	0,38	0,15	3,20	0,06
24	SARL MIZOU WORLD TRADING	2017	0,18	0,23	0,01	0,06	20,79	-0,16	0,03	0,55	2,02	0,54	1,30	0,06

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24	SARL MIZOU WORLD TRADING	2018	0,00	0,18	0,01	0,08	20,77	-0,16	0,02	0,53	0,03	-0,02	1,20	0,04
24	SARL MIZOU WORLD TRADING	2019	0,29	0,00	0,03	0,10	20,98	-0,17	0,01	0,59	0,08	0,23	1,00	0,02
24	SARL MIZOU WORLD TRADING	2020	0,38	0,29	0,03	0,05	20,59	0,00	0,13	0,26	0,04	-0,32	-5,10	0,02
25	SARL MODERN BRICKS	2010	0,00	0,00	-0,02	0,00	21,89	-0,04	0,43	0,08	0,30	-0,16	3,60	0,04
25	SARL MODERN BRICKS	2011	0,00	0,00	0,00	0,03	21,88	-0,07	0,38	0,12	0,00	-0,01	2,90	0,05
25	SARL MODERN BRICKS	2012	0,00	0,00	0,00	0,00	21,89	-0,05	0,38	0,13	0,00	0,01	3,40	0,09
25	SARL MODERN BRICKS	2013	0,00	0,00	0,00	0,03	21,83	-0,05	0,37	0,12	0,01	-0,06	2,80	0,03
25	SARL MODERN BRICKS	2014	0,00	0,00	-0,05	0,01	21,75	-0,07	0,31	0,18	0,01	-0,08	3,80	0,03
25	SARL MODERN BRICKS	2015	0,00	0,00	-0,05	0,06	21,76	-0,30	0,15	0,39	0,03	0,01	3,70	0,05
25	SARL MODERN BRICKS	2016	0,00	0,00	-0,09	0,06	21,69	-0,36	0,07	0,53	0,01	-0,07	3,20	0,06
25	SARL MODERN BRICKS	2017	0,00	0,00	-0,12	0,06	21,73	-0,36	0,01	0,73	0,08	0,04	1,30	0,06
25	SARL MODERN BRICKS	2018	0,00	0,00	-0,01	0,04	21,65	-0,39	0,00	0,73	-0,01	-0,08	1,20	0,04
25	SARL MODERN BRICKS	2019	0,00	0,00	-0,01	0,03	21,60	-0,32	0,00	0,72	0,00	-0,05	1,00	0,02
25	SARL MODERN BRICKS	2020	0,00	0,00	-0,07	0,01	21,56	-0,31	0,00	0,78	0,00	-0,04	-5,10	0,02
26	SARL MOULINS GUETIANE	2010	0,96	0,91	0,02	0,01	20,23	0,44	0,03	0,18	1,33	-0,16	3,60	0,04
26	SARL MOULINS GUETIANE	2011	0,96	0,96	0,03	0,01	20,13	0,37	0,03	0,10	0,03	-0,10	2,90	0,05
26	SARL MOULINS GUETIANE	2012	0,98	0,96	0,04	0,07	20,11	0,38	0,01	0,09	0,04	-0,02	3,40	0,09
26	SARL MOULINS GUETIANE	2013	0,99	0,98	0,04	0,14	20,14	0,38	0,02	0,09	0,01	0,03	2,80	0,03
26	SARL MOULINS GUETIANE	2014	0,48	0,99	0,03	0,04	20,25	0,39	0,10	0,12	0,18	0,12	3,80	0,03
26	SARL MOULINS GUETIANE	2015	0,50	0,48	0,04	0,04	20,42	0,48	0,15	0,16	0,00	0,19	3,70	0,05
26	SARL MOULINS GUETIANE	2016	0,29	0,50	0,04	0,02	20,61	0,39	0,19	0,21	0,02	0,21	3,20	0,06
26	SARL MOULINS GUETIANE	2017	0,33	0,29	0,05	0,05	20,64	0,41	0,17	0,21	0,42	0,03	1,30	0,06
26	SARL MOULINS GUETIANE	2018	0,13	0,33	0,05	0,03	20,65	0,47	0,12	0,24	0,03	0,01	1,20	0,04
26	SARL MOULINS GUETIANE	2019	0,13	0,13	0,04	0,04	20,54	0,47	0,10	0,16	0,01	-0,10	1,00	0,02
26	SARL MOULINS GUETIANE	2020	0,12	0,13	0,04	0,02	20,55	0,52	0,04	0,18	0,00	0,01	-5,10	0,02
27	SARL TOUDJA	2010	0	0	0,01	0	21,33	-0,04	0,04	0,55	0,84	-0,11	3,6	0,04
27	SARL TOUDJA	2011	0	0	0	0,08	21,68	0,35	0,39	0,31	-0,07	0,42	2,9	0,05
27	SARL TOUDJA	2012	0	0	0	0,02	21,85	0,38	0,36	0,39	0,05	0,19	3,4	0,09

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27	SARL TOUDJA	2013	0	0	0,09	0,06	21,89	0,27	0,41	0,44	0,19	0,04	2,8	0,03
27	SARL TOUDJA	2014	0	0	0,04	0,02	21,9	0,26	0,41	0,48	0,08	0,01	3,8	0,03
27	SARL TOUDJA	2015	0	0	0,02	0,01	22,03	0,23	0,45	0,47	0,39	0,14	3,7	0,05
27	SARL TOUDJA	2016	0	0	0,03	0,01	22,06	0,23	0,45	0,46	0,11	0,03	3,2	0,06
27	SARL TOUDJA	2017	0	0	0,04	0,01	22,06	0,32	0,56	0,39	0	0	1,3	0,06
27	SARL TOUDJA	2018	0	0	0,11	0,02	21,84	0,26	0,66	0,39	0	-0,2	1,2	0,04
27	SARL TOUDJA	2019	0	0	0,31	0,01	21,1	-0,15	1,02	0,49	0	-0,52	1	0,02
27	SARL TOUDJA	2020	0	0	0,19	0,03	21,1	-0,2	1,14	0,57	-0,01	0	-5,1	0,02
28	SARL MAHDI FOOD INTERNATIONAL	2010	0	0	0,04	0,2	21,1	-0,11	0,16	0,94	0,31	0,64	3,6	0,04
28	SARL MAHDI FOOD INTERNATIONAL	2011	0	0	0,02	0,21	21,2	-0,13	0,14	0,97	0,01	0,11	2,9	0,05
28	SARL MAHDI FOOD INTERNATIONAL	2012	0	0	0,04	0,15	21,46	-0,14	0,25	0,88	0,01	0,3	3,4	0,09
28	SARL MAHDI FOOD INTERNATIONAL	2013	0	0	0,02	0,07	21,54	-0,09	0,19	0,95	-0,06	0,08	2,8	0,03
28	SARL MAHDI FOOD INTERNATIONAL	2014	0	0	0,01	0,06	21,69	-0,11	0,15	0,91	0,21	0,16	3,8	0,03
28	SARL MAHDI FOOD INTERNATIONAL	2015	0	0	0,01	0,07	21,77	-0,12	0,13	0,93	0	0,08	3,7	0,05
28	SARL MAHDI FOOD INTERNATIONAL	2016	0	0	0,04	0,02	21,79	-0,1	0,2	0,9	0,01	0,02	3,2	0,06
28	SARL MAHDI FOOD INTERNATIONAL	2017	0	0	0,04	0,02	22,13	-0,21	0,16	0,95	1,03	0,4	1,3	0,06
28	SARL MAHDI FOOD INTERNATIONAL	2018	0	0	0,09	0,17	22,16	-0,35	0,05	1,08	0,13	0,03	1,2	0,04
28	SARL MAHDI FOOD INTERNATIONAL	2019	0	0	0,03	0,18	22,24	-0,35	0,04	1,11	0	0,08	1	0,02
28	SARL MAHDI FOOD INTERNATIONAL	2020	0	0	0,04	0,18	22,43	-0,33	0,03	1	0,26	0,21	-5,1	0,02
29	SARL NEW MARBRE CONTINENTAL	2010	0,00	0,00	-0,01	0,11	20,37	-0,25	0,37	0,60	0,07	0,43	3,60	0,04
29	SARL NEW MARBRE CONTINENTAL	2011	0,00	0,00	0,00	0,06	20,69	0,11	0,28	0,61	0,07	0,38	2,90	0,05
29	SARL NEW MARBRE CONTINENTAL	2012	0,26	0,00	0,04	0,06	20,57	0,21	0,32	0,52	0,04	-0,11	3,40	0,09
29	SARL NEW MARBRE CONTINENTAL	2013	0,45	0,26	0,06	0,05	20,66	0,11	0,24	0,57	0,02	0,09	2,80	0,03
29	SARL NEW MARBRE CONTINENTAL	2014	0,44	0,45	0,04	0,03	20,87	0,27	0,23	0,60	0,10	0,23	3,80	0,03
29	SARL NEW MARBRE CONTINENTAL	2015	0,45	0,44	0,04	0,04	20,82	0,29	0,22	0,58	0,07	-0,05	3,70	0,05
29	SARL NEW MARBRE CONTINENTAL	2016	0,06	0,45	0,04	0,08	20,97	0,32	0,14	0,66	0,03	0,16	3,20	0,06
29	SARL NEW MARBRE CONTINENTAL	2017	0,06	0,06	0,01	0,06	21,07	0,43	0,11	0,69	0,03	0,11	1,30	0,06
29	SARL NEW MARBRE CONTINENTAL	2018	0,06	0,06	0,00	0,11	21,09	0,38	0,10	0,71	0,00	0,02	1,20	0,04

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29	SARL NEW MARBRE CONTINENTAL	2019	0,00	0,06	-0,22	0,07	20,80	0,31	0,06	0,90	0,00	-0,25	1,00	0,02
29	SARL NEW MARBRE CONTINENTAL	2020	0,00	0,00	-0,08	0,00	20,76	0,42	0,13	0,90	0,00	-0,04	-5,10	0,02
30	SARL PALAIS D'OR	2010	0,00	0,00	0,01	0,00	20,07	-0,06	0,30	0,37	0,12	1,44	3,60	0,04
30	SARL PALAIS D'OR	2011	0,00	0,00	0,01	0,00	20,29	-0,08	0,21	0,52	0,00	0,25	2,90	0,05
30	SARL PALAIS D'OR	2012	0,00	0,00	0,01	0,00	20,24	-0,24	0,17	0,53	0,03	-0,05	3,40	0,09
30	SARL PALAIS D'OR	2013	0,87	0,00	0,01	0,02	20,25	-0,29	0,11	0,59	0,00	0,01	2,80	0,03
30	SARL PALAIS D'OR	2014	0,15	0,87	0,02	0,02	20,27	-0,33	0,08	0,61	0,05	0,02	3,80	0,03
30	SARL PALAIS D'OR	2015	0,00	0,15	0,02	0,04	20,34	-0,34	0,03	0,67	0,01	0,07	3,70	0,05
30	SARL PALAIS D'OR	2016	0,00	0,00	0,02	0,09	20,37	-0,34	0,01	0,68	0,00	0,03	3,20	0,06
30	SARL PALAIS D'OR	2017	0,92	0,00	0,02	0,17	20,31	-0,23	0,01	0,65	-0,03	-0,06	1,30	0,06
30	SARL PALAIS D'OR	2018	0,00	0,92	0,01	0,22	20,47	-0,27	0,01	0,70	0,00	0,17	1,20	0,04
30	SARL PALAIS D'OR	2019	1,56	0,00	0,02	0,26	20,55	-0,27	0,01	0,71	0,01	0,08	1,00	0,02
30	SARL PALAIS D'OR	2020	1,58	1,56	0,02	0,31	20,51	-0,33	0,01	0,71	0,01	-0,04	-5,10	0,02
31	SARL PETROSAM	2010	0,00	0,00	0,03	0,03	20,37	0,05	0,10	0,77	1,86	0,42	3,60	0,04
31	SARL PETROSAM	2011	0,00	0,00	0,03	0,03	20,61	0,21	0,21	0,66	0,03	0,27	2,90	0,05
31	SARL PETROSAM	2012	0,16	0,00	0,02	0,08	20,86	0,32	0,38	0,50	0,01	0,28	3,40	0,09
31	SARL PETROSAM	2013	0,00	0,16	0,02	0,06	20,76	0,23	0,26	0,59	-0,06	-0,10	2,80	0,03
31	SARL PETROSAM	2014	0,00	0,00	-0,03	0,00	20,76	0,31	0,31	0,58	0,00	0,00	3,80	0,03
31	SARL PETROSAM	2015	0,00	0,00	-0,02	0,00	20,75	0,35	0,37	0,53	0,00	-0,01	3,70	0,05
31	SARL PETROSAM	2016	0,00	0,00	-0,02	0,00	20,67	0,36	0,40	0,51	0,00	-0,08	3,20	0,06
31	SARL PETROSAM	2017	0,00	0,00	-0,01	0,00	20,66	0,35	0,40	0,52	0,00	-0,01	1,30	0,06
31	SARL PETROSAM	2018	0,00	0,00	-0,01	0,00	20,65	0,39	0,45	0,48	0,00	-0,01	1,20	0,04
31	SARL PETROSAM	2019	0,00	0,00	0,00	0,00	20,78	0,47	0,52	0,42	0,00	0,14	1,00	0,02
31	SARL PETROSAM	2020	0,00	0,00	0,01	0,00	20,88	0,29	0,32	0,61	0,00	0,11	-5,10	0,02
32	SARL PROLIPOS	2010	0,00	0,00	0,02	0,25	22,61	-0,03	0,18	0,58	-0,53	0,69	3,60	0,04
32	SARL PROLIPOS	2011	0,00	0,00	-0,05	0,36	22,18	-0,03	0,29	0,38	0,02	-0,35	2,90	0,05
32	SARL PROLIPOS	2012	0,00	0,00	0,00	0,18	22,87	-0,15	0,22	0,62	1,19	0,99	3,40	0,09
32	SARL PROLIPOS	2013	0,00	0,00	0,03	0,17	22,90	-0,06	0,21	0,59	-0,15	0,03	2,80	0,03

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32	SARL PROLIPOS	2014	0,15	0,00	0,04	0,00	22,44	0,40	0,10	0,52	-0,36	-0,37	3,80	0,03
32	SARL PROLIPOS	2015	1,00	0,15	0,00	0,22	22,35	0,12	0,06	0,30	0,63	-0,09	3,70	0,05
32	SARL PROLIPOS	2016	1,00	1,00	0,01	0,20	22,49	0,17	0,09	0,51	0,01	0,15	3,20	0,06
32	SARL PROLIPOS	2017	1,00	1,00	0,01	0,22	22,49	0,17	0,08	0,52	0,00	0,00	1,30	0,06
32	SARL PROLIPOS	2018	1,00	1,00	0,00	0,03	22,48	0,51	0,14	0,46	0,00	-0,01	1,20	0,04
32	SARL PROLIPOS	2019	1,00	1,00	0,03	0,04	22,36	0,31	0,14	0,39	-0,17	-0,11	1,00	0,02
32	SARL PROLIPOS	2020	0,00	1,00	0,00	0,06	22,30	0,35	0,12	0,41	-0,15	-0,06	-5,10	0,02
33	SARL RAYANE PAPIER	2010	1,10	1,07	0,11	0,13	20,32	0,08	0,18	0,40	1,41	0,49	3,60	0,04
33	SARL RAYANE PAPIER	2011	1,03	1,10	0,13	0,22	20,46	0,00	0,13	0,48	0,05	0,15	2,90	0,05
33	SARL RAYANE PAPIER	2012	1,00	1,03	0,12	0,22	20,50	-0,19	0,09	0,54	0,28	0,04	3,40	0,09
33	SARL RAYANE PAPIER	2013	1,00	1,00	0,11	0,18	20,38	-0,15	0,07	0,55	0,06	-0,11	2,80	0,03
33	SARL RAYANE PAPIER	2014	1,00	1,00	0,06	0,08	20,84	0,44	0,46	0,30	0,06	0,58	3,80	0,03
33	SARL RAYANE PAPIER	2015	1,00	1,00	0,08	0,38	20,68	0,21	0,47	0,25	-0,01	-0,15	3,70	0,05
33	SARL RAYANE PAPIER	2016	1,00	1,00	0,10	0,65	20,74	-0,56	0,00	0,71	0,04	0,06	3,20	0,06
33	SARL RAYANE PAPIER	2017	1,00	1,00	0,08	0,56	21,11	-0,47	0,00	0,78	0,05	0,45	1,30	0,06
33	SARL RAYANE PAPIER	2018	1,00	1,00	0,08	0,21	21,14	-0,20	0,00	0,79	-0,61	0,03	1,20	0,04
33	SARL RAYANE PAPIER	2019	0,00	1,00	0,09	0,51	20,86	-0,56	0,00	0,74	3,00	-0,24	1,00	0,02
33	SARL RAYANE PAPIER	2020	0,00	0,00	0,04	0,42	21,29	-0,40	0,00	0,79	-0,14	0,54	-5,10	0,02
34	SARL SITEP TUBOPLAST	2010	2,05	1,58	0,02	0,24	19,17	0,04	0,10	0,32	1,01	0,43	3,60	0,04
34	SARL SITEP TUBOPLAST	2011	1,10	2,05	0,01	0,24	19,45	-0,10	0,34	0,24	0,55	0,32	2,90	0,05
34	SARL SITEP TUBOPLAST	2012	1,00	1,10	0,01	0,02	19,86	-0,03	0,53	0,19	0,76	0,51	3,40	0,09
34	SARL SITEP TUBOPLAST	2013	0,91	1,00	0,01	0,08	19,88	0,00	0,50	0,22	0,01	0,02	2,80	0,03
34	SARL SITEP TUBOPLAST	2014	1,14	0,91	0,01	0,07	19,78	0,01	0,46	0,23	0,00	-0,10	3,80	0,03
34	SARL SITEP TUBOPLAST	2015	1,05	1,14	0,01	0,03	19,72	0,10	0,46	0,22	0,01	-0,06	3,70	0,05
34	SARL SITEP TUBOPLAST	2016	1,00	1,05	0,02	0,04	19,60	0,09	0,41	0,22	-0,01	-0,11	3,20	0,06
34	SARL SITEP TUBOPLAST	2017	0,99	1,00	0,02	0,06	19,54	0,09	0,31	0,29	-0,03	-0,06	1,30	0,06
34	SARL SITEP TUBOPLAST	2018	0,99	0,99	0,03	0,05	19,47	0,17	0,27	0,30	0,00	-0,07	1,20	0,04
34	SARL SITEP TUBOPLAST	2019	0,00	0,99	0,01	0,07	19,51	0,22	0,27	0,34	0,00	0,04	1,00	0,02

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34	SARL SITEP TUBOPLAST	2020	0,46	0,00	0,07	0,06	19,51	0,31	0,23	0,30	0,04	0,00	-5,10	0,02
35	SARL SOFICLEF	2010	0,28	0,27	0,18	0,15	21,06	0,15	0,43	0,14	0,16	0,43	3,60	0,04
35	SARL SOFICLEF	2011	0,29	0,28	0,19	0,11	21,41	0,32	0,31	0,22	0,05	0,42	2,90	0,05
35	SARL SOFICLEF	2012	0,22	0,29	0,12	0,12	21,59	0,29	0,29	0,24	0,10	0,20	3,40	0,09
35	SARL SOFICLEF	2013	0,24	0,22	0,14	0,08	21,65	0,42	0,27	0,18	0,11	0,06	2,80	0,03
35	SARL SOFICLEF	2014	0,22	0,24	0,12	0,21	21,82	0,23	0,23	0,21	0,27	0,19	3,80	0,03
35	SARL SOFICLEF	2015	0,13	0,22	0,03	0,13	21,72	0,37	0,24	0,13	-0,02	-0,10	3,70	0,05
35	SARL SOFICLEF	2016	0,15	0,13	0,05	0,25	21,71	0,29	0,15	0,18	-0,08	-0,01	3,20	0,06
35	SARL SOFICLEF	2017	0,15	0,15	0,05	0,24	21,90	0,21	0,11	0,29	0,08	0,21	1,30	0,06
35	SARL SOFICLEF	2018	-0,02	0,15	-0,01	0,32	21,93	0,20	0,09	0,35	0,06	0,03	1,20	0,04
35	SARL SOFICLEF	2019	-0,14	-0,02	-0,04	0,25	21,89	0,27	0,06	0,39	0,11	-0,04	1,00	0,02
35	SARL SOFICLEF	2020	-0,15	-0,14	-0,05	0,39	21,67	0,03	0,05	0,32	0,00	-0,20	-5,10	0,02
36	SARL STE CARTONNIERE MODERNE	2010	0,00	1,65	0,09	0,15	19,68	-0,15	0,00	0,46	1,20	0,15	3,60	0,04
36	SARL STE CARTONNIERE MODERNE	2011	2,25	0,00	0,07	0,08	19,66	0,01	0,00	0,37	0,05	-0,02	2,90	0,05
36	SARL STE CARTONNIERE MODERNE	2012	0,00	2,25	0,14	0,08	19,92	0,12	0,00	0,35	0,13	0,30	3,40	0,09
36	SARL STE CARTONNIERE MODERNE	2013	0,00	0,00	0,11	0,05	19,93	0,27	0,00	0,25	-0,01	0,01	2,80	0,03
36	SARL STE CARTONNIERE MODERNE	2014	0,00	0,00	0,10	0,10	20,13	0,30	0,00	0,28	-0,01	0,22	3,80	0,03
36	SARL STE CARTONNIERE MODERNE	2015	0,00	0,00	0,09	0,14	20,06	0,38	0,00	0,14	0,01	-0,07	3,70	0,05
36	SARL STE CARTONNIERE MODERNE	2016	1,01	0,00	0,09	0,09	20,02	0,53	0,00	0,01	0,13	-0,04	3,20	0,06
36	SARL STE CARTONNIERE MODERNE	2017	0,65	1,01	0,06	0,14	20,14	0,41	0,00	0,15	0,04	0,13	1,30	0,06
36	SARL STE CARTONNIERE MODERNE	2018	0,98	0,65	0,06	0,06	20,10	0,41	0,00	0,10	0,20	-0,04	1,20	0,04
36	SARL STE CARTONNIERE MODERNE	2019	0,00	0,98	0,13	0,18	20,15	0,27	0,00	0,06	0,06	0,05	1,00	0,02
36	SARL STE CARTONNIERE MODERNE	2020	0,36	0,00	0,10	0,29	20,41	0,19	0,00	0,18	0,03	0,30	-5,10	0,02
37	SARL TANGO	2010	0,57	0,43	0,07	0,04	22,88	0,13	0,06	0,24	0,43	0,43	3,60	0,04
37	SARL TANGO	2011	0,95	0,57	0,13	0,01	22,95	-0,01	0,00	0,26	-0,07	0,07	2,90	0,05
37	SARL TANGO	2012	1,00	0,95	0,17	0,24	23,03	0,01	0,00	0,26	0,81	0,08	3,40	0,09
37	SARL TANGO	2013	0,81	1,00	0,15	0,11	23,10	0,00	0,01	0,30	0,01	0,07	2,80	0,03
37	SARL TANGO	2014	0,95	0,81	0,18	0,19	23,08	-0,03	0,00	0,25	0,01	-0,02	3,80	0,03

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37	SARL TANGO	2015	0,91	0,95	0,07	0,07	22,95	0,11	0,00	0,26	-0,02	-0,12	3,70	0,05
37	SARL TANGO	2016	1,00	0,91	0,17	0,11	22,98	0,07	0,00	0,18	0,05	0,03	3,20	0,06
37	SARL TANGO	2017	0,91	1,01	0,07	0,05	23,01	0,04	0,05	0,25	0,06	0,03	1,30	0,06
37	SARL TANGO	2018	1,00	0,91	0,11	0,09	23,04	0,04	0,01	0,26	-0,02	0,03	1,20	0,04
37	SARL TANGO	2019	1,10	1,00	0,13	0,07	23,12	0,12	0,03	0,27	0,04	0,08	1,00	0,02
37	SARL TANGO	2020	1,00	1,10	0,03	0,04	23,07	0,21	0,03	0,36	0,02	-0,05	-5,10	0,02
38	SARL TECHNISATE	2010	0,00	0,00	0,08	0,10	20,91	0,56	0,03	0,59	0,47	-0,34	3,60	0,04
38	SARL TECHNISATE	2011	0,00	0,00	0,06	0,16	21,02	0,53	0,02	0,58	0,13	0,12	2,90	0,05
38	SARL TECHNISATE	2012	0,00	0,00	0,06	0,03	21,46	0,65	0,01	0,68	0,16	0,55	3,40	0,09
38	SARL TECHNISATE	2013	0,00	0,00	0,03	0,01	21,32	0,72	0,01	0,55	0,03	-0,13	2,80	0,03
38	SARL TECHNISATE	2014	0,00	0,00	0,03	0,00	20,92	0,45	0,00	0,30	0,33	-0,33	3,80	0,03
38	SARL TECHNISATE	2015	0,00	0,00	0,03	0,03	21,11	0,05	0,00	0,39	0,58	0,21	3,70	0,05
38	SARL TECHNISATE	2016	0,00	0,00	0,02	0,01	21,62	0,25	0,00	0,61	0,01	0,67	3,20	0,06
38	SARL TECHNISATE	2017	0,00	0,00	0,01	0,00	22,15	0,35	0,04	0,71	0,28	0,70	1,30	0,06
38	SARL TECHNISATE	2018	0,00	0,00	0,01	0,00	22,11	0,21	0,05	0,69	0,05	-0,04	1,20	0,04
38	SARL TECHNISATE	2019	0,00	0,00	0,01	0,01	22,33	0,34	0,06	0,72	0,14	0,25	1,00	0,02
38	SARL TECHNISATE	2020	0,00	0,00	0,01	0,01	22,17	0,20	0,22	0,51	0,14	-0,15	-5,10	0,02
39	SARL UPAC ELECTRONICS	2010	0,00	0,00	0,02	0,04	21,18	0,41	0,00	0,42	0,11	0,43	3,60	0,04
39	SARL UPAC ELECTRONICS	2011	0,00	0,00	0,01	0,04	21,16	0,43	0,00	0,40	0,00	-0,02	2,90	0,05
39	SARL UPAC ELECTRONICS	2012	0,00	0,00	0,01	0,02	21,02	0,42	0,00	0,29	0,00	-0,13	3,40	0,09
39	SARL UPAC ELECTRONICS	2013	0,00	0,00	0,01	0,03	21,15	0,50	0,00	0,37	0,00	0,14	2,80	0,03
39	SARL UPAC ELECTRONICS	2014	0,00	0,00	-0,04	0,08	20,95	0,39	0,00	0,28	0,00	-0,18	3,80	0,03
39	SARL UPAC ELECTRONICS	2015	0,00	0,00	-0,03	0,07	20,87	0,39	0,00	0,24	0,00	-0,08	3,70	0,05
39	SARL UPAC ELECTRONICS	2016	0,00	0,00	-0,03	0,09	20,79	0,40	0,00	0,21	0,00	-0,08	3,20	0,06
39	SARL UPAC ELECTRONICS	2017	0,00	0,00	0,01	0,09	20,77	0,41	0,00	0,18	0,00	-0,02	1,30	0,06
39	SARL UPAC ELECTRONICS	2018	0,00	0,00	0,00	0,08	20,73	0,47	0,00	0,14	0,00	-0,04	1,20	0,04
39	SARL UPAC ELECTRONICS	2019	0,00	0,00	0,01	0,09	20,73	0,51	0,00	0,13	0,01	0,00	1,00	0,02
39	SARL UPAC ELECTRONICS	2020	0,00	0,00	0,01	0,14	20,67	0,51	0,00	0,08	0,00	-0,06	-5,10	0,02

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40	SARL VENUS	2010	0,29	0,23	0,18	0,27	21,38	0,30	0,00	0,08	0,32	0,26	3,60	0,04
40	SARL VENUS	2011	0,17	0,29	0,19	0,25	21,53	0,33	0,00	0,06	0,21	0,16	2,90	0,05
40	SARL VENUS	2012	0,06	0,17	0,16	0,33	21,66	0,27	0,00	0,05	0,16	0,14	3,40	0,09
40	SARL VENUS	2013	0,56	0,06	0,13	0,29	21,80	0,32	0,00	0,05	0,13	0,15	2,80	0,03
40	SARL VENUS	2014	0,00	0,56	0,12	0,27	21,87	0,34	0,00	0,06	0,13	0,07	3,80	0,03
40	SARL VENUS	2015	0,00	0,00	0,10	0,15	22,05	0,34	0,07	0,05	0,48	0,20	3,70	0,05
40	SARL VENUS	2016	0,00	0,00	0,11	0,17	22,16	0,33	0,05	0,05	0,09	0,12	3,20	0,06
40	SARL VENUS	2017	0,00	0,00	0,10	0,20	22,29	0,30	0,04	0,06	0,13	0,14	1,30	0,06
40	SARL VENUS	2018	0,14	0,00	0,08	0,12	22,37	0,32	0,01	0,08	0,20	0,08	1,20	0,04
40	SARL VENUS	2019	1,53	0,14	0,10	0,22	22,44	0,26	0,00	0,06	0,07	0,07	1,00	0,02
40	SARL VENUS	2020	0,02	1,53	0,11	0,19	22,58	0,20	0,01	0,20	0,06	0,15	-5,10	0,02
41	SARL VITAJUS	2010	1,47	1,00	0,06	0,06	21,39	0,41	0,13	0,42	1,56	0,07	3,60	0,04
41	SARL VITAJUS	2011	0,00	1,47	0,05	0,06	21,34	0,26	0,09	0,50	0,10	-0,05	2,90	0,05
41	SARL VITAJUS	2012	0,92	0,00	0,04	0,09	21,56	0,29	0,14	0,49	0,14	0,25	3,40	0,09
41	SARL VITAJUS	2013	0,98	0,92	0,16	0,04	21,58	0,42	0,10	0,41	0,02	0,02	2,80	0,03
41	SARL VITAJUS	2014	0,00	0,98	-0,01	0,04	21,49	0,40	0,14	0,51	0,05	-0,09	3,80	0,03
41	SARL VITAJUS	2015	0,00	0,00	-0,20	0,03	21,38	-0,17	0,03	0,77	0,00	-0,10	3,70	0,05
41	SARL VITAJUS	2016	0,00	0,00	-0,06	0,01	21,55	0,17	0,02	0,87	-0,01	0,19	3,20	0,06
41	SARL VITAJUS	2017	0,00	0,00	0,00	0,01	21,66	0,34	0,23	0,67	-0,02	0,12	1,30	0,06
41	SARL VITAJUS	2018	0,00	0,00	-0,10	0,06	21,58	0,50	0,39	0,49	0,00	-0,08	1,20	0,04
41	SARL VITAJUS	2019	0,00	0,00	-0,18	0,07	21,37	0,38	0,42	0,58	0,04	-0,19	1,00	0,02
41	SARL VITAJUS	2020	0,00	0,00	0,03	0,03	21,39	0,25	0,41	0,57	-0,05	0,02	-5,10	0,02
42	SPA AFIA INTERNATIONAL	2010	0,00	0,00	-0,10	0,11	22,37	0,04	0,00	0,79	0,12	0,23	3,60	0,04
42	SPA AFIA INTERNATIONAL	2011	0,00	0,00	0,05	0,13	22,70	0,07	0,12	0,63	0,11	0,39	2,90	0,05
42	SPA AFIA INTERNATIONAL	2012	0,00	0,00	0,06	0,07	22,94	0,26	0,10	0,64	0,13	0,27	3,40	0,09
42	SPA AFIA INTERNATIONAL	2013	0,00	0,00	0,05	0,10	22,92	0,28	0,05	0,64	0,17	-0,02	2,80	0,03
42	SPA AFIA INTERNATIONAL	2014	0,00	0,00	0,09	0,10	22,83	0,16	0,03	0,55	0,01	-0,09	3,80	0,03
42	SPA AFIA INTERNATIONAL	2015	0,00	0,00	0,04	0,17	23,01	0,22	0,01	0,59	0,02	0,20	3,70	0,05

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42	SPA AFIA INTERNATIONAL	2016	-0,37	0,00	-0,02	0,12	23,02	0,25	0,01	0,61	0,04	0,01	3,20	0,06
42	SPA AFIA INTERNATIONAL	2017	0,99	-0,37	0,05	0,18	23,23	0,27	0,08	0,57	0,10	0,23	1,30	0,06
42	SPA AFIA INTERNATIONAL	2018	0,88	0,99	0,02	0,16	23,15	0,30	0,05	0,62	-0,01	-0,08	1,20	0,04
42	SPA AFIA INTERNATIONAL	2019	0,97	0,88	0,03	0,15	23,31	0,46	0,06	0,63	0,09	0,17	1,00	0,02
42	SPA AFIA INTERNATIONAL	2020	0,00	0,97	0,04	0,06	23,18	0,37	0,05	0,60	0,01	-0,12	-5,10	0,02
43	SPA AMENHYD	2010	0,00	0,00	0,11	0,07	22,69	0,08	0,08	0,43	0,24	0,43	3,60	0,04
43	SPA AMENHYD	2011	0,24	0,00	0,13	0,05	22,75	0,27	0,06	0,35	0,00	0,06	2,90	0,05
43	SPA AMENHYD	2012	1,24	0,24	0,07	0,17	22,99	0,09	0,06	0,43	0,10	0,27	3,40	0,09
43	SPA AMENHYD	2013	0,00	1,24	0,05	0,06	23,44	0,13	0,12	0,56	0,30	0,57	2,80	0,03
43	SPA AMENHYD	2014	0,34	0,00	0,04	0,10	23,68	0,07	0,13	0,59	0,34	0,27	3,80	0,03
43	SPA AMENHYD	2015	0,01	0,34	0,04	0,13	23,75	0,04	0,16	0,55	0,19	0,07	3,70	0,05
43	SPA AMENHYD	2016	0,01	0,01	0,07	0,08	23,66	0,15	0,15	0,45	0,08	-0,09	3,20	0,06
43	SPA AMENHYD	2017	2,69	0,01	0,03	0,09	23,67	0,18	0,12	0,45	-0,03	0,01	1,30	0,06
43	SPA AMENHYD	2018	0,00	2,69	0,03	0,08	23,75	0,13	0,13	0,52	0,08	0,08	1,20	0,04
43	SPA AMENHYD	2019	0,00	0,00	0,01	0,02	23,66	0,23	0,13	0,48	-0,04	-0,09	1,00	0,02
43	SPA AMENHYD	2020	0,00	0,00	-0,09	0,03	23,52	0,18	0,14	0,50	0,03	-0,13	-5,10	0,02
44	SPA BIOCARE	2010	0,00	0,00	0,07	0,00	21,47	0,39	0,14	0,36	0,52	0,84	3,60	0,04
44	SPA BIOCARE	2011	0,00	0,00	0,07	0,01	21,58	0,44	0,08	0,34	0,15	0,12	2,90	0,05
44	SPA BIOCARE	2012	0,00	0,00	0,07	0,01	21,77	0,40	0,19	0,19	0,19	0,21	3,40	0,09
44	SPA BIOCARE	2013	0,00	0,00	0,06	0,01	22,03	0,39	0,19	0,21	0,42	0,30	2,80	0,03
44	SPA BIOCARE	2014	0,00	0,00	0,07	0,01	22,13	0,44	0,15	0,21	0,07	0,11	3,80	0,03
44	SPA BIOCARE	2015	0,00	0,00	0,06	0,01	22,37	0,42	0,11	0,29	0,10	0,27	3,70	0,05
44	SPA BIOCARE	2016	0,00	0,00	0,04	0,04	22,43	0,47	0,06	0,29	-0,02	0,06	3,20	0,06
44	SPA BIOCARE	2017	0,00	0,00	0,03	0,03	22,71	0,44	0,13	0,32	0,44	0,32	1,30	0,06
44	SPA BIOCARE	2018	0,00	0,00	0,02	0,08	23,19	0,37	0,20	0,42	0,22	0,62	1,20	0,04
44	SPA BIOCARE	2019	0,00	0,00	0,01	0,05	23,28	0,57	0,09	0,56	0,00	0,09	1,00	0,02
44	SPA BIOCARE	2020	0,00	0,00	0,00	0,18	23,34	0,44	0,07	0,60	0,02	0,06	-5,10	0,02
45	SPA BIOPURE	2010	0,04	0,11	0,01	0,11	22,32	-0,01	0,06	0,88	0,77	-0,42	3,60	0,04

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45	SPA BIOPURE	2011	0,14	0,04	0,03	0,14	22,25	-0,04	0,03	0,86	0,44	-0,07	2,90	0,05
45	SPA BIOPURE	2012	0,20	0,14	0,06	0,18	22,49	-0,03	0,01	0,85	0,19	0,27	3,40	0,09
45	SPA BIOPURE	2013	0,26	0,20	0,12	0,07	22,78	0,16	0,00	0,78	0,16	0,34	2,80	0,03
45	SPA BIOPURE	2014	0,21	0,26	0,08	0,07	23,00	0,20	0,02	0,75	-0,85	0,25	3,80	0,03
45	SPA BIOPURE	2015	0,20	0,21	0,07	0,14	23,29	0,13	0,03	0,74	0,18	0,34	3,70	0,05
45	SPA BIOPURE	2016	0,21	0,20	0,08	0,19	23,47	0,10	0,03	0,71	0,20	0,20	3,20	0,06
45	SPA BIOPURE	2017	0,26	0,21	0,09	0,16	23,68	0,17	0,05	0,67	3,68	0,23	1,30	0,06
45	SPA BIOPURE	2018	0,30	0,26	0,10	0,17	23,83	0,21	0,07	0,61	0,30	0,16	1,20	0,04
45	SPA BIOPURE	2019	0,30	0,30	0,10	0,13	23,99	0,30	0,04	0,56	0,07	0,17	1,00	0,02
45	SPA BIOPURE	2020	0,20	0,30	0,06	0,22	24,07	0,23	0,06	0,54	0,03	0,08	-5,10	0,02
46	SPA BYA ELECTRONIC	2010	0,00	0,00	0,00	0,06	20,94	0,41	0,55	0,05	0,40	1,78	3,60	0,04
46	SPA BYA ELECTRONIC	2011	0,00	0,00	-0,01	0,09	20,96	0,37	0,61	0,01	0,01	0,02	2,90	0,05
46	SPA BYA ELECTRONIC	2012	0,00	0,00	0,01	0,05	20,98	0,37	0,60	0,02	0,11	0,02	3,40	0,09
46	SPA BYA ELECTRONIC	2013	0,00	0,00	0,00	0,07	21,03	0,38	0,57	0,06	0,00	0,05	2,80	0,03
46	SPA BYA ELECTRONIC	2014	0,00	0,00	0,00	0,07	21,01	0,40	0,54	0,09	0,00	-0,02	3,80	0,03
46	SPA BYA ELECTRONIC	2015	0,00	0,00	0,00	0,04	21,04	0,39	0,49	0,14	0,04	0,03	3,70	0,05
46	SPA BYA ELECTRONIC	2016	0,00	0,00	0,00	0,03	21,07	0,42	0,43	0,21	0,04	0,03	3,20	0,06
46	SPA BYA ELECTRONIC	2017	0,00	0,00	0,00	0,04	21,09	0,32	0,26	0,39	0,00	0,02	1,30	0,06
46	SPA BYA ELECTRONIC	2018	0,00	0,00	0,00	0,04	21,88	0,04	0,66	0,17	1,50	1,20	1,20	0,04
46	SPA BYA ELECTRONIC	2019	0,00	0,00	-0,01	0,01	21,84	0,05	0,65	0,19	0,01	-0,04	1,00	0,02
46	SPA BYA ELECTRONIC	2020	0,00	0,00	-0,02	0,02	21,85	0,06	0,65	0,21	0,00	0,01	-5,10	0,02
47	SPA HASNAOUI	2010	0,49	0,41	0,03	0,11	20,09	0,47	0,32	0,12	0,88	1,01	3,6	0,04
47	SPA HASNAOUI	2011	0,44	0,49	0,04	0,2	20,22	0,17	0,29	0,19	0,01	0,14	2,9	0,05
47	SPA HASNAOUI	2012	0,4	0,44	0,09	0,25	20,28	0,17	0,28	0,16	0	0,06	3,4	0,09
47	SPA HASNAOUI	2013	0,53	0,4	0,02	0,19	20,31	0,23	0,28	0,19	0,02	0,03	2,8	0,03
47	SPA HASNAOUI	2014	0,53	0,53	0,05	0,19	20,38	0,23	0,25	0,21	0,03	0,07	3,8	0,03
47	SPA HASNAOUI	2015	0,53	0,53	0,03	0,19	20,41	0,2	0,24	0,24	0,06	0,03	3,7	0,05
47	SPA HASNAOUI	2016	0,5	0,53	0,02	0,1	20,49	0,26	0,22	0,29	0,01	0,08	3,2	0,06

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47	SPA HASNAOUI	2017	0,42	0,5	0,12	0,04	20,83	0,33	0,16	0,38	0,02	0,4	1,3	0,06
47	SPA HASNAOUI	2018	0,5	0,42	0,06	0,21	20,82	0,16	0,16	0,37	0,29	-0,01	1,2	0,04
47	SPA HASNAOUI	2019	0,72	0,5	0,01	0,13	21,09	0,11	0,12	0,24	0,41	0,31	1	0,02
47	SPA HASNAOUI	2020	0	0,72	-0,04	0,09	20,97	0,15	0,14	0,2	0	-0,11	-5,1	0,02
48	SPA CARRIERE TAMOULGA	2010	0,00	0,00	0,00	0,00	20,67	-0,52	0,00	0,95	0,63	-0,31	3,60	0,04
48	SPA CARRIERE TAMOULGA	2011	0,00	0,00	0,00	0,01	20,58	-0,19	0,01	0,94	0,00	-0,09	2,90	0,05
48	SPA CARRIERE TAMOULGA	2012	0,00	0,00	0,00	0,01	20,69	-0,46	0,00	0,94	0,03	0,12	3,40	0,09
48	SPA CARRIERE TAMOULGA	2013	0,00	0,00	0,01	0,04	20,82	-0,44	0,01	0,94	-0,07	0,14	2,80	0,03
48	SPA CARRIERE TAMOULGA	2014	0,00	0,00	0,00	0,04	21,08	-0,33	0,05	0,91	0,37	0,30	3,80	0,03
48	SPA CARRIERE TAMOULGA	2015	0,00	0,00	0,01	0,06	20,66	-0,54	0,12	0,81	0,08	-0,34	3,70	0,05
48	SPA CARRIERE TAMOULGA	2016	0,00	0,00	0,01	0,04	20,60	-0,54	0,09	0,82	0,02	-0,06	3,20	0,06
48	SPA CARRIERE TAMOULGA	2017	0,00	0,00	0,02	0,06	20,42	-0,37	0,04	0,83	0,00	-0,16	1,30	0,06
48	SPA CARRIERE TAMOULGA	2018	0,00	0,00	0,01	0,05	20,73	-0,40	0,09	0,80	0,24	0,36	1,20	0,04
48	SPA CARRIERE TAMOULGA	2019	0,00	0,00	0,01	0,03	20,87	-0,30	0,13	0,70	0,12	0,15	1,00	0,02
48	SPA CARRIERE TAMOULGA	2020	0,00	0,00	0,02	0,01	20,87	-0,26	0,11	0,70	0,04	0,00	-5,10	0,02
49	SPA CHIALI TUBES	2010	0,08	0,13	0,14	0,05	22,46	0,36	0,03	0,12	1,10	0,07	3,60	0,04
49	SPA CHIALI TUBES	2011	0,15	0,08	0,09	0,05	22,51	0,36	0,01	0,10	0,00	0,05	2,90	0,05
49	SPA CHIALI TUBES	2012	0,15	0,15	0,08	0,10	22,68	0,27	0,07	0,11	0,00	0,19	3,40	0,09
49	SPA CHIALI TUBES	2013	0,04	0,15	0,09	0,03	22,74	0,36	0,07	0,09	0,03	0,06	2,80	0,03
49	SPA CHIALI TUBES	2014	0,37	0,04	0,10	0,25	22,98	0,24	0,08	0,15	0,15	0,27	3,80	0,03
49	SPA CHIALI TUBES	2015	0,16	0,37	0,10	0,10	23,11	0,46	0,10	0,15	0,14	0,14	3,70	0,05
49	SPA CHIALI TUBES	2016	0,31	0,16	0,09	0,02	23,15	0,62	0,10	0,11	0,09	0,04	3,20	0,06
49	SPA CHIALI TUBES	2017	0,21	0,31	0,07	0,05	23,16	0,66	0,10	0,09	-0,12	0,01	1,30	0,06
49	SPA CHIALI TUBES	2018	0,24	0,21	0,06	0,05	23,26	0,69	0,08	0,13	0,03	0,11	1,20	0,04
49	SPA CHIALI TUBES	2019	0,05	0,24	0,08	0,10	23,25	0,71	0,07	0,08	-0,18	-0,01	1,00	0,02
49	SPA CHIALI TUBES	2020	0,09	0,05	0,06	0,11	23,32	0,68	0,06	0,08	0,11	0,07	-5,10	0,02
50	SPA COMPTOIR DU MAGHREB	2010	1,49	1,23	0,03	0,02	21,83	0,23	0,05	0,68	0,31	0,43	3,60	0,04
50	SPA COMPTOIR DU MAGHREB	2011	0,00	1,49	0,01	0,03	21,85	0,46	0,06	0,71	-0,01	0,02	2,90	0,05

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50	SPA COMPTOIR DU MAGHREB	2012	0,00	0,00	0,01	0,06	22,31	0,56	0,02	0,83	-0,22	0,58	3,40	0,09
50	SPA COMPTOIR DU MAGHREB	2013	0,00	0,00	-0,05	0,08	22,22	0,23	0,01	0,87	0,43	-0,09	2,80	0,03
50	SPA COMPTOIR DU MAGHREB	2014	0,00	0,00	0,03	0,03	22,44	0,30	0,00	0,88	0,18	0,25	3,80	0,03
50	SPA COMPTOIR DU MAGHREB	2015	0,00	0,00	0,01	0,09	22,78	0,48	0,00	0,91	-0,37	0,40	3,70	0,05
50	SPA COMPTOIR DU MAGHREB	2016	0,00	0,00	0,04	0,02	22,71	0,51	0,00	0,86	0,02	-0,07	3,20	0,06
50	SPA COMPTOIR DU MAGHREB	2017	0,37	0,00	0,04	0,02	23,25	0,36	0,00	0,90	0,00	0,72	1,30	0,06
50	SPA COMPTOIR DU MAGHREB	2018	0,00	0,37	0,01	0,07	23,41	0,46	0,01	0,89	0,00	0,17	1,20	0,04
50	SPA COMPTOIR DU MAGHREB	2019	0,00	0,00	0,02	0,04	23,42	0,25	0,02	0,85	5,74	0,01	1,00	0,02
50	SPA COMPTOIR DU MAGHREB	2020	0,00	0,00	-0,02	0,07	23,03	0,30	0,03	0,77	-0,01	-0,32	-5,10	0,02
51	SPA Groupe Benhamadi	2010	0,00	0,00	0,05	0,04	23,09	-0,02	0,32	0,38	0,54	-0,02	3,60	0,04
51	SPA Groupe Benhamadi	2011	0,00	0,00	0,03	0,02	23,48	0,17	0,42	0,35	0,18	0,48	2,90	0,05
51	SPA Groupe Benhamadi	2012	0,36	0,00	0,03	0,07	23,63	0,27	0,51	0,25	0,01	0,16	3,40	0,09
51	SPA Groupe Benhamadi	2013	0,38	0,36	0,07	0,10	23,81	0,33	0,10	0,65	0,31	0,20	2,80	0,03
51	SPA Groupe Benhamadi	2014	0,15	0,38	0,07	0,04	24,19	0,44	0,07	0,70	0,28	0,46	3,80	0,03
51	SPA Groupe Benhamadi	2015	0,12	0,15	0,07	0,03	24,46	0,45	0,19	0,57	0,25	0,31	3,70	0,05
51	SPA Groupe Benhamadi	2016	0,10	0,12	0,06	0,16	24,82	0,20	0,07	0,71	0,26	0,43	3,20	0,06
51	SPA Groupe Benhamadi	2017	0,09	0,10	0,07	0,17	24,89	0,21	0,03	0,68	0,30	0,07	1,30	0,06
51	SPA Groupe Benhamadi	2018	0,08	0,09	0,03	0,05	25,75	0,46	0,29	0,56	0,18	1,36	1,20	0,04
51	SPA Groupe Benhamadi	2019	0,08	0,08	0,00	0,10	25,85	0,05	0,12	0,74	1,73	0,11	1,00	0,02
51	SPA Groupe Benhamadi	2020	0,52	0,08	0,01	0,02	25,23	0,11	0,29	0,44	-0,43	-0,46	-5,10	0,02
52	SPA DEF MED	2010	0,31	0,58	0,01	0,07	21,04	0,17	0,02	0,95	0,02	-0,03	3,60	0,04
52	SPA DEF MED	2011	1,06	0,31	0,03	0,07	21,24	0,15	0,02	0,93	0,00	0,22	2,90	0,05
52	SPA DEF MED	2012	0,84	1,06	0,05	0,09	21,49	0,16	0,01	0,92	0,23	0,28	3,40	0,09
52	SPA DEF MED	2013	0,10	0,84	0,05	0,08	21,62	0,15	0,02	0,92	0,15	0,14	2,80	0,03
52	SPA DEF MED	2014	0,53	0,10	0,04	0,08	21,87	0,10	0,02	0,89	0,20	0,28	3,80	0,03
52	SPA DEF MED	2015	0,00	0,53	0,03	0,12	21,91	0,10	0,02	0,89	0,13	0,04	3,70	0,05
52	SPA DEF MED	2016	0,00	0,00	0,04	0,08	22,09	0,22	0,02	0,86	0,24	0,20	3,20	0,06
52	SPA DEF MED	2017	0,00	0,00	0,05	0,06	22,21	0,26	0,01	0,82	0,07	0,13	1,30	0,06

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52	SPA DEF MED	2018	0,00	0,00	0,04	0,04	22,47	0,29	0,01	0,82	0,04	0,30	1,20	0,04
52	SPA DEF MED	2019	0,00	0,00	0,04	0,04	22,54	0,28	0,01	0,80	0,64	0,07	1,00	0,02
52	SPA DEF MED	2020	0,00	0,00	0,02	0,11	22,40	0,19	0,01	0,74	0,03	-0,13	-5,10	0,02
53	SPA DEPEC ALGERIE	2010	0,00	0,00	0,01	0,03	20,71	0,14	0,02	0,87	1,72	0,43	3,60	0,04
53	SPA DEPEC ALGERIE	2011	0,00	0,00	-0,01	0,03	20,85	0,45	0,04	0,88	0,00	0,15	2,90	0,05
53	SPA DEPEC ALGERIE	2012	0,00	0,00	0,02	0,10	21,13	0,26	0,03	0,90	0,01	0,32	3,40	0,09
53	SPA DEPEC ALGERIE	2013	0,00	0,00	0,01	0,12	20,78	0,28	0,00	0,88	0,14	-0,30	2,80	0,03
53	SPA DEPEC ALGERIE	2014	0,96	0,00	0,01	0,04	20,84	0,23	0,22	0,65	0,64	0,06	3,80	0,03
53	SPA DEPEC ALGERIE	2015	0,96	0,96	0,02	0,04	20,66	0,19	0,00	0,85	0,00	-0,16	3,70	0,05
53	SPA DEPEC ALGERIE	2016	1,09	0,96	0,02	0,04	20,72	0,32	0,00	0,85	0,00	0,06	3,20	0,06
53	SPA DEPEC ALGERIE	2017	1,18	1,09	0,02	0,21	20,96	0,26	0,04	0,82	-0,23	0,27	1,30	0,06
53	SPA DEPEC ALGERIE	2018	1,08	1,18	0,05	0,22	21,00	0,09	0,02	0,82	-0,09	0,04	1,20	0,04
53	SPA DEPEC ALGERIE	2019	0,00	1,08	0,07	0,10	20,96	0,36	0,00	0,82	-0,03	-0,04	1,00	0,02
53	SPA DEPEC ALGERIE	2020	0,00	0,00	0,01	0,15	21,01	0,33	0,00	0,82	0,04	0,05	-5,10	0,02
54	SPA GRAND MOULIN DAHMANI	2010	0,00	0,00	0,01	0,01	22,88	0,12	0,28	0,32	0,53	0,31	3,60	0,04
54	SPA GRAND MOULIN DAHMANI	2011	0,00	0,00	0,04	0,00	22,80	0,21	0,18	0,34	-0,02	-0,08	2,90	0,05
54	SPA GRAND MOULIN DAHMANI	2012	0,00	0,00	0,01	0,00	22,89	0,17	0,23	0,33	0,12	0,09	3,40	0,09
54	SPA GRAND MOULIN DAHMANI	2013	0,00	0,00	0,01	0,00	22,80	0,18	0,23	0,28	0,04	-0,09	2,80	0,03
54	SPA GRAND MOULIN DAHMANI	2014	0,00	0,00	0,00	0,00	22,81	0,11	0,23	0,28	0,12	0,01	3,80	0,03
54	SPA GRAND MOULIN DAHMANI	2015	0,00	0,00	0,00	0,03	23,01	0,04	0,49	0,10	0,27	0,22	3,70	0,05
54	SPA GRAND MOULIN DAHMANI	2016	0,00	0,00	0,00	0,02	23,02	0,09	0,47	0,12	0,03	0,01	3,20	0,06
54	SPA GRAND MOULIN DAHMANI	2017	0,00	0,00	-0,01	0,02	23,09	0,02	0,44	0,19	0,07	0,07	1,30	0,06
54	SPA GRAND MOULIN DAHMANI	2018	0,00	0,00	-0,02	0,02	23,07	-0,06	0,40	0,25	0,02	-0,02	1,20	0,04
54	SPA GRAND MOULIN DAHMANI	2019	0,00	0,00	-0,03	0,02	23,10	-0,08	0,38	0,28	0,03	0,03	1,00	0,02
54	SPA GRAND MOULIN DAHMANI	2020	0,00	0,00	-0,02	0,04	23,42	-0,25	0,35	0,41	0,26	0,38	-5,10	0,02
55	SPA GROUPE SIM	2010	0,23	0,17	0,01	0,13	22,51	-0,18	0,03	0,27	0,02	0,00	3,60	0,04
55	SPA GROUPE SIM	2011	0,13	0,23	0,02	0,03	22,53	-0,16	0,02	0,27	0,00	0,02	2,90	0,05
55	SPA GROUPE SIM	2012	0,10	0,13	0,08	0,09	22,62	-0,05	0,05	0,22	0,04	0,09	3,40	0,09

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55	SPA GROUPE SIM	2013	0,09	0,10	0,07	0,08	22,69	0,01	0,00	0,25	0,01	0,07	2,80	0,03
55	SPA GROUPE SIM	2014	0,03	0,09	0,06	0,02	22,77	-0,03	0,00	0,25	0,09	0,08	3,80	0,03
55	SPA GROUPE SIM	2015	0,03	0,03	0,07	0,02	22,77	-0,05	0,00	0,18	0,09	0,00	3,70	0,05
55	SPA GROUPE SIM	2016	0,04	0,03	0,03	0,03	22,80	0,10	0,00	0,18	-0,14	0,03	3,20	0,06
55	SPA GROUPE SIM	2017	0,02	0,04	0,10	0,01	22,91	0,11	0,00	0,17	0,16	0,12	1,30	0,06
55	SPA GROUPE SIM	2018	0,02	0,02	0,08	0,01	23,08	-0,02	0,06	0,17	0,28	0,19	1,20	0,04
55	SPA GROUPE SIM	2019	0,07	0,02	0,03	0,06	23,10	-0,09	0,04	0,17	0,07	0,02	1,00	0,02
55	SPA GROUPE SIM	2020	-0,27	0,07	-0,01	0,00	23,05	-0,11	0,04	0,14	0,08	-0,05	-5,10	0,02
56	SPA HAMOUD BOUALEM	2010	0,57	0,56	0,09	0,20	22,70	0,10	0,19	0,13	0,01	0,26	3,60	0,04
56	SPA HAMOUD BOUALEM	2011	0,57	0,57	0,10	0,08	22,93	0,13	0,12	0,13	0,00	0,26	2,90	0,05
56	SPA HAMOUD BOUALEM	2012	0,45	0,57	0,10	0,10	22,98	0,12	0,12	0,13	0,06	0,05	3,40	0,09
56	SPA HAMOUD BOUALEM	2013	0,46	0,45	0,12	0,16	23,19	0,11	0,15	0,15	0,14	0,23	2,80	0,03
56	SPA HAMOUD BOUALEM	2014	0,40	0,46	0,08	0,22	23,27	0,03	0,18	0,15	0,12	0,08	3,80	0,03
56	SPA HAMOUD BOUALEM	2015	0,47	0,40	0,09	0,29	23,44	0,00	0,20	0,16	0,08	0,19	3,70	0,05
56	SPA HAMOUD BOUALEM	2016	0,70	0,47	0,09	0,27	23,44	0,05	0,22	0,10	0,09	0,00	3,20	0,06
56	SPA HAMOUD BOUALEM	2017	0,74	0,70	0,10	0,28	23,46	0,08	0,19	0,10	0,04	0,02	1,30	0,06
56	SPA HAMOUD BOUALEM	2018	0,73	0,74	0,08	0,28	23,50	0,06	0,17	0,14	0,03	0,04	1,20	0,04
56	SPA HAMOUD BOUALEM	2019	0,84	0,73	0,10	0,20	23,51	0,05	0,14	0,13	0,16	0,01	1,00	0,02
56	SPA HAMOUD BOUALEM	2020	0,85	0,84	0,14	0,26	23,56	0,10	0,14	0,11	-0,06	0,05	-5,10	0,02
57	SPA LA FLECHE BLEUE	2010	0,44	0,26	0,04	0,06	21,40	0,01	0,10	0,13	0,61	0,18	3,60	0,04
57	SPA LA FLECHE BLEUE	2011	0,33	0,44	0,04	0,06	21,41	0,06	0,04	0,17	-0,19	0,01	2,90	0,05
57	SPA LA FLECHE BLEUE	2012	0,33	0,33	0,05	0,06	21,50	0,10	0,06	0,14	0,10	0,09	3,40	0,09
57	SPA LA FLECHE BLEUE	2013	0,32	0,33	0,03	0,02	22,17	0,09	0,48	0,06	1,00	0,95	2,80	0,03
57	SPA LA FLECHE BLEUE	2014	0,32	0,32	0,03	0,04	22,13	0,17	0,41	0,07	0,07	-0,04	3,80	0,03
57	SPA LA FLECHE BLEUE	2015	0,00	0,32	0,03	0,00	22,21	0,07	0,31	0,13	0,19	0,08	3,70	0,05
57	SPA LA FLECHE BLEUE	2016	0,00	0,00	0,04	0,01	22,11	0,04	0,18	0,18	0,04	-0,10	3,20	0,06
57	SPA LA FLECHE BLEUE	2017	0,00	0,00	0,03	0,05	22,15	0,05	0,19	0,16	0,10	0,04	1,30	0,06
57	SPA LA FLECHE BLEUE	2018	0,05	0,00	0,03	0,06	22,15	0,02	0,14	0,18	0,06	0,00	1,20	0,04

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57	SPA LA FLECHE BLEUE	2019	0,05	0,05	0,03	0,02	22,27	0,04	0,20	0,17	0,11	0,13	1,00	0,02
57	SPA LA FLECHE BLEUE	2020	0,05	0,05	0,02	0,02	22,29	0,01	0,20	0,16	0,09	0,02	-5,10	0,02
58	SPA LABORATOIRES INPHA-MEDIS	2010	0,00	0,00	0,03	0,42	20,49	0,22	0,19	0,13	-0,04	0,72	3,60	0,04
58	SPA LABORATOIRES INPHA-MEDIS	2011	0,04	0,00	0,16	0,32	20,73	0,35	0,09	0,13	-0,31	0,27	2,90	0,05
58	SPA LABORATOIRES INPHA-MEDIS	2012	0,06	0,04	0,12	0,25	21,07	0,39	0,10	0,14	1,45	0,40	3,40	0,09
58	SPA LABORATOIRES INPHA-MEDIS	2013	0,03	0,06	0,14	0,22	21,51	0,22	0,10	0,24	0,62	0,55	2,80	0,03
58	SPA LABORATOIRES INPHA-MEDIS	2014	0,03	0,03	0,15	0,11	21,66	0,48	0,18	0,08	0,15	0,16	3,80	0,03
58	SPA LABORATOIRES INPHA-MEDIS	2015	0,03	0,03	0,09	0,04	22,29	0,29	0,28	0,22	1,05	0,88	3,70	0,05
58	SPA LABORATOIRES INPHA-MEDIS	2016	0,03	0,03	0,05	0,07	22,63	0,16	0,39	0,19	0,72	0,40	3,20	0,06
58	SPA LABORATOIRES INPHA-MEDIS	2017	0,02	0,03	0,04	0,04	22,89	0,17	0,34	0,29	0,10	0,30	1,30	0,06
58	SPA LABORATOIRES INPHA-MEDIS	2018	0,32	0,02	0,01	0,15	22,63	0,04	0,30	0,29	-0,09	-0,23	1,20	0,04
58	SPA LABORATOIRES INPHA-MEDIS	2019	0,18	0,32	0,01	0,15	22,67	0,04	0,15	0,36	0,18	0,04	1,00	0,02
58	SPA LABORATOIRES INPHA-MEDIS	2020	0,09	0,18	0,03	0,14	22,69	-0,04	0,02	0,43	0,00	0,02	-5,10	0,02
59	SPA LAITERIE BETOUCHE	2010	0,07	0,56	0,09	0,05	20,70	-0,04	0,10	0,45	0,70	0,43	3,60	0,04
59	SPA LAITERIE BETOUCHE	2011	0,25	0,07	0,14	0,06	20,79	0,11	0,08	0,37	-0,03	0,09	2,90	0,05
59	SPA LAITERIE BETOUCHE	2012	0,16	0,25	0,09	0,05	21,22	0,36	0,12	0,31	0,26	0,54	3,40	0,09
59	SPA LAITERIE BETOUCHE	2013	0,00	0,16	0,03	0,00	21,45	0,14	0,04	0,49	0,19	0,26	2,80	0,03
59	SPA LAITERIE BETOUCHE	2014	0,00	0,00	0,05	0,03	21,26	0,25	0,09	0,29	0,00	-0,17	3,80	0,03
59	SPA LAITERIE BETOUCHE	2015	0,00	0,00	0,03	0,03	21,30	0,30	0,10	0,28	0,00	0,04	3,70	0,05
59	SPA LAITERIE BETOUCHE	2016	0,00	0,00	0,03	0,00	21,20	0,45	0,06	0,22	-0,05	-0,10	3,20	0,06
59	SPA LAITERIE BETOUCHE	2017	0,00	0,00	0,02	0,01	21,05	0,59	0,04	0,10	0,02	-0,14	1,30	0,06
59	SPA LAITERIE BETOUCHE	2018	0,00	0,00	0,02	0,03	20,98	0,58	0,02	0,05	-0,07	-0,07	1,20	0,04
59	SPA LAITERIE BETOUCHE	2019	0,31	0,00	0,01	0,12	21,06	0,50	0,01	0,12	0,05	0,08	1,00	0,02
59	SPA LAITERIE BETOUCHE	2020	0,26	0,31	0,01	0,09	21,09	0,62	0,06	0,08	0,07	0,03	-5,10	0,02
60	SPA LES GRANDS MOULINS BELGHIT	2010	0,05	0,11	0,02	0,02	21,04	-0,01	0,06	0,19	0,29	-0,16	3,60	0,04
60	SPA LES GRANDS MOULINS BELGHIT	2011	0,00	0,05	0,00	0,01	21,01	0,06	0,11	0,12	0,02	-0,03	2,90	0,05
60	SPA LES GRANDS MOULINS BELGHIT	2012	0,00	0,00	0,04	0,02	21,06	0,08	0,12	0,10	0,03	0,05	3,40	0,09
60	SPA LES GRANDS MOULINS BELGHIT	2013	0,45	0,00	0,02	0,10	21,20	0,12	0,16	0,14	-0,07	0,15	2,80	0,03

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60	SPA LES GRANDS MOULINS BELGHIT	2014	0,00	0,45	0,01	0,02	21,38	0,14	0,24	0,18	0,25	0,20	3,80	0,03
60	SPA LES GRANDS MOULINS BELGHIT	2015	0,00	0,00	0,01	0,01	21,56	0,14	0,30	0,21	0,14	0,20	3,70	0,05
60	SPA LES GRANDS MOULINS BELGHIT	2016	0,00	0,00	0,00	0,01	21,66	0,22	0,26	0,30	0,02	0,11	3,20	0,06
60	SPA LES GRANDS MOULINS BELGHIT	2017	0,90	0,00	0,00	0,00	21,75	0,25	0,19	0,40	0,00	0,09	1,30	0,06
60	SPA LES GRANDS MOULINS BELGHIT	2018	0,05	0,90	0,01	0,00	21,83	0,33	0,24	0,38	0,00	0,08	1,20	0,04
60	SPA LES GRANDS MOULINS BELGHIT	2019	0,00	0,05	0,01	0,01	22,00	0,41	0,28	0,39	0,18	0,19	1,00	0,02
60	SPA LES GRANDS MOULINS BELGHIT	2020	0,23	0,00	0,01	0,04	22,00	0,50	0,32	0,34	-0,15	0,00	-5,10	0,02
61	SPA LES MOULINS AZZOUZ	2010	0,00	0,00	0,00	0,03	20,91	0,41	0,30	0,39	1,60	0,01	3,60	0,04
61	SPA LES MOULINS AZZOUZ	2011	0,00	0,00	0,00	0,05	20,92	0,37	0,31	0,38	0,04	0,01	2,90	0,05
61	SPA LES MOULINS AZZOUZ	2012	0,00	0,00	0,01	0,03	20,94	0,45	0,30	0,39	-0,01	0,02	3,40	0,09
61	SPA LES MOULINS AZZOUZ	2013	0,00	0,00	0,01	0,07	21,01	0,34	0,27	0,42	0,06	0,07	2,80	0,03
61	SPA LES MOULINS AZZOUZ	2014	0,00	0,00	0,01	0,03	20,97	0,34	0,28	0,39	0,04	-0,04	3,80	0,03
61	SPA LES MOULINS AZZOUZ	2015	0,00	0,00	0,01	0,03	21,00	0,23	0,20	0,47	0,14	0,03	3,70	0,05
61	SPA LES MOULINS AZZOUZ	2016	0,00	0,00	0,01	0,02	21,12	0,23	0,22	0,48	0,09	0,13	3,20	0,06
61	SPA LES MOULINS AZZOUZ	2017	0,00	0,00	-0,04	0,01	21,21	0,18	0,18	0,59	0,07	0,09	1,30	0,06
61	SPA LES MOULINS AZZOUZ	2018	0,00	0,00	0,00	0,01	21,24	0,27	0,36	0,41	0,00	0,03	1,20	0,04
61	SPA LES MOULINS AZZOUZ	2019	0,00	0,00	0,00	0,02	21,27	0,29	0,36	0,42	0,09	0,03	1,00	0,02
61	SPA LES MOULINS AZZOUZ	2020	0,00	0,00	-0,04	0,02	21,25	0,33	0,38	0,43	0,00	-0,02	-5,10	0,02
62	SPA LES MOULINS DE LA CHORFA	2010	0,00	0,00	0,01	0,02	22,20	0,05	0,34	0,10	0,31	0,43	3,60	0,04
62	SPA LES MOULINS DE LA CHORFA	2011	0,00	0,00	0,01	0,02	22,34	0,19	0,28	0,23	0,00	0,15	2,90	0,05
62	SPA LES MOULINS DE LA CHORFA	2012	0,03	0,00	0,03	0,01	22,54	0,04	0,16	0,41	0,00	0,22	3,40	0,09
62	SPA LES MOULINS DE LA CHORFA	2013	0,19	0,03	0,01	0,01	22,77	0,04	0,12	0,53	0,00	0,26	2,80	0,03
62	SPA LES MOULINS DE LA CHORFA	2014	0,23	0,19	0,01	0,01	22,74	0,00	0,10	0,53	0,08	-0,03	3,80	0,03
62	SPA LES MOULINS DE LA CHORFA	2015	0,36	0,23	0,00	0,01	22,71	-0,03	0,09	0,54	0,11	-0,03	3,70	0,05
62	SPA LES MOULINS DE LA CHORFA	2016	0,24	0,36	0,01	0,03	22,69	0,08	0,11	0,49	0,01	-0,02	3,20	0,06
62	SPA LES MOULINS DE LA CHORFA	2017	0,00	0,24	0,01	0,05	22,95	-0,11	0,17	0,53	0,26	0,30	1,30	0,06
62	SPA LES MOULINS DE LA CHORFA	2018	0,00	0,00	0,08	0,03	22,83	-0,04	0,16	0,41	0,00	-0,11	1,20	0,04
62	SPA LES MOULINS DE LA CHORFA	2019	0,03	0,00	0,04	0,01	23,76	0,19	0,29	0,48	0,55	1,53	1,00	0,02

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62	SPA LES MOULINS DE LA CHORFA	2020	0,03	0,03	0,05	0,01	23,72	0,20	0,32	0,39	0,76	-0,04	-5,10	0,02
63	SPA MARGARINERIE LABELLE	2010	0,00	0,00	0,05	0,05	21,35	-0,06	0,01	0,66	0,00	0,43	3,60	0,04
63	SPA MARGARINERIE LABELLE	2011	0,00	0,00	0,05	0,04	21,47	0,05	0,01	0,66	0,00	0,13	2,90	0,05
63	SPA MARGARINERIE LABELLE	2012	0,00	0,00	0,03	0,00	22,01	0,34	0,00	0,60	-0,96	0,72	3,40	0,09
63	SPA MARGARINERIE LABELLE	2013	0,00	0,00	0,02	0,00	22,27	0,31	0,00	0,67	0,07	0,30	2,80	0,03
63	SPA MARGARINERIE LABELLE	2014	0,00	0,00	0,02	0,00	22,25	0,34	0,00	0,64	0,02	-0,02	3,80	0,03
63	SPA MARGARINERIE LABELLE	2015	0,15	0,00	0,02	0,00	22,10	0,48	0,14	0,43	0,44	-0,14	3,70	0,05
63	SPA MARGARINERIE LABELLE	2016	0,00	0,15	0,01	0,02	22,45	0,36	0,09	0,59	0,06	0,42	3,20	0,06
63	SPA MARGARINERIE LABELLE	2017	0,00	0,00	0,02	0,00	22,50	0,35	0,13	0,54	0,33	0,05	1,30	0,06
63	SPA MARGARINERIE LABELLE	2018	0,24	0,00	0,01	0,01	22,39	0,41	0,14	0,48	0,01	-0,10	1,20	0,04
63	SPA MARGARINERIE LABELLE	2019	0,13	0,24	0,01	0,00	22,38	0,52	0,11	0,38	0,02	-0,01	1,00	0,02
63	SPA MARGARINERIE LABELLE	2020	0,12	0,13	0,01	0,01	22,28	0,57	0,08	0,34	0,00	-0,10	-5,10	0,02
64	SPA MOULINS DE MAHDIA	2010	0,00	0,00	0,01	0,00	21,75	0,06	0,49	0,06	1,41	0,43	3,60	0,04
64	SPA MOULINS DE MAHDIA	2011	0,22	0,00	0,02	0,00	21,74	-0,03	0,36	0,16	0,01	-0,01	2,90	0,05
64	SPA MOULINS DE MAHDIA	2012	0,00	0,22	-0,01	0,00	21,69	-0,14	0,21	0,23	0,00	-0,05	3,40	0,09
64	SPA MOULINS DE MAHDIA	2013	0,00	0,00	0,04	0,00	21,74	-0,05	0,21	0,23	0,00	0,05	2,80	0,03
64	SPA MOULINS DE MAHDIA	2014	0,05	0,00	0,03	0,00	21,79	0,05	0,21	0,22	0,00	0,05	3,80	0,03
64	SPA MOULINS DE MAHDIA	2015	0,05	0,05	0,03	0,00	21,79	0,11	0,19	0,21	0,00	0,00	3,70	0,05
64	SPA MOULINS DE MAHDIA	2016	0,07	0,05	0,04	0,07	21,78	0,12	0,17	0,18	0,00	-0,01	3,20	0,06
64	SPA MOULINS DE MAHDIA	2017	0,05	0,07	0,05	0,07	21,82	0,19	0,16	0,18	0,01	0,04	1,30	0,06
64	SPA MOULINS DE MAHDIA	2018	0,90	0,05	0,03	0,07	21,83	0,23	0,12	0,18	0,00	0,01	1,20	0,04
64	SPA MOULINS DE MAHDIA	2019	0,90	0,90	0,02	0,07	21,81	0,24	0,12	0,18	0,01	-0,02	1,00	0,02
64	SPA MOULINS DE MAHDIA	2020	0,90	0,90	0,02	0,07	21,83	0,25	0,11	0,20	-0,31	0,02	-5,10	0,02
65	SPA NATRA INTERNATIONAL	2010	0,29	0,28	0,10	0,13	21,53	0,51	0,15	0,28	0,47	-0,61	3,60	0,04
65	SPA NATRA INTERNATIONAL	2011	0,29	0,29	0,12	0,17	21,78	0,40	0,14	0,32	0,29	0,28	2,90	0,05
65	SPA NATRA INTERNATIONAL	2012	0,20	0,29	0,09	0,11	21,82	0,52	0,20	0,22	1,62	0,04	3,40	0,09
65	SPA NATRA INTERNATIONAL	2013	0,19	0,20	0,08	0,16	21,98	0,55	0,20	0,24	-0,43	0,17	2,80	0,03
65	SPA NATRA INTERNATIONAL	2014	0,40	0,19	0,09	0,13	22,26	0,44	0,02	0,40	0,08	0,32	3,80	0,03

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65	SPA NATRA INTERNATIONAL	2015	0,27	0,40	0,04	0,07	22,42	0,68	0,07	0,38	0,15	0,17	3,70	0,05
65	SPA NATRA INTERNATIONAL	2016	0,28	0,27	0,09	0,04	22,42	0,70	0,03	0,31	0,29	0,00	3,20	0,06
65	SPA NATRA INTERNATIONAL	2017	0,29	0,28	0,09	0,04	22,51	0,79	0,04	0,24	-0,07	0,09	1,30	0,06
65	SPA NATRA INTERNATIONAL	2018	0,15	0,29	0,06	0,01	22,59	0,78	0,04	0,25	0,15	0,08	1,20	0,04
65	SPA NATRA INTERNATIONAL	2019	0,12	0,15	0,04	0,03	22,61	0,80	0,07	0,21	0,07	0,02	1,00	0,02
65	SPA NATRA INTERNATIONAL	2020	0,10	0,12	0,03	0,02	22,86	0,72	0,05	0,35	0,13	0,28	-5,10	0,02
66	SPA PROM BATI	2010	0,98	0,98	0,00	0,00	21,82	-0,02	0,44	0,02	1,93	1,25	3,60	0,04
66	SPA PROM BATI	2011	0,99	0,98	0,00	0,01	21,49	-0,04	0,20	0,05	-0,19	-0,28	2,90	0,05
66	SPA PROM BATI	2012	0,00	0,99	0,00	0,04	22,19	-0,39	0,15	0,48	0,67	1,01	3,40	0,09
66	SPA PROM BATI	2013	0,84	0,00	0,00	0,01	22,75	-0,06	0,68	0,10	0,57	0,75	2,80	0,03
66	SPA PROM BATI	2014	0,00	0,84	0,00	0,02	22,44	-0,21	0,38	0,33	0,26	-0,27	3,80	0,03
66	SPA PROM BATI	2015	0,00	0,00	0,00	0,00	22,89	-0,21	0,61	0,21	0,00	0,57	3,70	0,05
66	SPA PROM BATI	2016	0,00	0,00	0,00	0,01	23,40	-0,32	0,50	0,38	0,42	0,67	3,20	0,06
66	SPA PROM BATI	2017	0,27	0,00	0,00	0,00	23,55	-0,42	0,41	0,49	0,13	0,16	1,30	0,06
66	SPA PROM BATI	2018	0,00	0,27	0,00	0,00	23,51	-0,59	0,23	0,67	-0,02	-0,04	1,20	0,04
66	SPA PROM BATI	2019	0,00	0,00	0,00	0,00	23,52	-0,66	0,14	0,76	-0,05	0,01	1,00	0,02
66	SPA PROM BATI	2020	0,00	0,00	0,00	0,00	23,51	-0,69	0,11	0,78	0,00	-0,01	-5,10	0,02
67	SPA SOCIETE GUEDILA	2010	0,00	0,00	0,12	0,09	21,07	-0,07	0,37	0,29	0,64	0,26	3,60	0,04
67	SPA SOCIETE GUEDILA	2011	0,41	0,00	0,20	0,19	21,29	0,04	0,30	0,22	0,14	0,25	2,90	0,05
67	SPA SOCIETE GUEDILA	2012	0,52	0,41	0,30	0,37	21,47	-0,09	0,05	0,33	0,07	0,20	3,40	0,09
67	SPA SOCIETE GUEDILA	2013	0,35	0,52	0,20	0,18	21,90	0,08	0,36	0,14	0,79	0,54	2,80	0,03
67	SPA SOCIETE GUEDILA	2014	0,88	0,35	0,30	0,36	22,09	-0,06	0,13	0,20	0,12	0,21	3,80	0,03
67	SPA SOCIETE GUEDILA	2015	0,97	0,88	0,39	0,31	22,09	0,07	0,06	0,15	0,10	0,00	3,70	0,05
67	SPA SOCIETE GUEDILA	2016	0,32	0,97	0,30	0,25	22,33	0,11	0,16	0,20	0,19	0,27	3,20	0,06
67	SPA SOCIETE GUEDILA	2017	1,02	0,32	0,31	0,21	22,59	0,13	0,09	0,17	0,28	0,30	1,30	0,06
67	SPA SOCIETE GUEDILA	2018	1,26	1,02	0,33	0,09	22,45	0,27	0,07	0,12	0,03	-0,13	1,20	0,04
67	SPA SOCIETE GUEDILA	2019	1,72	1,26	0,36	0,11	22,38	0,20	0,04	0,18	0,01	-0,07	1,00	0,02
67	SPA SOCIETE GUEDILA	2020	1,16	1,72	0,48	0,11	22,32	0,23	0,01	0,35	-0,16	-0,06	-5,10	0,02

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68	SPA SODINCO	2010	0,00	0,00	0,05	0,05	21,23	0,63	0,02	0,59	0,07	0,43	3,60	0,04
68	SPA SODINCO	2011	0,00	0,00	0,09	0,06	20,99	0,71	0,05	0,36	-0,15	-0,21	2,90	0,05
68	SPA SODINCO	2012	0,00	0,00	0,01	0,10	20,88	0,66	0,03	0,30	0,81	-0,10	3,40	0,09
68	SPA SODINCO	2013	0,00	0,00	0,12	0,12	21,06	0,58	0,09	0,23	0,00	0,20	2,80	0,03
68	SPA SODINCO	2014	0,00	0,00	0,02	0,13	21,00	0,53	0,04	0,22	0,45	-0,06	3,80	0,03
68	SPA SODINCO	2015	0,00	0,00	0,01	0,12	20,98	0,54	0,02	0,21	0,08	-0,02	3,70	0,05
68	SPA SODINCO	2016	0,00	0,00	0,00	0,14	21,02	0,53	0,00	0,26	0,03	0,04	3,20	0,06
68	SPA SODINCO	2017	0,00	0,00	0,00	0,16	20,95	0,55	0,00	0,20	-0,04	-0,07	1,30	0,06
68	SPA SODINCO	2018	0,00	0,00	0,00	0,16	20,95	0,56	0,00	0,21	0,00	0,00	1,20	0,04
68	SPA SODINCO	2019	0,00	0,00	0,01	0,15	20,95	0,58	0,00	0,20	0,05	0,00	1,00	0,02
68	SPA SODINCO	2020	0,00	0,00	0,01	0,15	20,97	0,58	0,00	0,21	0,08	0,02	-5,10	0,02
69	SPA TCHIN LAIT	2010	0,00	0,00	0,19	0,08	21,99	0,12	0,13	0,47	0,02	0,43	3,60	0,04
69	SPA TCHIN LAIT	2011	0,22	0,00	0,19	0,01	22,20	0,35	0,13	0,36	0,04	0,23	2,90	0,05
69	SPA TCHIN LAIT	2012	0,71	0,22	0,25	0,10	22,45	0,34	0,09	0,21	0,23	0,28	3,40	0,09
69	SPA TCHIN LAIT	2013	-1,50	0,71	0,00	0,09	22,25	0,20	0,06	0,30	0,13	-0,18	2,80	0,03
69	SPA TCHIN LAIT	2014	0,01	-1,50	0,15	0,12	22,61	0,20	0,06	0,34	0,12	0,43	3,80	0,03
69	SPA TCHIN LAIT	2015	0,93	0,01	0,26	0,10	22,62	0,43	0,04	0,12	0,04	0,01	3,70	0,05
69	SPA TCHIN LAIT	2016	0,00	0,93	0,25	0,34	22,81	0,10	0,04	0,21	0,14	0,21	3,20	0,06
69	SPA TCHIN LAIT	2017	0,15	0,00	0,20	0,07	23,55	0,31	0,13	0,21	1,44	1,10	1,30	0,06
69	SPA TCHIN LAIT	2018	0,01	0,15	0,16	0,14	23,65	0,22	0,07	0,17	0,07	0,11	1,20	0,04
69	SPA TCHIN LAIT	2019	0,64	0,01	0,17	0,18	23,87	0,28	0,09	0,16	0,16	0,25	1,00	0,02
69	SPA TCHIN LAIT	2020	0,00	0,64	0,11	0,03	23,87	0,45	0,12	0,13	0,05	0,00	-5,10	0,02
70	SARL BAALOUDJ ET FILS	2010	0,00	0,00	0,08	0,11	20,21	-0,18	0,22	0,25	0,79	0,43	3,60	0,04
70	SARL BAALOUDJ ET FILS	2011	0,00	0,00	0,13	0,15	20,52	-0,17	0,07	0,23	0,03	0,35	2,90	0,05
70	SARL BAALOUDJ ET FILS	2012	0,00	0,00	-0,04	0,20	20,48	-0,22	0,08	0,31	0,03	-0,04	3,40	0,09
70	SARL BAALOUDJ ET FILS	2013	0,00	0,00	0,11	0,13	19,40	-0,10	0,03	0,27	0,09	-0,66	2,80	0,03
70	SARL BAALOUDJ ET FILS	2014	0,00	0,00	-0,15	0,00	19,48	-0,03	0,00	0,04	0,04	0,09	3,80	0,03
70	SARL BAALOUDJ ET FILS	2015	0,00	0,00	0,11	0,03	20,42	0,08	0,12	0,32	0,16	1,55	3,70	0,05

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70	SARL BAALLOUDJ ET FILS	2016	0,00	0,00	0,04	0,25	20,34	0,05	0,12	0,19	0,00	-0,07	3,20	0,06
70	SARL BAALLOUDJ ET FILS	2017	0,00	0,00	0,06	0,41	20,36	0,01	0,06	0,18	0,01	0,02	1,30	0,06
70	SARL BAALLOUDJ ET FILS	2018	0,00	0,00	0,01	0,20	20,14	0,39	0,00	0,08	0,00	-0,20	1,20	0,04
70	SARL BAALLOUDJ ET FILS	2019	0,00	0,00	-0,63	0,28	19,00	0,20	0,12	0,22	0,01	-0,68	1,00	0,02
70	SARL BAALLOUDJ ET FILS	2020	0,00	0,00	0,03	0,57	19,14	-0,12	0,11	0,30	0,00	0,16	-5,10	0,02
71	SARL BIOLUXE	2010	0,32	0,31	0,01	0,00	21,57	0,27	0,10	0,78	0,97	0,40	3,60	0,04
71	SARL BIOLUXE	2011	0,33	0,32	0,01	0,00	21,94	0,34	0,40	0,47	-0,01	0,44	2,90	0,05
71	SARL BIOLUXE	2012	0,25	0,33	0,01	0,00	22,29	0,44	0,38	0,50	0,20	0,42	3,40	0,09
71	SARL BIOLUXE	2013	0,20	0,25	0,00	0,00	21,60	0,56	0,57	0,38	0,43	-0,50	2,80	0,03
71	SARL BIOLUXE	2014	0,21	0,20	0,00	0,00	21,70	0,66	0,60	0,34	0,06	0,11	3,80	0,03
71	SARL BIOLUXE	2015	0,22	0,21	0,01	0,00	21,83	0,60	0,59	0,33	-0,10	0,13	3,70	0,05
71	SARL BIOLUXE	2016	0,21	0,22	0,01	0,00	22,18	0,74	0,69	0,25	-0,09	0,43	3,20	0,06
71	SARL BIOLUXE	2017	0,19	0,21	0,00	0,00	22,05	0,82	0,77	0,16	0,07	-0,13	1,30	0,06
71	SARL BIOLUXE	2018	0,21	0,19	0,01	0,00	22,74	0,74	0,71	0,23	0,22	1,01	1,20	0,04
71	SARL BIOLUXE	2019	0,19	0,21	0,01	0,00	21,89	0,73	0,73	0,21	0,22	-0,57	1,00	0,02
71	SARL BIOLUXE	2020	0,15	0,19	0,00	0,00	20,74	0,78	0,77	0,16	0,06	-0,68	-5,10	0,02
72	SARL CORSO CERAM	2010	0,02	0,08	0,00	0,00	19,91	-0,18	0,27	0,32	0,44	0,67	3,60	0,04
72	SARL CORSO CERAM	2011	0,10	0,02	0,05	0,04	20,83	-0,01	0,39	0,19	-0,20	1,51	2,90	0,05
72	SARL CORSO CERAM	2012	0,15	0,10	0,04	0,04	20,92	-0,02	0,33	0,20	0,04	0,09	3,40	0,09
72	SARL CORSO CERAM	2013	0,17	0,15	0,05	0,04	20,91	-0,09	0,23	0,24	0,07	-0,01	2,80	0,03
72	SARL CORSO CERAM	2014	0,52	0,17	0,09	0,09	21,04	-0,14	0,08	0,28	0,01	0,15	3,80	0,03
72	SARL CORSO CERAM	2015	0,52	0,52	0,09	0,09	20,91	0,01	0,12	0,21	0,01	-0,13	3,70	0,05
72	SARL CORSO CERAM	2016	0,00	0,52	0,13	0,14	21,14	0,07	0,05	0,14	0,00	0,26	3,20	0,06
72	SARL CORSO CERAM	2017	0,00	0,00	0,09	0,09	20,89	0,20	0,05	0,10	0,00	-0,22	1,30	0,06
72	SARL CORSO CERAM	2018	0,00	0,00	0,06	0,05	21,03	0,21	0,35	0,08	0,02	0,16	1,20	0,04
72	SARL CORSO CERAM	2019	0,00	0,00	0,04	0,04	21,01	0,27	0,41	0,08	0,63	-0,03	1,00	0,02
72	SARL CORSO CERAM	2020	-0,82	0,00	-0,03	0,00	20,79	0,32	0,46	0,11	0,01	-0,19	-5,10	0,02
73	SARL INNOVATION TRANSFORMARTION	2010	0,73	0,75	0,02	0,05	21,00	0,06	0,02	0,16	1,17	-0,23	3,60	0,04

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73	SARL INNOVATION TRANSFORMARTION	2011	0,80	0,73	0,02	0,04	21,02	0,07	0,01	0,13	0,37	0,02	2,90	0,05
73	SARL INNOVATION TRANSFORMARTION	2012	0,79	0,80	0,02	0,03	21,12	0,12	0,06	0,13	0,04	0,10	3,40	0,09
73	SARL INNOVATION TRANSFORMARTION	2013	0,70	0,79	0,01	0,03	21,15	0,07	0,05	0,13	0,00	0,03	2,80	0,03
73	SARL INNOVATION TRANSFORMARTION	2014	0,86	0,70	0,02	0,04	21,21	0,09	0,05	0,10	0,01	0,07	3,80	0,03
73	SARL INNOVATION TRANSFORMARTION	2015	0,70	0,86	0,01	0,03	21,38	0,11	0,05	0,13	0,01	0,18	3,70	0,05
73	SARL INNOVATION TRANSFORMARTION	2016	0,14	0,70	0,01	0,01	21,44	0,12	0,06	0,17	0,02	0,06	3,20	0,06
73	SARL INNOVATION TRANSFORMARTION	2017	0,11	0,14	0,01	0,01	20,96	0,12	0,05	0,16	0,00	-0,38	1,30	0,06
73	SARL INNOVATION TRANSFORMARTION	2018	0,20	0,11	0,01	0,01	21,36	0,16	0,07	0,15	0,00	0,48	1,20	0,04
73	SARL INNOVATION TRANSFORMARTION	2019	0,15	0,20	0,01	0,01	21,15	0,15	0,04	0,21	0,01	-0,19	1,00	0,02
73	SARL INNOVATION TRANSFORMARTION	2020	0,14	0,15	0,00	0,01	20,94	0,16	0,03	0,19	0,08	-0,19	-5,10	0,02
74	SARL LAOUINI ET FILS	2010	0,96	0,95	0,06	0,05	18,46	0,47	0,00	0,31	-0,99	0,04	3,60	0,04
74	SARL LAOUINI ET FILS	2011	0,95	0,96	0,06	0,05	18,65	0,40	0,01	0,42	0,15	0,22	2,90	0,05
74	SARL LAOUINI ET FILS	2012	0,86	0,95	0,05	0,04	19,84	0,04	0,00	0,74	1,27	2,29	3,40	0,09
74	SARL LAOUINI ET FILS	2013	0,75	0,86	0,04	0,03	20,28	0,05	0,13	0,70	0,92	0,55	2,80	0,03
74	SARL LAOUINI ET FILS	2014	0,86	0,75	0,05	0,04	20,68	0,06	0,07	0,78	-0,05	0,49	3,80	0,03
74	SARL LAOUINI ET FILS	2015	0,86	0,86	0,05	0,04	21,45	-0,01	0,05	0,85	1,04	1,17	3,70	0,05
74	SARL LAOUINI ET FILS	2016	0,76	0,86	0,05	0,04	21,42	-0,11	0,03	0,88	1,05	-0,03	3,20	0,06
74	SARL LAOUINI ET FILS	2017	0,76	0,76	0,05	0,04	21,71	-0,05	0,01	0,90	0,03	0,33	1,30	0,06
74	SARL LAOUINI ET FILS	2018	0,70	0,76	0,03	0,02	21,19	-0,01	0,00	0,91	-0,01	-0,40	1,20	0,04
74	SARL LAOUINI ET FILS	2019	0,50	0,70	0,02	0,01	20,59	-0,01	0,00	0,91	0,20	-0,45	1,00	0,02
74	SARL LAOUINI ET FILS	2020	0,49	0,50	0,02	0,01	20,45	0,02	0,00	0,89	0,05	-0,13	-5,10	0,02
75	SARL MAGIMIX DE LEZZAR	2010	0,00	0,00	0,30	0,04	19,41	0,15	0,04	0,49	0,32	0,79	3,60	0,04
75	SARL MAGIMIX DE LEZZAR	2011	0,00	0,00	0,24	0,10	19,47	0,18	0,00	0,43	0,38	0,07	2,90	0,05
75	SARL MAGIMIX DE LEZZAR	2012	0,00	0,00	0,16	0,10	19,77	0,16	0,00	0,42	0,13	0,35	3,40	0,09
75	SARL MAGIMIX DE LEZZAR	2013	0,00	0,00	0,12	0,21	19,85	0,30	0,00	0,33	0,04	0,09	2,80	0,03
75	SARL MAGIMIX DE LEZZAR	2014	0,00	0,00	0,07	0,20	19,61	0,36	0,00	0,30	0,03	-0,21	3,80	0,03
75	SARL MAGIMIX DE LEZZAR	2015	0,00	0,00	0,05	0,12	19,60	0,58	0,00	0,22	-0,02	-0,02	3,70	0,05
75	SARL MAGIMIX DE LEZZAR	2016	0,88	0,00	0,06	0,13	19,56	0,56	0,00	0,25	0,05	-0,04	3,20	0,06

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75	SARL MAGIMIX DE LEZZAR	2017	1,59	0,88	0,06	0,22	19,96	0,31	0,00	0,32	0,43	0,50	1,30	0,06
75	SARL MAGIMIX DE LEZZAR	2018	0,00	1,59	0,07	0,12	19,98	0,23	0,00	0,47	0,27	0,02	1,20	0,04
75	SARL MAGIMIX DE LEZZAR	2019	0,02	0,00	0,06	0,09	20,00	0,35	0,12	0,25	0,43	0,02	1,00	0,02
75	SARL MAGIMIX DE LEZZAR	2020	0,00	0,02	0,05	0,14	19,94	0,41	0,12	0,19	0,00	-0,05	-5,10	0,02
76	SARL TAPIS MAGHREB	2010	0,33	0,33	0,01	0,02	18,69	0,63	0,00	0,16	0,95	-0,70	3,60	0,04
76	SARL TAPIS MAGHREB	2011	0,34	0,33	0,01	0,03	19,48	0,62	0,00	0,18	0,02	1,22	2,90	0,05
76	SARL TAPIS MAGHREB	2012	0,32	0,34	0,01	0,02	19,55	0,66	0,00	0,21	0,00	0,07	3,40	0,09
76	SARL TAPIS MAGHREB	2013	0,63	0,32	0,00	0,01	21,07	0,67	0,09	0,19	0,09	3,58	2,80	0,03
76	SARL TAPIS MAGHREB	2014	1,11	0,63	0,00	0,00	21,54	0,65	0,16	0,24	0,11	0,60	3,80	0,03
76	SARL TAPIS MAGHREB	2015	1,88	1,11	0,00	0,01	21,32	0,69	0,17	0,24	0,00	-0,20	3,70	0,05
76	SARL TAPIS MAGHREB	2016	0,50	1,88	0,01	0,00	21,59	0,68	0,15	0,24	-0,01	0,32	3,20	0,06
76	SARL TAPIS MAGHREB	2017	0,39	0,50	0,01	0,01	21,37	0,69	0,15	0,21	0,01	-0,20	1,30	0,06
76	SARL TAPIS MAGHREB	2018	0,77	0,39	0,00	0,01	22,19	0,56	0,37	0,15	0,27	1,25	1,20	0,04
76	SARL TAPIS MAGHREB	2019	0,99	0,77	0,00	0,00	21,64	0,50	0,30	0,24	0,00	-0,42	1,00	0,02
76	SARL TAPIS MAGHREB	2020	0,00	0,99	-0,04	0,03	20,91	0,05	0,30	0,29	0,38	-0,52	-5,10	0,02
77	SPA ALCIB ALGERIAN COMPANY	2010	0,00	0,00	0,02	0,08	20,20	0,24	0,39	0,30	0,80	0,06	3,60	0,04
77	SPA ALCIB ALGERIAN COMPANY	2011	1,46	0,00	0,01	0,16	20,17	0,30	0,46	0,24	0,01	-0,03	2,90	0,05
77	SPA ALCIB ALGERIAN COMPANY	2012	1,12	1,46	0,08	0,10	19,46	0,55	0,36	0,12	0,15	-0,51	3,40	0,09
77	SPA ALCIB ALGERIAN COMPANY	2013	0,49	1,12	0,01	0,20	20,01	0,08	0,18	0,52	-0,15	0,73	2,80	0,03
77	SPA ALCIB ALGERIAN COMPANY	2014	0,00	0,49	0,03	0,26	20,67	-0,15	0,06	0,54	0,00	0,93	3,80	0,03
77	SPA ALCIB ALGERIAN COMPANY	2015	0,00	0,00	0,01	0,50	20,06	-0,14	0,03	0,49	-0,01	-0,46	3,70	0,05
77	SPA ALCIB ALGERIAN COMPANY	2016	0,00	0,00	0,02	0,23	19,99	0,13	0,00	0,36	-0,13	-0,07	3,20	0,06
77	SPA ALCIB ALGERIAN COMPANY	2017	0,00	0,00	0,02	0,34	19,60	-0,19	0,00	0,49	0,00	-0,32	1,30	0,06
77	SPA ALCIB ALGERIAN COMPANY	2018	0,00	0,00	0,20	0,53	18,80	-0,22	0,00	0,42	-0,46	-0,55	1,20	0,04
77	SPA ALCIB ALGERIAN COMPANY	2019	0,91	0,00	0,01	0,35	18,71	-0,23	0,00	0,33	0,38	-0,09	1,00	0,02
77	SPA ALCIB ALGERIAN COMPANY	2020	0,33	0,91	0,06	0,36	18,22	-0,18	0,01	0,23	-0,14	-0,38	-5,10	0,02
78	SPA CEVITAL	2010	0,16	0,16	0,09	0,19	25,44	0,12	0,06	0,26	0,24	0,42	3,60	0,04
78	SPA CEVITAL	2011	0,09	0,16	0,04	0,40	25,62	0,11	0,04	0,50	0,56	0,20	2,90	0,05

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78	SPA CEVITAL	2012	0,05	0,09	0,08	0,24	25,79	0,17	0,05	0,35	-0,24	0,19	3,40	0,09
78	SPA CEVITAL	2013	0,06	0,05	0,12	0,06	25,86	0,20	0,12	0,12	0,17	0,07	2,80	0,03
78	SPA CEVITAL	2014	0,06	0,06	0,09	0,05	25,80	0,20	0,07	0,26	0,05	-0,06	3,80	0,03
78	SPA CEVITAL	2015	0,05	0,06	0,10	0,04	25,81	0,17	0,07	0,30	1,40	0,01	3,70	0,05
78	SPA CEVITAL	2016	0,00	0,05	0,05	0,02	25,88	0,26	0,04	0,29	-0,49	0,08	3,20	0,06
78	SPA CEVITAL	2017	0,04	0,00	0,06	0,13	25,90	0,22	0,05	0,38	0,26	0,02	1,30	0,06
78	SPA CEVITAL	2018	0,00	0,04	0,03	0,02	25,83	0,27	0,08	0,32	0,12	-0,07	1,20	0,04
78	SPA CEVITAL	2019	1,31	0,00	0,02	0,01	25,79	0,25	0,07	0,33	0,06	-0,04	1,00	0,02
78	SPA CEVITAL	2020	0,00	1,31	0,02	0,07	25,80	0,09	0,07	0,29	0,27	0,00	-5,10	0,02
79	SPA LAITERIE ARIB	2010	0,00	0,00	-0,04	0,39	20,54	-0,72	0,00	0,91	1,15	0,36	3,60	0,04
79	SPA LAITERIE ARIB	2011	0,00	0,00	0,19	0,25	21,39	-0,46	0,00	0,72	0,04	1,33	2,90	0,05
79	SPA LAITERIE ARIB	2012	0,19	0,00	0,12	0,43	21,36	-0,01	0,45	0,20	0,01	-0,02	3,40	0,09
79	SPA LAITERIE ARIB	2013	0,16	0,19	0,09	0,41	21,49	0,02	0,35	0,25	0,04	0,14	2,80	0,03
79	SPA LAITERIE ARIB	2014	0,58	0,16	0,03	0,28	21,66	-0,22	0,11	0,50	0,10	0,18	3,80	0,03
79	SPA LAITERIE ARIB	2015	0,05	0,58	0,13	0,29	21,69	-0,21	0,08	0,46	0,12	0,04	3,70	0,05
79	SPA LAITERIE ARIB	2016	0,15	0,05	0,12	0,24	21,71	-0,14	0,05	0,43	0,10	0,02	3,20	0,06
79	SPA LAITERIE ARIB	2017	0,00	0,15	0,13	0,19	21,72	-0,07	0,05	0,37	0,16	0,02	1,30	0,06
79	SPA LAITERIE ARIB	2018	0,30	0,00	0,13	0,09	21,90	0,25	0,01	0,11	0,00	0,20	1,20	0,04
79	SPA LAITERIE ARIB	2019	0,00	0,30	0,13	0,14	21,97	0,27	0,00	0,12	0,02	0,07	1,00	0,02
79	SPA LAITERIE ARIB	2020	0,00	0,00	0,10	0,16	21,88	0,33	0,00	0,08	0,02	-0,09	-5,10	0,02
80	SPA METIDJI	2010	0,85	0,91	0,50	0,01	19,31	0,12	0,05	0,01	0,41	0,43	3,60	0,04
80	SPA METIDJI	2011	0,97	0,85	0,48	0,03	19,73	0,16	0,03	0,01	0,00	0,52	2,90	0,05
80	SPA METIDJI	2012	0,99	0,97	0,47	0,03	19,74	0,17	0,05	0,03	0,01	0,01	3,40	0,09
80	SPA METIDJI	2013	1,00	0,99	0,47	0,09	19,67	0,11	0,05	0,02	0,01	-0,07	2,80	0,03
80	SPA METIDJI	2014	1,00	1,00	0,49	0,10	20,11	0,06	0,01	0,01	0,00	0,55	3,80	0,03
80	SPA METIDJI	2015	0,99	1,00	0,47	0,10	20,24	0,08	0,03	0,05	0,01	0,14	3,70	0,05
80	SPA METIDJI	2016	0,99	0,99	0,48	0,06	20,44	0,05	0,01	0,05	0,08	0,22	3,20	0,06
80	SPA METIDJI	2017	0,99	0,99	0,40	0,05	20,40	0,05	0,13	0,07	0,18	-0,04	1,30	0,06

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80	SPA METIDJI	2018	0,85	0,99	0,47	0,01	20,38	0,15	0,11	0,04	0,00	-0,02	1,20	0,04
80	SPA METIDJI	2019	1,00	0,85	0,43	0,01	20,27	0,18	0,11	0,04	0,00	-0,10	1,00	0,02
80	SPA METIDJI	2020	0,99	1,00	0,45	0,00	20,11	0,24	0,12	0,01	0,00	-0,15	-5,10	0,02
81	SPA PROMG II ALGERIE	2010	0,00	0,00	0,00	0,00	18,23	-0,37	0,11	0,42	0,12	-0,64	3,60	0,04
81	SPA PROMG II ALGERIE	2011	0,00	0,00	0,00	0,00	18,42	-0,40	0,07	0,45	0,00	0,21	2,90	0,05
81	SPA PROMG II ALGERIE	2012	0,00	0,00	0,01	0,00	18,22	-0,26	0,15	0,40	0,00	-0,18	3,40	0,09
81	SPA PROMG II ALGERIE	2013	0,00	0,00	0,00	0,00	18,54	-0,26	0,27	0,36	0,24	0,39	2,80	0,03
81	SPA PROMG II ALGERIE	2014	0,00	0,00	0,00	0,00	18,60	-0,40	0,11	0,51	0,00	0,06	3,80	0,03
81	SPA PROMG II ALGERIE	2015	0,00	0,00	0,00	0,00	18,96	-0,32	0,20	0,40	0,00	0,43	3,70	0,05
81	SPA PROMG II ALGERIE	2016	1,00	0,00	0,00	0,00	19,12	-0,32	0,18	0,44	0,02	0,17	3,20	0,06
81	SPA PROMG II ALGERIE	2017	0,23	1,00	0,00	0,00	18,99	-0,30	0,18	0,46	0,00	-0,12	1,30	0,06
81	SPA PROMG II ALGERIE	2018	0,05	0,23	0,00	0,00	19,02	-0,32	0,21	0,40	0,04	0,03	1,20	0,04
81	SPA PROMG II ALGERIE	2019	0,05	0,05	0,00	0,00	19,12	-0,32	0,21	0,41	0,02	0,11	1,00	0,02
81	SPA PROMG II ALGERIE	2020	0,00	0,05	-0,02	0,00	19,05	-0,39	0,21	0,42	0,00	-0,07	-5,10	0,02
82	SARL AFRO TP	2010	0,00	0,00	0,04	0,01	19,01	-0,15	0,00	0,92	0,32	0,43	3,60	0,04
82	SARL AFRO TP	2011	0,00	0,00	0,03	0,01	19,70	-0,03	0,00	0,93	-0,01	0,99	2,90	0,05
82	SARL AFRO TP	2012	0,00	0,00	0,00	0,04	16,44	-0,06	0,00	0,91	0,00	-0,96	3,40	0,09
82	SARL AFRO TP	2013	0,61	0,00	0,01	0,04	17,54	-0,07	0,00	0,90	-0,04	2,01	2,80	0,03
82	SARL AFRO TP	2014	0,86	0,61	0,03	0,13	19,37	-0,06	0,00	0,83	0,43	5,26	3,80	0,03
82	SARL AFRO TP	2015	1,05	0,86	0,03	0,13	19,46	-0,05	0,00	0,83	0,11	0,09	3,70	0,05
82	SARL AFRO TP	2016	1,71	1,05	0,01	0,32	18,80	-0,21	0,00	0,83	-0,02	-0,49	3,20	0,06
82	SARL AFRO TP	2017	1,81	1,71	0,02	0,04	18,88	0,12	0,00	0,78	-0,01	0,08	1,30	0,06
82	SARL AFRO TP	2018	0,00	1,81	0,03	0,14	19,23	0,09	0,10	0,73	0,02	0,42	1,20	0,04
82	SARL AFRO TP	2019	0,00	0,00	0,03	0,12	19,13	0,07	0,00	0,77	0,01	-0,10	1,00	0,02
82	SARL AFRO TP	2020	0,00	0,00	0,02	0,12	18,99	0,06	0,03	0,75	0,20	-0,12	-5,10	0,02
83	SPA ROTHAE M	2010	0,00	0,00	0,05	0,00	20,71	0,34	0,19	0,39	-0,13	-0,25	3,60	0,04
83	SPA ROTHAE M	2011	0,00	0,00	0,00	0,00	20,43	0,27	0,13	0,47	0,84	-0,25	2,90	0,05
83	SPA ROTHAE M	2012	0,00	0,00	0,00	0,00	20,17	0,27	0,09	0,58	0,00	-0,23	3,40	0,09

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83	SPA ROTHAE M	2013	1,17	0,00	0,00	0,00	20,58	0,21	0,07	0,68	0,09	0,51	2,80	0,03
83	SPA ROTHAE M	2014	1,78	1,17	0,00	0,00	21,49	0,11	0,04	0,77	0,20	1,49	3,80	0,03
83	SPA ROTHAE M	2015	0,96	1,78	0,00	0,00	21,18	-0,04	0,05	0,82	0,59	-0,27	3,70	0,05
83	SPA ROTHAE M	2016	1,74	0,96	0,00	0,00	21,16	-0,04	0,04	0,84	0,05	-0,02	3,20	0,06
83	SPA ROTHAE M	2017	0,75	1,74	0,00	0,00	21,38	-0,01	0,06	0,83	0,05	0,25	1,30	0,06
83	SPA ROTHAE M	2018	1,43	0,75	0,00	0,00	21,00	-0,20	0,05	0,84	0,48	-0,32	1,20	0,04
83	SPA ROTHAE M	2019	0,00	1,43	-0,04	0,00	21,02	-0,20	0,05	0,88	-0,02	0,02	1,00	0,02
83	SPA ROTHAE M	2020	0,00	0,00	-0,01	0,00	20,25	-0,20	0,05	0,88	-0,05	-0,54	-5,10	0,02
84	SPA PROFERT	2010	0,52	0,23	0,17	0,15	22,36	0,19	0,06	0,43	0,48	0,37	3,60	0,04
84	SPA PROFERT	2011	0,03	0,52	0,13	0,13	22,55	0,36	0,05	0,45	-0,05	0,20	2,90	0,05
84	SPA PROFERT	2012	0,04	0,03	0,10	0,11	22,74	0,40	0,10	0,42	0,53	0,22	3,40	0,09
84	SPA PROFERT	2013	0,01	0,04	0,13	0,07	22,91	0,48	0,10	0,36	0,14	0,18	2,80	0,03
84	SPA PROFERT	2014	0,11	0,01	0,15	0,02	23,03	0,55	0,09	0,30	0,07	0,13	3,80	0,03
84	SPA PROFERT	2015	0,42	0,11	0,06	0,01	22,99	0,65	0,06	0,43	0,25	-0,05	3,70	0,05
84	SPA PROFERT	2016	0,00	0,42	0,08	0,09	22,51	0,60	0,06	0,17	-0,08	-0,38	3,20	0,06
84	SPA PROFERT	2017	0,49	0,00	0,08	0,20	22,18	0,50	0,02	0,12	0,01	-0,28	1,30	0,06
84	SPA PROFERT	2018	0,51	0,49	0,05	0,05	22,67	0,68	0,04	0,35	0,07	0,64	1,20	0,04
84	SPA PROFERT	2019	0,10	0,51	0,07	0,12	22,76	0,56	0,04	0,28	0,07	0,09	1,00	0,02
84	SPA PROFERT	2020	0,23	0,10	0,10	0,04	22,93	0,73	0,04	0,24	0,03	0,19	-5,10	0,02
85	SPA BOUROUAG CONSTRUCTION	2010	0,99	0,89	0,04	0,01	19,02	0,01	0,43	0,44	0,08	0,43	3,60	0,04
85	SPA BOUROUAG CONSTRUCTION	2011	0,89	0,99	0,05	0,01	19,40	-0,01	0,37	0,49	-0,02	0,46	2,90	0,05
85	SPA BOUROUAG CONSTRUCTION	2012	1,60	0,89	0,05	0,01	19,40	-0,10	0,32	0,55	0,15	0,00	3,40	0,09
85	SPA BOUROUAG CONSTRUCTION	2013	0,72	1,60	0,05	0,01	19,85	-0,05	0,27	0,62	-0,17	0,57	2,80	0,03
85	SPA BOUROUAG CONSTRUCTION	2014	0,65	0,72	0,05	0,01	20,56	0,30	0,22	0,67	-0,72	1,02	3,80	0,03
85	SPA BOUROUAG CONSTRUCTION	2015	0,58	0,65	0,05	0,01	20,90	0,20	0,17	0,72	1,01	0,41	3,70	0,05
85	SPA BOUROUAG CONSTRUCTION	2016	0,52	0,58	0,04	0,01	19,23	0,16	0,13	0,76	0,34	-0,81	3,20	0,06
85	SPA BOUROUAG CONSTRUCTION	2017	0,55	0,52	0,04	0,01	18,79	0,13	0,09	0,80	0,20	-0,35	1,30	0,06
85	SPA BOUROUAG CONSTRUCTION	2018	0,00	0,55	0,03	0,01	22,67	0,12	0,07	0,83	0,30	3,36	1,20	0,04

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85	SPA BOUROUAG CONSTRUCTION	2019	0,00	0,00	0,02	0,06	22,71	0,10	0,07	0,84	-0,18	0,03	1,00	0,02
85	SPA BOUROUAG CONSTRUCTION	2020	0,41	0,00	0,01	0,04	23,03	0,18	0,04	0,87	-0,21	0,38	-5,10	0,02
86	SARL YOUSRA PHARM	2010	0,00	0,00	0,08	0,03	21,10	0,12	0,06	0,87	0,36	0,43	3,60	0,04
86	SARL YOUSRA PHARM	2011	1,41	0,00	0,10	0,00	21,03	0,23	0,08	0,73	-0,47	-0,07	2,90	0,05
86	SARL YOUSRA PHARM	2012	1,01	1,41	0,06	0,00	21,09	0,12	0,06	0,85	0,32	0,07	3,40	0,09
86	SARL YOUSRA PHARM	2013	0,69	1,01	0,07	0,01	21,01	0,13	0,07	0,83	0,51	-0,08	2,80	0,03
86	SARL YOUSRA PHARM	2014	0,00	0,69	0,05	0,02	20,93	0,14	0,04	0,83	-0,10	-0,08	3,80	0,03
86	SARL YOUSRA PHARM	2015	0,48	0,00	0,06	0,02	21,10	0,20	0,00	0,79	-0,04	0,19	3,70	0,05
86	SARL YOUSRA PHARM	2016	0,00	0,48	0,05	0,04	21,17	0,28	0,00	0,80	0,14	0,07	3,20	0,06
86	SARL YOUSRA PHARM	2017	0,00	0,00	0,05	0,05	21,15	0,32	0,00	0,74	-0,09	-0,02	1,30	0,06
86	SARL YOUSRA PHARM	2018	1,00	0,00	0,04	0,04	21,19	0,35	0,00	0,71	0,10	0,04	1,20	0,04
86	SARL YOUSRA PHARM	2019	0,04	1,00	0,04	0,01	21,24	0,40	0,00	0,72	0,00	0,05	1,00	0,02
86	SARL YOUSRA PHARM	2020	1,7	0,04	0,03	0,01	21,21	0,42	0,00	0,68	-0,34	-0,03	-5,10	0,02
87	SARL SUD ETANCH	2010	0,79	0,54	0,40	0,09	20,53	0,33	0,17	0,21	0,83	0,43	3,60	0,04
87	SARL SUD ETANCH	2011	0,00	0,79	0,22	0,12	20,84	0,32	0,12	0,18	-0,26	0,37	2,90	0,05
87	SARL SUD ETANCH	2012	0,30	0,00	0,18	0,12	20,87	0,31	0,08	0,15	0,26	0,03	3,40	0,09
87	SARL SUD ETANCH	2013	1,15	0,30	0,15	0,10	21,00	0,31	0,03	0,16	0,15	0,14	2,80	0,03
87	SARL SUD ETANCH	2014	1,61	1,15	0,16	0,12	21,04	0,24	0,01	0,17	0,23	0,04	3,80	0,03
87	SARL SUD ETANCH	2015	0,29	1,61	0,20	0,14	21,16	0,20	0,06	0,23	0,27	0,12	3,70	0,05
87	SARL SUD ETANCH	2016	1,37	0,29	0,16	0,09	21,18	0,22	0,17	0,15	0,45	0,03	3,20	0,06
87	SARL SUD ETANCH	2017	0,38	1,37	0,12	0,05	21,27	0,15	0,14	0,21	0,25	0,09	1,30	0,06
87	SARL SUD ETANCH	2018	1,71	0,38	0,12	0,14	21,57	0,02	0,09	0,29	0,15	0,35	1,20	0,04
87	SARL SUD ETANCH	2019	0,45	1,71	0,11	0,12	21,64	0,11	0,05	0,30	0,02	0,07	1,00	0,02
87	SARL SUD ETANCH	2020	1,19	0,45	0,13	0,14	21,57	0,15	0,06	0,16	0,08	-0,07	-5,10	0,02
88	SARL SIFCO	2010	0,42	0,23	0,01	0,05	19,10	0,29	0,04	0,64	0,67	0,47	3,60	0,04
88	SARL SIFCO	2011	0,00	0,42	0,01	0,05	19,12	0,29	0,04	0,65	0,07	0,01	2,90	0,05
88	SARL SIFCO	2012	2,04	0,00	0,01	0,12	19,48	0,28	0,11	0,63	0,15	0,44	3,40	0,09
88	SARL SIFCO	2013	0,75	2,04	0,02	0,04	19,58	0,21	0,28	0,54	0,62	0,11	2,80	0,03

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88	SARL SIFCO	2014	2,64	0,75	0,00	0,03	19,66	0,24	0,27	0,54	0,02	0,07	3,80	0,03
88	SARL SIFCO	2015	0,93	2,64	0,02	0,06	19,76	0,26	0,29	0,51	0,05	0,11	3,70	0,05
88	SARL SIFCO	2016	0,96	0,93	0,02	0,02	19,67	0,35	0,33	0,51	0,33	-0,09	3,20	0,06
88	SARL SIFCO	2017	0,86	0,96	0,03	0,01	19,38	0,39	0,30	0,53	-0,05	-0,25	1,30	0,06
88	SARL SIFCO	2018	0,00	0,86	0,01	0,01	19,99	0,20	0,59	0,30	2,49	0,85	1,20	0,04
88	SARL SIFCO	2019	0,00	0,00	0,01	0,01	20,63	0,28	0,52	0,37	-0,10	0,89	1,00	0,02
88	SARL SIFCO	2020	0,65	0,00	0,01	0,02	21,01	0,33	0,47	0,43	0,10	0,47	-5,10	0,02

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ANNEX N 1 BIS : Sample data

ID	Firms	year	EAR	DIV	L1DIV
1	SARL AGRODEEL EQUIPEMENT	2010	22 824 414,77	22 824 414,77	33 528 776,19
1	SARL AGRODEEL EQUIPEMENT	2011	30 634 009,45	20 000 000,07	22 824 414,77
1	SARL AGRODEEL EQUIPEMENT	2012	70 570 876,24	14 994 077,86	20 000 000,07
1	SARL AGRODEEL EQUIPEMENT	2013	97 174 559,04	15 500 000,30	14 994 077,86
1	SARL AGRODEEL EQUIPEMENT	2014	136 912 911,10	17 710 032,50	15 500 000,30
1	SARL AGRODEEL EQUIPEMENT	2015	13 052 304,76	13 052 304,76	17 710 032,50
1	SARL AGRODEEL EQUIPEMENT	2016	103 684 730,80	16 297 695,30	13 052 304,76
1	SARL AGRODEEL EQUIPEMENT	2017	96 774 119,76	10 000 000,06	16 297 695,30
1	SARL AGRODEEL EQUIPEMENT	2018	130 073 840,60	20 000 000,00	10 000 000,06
1	SARL AGRODEEL EQUIPEMENT	2019	137 049 014,10	14 000 000,10	20 000 000,00
1	SARL AGRODEEL EQUIPEMENT	2020	69 427 939,49	5 669 835,46	14 000 000,10
2	SARL BATICERAM KHENFRI	2010	12 495 531,82	0,00	0,00
2	SARL BATICERAM KHENFRI	2011	34 373 541,01	0,00	0,00
2	SARL BATICERAM KHENFRI	2012	105 372 356,44	0,00	0,00
2	SARL BATICERAM KHENFRI	2013	132 423 572,13	0,00	0,00
2	SARL BATICERAM KHENFRI	2014	126 897 480,22	0,00	0,00
2	SARL BATICERAM KHENFRI	2015	-59 637 820,31	0,00	0,00
2	SARL BATICERAM KHENFRI	2016	89 140 080,64	0,00	0,00
2	SARL BATICERAM KHENFRI	2017	54 982 955,74	0,00	0,00
2	SARL BATICERAM KHENFRI	2018	64 996 176,74	0,00	0,00
2	SARL BATICERAM KHENFRI	2019	33 955 318,71	0,00	0,00
2	SARL BATICERAM KHENFRI	2020	6 445 592,12	0,00	0,00
3	SARL CAPSU PLAST	2010	44 076 946,35	2 243 137,51	7 899 396,79
3	SARL CAPSU PLAST	2011	105 436 846,69	34 076 946,35	2 243 137,51
3	SARL CAPSU PLAST	2012	108 067 767,00	26 437 774,17	34 076 946,35
3	SARL CAPSU PLAST	2013	88 408 380,00	18 582 592,76	26 437 774,17
3	SARL CAPSU PLAST	2014	58 192 374,00	4 694 210,05	18 582 592,76
3	SARL CAPSU PLAST	2015	18 692 426,00	662 883,90	4 694 210,05
3	SARL CAPSU PLAST	2016	51 777 243,00	2 849 840,17	662 883,90
3	SARL CAPSU PLAST	2017	80 175 375,00	7 020 853,36	2 849 840,17
3	SARL CAPSU PLAST	2018	34 711 986,00	1 534 488,47	7 020 853,36
3	SARL CAPSU PLAST	2019	87 419 975,47	8 590 385,08	1 534 488,47
3	SARL CAPSU PLAST	2020	10 218 500,71	222 073,57	8 590 385,08
4	SARL CERAL	2010	2 321 728,00	0,00	0,00
4	SARL CERAL	2011	41 676 121,00	0,00	0,00
4	SARL CERAL	2012	33 359 345,25	0,00	0,00
4	SARL CERAL	2013	35 434 999,98	0,00	0,00
4	SARL CERAL	2014	51 523 696,48	0,00	0,00
4	SARL CERAL	2015	25 272 515,53	0,00	0,00
4	SARL CERAL	2016	32 664 778,72	0,00	0,00

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4	SARL CERAL	2017	32 677 008,36	0,00	0,00
4	SARL CERAL	2018	51 753 548,15	0,00	0,00
4	SARL CERAL	2019	25 732 160,05	0,00	0,00
4	SARL CERAL	2020	-29 692 758,05	0,00	0,00
5	SARL CERAMIQUE BOUMERDES	2010	33 801 320,28	0,00	0,00
5	SARL CERAMIQUE BOUMERDES	2011	53 915 782,48	0,00	0,00
5	SARL CERAMIQUE BOUMERDES	2012	61 083 572,68	0,00	0,00
5	SARL CERAMIQUE BOUMERDES	2013	84 884 961,27	0,00	0,00
5	SARL CERAMIQUE BOUMERDES	2014	86 294 447,85	0,00	0,00
5	SARL CERAMIQUE BOUMERDES	2015	196 505 004,30	0,00	0,00
5	SARL CERAMIQUE BOUMERDES	2016	131 122 718,19	0,00	0,00
5	SARL CERAMIQUE BOUMERDES	2017	260 711 716,20	0,00	0,00
5	SARL CERAMIQUE BOUMERDES	2018	597 042 026,71	2 100 000,00	0,00
5	SARL CERAMIQUE BOUMERDES	2019	434 844 778,99	2 000 000,00	2 100 000,00
5	SARL CERAMIQUE BOUMERDES	2020	377 898 270,82	982 270,98	2 000 000,00
6	SARL CIOMAT	2010	3 910 732,51	0,00	0,00
6	SARL CIOMAT	2011	2 715 249,41	0,00	0,00
6	SARL CIOMAT	2012	2 302 498,96	752 233,23	0,00
6	SARL CIOMAT	2013	5 575 362,79	0,00	752 233,23
6	SARL CIOMAT	2014	5 550 504,00	0,00	0,00
6	SARL CIOMAT	2015	4 393 528,08	702 890,69	0,00
6	SARL CIOMAT	2016	7 005 784,96	0,00	702 890,69
6	SARL CIOMAT	2017	7 464 882,40	0,00	0,00
6	SARL CIOMAT	2018	7 840 168,68	487 301,60	0,00
6	SARL CIOMAT	2019	-2 605 981,47	0,00	487 301,60
6	SARL CIOMAT	2020	-113 547,24	0,00	0,00
7	SARL FADERCO	2010	51 532 066,90	0,00	0,00
7	SARL FADERCO	2011	170 403 827,47	0,00	0,00
7	SARL FADERCO	2012	190 753 801,24	2 100 000,00	0,00
7	SARL FADERCO	2013	215 992 282,10	0,00	2 100 000,00
7	SARL FADERCO	2014	406 261 214,52	0,00	0,00
7	SARL FADERCO	2015	471 374 094,27	0,00	0,00
7	SARL FADERCO	2016	581 522 952,58	334 500 000,00	0,00
7	SARL FADERCO	2017	721 911 184,66	0,00	334 500 000,00
7	SARL FADERCO	2018	796 486 861,59	0,00	0,00
7	SARL FADERCO	2019	1 368 555 250,35	1 000 000 000,00	0,00
7	SARL FADERCO	2020	1 549 672 884,00	1 154 967 295,27	1 000 000 000,00
8	SARL FAIENCERIES ALGERIENNES	2010	92 274 783,70	0,00	0,00
8	SARL FAIENCERIES ALGERIENNES	2011	567 974 723,00	0,00	0,00
8	SARL FAIENCERIES ALGERIENNES	2012	385 108 736,01	0,00	0,00
8	SARL FAIENCERIES ALGERIENNES	2013	622 752 571,72	0,00	0,00
8	SARL FAIENCERIES ALGERIENNES	2014	832 379 795,46	0,00	0,00

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8	SARL FAIENCERIES ALGERIENNES	2015	1 162 135 857,50	0,00	0,00
8	SARL FAIENCERIES ALGERIENNES	2016	1 391 084 784,53	0,00	0,00
8	SARL FAIENCERIES ALGERIENNES	2017	887 979 454,49	0,00	0,00
8	SARL FAIENCERIES ALGERIENNES	2018	1 297 998 654,35	0,00	0,00
8	SARL FAIENCERIES ALGERIENNES	2019	1 482 708 008,62	0,00	0,00
8	SARL FAIENCERIES ALGERIENNES	2020	0,00	0,00	0,00
9	SARL GALVA TUBE ANNABA	2010	129 384 558,02	0,00	0,00
9	SARL GALVA TUBE ANNABA	2011	43 209 847,31	0,00	0,00
9	SARL GALVA TUBE ANNABA	2012	32 649 969,99	0,00	0,00
9	SARL GALVA TUBE ANNABA	2013	43 456 416,68	0,00	0,00
9	SARL GALVA TUBE ANNABA	2014	55 860 611,96	0,00	0,00
9	SARL GALVA TUBE ANNABA	2015	51 414 844,69	0,00	0,00
9	SARL GALVA TUBE ANNABA	2016	50 760 250,34	0,00	0,00
9	SARL GALVA TUBE ANNABA	2017	47 660 789,61	0,00	0,00
9	SARL GALVA TUBE ANNABA	2018	48 095 886,44	0,00	0,00
9	SARL GALVA TUBE ANNABA	2019	48 548 826,14	0,00	0,00
9	SARL GALVA TUBE ANNABA	2020	24 684 232,88	0,00	0,00
10	SARL HYDRABEL	2010	281 566 321,00	22 800 000,00	41 207 913,34
10	SARL HYDRABEL	2011	284 359 839,00	93 300 000,00	22 800 000,00
10	SARL HYDRABEL	2012	284 359 839,00	105 000 000,00	93 300 000,00
10	SARL HYDRABEL	2013	348 765 123,00	118 700 000,00	105 000 000,00
10	SARL HYDRABEL	2014	223 103 271,61	31 400 000,00	118 700 000,00
10	SARL HYDRABEL	2015	540 053 723,74	10 100 000,00	31 400 000,00
10	SARL HYDRABEL	2016	437 769 403,65	20 200 000,00	10 100 000,00
10	SARL HYDRABEL	2017	104 414 711,53	18 800 000,00	20 200 000,00
10	SARL HYDRABEL	2018	115 081 232,21	24 500 000,00	18 800 000,00
10	SARL HYDRABEL	2019	153 765 987,00	27 100 000,00	24 500 000,00
10	SARL HYDRABEL	2020	94 619 637,28	19 500 000,00	27 100 000,00
11	SARL INNOVATION TRANSFORMARTION POLYMERE	2010	79 462 960,34	57 800 000,00	88 117 256,27
11	SARL INNOVATION TRANSFORMARTION POLYMERE	2011	154 170 660,06	123 336 528,05	57 800 000,00
11	SARL INNOVATION TRANSFORMARTION POLYMERE	2012	144 844 450,08	114 427 115,56	123 336 528,05
11	SARL INNOVATION TRANSFORMARTION POLYMERE	2013	77 694 360,28	54 386 052,20	114 427 115,56
11	SARL INNOVATION TRANSFORMARTION POLYMERE	2014	153 176 705,22	131 134 577,34	54 386 052,20
11	SARL INNOVATION TRANSFORMARTION POLYMERE	2015	98 274 279,94	68 791 995,96	131 134 577,34
11	SARL INNOVATION TRANSFORMARTION POLYMERE	2016	66 049 153,23	9 171 123,07	68 791 995,96
11	SARL INNOVATION TRANSFORMARTION POLYMERE	2017	40 049 744,67	4 277 312,73	9 171 123,07
11	SARL INNOVATION TRANSFORMARTION POLYMERE	2018	60 875 345,20	12 405 969,22	4 277 312,73
11	SARL INNOVATION TRANSFORMARTION POLYMERE	2019	42 544 256,41	6 193 337,58	12 405 969,22
11	SARL INNOVATION TRANSFORMARTION POLYMERE	2020	36 405 097,84	4 935 584,73	6 193 337,58
12	SARL LITERIE MAGHREBINE LIT.MAG	2010	770 662,62	0,00	0,00
12	SARL LITERIE MAGHREBINE LIT.MAG	2011	18 916 697,65	0,00	0,00
12	SARL LITERIE MAGHREBINE LIT.MAG	2012	11 783 239,58	0,00	0,00

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12	SARL LITERIE MAGHREBINE LIT.MAG	2013	6 407 275,23	0,00	0,00
12	SARL LITERIE MAGHREBINE LIT.MAG	2014	7 949 006,10	0,00	0,00
12	SARL LITERIE MAGHREBINE LIT.MAG	2015	12 651 561,71	0,00	0,00
12	SARL LITERIE MAGHREBINE LIT.MAG	2016	8 269 935,57	0,00	0,00
12	SARL LITERIE MAGHREBINE LIT.MAG	2017	3 427 734,52	0,00	0,00
12	SARL LITERIE MAGHREBINE LIT.MAG	2018	3 376 116,24	0,00	0,00
12	SARL LITERIE MAGHREBINE LIT.MAG	2019	583 328,29	0,00	0,00
12	SARL LITERIE MAGHREBINE LIT.MAG	2020	1 155 419,86	0,00	0,00
13	SARL MAGHREB PIPE INDUSTRIE	2010	5 367 945,00	5 733 270,68	12 060 308,07
13	SARL MAGHREB PIPE INDUSTRIE	2011	98 748 324,46	0,00	5 733 270,68
13	SARL MAGHREB PIPE INDUSTRIE	2012	4 572 808,49	5 145 616,98	0,00
13	SARL MAGHREB PIPE INDUSTRIE	2013	95 686 829,49	10 351 031,94	5 145 616,98
13	SARL MAGHREB PIPE INDUSTRIE	2014	45 995 330,06	11 096 150,83	10 351 031,94
13	SARL MAGHREB PIPE INDUSTRIE	2015	51 254 155,84	8 376 905,39	11 096 150,83
13	SARL MAGHREB PIPE INDUSTRIE	2016	22 672 560,55	11 873 945,52	8 376 905,39
13	SARL MAGHREB PIPE INDUSTRIE	2017	22 672 560,55	0,00	11 873 945,52
13	SARL MAGHREB PIPE INDUSTRIE	2018	114 463 648,27	20 000 000,00	0,00
13	SARL MAGHREB PIPE INDUSTRIE	2019	129 255 217,57	20 000 000,16	20 000 000,00
13	SARL MAGHREB PIPE INDUSTRIE	2020	23 741 281,04	0,00	20 000 000,16
14	SARL MALPACO	2010	7 157 119,00	7 157 119,00	9 707 640,50
14	SARL MALPACO	2011	12 258 162,00	12 258 161,90	7 157 119,00
14	SARL MALPACO	2012	1 325 052,27	1 325 053,07	12 258 161,90
14	SARL MALPACO	2013	713 220,40	713 220,39	1 325 053,07
14	SARL MALPACO	2014	858 194,19	858 194,18	713 220,39
14	SARL MALPACO	2015	652 150,52	652 150,51	858 194,18
14	SARL MALPACO	2016	569 048,50	569 048,49	652 150,51
14	SARL MALPACO	2017	606 999,98	606 999,97	569 048,49
14	SARL MALPACO	2018	65 918,58	0,00	606 999,97
14	SARL MALPACO	2019	2 836 412,82	2 836 412,81	0,00
14	SARL MALPACO	2020	5 800 567,00	5 800 000,00	2 836 412,81
15	SARL MERIPLAST	2010	27 766 661,79	0,00	0,00
15	SARL MERIPLAST	2011	30 796 082,08	0,00	0,00
15	SARL MERIPLAST	2012	45 175 126,89	0,00	0,00
15	SARL MERIPLAST	2013	82 165 180,92	0,00	0,00
15	SARL MERIPLAST	2014	85 757 567,45	0,00	0,00
15	SARL MERIPLAST	2015	142 664 056,29	0,00	0,00
15	SARL MERIPLAST	2016	401 857 285,18	0,00	0,00
15	SARL MERIPLAST	2017	171 531 379,57	0,00	0,00
15	SARL MERIPLAST	2018	49 326 032,48	0,00	0,00
15	SARL MERIPLAST	2019	110 006 145,44	0,00	0,00
15	SARL MERIPLAST	2020	374 286 228,22	0,00	0,00
16	SARL MODERN BRICKS	2010	-51 294 794,96	0,00	0,00

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16	SARL MODERN BRICKS	2011	-6 034 688,36	0,00	0,00
16	SARL MODERN BRICKS	2012	-779 469,90	0,00	0,00
16	SARL MODERN BRICKS	2013	-10 271 656,56	0,00	0,00
16	SARL MODERN BRICKS	2014	-129 517 144,68	0,00	0,00
16	SARL MODERN BRICKS	2015	-136 470 700,26	0,00	0,00
16	SARL MODERN BRICKS	2016	-246 853 714,77	0,00	0,00
16	SARL MODERN BRICKS	2017	-330 407 639,14	0,00	0,00
16	SARL MODERN BRICKS	2018	-13 615 046,00	0,00	0,00
16	SARL MODERN BRICKS	2019	-20 222 272,00	0,00	0,00
16	SARL MODERN BRICKS	2020	-160 295 674,10	0,00	0,00
17	SARL NEW MARBRE CONTINENTAL	2010	-4 833 591,84	0,00	0,00
17	SARL NEW MARBRE CONTINENTAL	2011	3 685 279,74	0,00	0,00
17	SARL NEW MARBRE CONTINENTAL	2012	34 841 386,63	8 900 000,17	0,00
17	SARL NEW MARBRE CONTINENTAL	2013	54 639 282,63	24 555 713,20	8 900 000,17
17	SARL NEW MARBRE CONTINENTAL	2014	43 141 162,00	18 891 649,01	24 555 713,20
17	SARL NEW MARBRE CONTINENTAL	2015	46 588 508,00	20 797 655,06	18 891 649,01
17	SARL NEW MARBRE CONTINENTAL	2016	48 871 712,00	2 999 999,82	20 797 655,06
17	SARL NEW MARBRE CONTINENTAL	2017	19 435 922,00	1 125 631,23	2 999 999,82
17	SARL NEW MARBRE CONTINENTAL	2018	7 081 888,00	428 382,06	1 125 631,23
17	SARL NEW MARBRE CONTINENTAL	2019	-233 702 834,00	0,00	428 382,06
17	SARL NEW MARBRE CONTINENTAL	2020	-81 344 411,00	0,00	0,00
18	SARL PETROSAM	2010	18 692 017,00	0,00	0,00
18	SARL PETROSAM	2011	23 215 808,00	0,00	0,00
18	SARL PETROSAM	2012	21 294 848,00	3 437 339,00	0,00
18	SARL PETROSAM	2013	22 419 455,00	0,00	3 437 339,00
18	SARL PETROSAM	2014	-30 154 322,00	0,00	0,00
18	SARL PETROSAM	2015	-22 356 720,00	0,00	0,00
18	SARL PETROSAM	2016	-19 528 916,00	0,00	0,00
18	SARL PETROSAM	2017	-10 775 910,00	0,00	0,00
18	SARL PETROSAM	2018	-5 009 369,00	0,00	0,00
18	SARL PETROSAM	2019	-4 172 043,00	0,00	0,00
18	SARL PETROSAM	2020	13 951 023,63	0,00	0,00
19	SARL RAYANE PAPIER	2010	70 310 717,10	77 117 501,81	91 512 615,33
19	SARL RAYANE PAPIER	2011	101 474 600,24	104 215 721,45	77 117 501,81
19	SARL RAYANE PAPIER	2012	99 033 613,20	99 061 751,14	104 215 721,45
19	SARL RAYANE PAPIER	2013	75 822 086,06	75 850 224,00	99 061 751,14
19	SARL RAYANE PAPIER	2014	64 684 281,68	64 712 419,62	75 850 224,00
19	SARL RAYANE PAPIER	2015	73 261 611,09	73 285 822,15	64 712 419,62
19	SARL RAYANE PAPIER	2016	98 131 175,33	98 135 283,03	73 285 822,15
19	SARL RAYANE PAPIER	2017	116 921 204,82	116 921 204,82	98 135 283,03
19	SARL RAYANE PAPIER	2018	122 765 745,40	122 765 745,40	116 921 204,82
19	SARL RAYANE PAPIER	2019	104 341 954,37	0,00	122 765 745,40

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19	SARL RAYANE PAPIER	2020	67 556 650,53	0,00	0,00
20	SARL SIFCO	2010	1 838 020,92	768 000,00	463 592,54
20	SARL SIFCO	2011	2 114 848,60	0,00	768 000,00
20	SARL SIFCO	2012	3 007 866,65	6 146 914,78	0,00
20	SARL SIFCO	2013	9 156 489,86	6 837 297,25	6 146 914,78
20	SARL SIFCO	2014	636 065,24	1 678 514,29	6 837 297,25
20	SARL SIFCO	2015	5 964 833,23	5 540 183,85	1 678 514,29
20	SARL SIFCO	2016	10 251 152,17	9 851 905,23	5 540 183,85
20	SARL SIFCO	2017	14 647 326,18	12 557 055,49	9 851 905,23
20	SARL SIFCO	2018	19 436 962,66	0,00	12 557 055,49
20	SARL SIFCO	2019	12 108 257,79	0,00	0,00
20	SARL SIFCO	2020	13 687 369,57	8 950 000,00	0,00
21	SARL SITEP TUBOPLAST	2010	3 910 732,51	8 000 000,00	5 223 072,71
21	SARL SITEP TUBOPLAST	2011	2 715 249,41	3 000 000,00	8 000 000,00
21	SARL SITEP TUBOPLAST	2012	2 302 498,96	2 300 000,00	3 000 000,00
21	SARL SITEP TUBOPLAST	2013	5 575 362,79	5 100 000,00	2 300 000,00
21	SARL SITEP TUBOPLAST	2014	5 550 504,00	6 300 000,00	5 100 000,00
21	SARL SITEP TUBOPLAST	2015	4 393 528,08	4 600 000,00	6 300 000,00
21	SARL SITEP TUBOPLAST	2016	7 005 784,96	7 000 000,00	4 600 000,00
21	SARL SITEP TUBOPLAST	2017	7 464 882,40	7 400 000,00	7 000 000,00
21	SARL SITEP TUBOPLAST	2018	7 840 168,68	7 800 000,00	7 400 000,00
21	SARL SITEP TUBOPLAST	2019	2 605 981,47	0,00	7 800 000,00
21	SARL SITEP TUBOPLAST	2020	21 823 534,44	10 000 000,00	0,00
22	SARL SOFICLEF	2010	251 907 485,00	70 380 835,29	83 495 715,10
22	SARL SOFICLEF	2011	377 227 994,00	108 995 313,52	70 380 835,29
22	SARL SOFICLEF	2012	298 049 350,00	66 963 403,17	108 995 313,52
22	SARL SOFICLEF	2013	350 646 202,00	83 774 917,87	66 963 403,17
22	SARL SOFICLEF	2014	369 600 440,03	82 576 352,07	83 774 917,87
22	SARL SOFICLEF	2015	93 563 910,00	12 598 848,30	82 576 352,07
22	SARL SOFICLEF	2016	126 269 345,00	18 571 872,04	12 598 848,30
22	SARL SOFICLEF	2017	162 551 542,88	24 373 352,21	18 571 872,04
22	SARL SOFICLEF	2018	-30 130 060,31	573 616,09	24 373 352,21
22	SARL SOFICLEF	2019	-126 244 320,10	17 588 611,16	573 616,09
22	SARL SOFICLEF	2020	-127 256 161,99	18 990 309,80	17 588 611,16
23	SARL STE CARTONNERIE MODERNE	2010	30 946 075,24	0,00	45 920 883,39
23	SARL STE CARTONNERIE MODERNE	2011	24 570 249,75	55 200 000,00	0,00
23	SARL STE CARTONNERIE MODERNE	2012	62 621 387,87	0,00	55 200 000,00
23	SARL STE CARTONNERIE MODERNE	2013	50 018 449,56	0,00	0,00
23	SARL STE CARTONNERIE MODERNE	2014	57 204 546,19	0,00	0,00
23	SARL STE CARTONNERIE MODERNE	2015	45 439 611,81	0,00	0,00
23	SARL STE CARTONNERIE MODERNE	2016	46 255 448,03	46 500 000,00	0,00
23	SARL STE CARTONNERIE MODERNE	2017	32 020 572,58	20 700 000,00	46 500 000,00

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23	SARL STE CARTONNERIE MODERNE	2018	31 128 511,70	30 400 000,00	20 700 000,00
23	SARL STE CARTONNERIE MODERNE	2019	76 053 930,79	0,00	30 400 000,00
23	SARL STE CARTONNERIE MODERNE	2020	72 187 613,38	26 300 000,00	0,00
24	SARL TECHNISAT	2010	100 799 353,86	0,00	0,00
24	SARL TECHNISAT	2011	80 053 611,39	0,00	0,00
24	SARL TECHNISAT	2012	115 711 529,00	0,00	0,00
24	SARL TECHNISAT	2013	48 955 334,00	0,00	0,00
24	SARL TECHNISAT	2014	37 489 705,70	0,00	0,00
24	SARL TECHNISAT	2015	50 074 118,85	0,00	0,00
24	SARL TECHNISAT	2016	52 953 362,03	0,00	0,00
24	SARL TECHNISAT	2017	58 042 679,52	0,00	0,00
24	SARL TECHNISAT	2018	43 747 137,46	0,00	0,00
24	SARL TECHNISAT	2019	38 732 122,81	0,00	0,00
24	SARL TECHNISAT	2020	29 230 446,48	0,00	0,00
25	SARL UPAC ELECTRONICS	2010	39 019 470,07	0,00	0,00
25	SARL UPAC ELECTRONICS	2011	19 581 827,19	0,00	0,00
25	SARL UPAC ELECTRONICS	2012	18 940 901,86	0,00	0,00
25	SARL UPAC ELECTRONICS	2013	8 672 813,60	0,00	0,00
25	SARL UPAC ELECTRONICS	2014	-54 366 645,52	0,00	0,00
25	SARL UPAC ELECTRONICS	2015	-30 223 340,57	0,00	0,00
25	SARL UPAC ELECTRONICS	2016	-27 497 169,17	0,00	0,00
25	SARL UPAC ELECTRONICS	2017	7 557 983,08	0,00	0,00
25	SARL UPAC ELECTRONICS	2018	5 004 469,02	0,00	0,00
25	SARL UPAC ELECTRONICS	2019	6 392 801,66	0,00	0,00
25	SARL UPAC ELECTRONICS	2020	5 284 454,34	0,00	0,00
26	SARL VENUS	2010	355 780 025,84	103 700 000,00	91 179 329,33
26	SARL VENUS	2011	421 007 581,36	71 400 000,00	103 700 000,00
26	SARL VENUS	2012	410 765 343,62	23 100 000,00	71 400 000,00
26	SARL VENUS	2013	374 857 899,70	210 500 000,00	23 100 000,00
26	SARL VENUS	2014	374 380 593,36	0,00	210 500 000,00
26	SARL VENUS	2015	379 849 538,17	0,00	0,00
26	SARL VENUS	2016	443 393 146,87	0,00	0,00
26	SARL VENUS	2017	479 827 018,30	0,00	0,00
26	SARL VENUS	2018	437 164 816,55	60 000 000,00	0,00
26	SARL VENUS	2019	570 755 561,94	871 000 000,00	60 000 000,00
26	SARL VENUS	2020	714 295 720,71	14 100 000,00	871 000 000,00
27	SPA BIO CARE INDUSTRIE PHARMACEUTIQUE	2010	144 149 919,86	0,00	0,00
27	SPA BIO CARE INDUSTRIE PHARMACEUTIQUE	2011	167 239 784,93	0,00	0,00
27	SPA BIO CARE INDUSTRIE PHARMACEUTIQUE	2012	203 780 104,86	0,00	0,00
27	SPA BIO CARE INDUSTRIE PHARMACEUTIQUE	2013	220 082 943,72	0,00	0,00
27	SPA BIO CARE INDUSTRIE PHARMACEUTIQUE	2014	270 266 747,13	0,00	0,00
27	SPA BIO CARE INDUSTRIE PHARMACEUTIQUE	2015	291 556 312,71	0,00	0,00

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27	SPA BIOCARE INDUSTRIE PHARMACEUTIQUE	2016	202 794 977,53	0,00	0,00
27	SPA BIOCARE INDUSTRIE PHARMACEUTIQUE	2017	224 141 916,63	0,00	0,00
27	SPA BIOCARE INDUSTRIE PHARMACEUTIQUE	2018	260 136 392,11	0,00	0,00
27	SPA BIOCARE INDUSTRIE PHARMACEUTIQUE	2019	108 576 793,13	0,00	0,00
27	SPA BIOCARE INDUSTRIE PHARMACEUTIQUE	2020	18 989 494,41	0,00	0,00
28	SPA BOUROUAG CONSTRUCTION	2010	101 399 876,40	100 000 000,00	95 233 006,30
28	SPA BOUROUAG CONSTRUCTION	2011	112 666 529,30	100 000 000,00	100 000 000,00
28	SPA BOUROUAG CONSTRUCTION	2012	125 185 032,50	200 000 000,00	100 000 000,00
28	SPA BOUROUAG CONSTRUCTION	2013	139 094 480,50	100 000 000,00	200 000 000,00
28	SPA BOUROUAG CONSTRUCTION	2014	154 549 422,80	100 000 000,00	100 000 000,00
28	SPA BOUROUAG CONSTRUCTION	2015	171 721 580,90	100 000 000,00	100 000 000,00
28	SPA BOUROUAG CONSTRUCTION	2016	190 801 756,50	100 000 000,00	100 000 000,00
28	SPA BOUROUAG CONSTRUCTION	2017	212 001 951,70	116 087 666,97	100 000 000,00
28	SPA BOUROUAG CONSTRUCTION	2018	192 729 047,00	0,00	116 087 666,97
28	SPA BOUROUAG CONSTRUCTION	2019	155 652 634,00	0,00	0,00
28	SPA BOUROUAG CONSTRUCTION	2020	148 839 055,00	60 661 055,00	0,00
29	SPA BYA ELECTRONIQUE	2010	3 434 763,00	0,00	0,00
29	SPA BYA ELECTRONIQUE	2011	-12 640 690,75	0,00	0,00
29	SPA BYA ELECTRONIQUE	2012	13 969 055,37	0,00	0,00
29	SPA BYA ELECTRONIQUE	2013	4 932 163,95	0,00	0,00
29	SPA BYA ELECTRONIQUE	2014	834 135,47	0,00	0,00
29	SPA BYA ELECTRONIQUE	2015	1 072 824,37	0,00	0,00
29	SPA BYA ELECTRONIQUE	2016	835 614,48	0,00	0,00
29	SPA BYA ELECTRONIQUE	2017	6 140 090,01	0,00	0,00
29	SPA BYA ELECTRONIQUE	2018	2 496 326,27	0,00	0,00
29	SPA BYA ELECTRONIQUE	2019	-31 556 240,93	0,00	0,00
29	SPA BYA ELECTRONIQUE	2020	-66 762 543,00	0,00	0,00
30	SPA HASNAOUI	2010	16 673 615,89	8 200 000,00	8 383 428,51
30	SPA HASNAOUI	2011	24 681 918,49	10 900 000,00	8 200 000,00
30	SPA HASNAOUI	2012	55 570 043,87	22 500 000,00	10 900 000,00
30	SPA HASNAOUI	2013	13 885 318,09	7 400 000,00	22 500 000,00
30	SPA HASNAOUI	2014	37 996 274,30	20 100 000,00	7 400 000,00
30	SPA HASNAOUI	2015	21 068 974,18	11 100 000,00	20 100 000,00
30	SPA HASNAOUI	2016	19 572 885,97	9 700 000,00	11 100 000,00
30	SPA HASNAOUI	2017	132 230 698,27	56 100 000,00	9 700 000,00
30	SPA HASNAOUI	2018	67 272 657,36	33 300 000,00	56 100 000,00
30	SPA HASNAOUI	2019	12 348 586,92	8 900 000,00	33 300 000,00
30	SPA HASNAOUI	2020	-52 335 945,47	0,00	8 900 000,00
31	SPA Groupe Benhamadi	2010	573 616 219,11	0,00	0,00
31	SPA Groupe Benhamadi	2011	441 042 145,25	0,00	0,00
31	SPA Groupe Benhamadi	2012	582 655 577,78	210 000 000,00	0,00
31	SPA Groupe Benhamadi	2013	1 585 262 769,07	603 642 048,30	210 000 000,00

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31	SPA Groupe Benhamadi	2014	2 265 266 488,80	350 000 005,09	603 642 048,30
31	SPA Groupe Benhamadi	2015	2 889 426 225,63	350 000 012,75	350 000 005,09
31	SPA Groupe Benhamadi	2016	3 675 426 906,10	349 999 988,25	350 000 012,75
31	SPA Groupe Benhamadi	2017	4 289 366 131,31	392 893 670,04	349 999 988,25
31	SPA Groupe Benhamadi	2018	4 713 322 060,11	389 956 983,44	392 893 670,04
31	SPA Groupe Benhamadi	2019	730 214 489,46	59 684 125,11	389 956 983,44
31	SPA Groupe Benhamadi	2020	794 796 103,14	410 407 790,80	59 684 125,11
32	SPA LABORATOIRES INPHA-MEDIS	2010	30 339 254,47	0,00	0,00
32	SPA LABORATOIRES INPHA-MEDIS	2011	229 386 784,13	8 600 000,00	0,00
32	SPA LABORATOIRES INPHA-MEDIS	2012	213 887 674,00	13 000 000,00	8 600 000,00
32	SPA LABORATOIRES INPHA-MEDIS	2013	361 438 492,00	11 000 000,00	13 000 000,00
32	SPA LABORATOIRES INPHA-MEDIS	2014	434 330 577,62	14 700 000,00	11 000 000,00
32	SPA LABORATOIRES INPHA-MEDIS	2015	438 159 391,00	15 000 000,00	14 700 000,00
32	SPA LABORATOIRES INPHA-MEDIS	2016	355 581 660,00	11 000 000,00	15 000 000,00
32	SPA LABORATOIRES INPHA-MEDIS	2017	363 469 721,00	8 400 000,00	11 000 000,00
32	SPA LABORATOIRES INPHA-MEDIS	2018	52 269 363,35	16 900 000,00	8 400 000,00
32	SPA LABORATOIRES INPHA-MEDIS	2019	76 335 663,65	14 000 000,00	16 900 000,00
32	SPA LABORATOIRES INPHA-MEDIS	2020	216 146 248,02	19 000 000,00	14 000 000,00
33	SPA PROMAG II ALGERIE	2010	3 122 271,00	0,00	0,00
33	SPA PROMAG II ALGERIE	2011	3 949 661,00	0,00	0,00
33	SPA PROMAG II ALGERIE	2012	18 740 287,00	0,00	0,00
33	SPA PROMAG II ALGERIE	2013	4 655 225,00	0,00	0,00
33	SPA PROMAG II ALGERIE	2014	3 401 938,00	0,00	0,00
33	SPA PROMAG II ALGERIE	2015	2 541 592,00	0,00	0,00
33	SPA PROMAG II ALGERIE	2016	1 612 289,00	1 612 289,00	0,00
33	SPA PROMAG II ALGERIE	2017	1 312 623,00	302 559,00	1 612 289,00
33	SPA PROMAG II ALGERIE	2018	1 268 512,00	63 426,00	302 559,00
33	SPA PROMAG II ALGERIE	2019	1 670 922,00	83 546,00	63 426,00
33	SPA PROMAG II ALGERIE	2020	-27 243 791,00	0,00	83 546,00
34	SARL BAALOU DJ ET FILS	2010	71 807 764,89	0,00	0,00
34	SARL BAALOU DJ ET FILS	2011	105 520 768,20	0,00	0,00
34	SARL BAALOU DJ ET FILS	2012	-34 082 009,46	0,00	0,00
34	SARL BAALOU DJ ET FILS	2013	96 491 960,91	0,00	0,00
34	SARL BAALOU DJ ET FILS	2014	-86 994 798,33	0,00	0,00
34	SARL BAALOU DJ ET FILS	2015	126 475 116,30	0,00	0,00
34	SARL BAALOU DJ ET FILS	2016	41 718 124,53	0,00	0,00
34	SARL BAALOU DJ ET FILS	2017	57 753 557,85	0,00	0,00
34	SARL BAALOU DJ ET FILS	2018	12 586 562,46	0,00	0,00
34	SARL BAALOU DJ ET FILS	2019	-386 394 764,94	0,00	0,00
34	SARL BAALOU DJ ET FILS	2020	22 797 291,39	0,00	0,00
35	SARL LES MOULINS AMOR BENAMOR	2010	419 766 467,00	0,00	0,00
35	SARL LES MOULINS AMOR BENAMOR	2011	226 657 609,00	0,00	0,00

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35	SARL LES MOULINS AMOR BENAMOR	2012	222 663 713,82	0,00	0,00
35	SARL LES MOULINS AMOR BENAMOR	2013	304 678 976,17	150 000 000,00	0,00
35	SARL LES MOULINS AMOR BENAMOR	2014	131 949 666,61	0,00	150 000 000,00
35	SARL LES MOULINS AMOR BENAMOR	2015	177 703 078,32	0,00	0,00
35	SARL LES MOULINS AMOR BENAMOR	2016	146 571 005,69	170 000 000,00	0,00
35	SARL LES MOULINS AMOR BENAMOR	2017	77 794 889,82	0,00	170 000 000,00
35	SARL LES MOULINS AMOR BENAMOR	2018	225 491 196,24	0,00	0,00
35	SARL LES MOULINS AMOR BENAMOR	2019	408 030 362,78	0,00	0,00
35	SARL LES MOULINS AMOR BENAMOR	2020	146 883 029,00	0,00	0,00
36	SARL MAGIMIX DE LEZZAR	2010	36 535 920,00	0,00	0,00
36	SARL MAGIMIX DE LEZZAR	2011	42 755 557,33	0,00	0,00
36	SARL MAGIMIX DE LEZZAR	2012	39 215 546,82	0,00	0,00
36	SARL MAGIMIX DE LEZZAR	2013	31 907 971,00	0,00	0,00
36	SARL MAGIMIX DE LEZZAR	2014	18 587 718,50	0,00	0,00
36	SARL MAGIMIX DE LEZZAR	2015	12 041 870,04	0,00	0,00
36	SARL MAGIMIX DE LEZZAR	2016	18 262 928,20	16 000 000,00	0,00
36	SARL MAGIMIX DE LEZZAR	2017	21 398 470,56	34 000 000,00	16 000 000,00
36	SARL MAGIMIX DE LEZZAR	2018	30 999 629,28	0,00	34 000 000,00
36	SARL MAGIMIX DE LEZZAR	2019	25 184 751,25	608 317,24	0,00
36	SARL MAGIMIX DE LEZZAR	2020	17 666 763,35	0,00	608 317,24
37	SARL MATEG	2010	174 514 339,00	68 138 460,51	29 593 867,54
37	SARL MATEG	2011	130 066 827,00	38 422 104,88	68 138 460,51
37	SARL MATEG	2012	86 437 643,00	7 655 928,98	38 422 104,88
37	SARL MATEG	2013	76 462 513,00	8 120 678,25	7 655 928,98
37	SARL MATEG	2014	191 495 687,17	53 907 567,90	8 120 678,25
37	SARL MATEG	2015	363 257 363,77	80 321 288,73	53 907 567,90
37	SARL MATEG	2016	90 132 198,18	5 568 304,11	80 321 288,73
37	SARL MATEG	2017	102 071 027,13	6 238 132,07	5 568 304,11
37	SARL MATEG	2018	150 693 597,94	13 535 253,76	6 238 132,07
37	SARL MATEG	2019	202 579 489,00	18 393 083,16	13 535 253,76
37	SARL MATEG	2020	222 208 909,00	21 905 754,23	18 393 083,16
38	SARL MEXICALI	2010	17 374 491,00	0,00	0,00
38	SARL MEXICALI	2011	-25 163 104,00	0,00	0,00
38	SARL MEXICALI	2012	5 573 236,00	0,00	0,00
38	SARL MEXICALI	2013	50 137 115,00	0,00	0,00
38	SARL MEXICALI	2014	-20 363 573,00	0,00	0,00
38	SARL MEXICALI	2015	-31 529 365,00	0,00	0,00
38	SARL MEXICALI	2016	55 509 097,00	0,00	0,00
38	SARL MEXICALI	2017	-26 549 372,00	0,00	0,00
38	SARL MEXICALI	2018	-124 430 950,00	0,00	0,00
38	SARL MEXICALI	2019	-156 179 628,00	0,00	0,00
38	SARL MEXICALI	2020	612 780,91	0,00	0,00

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39	SARL MOULINS GUETIANE	2010	10 318 876,42	9 900 000,00	11 950 520,89
39	SARL MOULINS GUETIANE	2011	15 869 626,31	15 308 738,49	9 900 000,00
39	SARL MOULINS GUETIANE	2012	21 265 113,00	20 745 207,57	15 308 738,49
39	SARL MOULINS GUETIANE	2013	25 004 935,00	24 652 911,77	20 745 207,57
39	SARL MOULINS GUETIANE	2014	20 477 368,64	9 899 999,91	24 652 911,77
39	SARL MOULINS GUETIANE	2015	30 678 853,00	15 215 405,09	9 899 999,91
39	SARL MOULINS GUETIANE	2016	33 897 355,20	9 799 999,96	15 215 405,09
39	SARL MOULINS GUETIANE	2017	45 361 566,35	14 999 999,91	9 799 999,96
39	SARL MOULINS GUETIANE	2018	45 914 640,30	5 999 999,85	14 999 999,91
39	SARL MOULINS GUETIANE	2019	35 236 334,40	4 424 373,16	5 999 999,85
39	SARL MOULINS GUETIANE	2020	29 911 893,20	3 618 502,44	4 424 373,16
40	SARL PROLIPOS	2010	126 159 980,43	0,00	0,00
40	SARL PROLIPOS	2011	-205 460 511,80	0,00	0,00
40	SARL PROLIPOS	2012	2 197 401,21	0,00	0,00
40	SARL PROLIPOS	2013	301 469 151,83	0,00	0,00
40	SARL PROLIPOS	2014	226 624 695,29	33 919 445,82	0,00
40	SARL PROLIPOS	2015	12 109 234,30	12 109 234,69	33 919 445,82
40	SARL PROLIPOS	2016	70 419 898,00	70 419 898,00	12 109 234,69
40	SARL PROLIPOS	2017	67 323 825,00	67 323 825,00	70 419 898,00
40	SARL PROLIPOS	2018	14 714 856,00	14 714 856,00	67 323 825,00
40	SARL PROLIPOS	2019	130 671 465,00	130 671 465,00	14 714 856,00
40	SARL PROLIPOS	2020	6 369 512,00	0,00	130 671 465,00
41	SARL TANGO	2010	604 391 694,00	346 500 000,46	384 985 858,21
41	SARL TANGO	2011	1 177 306 851,00	1 118 399 996,61	346 500 000,46
41	SARL TANGO	2012	1 697 667 100,00	1 697 583 354,08	1 118 399 996,61
41	SARL TANGO	2013	1 625 691 400,00	1 316 803 206,10	1 697 583 354,08
41	SARL TANGO	2014	1 887 917 524,00	1 793 499 993,39	1 316 803 206,10
41	SARL TANGO	2015	658 128 259,00	598 874 872,41	1 793 499 993,39
41	SARL TANGO	2016	1 594 742 325,00	1 602 715 510,36	598 874 872,41
41	SARL TANGO	2017	722 600 705,00	655 517 952,94	1 602 715 510,36
41	SARL TANGO	2018	1 142 324 048,39	1 140 299 998,68	655 517 952,94
41	SARL TANGO	2019	1 456 006 155,60	1 599 200 619,07	1 140 299 998,68
41	SARL TANGO	2020	280 438 386,98	279 900 001,36	1 599 200 619,07
42	SARL VITA JUS	2010	114 376 154,99	168 099 999,50	107 321 241,98
42	SARL VITA JUS	2011	100 266 328,97	0,00	168 099 999,50
42	SARL VITA JUS	2012	81 699 690,55	74 999 999,75	0,00
42	SARL VITA JUS	2013	370 412 451,85	364 699 999,17	74 999 999,75
42	SARL VITA JUS	2014	-12 650 634,45	0,00	364 699 999,17
42	SARL VITA JUS	2015	-388 593 408,77	0,00	0,00
42	SARL VITA JUS	2016	-135 793 144,88	0,00	0,00
42	SARL VITA JUS	2017	8 219 446,78	0,00	0,00
42	SARL VITA JUS	2018	-228 987 320,60	0,00	0,00

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42	SARL VITA JUS	2019	-338 911 596,87	0,00	0,00
42	SARL VITA JUS	2020	50 000 000,00	0,00	0,00
43	SPA AFIA INTERNATIONAL	2010	-542 956 484,00	0,00	0,00
43	SPA AFIA INTERNATIONAL	2011	391 778 853,92	0,00	0,00
43	SPA AFIA INTERNATIONAL	2012	525 081 847,65	0,00	0,00
43	SPA AFIA INTERNATIONAL	2013	458 783 546,77	0,00	0,00
43	SPA AFIA INTERNATIONAL	2014	720 185 993,98	0,00	0,00
43	SPA AFIA INTERNATIONAL	2015	365 492 822,59	0,00	0,00
43	SPA AFIA INTERNATIONAL	2016	-183 518 190,00	68 700 034,43	0,00
43	SPA AFIA INTERNATIONAL	2017	634 913 936,00	625 700 001,47	68 700 034,43
43	SPA AFIA INTERNATIONAL	2018	184 093 493,00	162 100 009,08	625 700 001,47
43	SPA AFIA INTERNATIONAL	2019	412 097 131,73	399 299 991,03	162 100 009,08
43	SPA AFIA INTERNATIONAL	2020	485 388 133,00	0,00	399 299 991,03
44	SARL TOUDJA	2010	16 123 705,31	0,00	0,00
44	SARL TOUDJA	2011	7 687 205,68	0,00	0,00
44	SARL TOUDJA	2012	7 006 122,39	0,00	0,00
44	SARL TOUDJA	2013	28 184 359,42	0,00	0,00
44	SARL TOUDJA	2014	14 927 169,11	0,00	0,00
44	SARL TOUDJA	2015	70 049 566,64	0,00	0,00
44	SARL TOUDJA	2016	50 687 584,93	0,00	0,00
44	SARL TOUDJA	2017	34 238 403,06	0,00	0,00
44	SARL TOUDJA	2018	33 354 734,12	0,00	0,00
44	SARL TOUDJA	2019	45 667 360,95	0,00	0,00
44	SARL TOUDJA	2020	80 065 407,58	0,00	0,00
45	SPA GRAND MOULIN DAHMANI	2010	100 820 673,50	0,00	0,00
45	SPA GRAND MOULIN DAHMANI	2011	314 200 838,27	0,00	0,00
45	SPA GRAND MOULIN DAHMANI	2012	50 447 057,68	0,00	0,00
45	SPA GRAND MOULIN DAHMANI	2013	45 861 199,00	0,00	0,00
45	SPA GRAND MOULIN DAHMANI	2014	35 223 847,21	0,00	0,00
45	SPA GRAND MOULIN DAHMANI	2015	11 883 603,33	0,00	0,00
45	SPA GRAND MOULIN DAHMANI	2016	-40 822 873,69	0,00	0,00
45	SPA GRAND MOULIN DAHMANI	2017	-152 643 682,81	0,00	0,00
45	SPA GRAND MOULIN DAHMANI	2018	-208 196 280,43	0,00	0,00
45	SPA GRAND MOULIN DAHMANI	2019	-310 902 458,07	0,00	0,00
45	SPA GRAND MOULIN DAHMANI	2020	-298 277 466,99	0,00	0,00
46	SPA GROUPE SIM	2010	43 378 373,37	10 000 000,00	13 977 645,08
46	SPA GROUPE SIM	2011	123 131 187,44	16 051 402,93	10 000 000,00
46	SPA GROUPE SIM	2012	541 911 864,05	52 000 000,00	16 051 402,93
46	SPA GROUPE SIM	2013	532 408 022,96	48 800 000,00	52 000 000,00
46	SPA GROUPE SIM	2014	497 533 089,84	15 100 000,00	48 800 000,00
46	SPA GROUPE SIM	2015	546 298 416,66	14 200 000,00	15 100 000,00
46	SPA GROUPE SIM	2016	249 069 344,55	10 100 000,00	14 200 000,00

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46	SPA GROUPE SIM	2017	849 912 109,86	18 000 000,00	10 100 000,00
46	SPA GROUPE SIM	2018	814 263 053,29	15 000 000,00	18 000 000,00
46	SPA GROUPE SIM	2019	304 973 553,39	20 000 000,00	15 000 000,00
46	SPA GROUPE SIM	2020	-54 770 279,69	15 000 000,00	20 000 000,00
47	SPA HAMOUD BOUALEM	2010	663 492 389,51	376 400 002,22	438 268 693,86
47	SPA HAMOUD BOUALEM	2011	908 336 945,83	521 333 913,28	376 400 002,22
47	SPA HAMOUD BOUALEM	2012	938 914 359,43	419 999 997,28	521 333 913,28
47	SPA HAMOUD BOUALEM	2013	1 457 871 900,56	669 523 340,45	419 999 997,28
47	SPA HAMOUD BOUALEM	2014	1 005 469 603,00	399 899 995,67	669 523 340,45
47	SPA HAMOUD BOUALEM	2015	1 370 335 782,56	639 899 999,79	399 899 995,67
47	SPA HAMOUD BOUALEM	2016	1 401 568 455,54	977 900 002,18	639 899 999,79
47	SPA HAMOUD BOUALEM	2017	1 544 655 747,48	1 142 400 004,09	977 900 002,18
47	SPA HAMOUD BOUALEM	2018	1 238 812 106,67	899 142 549,62	1 142 400 004,09
47	SPA HAMOUD BOUALEM	2019	1 678 855 269,00	1 403 599 997,19	899 142 549,62
47	SPA HAMOUD BOUALEM	2020	2 349 439 387,41	1 990 997 261,25	1 403 599 997,19
48	SPA LAITERIE ARIB	2010	-40 351 201,46	0,00	0,00
48	SPA LAITERIE ARIB	2011	191 250 595,67	0,00	0,00
48	SPA LAITERIE ARIB	2012	147 023 061,08	28 000 000,00	0,00
48	SPA LAITERIE ARIB	2013	124 298 183,64	20 000 000,00	28 000 000,00
48	SPA LAITERIE ARIB	2014	34 700 413,20	20 000 000,00	20 000 000,00
48	SPA LAITERIE ARIB	2015	206 489 643,97	9 614 731,67	20 000 000,00
48	SPA LAITERIE ARIB	2016	227 775 951,64	34 000 000,00	9 614 731,67
48	SPA LAITERIE ARIB	2017	256 920 278,57	0,00	34 000 000,00
48	SPA LAITERIE ARIB	2018	284 445 553,79	84 000 000,00	0,00
48	SPA LAITERIE ARIB	2019	302 907 284,48	0,00	84 000 000,00
48	SPA LAITERIE ARIB	2020	253 939 058,73	0,00	0,00
49	SPA LAITERIE BETOUCHE	2010	86 753 527,00	5 700 000,00	68 067 467,04
49	SPA LAITERIE BETOUCHE	2011	154 483 170,00	38 400 000,00	5 700 000,00
49	SPA LAITERIE BETOUCHE	2012	140 163 896,00	21 800 000,00	38 400 000,00
49	SPA LAITERIE BETOUCHE	2013	68 005 598,00	0,00	21 800 000,00
49	SPA LAITERIE BETOUCHE	2014	91 786 360,62	0,00	0,00
49	SPA LAITERIE BETOUCHE	2015	47 152 409,14	0,00	0,00
49	SPA LAITERIE BETOUCHE	2016	54 825 711,83	0,00	0,00
49	SPA LAITERIE BETOUCHE	2017	23 771 675,10	0,00	0,00
49	SPA LAITERIE BETOUCHE	2018	26 149 771,44	0,00	0,00
49	SPA LAITERIE BETOUCHE	2019	12 685 534,12	3 900 000,00	0,00
49	SPA LAITERIE BETOUCHE	2020	18 471 986,80	4 840 399,42	3 900 000,00
50	SPA TCHIN LAIT	2010	682 135 039,62	0,00	0,00
50	SPA TCHIN LAIT	2011	845 535 196,37	186 000 000,00	0,00
50	SPA TCHIN LAIT	2012	1 398 674 498,43	1 000 000 000,00	186 000 000,00
50	SPA TCHIN LAIT	2013	-4 768 069,16	7 135 177,09	1 000 000 000,00
50	SPA TCHIN LAIT	2014	974 564 105,77	7 000 000,00	7 135 177,09

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50	SPA TCHIN LAIT	2015	1 725 840 884,59	1 607 600 000,00	7 000 000,00
50	SPA TCHIN LAIT	2016	1 966 417 485,40	0,00	1 607 600 000,00
50	SPA TCHIN LAIT	2017	3 350 287 772,53	503 500 000,00	0,00
50	SPA TCHIN LAIT	2018	2 978 062 807,33	16 600 000,00	503 500 000,00
50	SPA TCHIN LAIT	2019	3 876 102 572,16	2 473 300 000,00	16 600 000,00
50	SPA TCHIN LAIT	2020	2 529 329 321,16	0,00	2 473 300 000,00
51	SPA LES GRANDS MOULINS BELGHIT	2010	24 979 853,25	1 150 240,73	1 496 429,77
51	SPA LES GRANDS MOULINS BELGHIT	2011	3 110 719,82	0,00	1 150 240,73
51	SPA LES GRANDS MOULINS BELGHIT	2012	53 360 897,56	0,00	0,00
51	SPA LES GRANDS MOULINS BELGHIT	2013	36 104 564,11	16 194 633,43	0,00
51	SPA LES GRANDS MOULINS BELGHIT	2014	15 130 909,13	0,00	16 194 633,43
51	SPA LES GRANDS MOULINS BELGHIT	2015	12 625 205,37	0,00	0,00
51	SPA LES GRANDS MOULINS BELGHIT	2016	2 260 993,63	0,00	0,00
51	SPA LES GRANDS MOULINS BELGHIT	2017	5 995 450,03	5 405 905,00	0,00
51	SPA LES GRANDS MOULINS BELGHIT	2018	17 544 000,34	859 191,00	5 405 905,00
51	SPA LES GRANDS MOULINS BELGHIT	2019	34 584 130,37	0,00	859 191,00
51	SPA LES GRANDS MOULINS BELGHIT	2020	24 804 642,73	5 800 000,00	0,00
52	SPA LES MOULINS AZZOUZ	2010	4 172 139,43	0,00	0,00
52	SPA LES MOULINS AZZOUZ	2011	5 256 736,30	0,00	0,00
52	SPA LES MOULINS AZZOUZ	2012	7 241 777,92	0,00	0,00
52	SPA LES MOULINS AZZOUZ	2013	17 053 360,48	0,00	0,00
52	SPA LES MOULINS AZZOUZ	2014	16 008 194,30	0,00	0,00
52	SPA LES MOULINS AZZOUZ	2015	10 779 232,68	0,00	0,00
52	SPA LES MOULINS AZZOUZ	2016	11 471 085,80	0,00	0,00
52	SPA LES MOULINS AZZOUZ	2017	-69 894 620,70	0,00	0,00
52	SPA LES MOULINS AZZOUZ	2018	2 058 943,02	0,00	0,00
52	SPA LES MOULINS AZZOUZ	2019	8 469 392,61	0,00	0,00
52	SPA LES MOULINS AZZOUZ	2020	-74 045 430,61	0,00	0,00
53	SPA LES MOULINS DE LA CHORFA	2010	40 876 234,00	0,00	0,00
53	SPA LES MOULINS DE LA CHORFA	2011	36 375 781,00	0,00	0,00
53	SPA LES MOULINS DE LA CHORFA	2012	198 676 336,00	6 802 421,05	0,00
53	SPA LES MOULINS DE LA CHORFA	2013	53 294 241,00	10 000 000,00	6 802 421,05
53	SPA LES MOULINS DE LA CHORFA	2014	43 082 423,00	10 000 000,00	10 000 000,00
53	SPA LES MOULINS DE LA CHORFA	2015	27 599 843,00	10 000 000,00	10 000 000,00
53	SPA LES MOULINS DE LA CHORFA	2016	56 620 286,00	13 857 577,99	10 000 000,00
53	SPA LES MOULINS DE LA CHORFA	2017	49 974 755,00	0,00	13 857 577,99
53	SPA LES MOULINS DE LA CHORFA	2018	640 426 786,00	0,00	0,00
53	SPA LES MOULINS DE LA CHORFA	2019	929 347 010,00	27 644 769,72	0,00
53	SPA LES MOULINS DE LA CHORFA	2020	971 455 704,00	29 000 000,00	27 644 769,72
54	SPA MARGARINERIE LABELLE	2010	95 426 821,98	0,00	0,00
54	SPA MARGARINERIE LABELLE	2011	94 571 902,16	0,00	0,00
54	SPA MARGARINERIE LABELLE	2012	105 055 580,72	0,00	0,00

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54	SPA MARGARINERIE LABELLE	2013	116 310 348,47	0,00	0,00
54	SPA MARGARINERIE LABELLE	2014	101 186 485,57	0,00	0,00
54	SPA MARGARINERIE LABELLE	2015	88 200 963,78	13 200 000,00	0,00
54	SPA MARGARINERIE LABELLE	2016	83 579 697,26	0,00	13 200 000,00
54	SPA MARGARINERIE LABELLE	2017	134 097 554,83	0,00	0,00
54	SPA MARGARINERIE LABELLE	2018	76 304 983,75	18 000 000,00	0,00
54	SPA MARGARINERIE LABELLE	2019	74 388 878,60	10 000 000,00	18 000 000,00
54	SPA MARGARINERIE LABELLE	2020	65 474 517,63	8 035 764,15	10 000 000,00
55	SPA METIDJI GROUPE METIDJI SPA MAISERIE DE LA TAFNA	2010	4 662 520 397,98	3 985 065 843,77	4 314 586 417,75
55	SPA METIDJI GROUPE METIDJI SPA MAISERIE DE LA TAFNA	2011	4 795 765 806,18	4 672 520 397,98	3 985 065 843,77
55	SPA METIDJI GROUPE METIDJI SPA MAISERIE DE LA TAFNA	2012	4 847 573 200,30	4 805 765 806,18	4 672 520 397,98
55	SPA METIDJI GROUPE METIDJI SPA MAISERIE DE LA TAFNA	2013	4 888 503 894,11	4 907 098 443,24	4 805 765 806,18
55	SPA METIDJI GROUPE METIDJI SPA MAISERIE DE LA TAFNA	2014	4 838 978 651,17	4 848 978 651,17	4 907 098 443,24
55	SPA METIDJI GROUPE METIDJI SPA MAISERIE DE LA TAFNA	2015	4 874 036 039,08	4 848 978 651,17	4 848 978 651,17
55	SPA METIDJI GROUPE METIDJI SPA MAISERIE DE LA TAFNA	2016	4 918 986 275,72	4 884 036 039,08	4 848 978 651,17
55	SPA METIDJI GROUPE METIDJI SPA MAISERIE DE LA TAFNA	2017	4 971 533 479,37	4 928 986 275,72	4 884 036 039,08
55	SPA METIDJI GROUPE METIDJI SPA MAISERIE DE LA TAFNA	2018	5 876 351 618,52	4 981 533 479,72	4 928 986 275,72
55	SPA METIDJI GROUPE METIDJI SPA MAISERIE DE LA TAFNA	2019	5 888 828 869,29	5 888 351 618,52	4 981 533 479,72
55	SPA METIDJI GROUPE METIDJI SPA MAISERIE DE LA TAFNA	2020	5 963 330 530,05	5 898 828 869,29	5 888 351 618,52
56	SPA MOULINS DE MAHDIA	2010	31 691 821,00	0,00	0,00
56	SPA MOULINS DE MAHDIA	2011	48 185 611,00	10 757 558,12	0,00
56	SPA MOULINS DE MAHDIA	2012	-33 212 522,62	0,00	10 757 558,12
56	SPA MOULINS DE MAHDIA	2013	99 049 922,56	0,00	0,00
56	SPA MOULINS DE MAHDIA	2014	95 472 839,44	4 700 000,00	0,00
56	SPA MOULINS DE MAHDIA	2015	85 064 821,54	4 200 000,00	4 700 000,00
56	SPA MOULINS DE MAHDIA	2016	114 061 775,11	8 100 000,00	4 200 000,00
56	SPA MOULINS DE MAHDIA	2017	161 221 276,00	8 000 000,00	8 100 000,00
56	SPA MOULINS DE MAHDIA	2018	103 479 338,36	93 100 000,00	8 000 000,00
56	SPA MOULINS DE MAHDIA	2019	60 762 227,78	54 600 000,00	93 100 000,00
56	SPA MOULINS DE MAHDIA	2020	69 433 522,90	62 400 000,00	54 600 000,00
57	SPA SOCIETE GUEDILA DES EAUX MINERALES	2010	173 868 958,11	0,00	0,00
57	SPA SOCIETE GUEDILA DES EAUX MINERALES	2011	355 677 112,65	144 061 444,58	0,00
57	SPA SOCIETE GUEDILA DES EAUX MINERALES	2012	622 193 652,58	321 990 895,84	144 061 444,58
57	SPA SOCIETE GUEDILA DES EAUX MINERALES	2013	645 956 216,99	224 643 780,17	321 990 895,84
57	SPA SOCIETE GUEDILA DES EAUX MINERALES	2014	1 198 961 801,56	1 050 000 005,74	224 643 780,17
57	SPA SOCIETE GUEDILA DES EAUX MINERALES	2015	1 528 521 980,45	1 476 360 984,44	1 050 000 005,74
57	SPA SOCIETE GUEDILA DES EAUX MINERALES	2016	1 510 487 882,97	479 999 999,73	1 476 360 984,44

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57	SPA SOCIETE GUEDILA DES EAUX MINERALES	2017	2 010 836 052,99	2 051 899 999,60	479 999 999,73
57	SPA SOCIETE GUEDILA DES EAUX MINERALES	2018	1 868 848 821,45	2 354 999 996,83	2 051 899 999,60
57	SPA SOCIETE GUEDILA DES EAUX MINERALES	2019	1 880 487 938,87	3 234 999 997,55	2 354 999 996,83
57	SPA SOCIETE GUEDILA DES EAUX MINERALES	2020	2 348 614 484,03	2 726 714 033,61	3 234 999 997,55
58	SARL AGRO ALIMENTAIRE IZDIHAR	2010	151 949 319,22	60 000 000,00	36 027 811,73
58	SARL AGRO ALIMENTAIRE IZDIHAR	2011	121 242 903,45	80 000 000,00	60 000 000,00
58	SARL AGRO ALIMENTAIRE IZDIHAR	2012	129 327 255,74	10 561 959,08	80 000 000,00
58	SARL AGRO ALIMENTAIRE IZDIHAR	2013	150 470 417,16	290 000 000,00	10 561 959,08
58	SARL AGRO ALIMENTAIRE IZDIHAR	2014	153 826 365,02	120 000 000,00	290 000 000,00
58	SARL AGRO ALIMENTAIRE IZDIHAR	2015	148 970 477,64	100 000 000,00	120 000 000,00
58	SARL AGRO ALIMENTAIRE IZDIHAR	2016	181 604 129,00	100 000 000,00	100 000 000,00
58	SARL AGRO ALIMENTAIRE IZDIHAR	2017	166 806 137,26	100 000 000,00	100 000 000,00
58	SARL AGRO ALIMENTAIRE IZDIHAR	2018	237 492 202,62	100 000 000,00	100 000 000,00
58	SARL AGRO ALIMENTAIRE IZDIHAR	2019	233 545 047,00	100 000 000,00	100 000 000,00
58	SARL AGRO ALIMENTAIRE IZDIHAR	2020	284 513 374,93	199 579 674,06	100 000 000,00
59	SARL AFRO TP	2010	10 321 855,65	0,00	0,00
59	SARL AFRO TP	2011	20 197 308,68	0,00	0,00
59	SARL AFRO TP	2012	789 186,77	0,00	0,00
59	SARL AFRO TP	2013	2 987 391,61	1 825 999,54	0,00
59	SARL AFRO TP	2014	16 423 163,15	14 174 000,00	1 825 999,54
59	SARL AFRO TP	2015	18 923 144,90	19 923 144,90	14 174 000,00
59	SARL AFRO TP	2016	9 433 742,95	16 173 549,10	19 923 144,90
59	SARL AFRO TP	2017	11 057 538,97	20 000 000,00	16 173 549,10
59	SARL AFRO TP	2018	17 492 937,62	0,00	20 000 000,00
59	SARL AFRO TP	2019	15 418 985,92	0,00	0,00
59	SARL AFRO TP	2020	16 246 167,22	0,00	0,00
60	SARL BIOLUXE	2010	31 397 885,00	10 047 323,20	9 626 722,75
60	SARL BIOLUXE	2011	30 710 003,68	10 134 301,21	10 047 323,20
60	SARL BIOLUXE	2012	40 315 306,58	10 078 826,64	10 134 301,21
60	SARL BIOLUXE	2013	23 544 647,71	4 708 929,54	10 078 826,64
60	SARL BIOLUXE	2014	28 223 445,75	5 926 923,61	4 708 929,54
60	SARL BIOLUXE	2015	27 803 068,36	6 116 675,04	5 926 923,61
60	SARL BIOLUXE	2016	34 043 594,62	7 149 154,87	6 116 675,04
60	SARL BIOLUXE	2017	27 258 186,00	5 179 055,34	7 149 154,87
60	SARL BIOLUXE	2018	51 266 056,00	10 765 871,76	5 179 055,34
60	SARL BIOLUXE	2019	42 751 782,00	8 122 838,58	10 765 871,76
60	SARL BIOLUXE	2020	17 093 894,00	2 564 084,10	8 122 838,58
61	SARL CORSO CERAM	2010	5 677 199,25	132 323,62	5 136 952,47
61	SARL CORSO CERAM	2011	128 546 765,45	13 286 465,13	132 323,62
61	SARL CORSO CERAM	2012	114 493 323,74	16 956 003,27	13 286 465,13
61	SARL CORSO CERAM	2013	124 677 227,86	21 030 679,47	16 956 003,27
61	SARL CORSO CERAM	2014	222 480 396,12	114 813 010,74	21 030 679,47

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61	SARL CORSO CERAM	2015	235 392 800,94	122 735 218,77	114 813 010,74
61	SARL CORSO CERAM	2016	315 282 626,22	0,00	122 735 218,77
61	SARL CORSO CERAM	2017	216 557 943,93	0,00	0,00
61	SARL CORSO CERAM	2018	225 500 943,69	0,00	0,00
61	SARL CORSO CERAM	2019	171 426 668,09	0,00	0,00
61	SARL CORSO CERAM	2020	-144 388 818,53	118 857 787,49	0,00
62	SARL CRDS	2010	42 085 977,65	9 000 000,04	29 592 097,75
62	SARL CRDS	2011	35 235 522,02	5 387 135,00	9 000 000,04
62	SARL CRDS	2012	18 326 405,08	1 885 758,31	5 387 135,00
62	SARL CRDS	2013	45 566 292,73	8 888 674,14	1 885 758,31
62	SARL CRDS	2014	45 934 489,00	8 703 275,61	8 888 674,14
62	SARL CRDS	2015	19 816 648,00	2 171 507,30	8 703 275,61
62	SARL CRDS	2016	15 496 386,00	1 196 363,77	2 171 507,30
62	SARL CRDS	2017	18 156 502,00	1 205 848,10	1 196 363,77
62	SARL CRDS	2018	88 265 579,17	5 469 376,61	1 205 848,10
62	SARL CRDS	2019	17 216 765,11	6 999 999,93	5 469 376,61
62	SARL CRDS	2020	4 450 138,93	874 652,69	6 999 999,93
63	SARL DERMOUNE FRERES LES MAGASINS LE PRINTEMPS	2010	83 301 589,28	359 332,53	6 123 896,26
63	SARL DERMOUNE FRERES LES MAGASINS LE PRINTEMPS	2011	103 887 659,16	2 900 000,00	359 332,53
63	SARL DERMOUNE FRERES LES MAGASINS LE PRINTEMPS	2012	162 626 812,65	900 000,00	2 900 000,00
63	SARL DERMOUNE FRERES LES MAGASINS LE PRINTEMPS	2013	224 168 779,64	1 500 000,00	900 000,00
63	SARL DERMOUNE FRERES LES MAGASINS LE PRINTEMPS	2014	356 236 092,13	2 000 000,00	1 500 000,00
63	SARL DERMOUNE FRERES LES MAGASINS LE PRINTEMPS	2015	386 099 880,43	0,00	2 000 000,00
63	SARL DERMOUNE FRERES LES MAGASINS LE PRINTEMPS	2016	443 061 628,57	65 500 000,00	0,00
63	SARL DERMOUNE FRERES LES MAGASINS LE PRINTEMPS	2017	437 758 419,97	740 000,00	65 500 000,00
63	SARL DERMOUNE FRERES LES MAGASINS LE PRINTEMPS	2018	356 036 657,27	0,00	740 000,00
63	SARL DERMOUNE FRERES LES MAGASINS LE PRINTEMPS	2019	416 277 435,65	0,00	0,00
63	SARL DERMOUNE FRERES LES MAGASINS LE PRINTEMPS	2020	270 644 635,53	0,00	0,00
64	SARL EL GUEDRA	2010	48 195 321,02	11 099 999,81	8 610 630,13
64	SARL EL GUEDRA	2011	31 743 685,91	7 133 825,83	11 099 999,81
64	SARL EL GUEDRA	2012	29 437 271,20	4 999 999,99	7 133 825,83
64	SARL EL GUEDRA	2013	40 036 445,74	7 899 999,88	4 999 999,99
64	SARL EL GUEDRA	2014	64 952 531,76	16 395 253,11	7 899 999,88
64	SARL EL GUEDRA	2015	46 029 652,53	11 238 220,68	16 395 253,11
64	SARL EL GUEDRA	2016	67 045 446,56	27 386 362,64	11 238 220,68
64	SARL EL GUEDRA	2017	49 631 259,90	9 985 250,64	27 386 362,64
64	SARL EL GUEDRA	2018	45 755 655,85	7 830 226,24	9 985 250,64

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64	SARL EL GUEDRA	2019	32 169 277,80	4 174 608,47	7 830 226,24
64	SARL EL GUEDRA	2020	12 506 564,75	345 929,83	4 174 608,47
65	SARL ERGOSOTS	2010	66 172 543,00	0,00	0,00
65	SARL ERGOSOTS	2011	59 584 856,00	0,00	0,00
65	SARL ERGOSOTS	2012	31 607 194,31	0,00	0,00
65	SARL ERGOSOTS	2013	18 502 758,00	0,00	0,00
65	SARL ERGOSOTS	2014	4 767 385,00	0,00	0,00
65	SARL ERGOSOTS	2015	78 660 000,00	0,00	0,00
65	SARL ERGOSOTS	2016	585 600,00	0,00	0,00
65	SARL ERGOSOTS	2017	848 446,00	0,00	0,00
65	SARL ERGOSOTS	2018	-128 796 909,31	0,00	0,00
65	SARL ERGOSOTS	2019	-24 765 234,00	0,00	0,00
65	SARL ERGOSOTS	2020	-127 557 277,00	0,00	0,00
66	SARL FAMILI SHOP HYPERMARCHE	2010	57 268 407,42	54 721 308,30	41 458 651,91
66	SARL FAMILI SHOP HYPERMARCHE	2011	89 664 722,39	4 342 999,78	54 721 308,30
66	SARL FAMILI SHOP HYPERMARCHE	2012	91 913 831,15	142 192 893,53	4 342 999,78
66	SARL FAMILI SHOP HYPERMARCHE	2013	124 218 972,56	0,00	142 192 893,53
66	SARL FAMILI SHOP HYPERMARCHE	2014	143 638 170,44	0,00	0,00
66	SARL FAMILI SHOP HYPERMARCHE	2015	186 330 437,89	0,00	0,00
66	SARL FAMILI SHOP HYPERMARCHE	2016	155 897 274,29	0,00	0,00
66	SARL FAMILI SHOP HYPERMARCHE	2017	221 514 129,12	0,00	0,00
66	SARL FAMILI SHOP HYPERMARCHE	2018	96 574 475,27	0,00	0,00
66	SARL FAMILI SHOP HYPERMARCHE	2019	-111 735 331,21	0,00	0,00
66	SARL FAMILI SHOP HYPERMARCHE	2020	-379 183 141,01	0,00	0,00
67	SARL LAOUINI ET FILS	2010	8 752 819,97	8 411 425,97	9 611 652,53
67	SARL LAOUINI ET FILS	2011	11 390 638,27	10 810 753,27	8 411 425,97
67	SARL LAOUINI ET FILS	2012	25 250 836,20	21 778 063,45	10 810 753,27
67	SARL LAOUINI ET FILS	2013	28 957 437,93	21 694 738,75	21 778 063,45
67	SARL LAOUINI ET FILS	2014	60 599 359,67	52 323 485,92	21 694 738,75
67	SARL LAOUINI ET FILS	2015	130 370 661,97	112 175 219,79	52 323 485,92
67	SARL LAOUINI ET FILS	2016	138 662 202,93	105 472 988,67	112 175 219,79
67	SARL LAOUINI ET FILS	2017	186 312 370,22	142 463 194,95	105 472 988,67
67	SARL LAOUINI ET FILS	2018	111 833 986,42	78 803 483,03	142 463 194,95
67	SARL LAOUINI ET FILS	2019	61 678 954,19	31 126 099,20	78 803 483,03
67	SARL LAOUINI ET FILS	2020	52 653 834,94	26 045 061,49	31 126 099,20
68	SARL MIZOU WORLD TRADING	2010	22 310 584,19	16 900 000,02	18 831 152,53
68	SARL MIZOU WORLD TRADING	2011	35 248 874,59	28 489 144,68	16 900 000,02
68	SARL MIZOU WORLD TRADING	2012	45 149 174,84	43 119 339,73	28 489 144,68
68	SARL MIZOU WORLD TRADING	2013	44 199 676,88	34 751 819,15	43 119 339,73
68	SARL MIZOU WORLD TRADING	2014	44 076 664,80	0,00	34 751 819,15
68	SARL MIZOU WORLD TRADING	2015	46 999 150,80	14 999 999,87	0,00
68	SARL MIZOU WORLD TRADING	2016	46 148 880,32	10 614 888,10	14 999 999,87

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68	SARL MIZOU WORLD TRADING	2017	14 636 232,65	2 581 883,69	10 614 888,10
68	SARL MIZOU WORLD TRADING	2018	13 552 630,35	0,00	2 581 883,69
68	SARL MIZOU WORLD TRADING	2019	34 554 210,81	10 000 000,01	0,00
68	SARL MIZOU WORLD TRADING	2020	26 073 814,31	10 000 000,05	10 000 000,01
69	SARL PALAIS D'OR	2010	6 512 735,89	0,00	0,00
69	SARL PALAIS D'OR	2011	9 201 457,58	0,00	0,00
69	SARL PALAIS D'OR	2012	6 240 074,02	0,00	0,00
69	SARL PALAIS D'OR	2013	6 548 721,92	5 700 000,00	0,00
69	SARL PALAIS D'OR	2014	10 337 051,58	1 600 000,00	5 700 000,00
69	SARL PALAIS D'OR	2015	10 569 795,30	0,00	1 600 000,00
69	SARL PALAIS D'OR	2016	11 376 898,30	0,00	0,00
69	SARL PALAIS D'OR	2017	11 901 790,00	11 000 000,00	0,00
69	SARL PALAIS D'OR	2018	7 602 301,00	0,00	11 000 000,00
69	SARL PALAIS D'OR	2019	12 853 151,47	20 000 000,00	0,00
69	SARL PALAIS D'OR	2020	12 666 995,00	20 000 000,00	20 000 000,00
70	SARL SUD ETANCH	2010	151 159 775,31	120 000 000,00	70 551 530,09
70	SARL SUD ETANCH	2011	108 598 071,90	0,00	120 000 000,00
70	SARL SUD ETANCH	2012	100 710 950,29	29 938 590,90	0,00
70	SARL SUD ETANCH	2013	95 192 418,95	109 783 834,72	29 938 590,90
70	SARL SUD ETANCH	2014	148 710 037,20	239 440 208,40	109 783 834,72
70	SARL SUD ETANCH	2015	203 651 500,71	58 514 400,00	239 440 208,40
70	SARL SUD ETANCH	2016	198 262 239,84	272 322 766,40	58 514 400,00
70	SARL SUD ETANCH	2017	184 938 490,58	70 780 438,02	272 322 766,40
70	SARL SUD ETANCH	2018	218 806 467,92	374 170 339,21	70 780 438,02
70	SARL SUD ETANCH	2019	225 224 738,12	102 396 364,00	374 170 339,21
70	SARL SUD ETANCH	2020	232 724 688,26	275 812 744,00	102 396 364,00
71	SARL TAPIS MAGHREB	2010	6 986 491,87	2 327 433,00	3 147 569,54
71	SARL TAPIS MAGHREB	2011	11 905 688,75	4 000 000,00	2 327 433,00
71	SARL TAPIS MAGHREB	2012	9 460 222,05	3 000 000,00	4 000 000,00
71	SARL TAPIS MAGHREB	2013	4 322 407,06	2 721 984,93	3 000 000,00
71	SARL TAPIS MAGHREB	2014	2 691 027,07	3 000 000,00	2 721 984,93
71	SARL TAPIS MAGHREB	2015	1 598 693,98	3 000 000,00	3 000 000,00
71	SARL TAPIS MAGHREB	2016	5 999 263,21	3 000 000,00	3 000 000,00
71	SARL TAPIS MAGHREB	2017	7 690 119,75	3 000 000,00	3 000 000,00
71	SARL TAPIS MAGHREB	2018	5 268 876,21	4 041 652,00	3 000 000,00
71	SARL TAPIS MAGHREB	2019	5 049 249,35	5 000 000,53	4 041 652,00
71	SARL TAPIS MAGHREB	2020	-70 611 893,00	0,00	5 000 000,53
72	SARL YOUSRA PHARM	2010	38 417 475,07	0,00	0,00
72	SARL YOUSRA PHARM	2011	37 811 972,07	53 150 284,76	0,00
72	SARL YOUSRA PHARM	2012	40 297 704,03	40 699 240,72	53 150 284,76
72	SARL YOUSRA PHARM	2013	40 242 692,83	27 666 505,67	40 699 240,72
72	SARL YOUSRA PHARM	2014	35 027 571,90	0,00	27 666 505,67

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72	SARL YOUSRA PHARM	2015	42 392 940,89	20 250 140,00	0,00
72	SARL YOUSRA PHARM	2016	40 286 634,69	0,00	20 250 140,00
72	SARL YOUSRA PHARM	2017	39 140 279,89	0,00	0,00
72	SARL YOUSRA PHARM	2018	33 968 674,59	33 968 674,59	0,00
72	SARL YOUSRA PHARM	2019	34 906 026,43	1 500 000,00	33 968 674,59
72	SARL YOUSRA PHARM	2020	28 740 470,88	48 928 831,23	1 500 000,00
73	SPA ALCIB ALGERIAN COMPANY INVEST BUILDING	2010	15 934 687,90	0,00	0,00
73	SPA ALCIB ALGERIAN COMPANY INVEST BUILDING	2011	14 582 257,73	21 265 027,68	0,00
73	SPA ALCIB ALGERIAN COMPANY INVEST BUILDING	2012	64 455 435,59	72 503 167,78	21 265 027,68
73	SPA ALCIB ALGERIAN COMPANY INVEST BUILDING	2013	14 599 177,92	7 188 765,08	72 503 167,78
73	SPA ALCIB ALGERIAN COMPANY INVEST BUILDING	2014	24 750 963,89	0,00	7 188 765,08
73	SPA ALCIB ALGERIAN COMPANY INVEST BUILDING	2015	6 780 545,03	0,00	0,00
73	SPA ALCIB ALGERIAN COMPANY INVEST BUILDING	2016	13 712 548,15	0,00	0,00
73	SPA ALCIB ALGERIAN COMPANY INVEST BUILDING	2017	10 372 908,37	0,00	0,00
73	SPA ALCIB ALGERIAN COMPANY INVEST BUILDING	2018	137 005 612,31	0,00	0,00
73	SPA ALCIB ALGERIAN COMPANY INVEST BUILDING	2019	5 182 180,84	4 700 000,00	0,00
73	SPA ALCIB ALGERIAN COMPANY INVEST BUILDING	2020	32 317 211,93	10 795 245,37	4 700 000,00
74	SPA AMENHYD	2010	805 552 290,34	0,00	0,00
74	SPA AMENHYD	2011	1 011 452 870,37	245 519 599,76	0,00
74	SPA AMENHYD	2012	633 448 089,32	783 500 000,00	245 519 599,76
74	SPA AMENHYD	2013	719 814 208,05	0,00	783 500 000,00
74	SPA AMENHYD	2014	797 342 668,29	267 733 138,67	0,00
74	SPA AMENHYD	2015	842 582 704,28	5 671 908,49	267 733 138,67
74	SPA AMENHYD	2016	1 286 267 893,19	7 551 616,30	5 671 908,49
74	SPA AMENHYD	2017	573 618 445,67	1 544 937 523,37	7 551 616,30
74	SPA AMENHYD	2018	675 950 069,71	0,00	1 544 937 523,37
74	SPA AMENHYD	2019	219 385 305,85	0,00	0,00
74	SPA AMENHYD	2020	-1 471 758 808,65	0,00	0,00
75	SPA BIOPURE ORAN	2010	46 305 310,40	1 799 999,94	9 097 031,71
75	SPA BIOPURE ORAN	2011	122 699 681,62	16 969 968,42	1 799 999,94
75	SPA BIOPURE ORAN	2012	373 364 000,00	76 305 520,77	16 969 968,42
75	SPA BIOPURE ORAN	2013	905 995 130,00	231 400 487,95	76 305 520,77
75	SPA BIOPURE ORAN	2014	796 765 439,00	163 663 827,85	231 400 487,95
75	SPA BIOPURE ORAN	2015	930 300 361,98	181 790 272,82	163 663 827,85
75	SPA BIOPURE ORAN	2016	1 215 315 783,47	249 638 379,68	181 790 272,82
75	SPA BIOPURE ORAN	2017	1 755 499 529,25	448 372 661,42	249 638 379,68
75	SPA BIOPURE ORAN	2018	2 157 261 650,20	657 199 989,34	448 372 661,42
75	SPA BIOPURE ORAN	2019	2 502 785 550,23	750 789 388,56	657 199 989,34
75	SPA BIOPURE ORAN	2020	1 569 793 263,97	313 929 627,32	750 789 388,56
76	SPA CARRIERE TAMOULGA	2010	4 209 650,39	0,00	0,00
76	SPA CARRIERE TAMOULGA	2011	4 070 169,00	0,00	0,00
76	SPA CARRIERE TAMOULGA	2012	1 916 674,09	0,00	0,00

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76	SPA CARRIERE TAMOULGA	2013	7 290 707,27	0,00	0,00
76	SPA CARRIERE TAMOULGA	2014	4 815 534,48	0,00	0,00
76	SPA CARRIERE TAMOULGA	2015	6 840 601,00	0,00	0,00
76	SPA CARRIERE TAMOULGA	2016	10 248 710,00	0,00	0,00
76	SPA CARRIERE TAMOULGA	2017	13 997 500,00	0,00	0,00
76	SPA CARRIERE TAMOULGA	2018	10 991 974,00	0,00	0,00
76	SPA CARRIERE TAMOULGA	2019	13 456 023,00	0,00	0,00
76	SPA CARRIERE TAMOULGA	2020	20 356 023,00	0,00	0,00
77	SPA CHIALI TUBES	2010	768 575 212,48	61 085 600,36	84 244 663,45
77	SPA CHIALI TUBES	2011	562 935 194,51	85 365 990,61	61 085 600,36
77	SPA CHIALI TUBES	2012	577 727 082,25	85 060 394,02	85 365 990,61
77	SPA CHIALI TUBES	2013	650 613 912,19	24 084 438,37	85 060 394,02
77	SPA CHIALI TUBES	2014	984 378 282,77	360 000 000,00	24 084 438,37
77	SPA CHIALI TUBES	2015	1 103 058 026,38	180 000 000,00	360 000 000,00
77	SPA CHIALI TUBES	2016	1 019 353 312,69	311 715 231,81	180 000 000,00
77	SPA CHIALI TUBES	2017	746 147 429,09	160 000 000,00	311 715 231,81
77	SPA CHIALI TUBES	2018	804 502 515,19	196 067 281,66	160 000 000,00
77	SPA CHIALI TUBES	2019	963 184 485,52	50 000 000,00	196 067 281,66
77	SPA CHIALI TUBES	2020	800 575 800,54	70 000 000,00	50 000 000,00
78	SPA COMPTOIR DU MAGHREB	2010	96 940 146,12	144 100 000,00	72 364 202,22
78	SPA COMPTOIR DU MAGHREB	2011	20 290 611,75	0,00	144 100 000,00
78	SPA COMPTOIR DU MAGHREB	2012	35 860 362,00	0,00	0,00
78	SPA COMPTOIR DU MAGHREB	2013	-225 932 922,91	0,00	0,00
78	SPA COMPTOIR DU MAGHREB	2014	158 432 669,50	0,00	0,00
78	SPA COMPTOIR DU MAGHREB	2015	48 741 893,18	0,00	0,00
78	SPA COMPTOIR DU MAGHREB	2016	262 063 118,56	0,00	0,00
78	SPA COMPTOIR DU MAGHREB	2017	519 223 154,25	193 200 000,00	0,00
78	SPA COMPTOIR DU MAGHREB	2018	83 354 666,29	0,00	193 200 000,00
78	SPA COMPTOIR DU MAGHREB	2019	292 715 146,19	0,00	0,00
78	SPA COMPTOIR DU MAGHREB	2020	-200 319 831,00	0,00	0,00
79	SPA DEF MED	2010	20 047 227,49	6 146 197,22	19 323 056,54
79	SPA DEF MED	2011	46 983 528,36	49 958 321,66	6 146 197,22
79	SPA DEF MED	2012	103 663 387,17	87 358 626,94	49 958 321,66
79	SPA DEF MED	2013	111 321 152,87	10 779 472,47	87 358 626,94
79	SPA DEF MED	2014	120 660 223,64	63 695 239,79	10 779 472,47
79	SPA DEF MED	2015	96 085 134,26	0,00	63 695 239,79
79	SPA DEF MED	2016	149 292 188,68	0,00	0,00
79	SPA DEF MED	2017	220 362 582,60	0,00	0,00
79	SPA DEF MED	2018	240 511 369,63	0,00	0,00
79	SPA DEF MED	2019	231 107 941,17	0,00	0,00
79	SPA DEF MED	2020	108 314 767,00		0,00
80	SPA DPEC DISTRIBUTEUR PARAPHARMACEUTIQUE ET COSMETTQUE	2010	7 732 655,48	0,00	0,00

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80	SPA DPEC DISTRIBUTEUR PARAPHARMACEUTIQUE ET COSMETTQUE	2011	-16 543 542,26	0,00	0,00
80	SPA DPEC DISTRIBUTEUR PARAPHARMACEUTIQUE ET COSMETTQUE	2012	23 125 949,22	0,00	0,00
80	SPA DPEC DISTRIBUTEUR PARAPHARMACEUTIQUE ET COSMETTQUE	2013	15 090 900,82	0,00	0,00
80	SPA DPEC DISTRIBUTEUR PARAPHARMACEUTIQUE ET COSMETTQUE	2014	15 267 193,03	14 700 000,00	0,00
80	SPA DPEC DISTRIBUTEUR PARAPHARMACEUTIQUE ET COSMETTQUE	2015	15 449 716,44	14 800 000,00	14 700 000,00
80	SPA DPEC DISTRIBUTEUR PARAPHARMACEUTIQUE ET COSMETTQUE	2016	15 632 239,84	17 000 000,00	14 800 000,00
80	SPA DPEC DISTRIBUTEUR PARAPHARMACEUTIQUE ET COSMETTQUE	2017	18 974 734,06	22 353 252,88	17 000 000,00
80	SPA DPEC DISTRIBUTEUR PARAPHARMACEUTIQUE ET COSMETTQUE	2018	65 201 761,76	70 228 173,76	22 353 252,88
80	SPA DPEC DISTRIBUTEUR PARAPHARMACEUTIQUE ET COSMETTQUE	2019	85 126 864,00	0,00	70 228 173,76
80	SPA DPEC DISTRIBUTEUR PARAPHARMACEUTIQUE ET COSMETTQUE	2020	12 042 238,00	0,00	0,00
81	SPA LA FLECHE BLEUE	2010	88 282 679,16	38 800 000,01	22 390 357,73
81	SPA LA FLECHE BLEUE	2011	86 124 220,13	28 000 000,23	38 800 000,01
81	SPA LA FLECHE BLEUE	2012	103 814 316,51	33 839 149,54	28 000 000,23
81	SPA LA FLECHE BLEUE	2013	126 620 034,86	40 144 990,95	33 839 149,54
81	SPA LA FLECHE BLEUE	2014	131 150 947,00	42 507 170,80	40 144 990,95
81	SPA LA FLECHE BLEUE	2015	126 431 820,44	0,00	42 507 170,80
81	SPA LA FLECHE BLEUE	2016	155 614 115,91	0,00	0,00
81	SPA LA FLECHE BLEUE	2017	122 120 736,40	0,00	0,00
81	SPA LA FLECHE BLEUE	2018	125 579 589,20	6 199 999,94	0,00
81	SPA LA FLECHE BLEUE	2019	128 641 313,01	6 271 359,20	6 199 999,94
81	SPA LA FLECHE BLEUE	2020	113 805 368,51	5 372 389,55	6 271 359,20
82	SARL MAHDI FOOD INTERNATIONAL	2010	55 302 923,77	0,00	0,00
82	SARL MAHDI FOOD INTERNATIONAL	2011	38 351 132,87	0,00	0,00
82	SARL MAHDI FOOD INTERNATIONAL	2012	87 002 939,09	0,00	0,00
82	SARL MAHDI FOOD INTERNATIONAL	2013	55 165 797,06	0,00	0,00
82	SARL MAHDI FOOD INTERNATIONAL	2014	16 312 011,87	0,00	0,00
82	SARL MAHDI FOOD INTERNATIONAL	2015	16 920 405,74	0,00	0,00
82	SARL MAHDI FOOD INTERNATIONAL	2016	16 788 921,70	0,00	0,00
82	SARL MAHDI FOOD INTERNATIONAL	2017	80 319 152,50	0,00	0,00
82	SARL MAHDI FOOD INTERNATIONAL	2018	37 933 030,30	0,00	0,00
82	SARL MAHDI FOOD INTERNATIONAL	2019	40 654 744,10	0,00	0,00
82	SARL MAHDI FOOD INTERNATIONAL	2020	94 017 683,80	0,00	0,00
83	SPA NATRA INTERNATIONAL	2010	235 324 987,39	67 235 003,36	82 153 817,02
83	SPA NATRA INTERNATIONAL	2011	358 823 604,50	105 735 305,07	67 235 003,36
83	SPA NATRA INTERNATIONAL	2012	279 538 972,95	55 500 000,00	105 735 305,07
83	SPA NATRA INTERNATIONAL	2013	294 933 146,46	55 460 028,13	55 500 000,00
83	SPA NATRA INTERNATIONAL	2014	439 954 721,54	175 120 769,64	55 460 028,13
83	SPA NATRA INTERNATIONAL	2015	242 257 109,00	64 574 288,92	175 120 769,64

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83	SPA NATRA INTERNATIONAL	2016	480 285 052,00	136 828 504,53	64 574 288,92
83	SPA NATRA INTERNATIONAL	2017	556 030 033,00	162 082 404,32	136 828 504,53
83	SPA NATRA INTERNATIONAL	2018	396 306 611,00	58 799 999,98	162 082 404,32
83	SPA NATRA INTERNATIONAL	2019	262 912 849,00	32 508 716,31	58 799 999,98
83	SPA NATRA INTERNATIONAL	2020	292 984 540,00	29 501 545,02	32 508 716,31
84	SPA PROFERT	2010	654 890 875,88	339 346 969,08	158 197 081,85
84	SPA PROFERT	2011	693 992 837,00	22 778 135,00	339 346 969,08
84	SPA PROFERT	2012	725 470 417,00	32 242 274,00	22 778 135,00
84	SPA PROFERT	2013	1 073 732 871,00	11 999 999,90	32 242 274,00
84	SPA PROFERT	2014	1 471 578 885,64	166 667 000,00	11 999 999,90
84	SPA PROFERT	2015	767 448 143,73	322 640 250,47	166 667 000,00
84	SPA PROFERT	2016	668 514 050,00	0,00	322 640 250,47
84	SPA PROFERT	2017	709 038 641,00	350 000 000,05	0,00
84	SPA PROFERT	2018	680 214 537,01	349 999 999,96	350 000 000,05
84	SPA PROFERT	2019	803 418 658,00	81 000 001,00	349 999 999,96
84	SPA PROFERT	2020	1 297 868 205,00	297 868 205,00	81 000 001,00
85	SPA PROM BATI	2010	5 789 300,00	5 700 000,00	6 186 482,37
85	SPA PROM BATI	2011	6 895 300,00	6 800 000,00	5 700 000,00
85	SPA PROM BATI	2012	1 505 886,56	0,00	6 800 000,00
85	SPA PROM BATI	2013	34 011 795,99	28 400 000,00	0,00
85	SPA PROM BATI	2014	665 945,27	0,00	28 400 000,00
85	SPA PROM BATI	2015	670 852,73	0,00	0,00
85	SPA PROM BATI	2016	12 861 007,35	0,00	0,00
85	SPA PROM BATI	2017	8 635 270,60	2 300 000,00	0,00
85	SPA PROM BATI	2018	11 197 475,45	0,00	2 300 000,00
85	SPA PROM BATI	2019	12 126 013,31	0,00	0,00
85	SPA PROM BATI	2020	11 631 184,29	0,00	0,00
86	SPA ROTHAEEM	2010	88 288 311,12	0,00	0,00
86	SPA ROTHAEEM	2011	8 399 457,60	0,00	0,00
86	SPA ROTHAEEM	2012	3 219 219,88	0,00	0,00
86	SPA ROTHAEEM	2013	1 133 475,01	1 329 323,65	0,00
86	SPA ROTHAEEM	2014	4 483 490,46	8 000 000,00	1 329 323,65
86	SPA ROTHAEEM	2015	15 401 250,33	14 789 752,76	8 000 000,00
86	SPA ROTHAEEM	2016	2 666 114,53	4 650 569,36	14 789 752,76
86	SPA ROTHAEEM	2017	2 720 632,58	2 044 450,00	4 650 569,36
86	SPA ROTHAEEM	2018	1 306 210,87	1 871 277,29	2 044 450,00
86	SPA ROTHAEEM	2019	-275 057 450,68	0,00	1 871 277,29
86	SPA ROTHAEEM	2020	-48 066 701,27	0,00	0,00
87	SPA SODINCO	2010	90 875 890,00	0,00	0,00
87	SPA SODINCO	2011	123 546 825,00	0,00	0,00
87	SPA SODINCO	2012	12 374 939,00	0,00	0,00
87	SPA SODINCO	2013	164 227 266,00	0,00	0,00

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87	SPA SODINCO	2014	29 205 392,00	0,00	0,00
87	SPA SODINCO	2015	11 431 400,00	0,00	0,00
87	SPA SODINCO	2016	2 691 630,00	0,00	0,00
87	SPA SODINCO	2017	2 620 931,00	0,00	0,00
87	SPA SODINCO	2018	2 034 194,00	0,00	0,00
87	SPA SODINCO	2019	8 574 350,00	0,00	0,00
87	SPA SODINCO	2020	7 374 973,00	0,00	0,00

ANNEXES

ANNEX N 2 : DESCRIPTIVE ANALYSIS

```
. summarize DIV
```

Variable	Obs	Mean	Std. Dev.	Min	Max
DIV	968	.2716219	.4339396	-1.5	2.69

```
.  
. . summarize L1DIV
```

Variable	Obs	Mean	Std. Dev.	Min	Max
L1DIV	968	.2772107	.4326524	-1.5	2.69

```
.  
. . summarize ROA
```

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	968	.0513533	.0821866	-.63	.5

```
.  
. . summarize LIQ
```

Variable	Obs	Mean	Std. Dev.	Min	Max
LIQ	968	.0841942	.0958701	0	.65

```
.  
. . summarize LMD
```

Variable	Obs	Mean	Std. Dev.	Min	Max
LMD	968	.1432645	.1666957	0	1.14

```
.
```

ANNEXES

```
.  
. . summarize SD  
  
Variable | Obs Mean Std. Dev. Min Max  
-----+-----  
SD | 968 .4129959 .2556155 .01 1.11  
  
. . summarize SIZE  
  
Variable | Obs Mean Std. Dev. Min Max  
-----+-----  
SIZE | 968 21.48475 1.327505 16.43626 25.90351  
  
. . summarize WCR  
  
Variable | Obs Mean Std. Dev. Min Max  
-----+-----  
WCR | 968 .1727583 .2754955 -.72 .85  
  
. . summarize INV  
  
Variable | Obs Mean Std. Dev. Min Max  
-----+-----  
INV | 968 .1619215 .4142196 -.99 5.74  
  
. . summarize GROW  
  
Variable | Obs Mean Std. Dev. Min Max  
-----+-----  
GROW | 968 .137407 .3926104 -.98 5.26
```

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ANNEX N 3: VIF Test

```
. vif
```

Variable	VIF	1/VIF
SD	1.34	0.747772
GrowthGDP	1.33	0.751403
INF	1.27	0.788340
LMD	1.25	0.802469
ROA	1.23	0.813000
LIQ	1.19	0.841467
WCR	1.14	0.879207
GROW	1.08	0.928983
INV	1.06	0.945876
SIZE	1.04	0.966004
Mean VIF	1.19	

```
. vif
```

Variable	VIF	1/VIF
SD	1.34	0.746465
GrowthGDP	1.33	0.751127
ROA	1.29	0.777914
INF	1.27	0.788295
LMD	1.25	0.802405
LIQ	1.19	0.840628
WCR	1.14	0.878854
L1DIV	1.10	0.909179
SIZE	1.08	0.926656
GROW	1.08	0.928981
INV	1.06	0.944861
Mean VIF	1.19	

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ANNEX N 4: SERIAL CORRELATION TEST

```
. xtserial DIV ROA LIQ LMD SD SIZE WCR GrowthGDP INV GROW INF
```

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

```
F( 1,      87) =      1.818
Prob > F =      0.1811
```

```
. xtserial DIV L1DIV ROA LIQ LMD SD SIZE WCR GrowthGDP INV GROW INF
```

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

```
F( 1,      87) =     113.894
Prob > F =      0.0000
```

ANNEXES

ANNEX N 5: HETEROSKEDASTICITY TEST

```
regress DIV ROA LIQ LMD SD SIZE WCR GrowthGDP INV GROW INF
```

Source	SS	df	MS	Number of obs	=	968
				F(10, 957)	=	9.90
Model	17.0769263	10	1.70769263	Prob > F	=	0.0000
Residual	165.012627	957	.172426988	R-squared	=	0.0938
				Adj R-squared	=	0.0843
Total	182.089554	967	.188303571	Root MSE	=	.41524

DIV	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ROA	1.190544	.1801953	6.61	0.000	.83692	1.544167
LIQ	.2837025	.1518405	1.87	0.062	-.0142762	.5816811
LMD	-.0273683	.0894233	-0.31	0.760	-.2028567	.1481201
SD	.0391664	.0604112	0.65	0.517	-.0793874	.1577201
SIZE	-.0572001	.0102344	-5.59	0.000	-.0772846	-.0371156
WCR	.0539001	.0516927	1.04	0.297	-.047544	.1553443
GrowthGDP	.0004719	.0062821	0.08	0.940	-.0118563	.0128001
INV	-.0143954	.0331468	-0.43	0.664	-.0794442	.0506534
GROW	.0309351	.0352877	0.88	0.381	-.0383152	.1001853
INF	.4094419	.7626967	0.54	0.592	-1.087309	1.906193
_cons	1.372867	.2255571	6.09	0.000	.9302237	1.815511

```
. predict residual_terms , r
```

```
. reg residual_terms 1.residual_terms 12.residual_terms 13.residual_terms
```

Source	SS	df	MS	Number of obs	=	704
				F(3, 700)	=	83.37
Model	31.1247162	3	10.3749054	Prob > F	=	0.0000
Residual	87.112405	700	.124446293	R-squared	=	0.2632
				Adj R-squared	=	0.2601

ANNEXES

```
. predict residual_terms , r
```

```
. reg residual_terms 1.residual_terms 12.residual_terms 13.residual_terms
```

Source	SS	df	MS	Number of obs	=	704
Model	31.1247162	3	10.3749054	F(3, 700)	=	83.37
Residual	87.112405	700	.124446293	Prob > F	=	0.0000
				R-squared	=	0.2632
				Adj R-squared	=	0.2601
Total	118.237121	703	.168189361	Root MSE	=	.35277

residual_terms	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
residual_terms					
L1.	.3341521	.0373158	8.95	0.000	.2608877 .4074164
L2.	.2282314	.0378126	6.04	0.000	.1539917 .302471
L3.	.044803	.0370233	1.21	0.227	-.027887 .117493
_cons	.006673	.0133031	0.50	0.616	-.0194457 .0327917


```
. hettest
```

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of residual_terms

```
chi2(1)      = 115.73
Prob > chi2   = 0.0000
```

```
.
```

ANNEXES

```
. regress DIV L1DIV ROA LIQ LMD SD SIZE WCR GrowthGDP INV GROW INF
```

Source	SS	df	MS	Number of obs	=	968
Model	56.118918	11	5.10171982	F(11, 956)	=	38.72
Residual	125.970636	956	.131768447	Prob > F	=	0.0000
				R-squared	=	0.3082
				Adj R-squared	=	0.3002
Total	182.089554	967	.188303571	Root MSE	=	.363

DIV	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
L1DIV	.4870672	.0282962	17.21	0.000	.4315373 .5425972
ROA	.6146995	.1610371	3.82	0.000	.2986726 .9307264
LIQ	.2114805	.1328029	1.59	0.112	-.0491383 .4720993
LMD	-.0153994	.0781756	-0.20	0.844	-.1688149 .1380161
SD	.0011341	.0528567	0.02	0.983	-.1025945 .1048628
SIZE	-.0254657	.0091348	-2.79	0.005	-.0433922 -.0075392
WCR	.0383036	.045198	0.85	0.397	-.0503952 .1270025
GrowthGDP	.0022851	.0054927	0.42	0.677	-.0084941 .0130642
INV	-.0307439	.028992	-1.06	0.289	-.0876392 .0261513
GROW	.0301773	.030848	0.98	0.328	-.0303604 .0907149
INF	.4959435	.6667565	0.74	0.457	-.8125319 1.804419
_cons	.6036856	.2021786	2.99	0.003	.2069205 1.000451

```
. predict residual_terms , r
```

```
. reg residual_terms l.residual_terms l2.residual_terms l3.residual_terms
```

Source	SS	df	MS	Number of obs	=	704
Model	5.22169299	3	1.74056433	F(3, 700)	=	13.99
Residual	87.108374	700	.124440534	Prob > F	=	0.0000
				R-squared	=	0.0566
				Adj R-squared	=	0.0525
Total	92.330067	703	.131337222	Root MSE	=	.35276

ANNEXES

```
. predict residual_terms , r
```

```
. reg residual_terms 1.residual_terms 12.residual_terms 13.residual_terms
```

Source	SS	df	MS	Number of obs	=	704
Model	5.22169299	3	1.74056433	F(3, 700)	=	13.99
Residual	87.108374	700	.124440534	Prob > F	=	0.0000
				R-squared	=	0.0566
				Adj R-squared	=	0.0525
Total	92.330067	703	.131337222	Root MSE	=	.35276

residual_terms	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
residual_terms					
L1.	-.1378402	.0370805	-3.72	0.000	-.2106424 -.065038
L2.	.167408	.0369036	4.54	0.000	.0949529 .239863
L3.	.1144634	.0381581	3.00	0.003	.0395453 .1893815
_cons	.0047453	.0132963	0.36	0.721	-.0213602 .0308507


```
. hettest
```

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of residual_terms

```
chi2(1)      =      9.21
Prob > chi2   =      0.0024
```

ANNEXES

ANNEX N 6: GMM ANALYSIS

```
import excel "C:\Users\Azur Computer\Desktop\DATA MOD.xlsx", sheet("Feuil2") firstrow clear

. xtset ID year
    panel variable:  ID (strongly balanced)
    time variable:   year, 2010 to 2020
    delta: 1 unit

. xtabond2 DIV L1DIV ROA LIQ LMD SD SIZE WCR GrowthGDP INV GROW INF, gmm( L1DIV) iv (ROA LIQ SIZE LMD SD GROW WCR GrowthGDP INV INF)robu
> st twostep
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, perm.
Warning: Two-step estimated covariance matrix of moments is singular.
Using a generalized inverse to calculate optimal weighting matrix for two-step estimation.
Difference-in-Sargan/Hansen statistics may be negative.

Dynamic panel-data estimation, two-step system GMM

-----
Group variable: ID                      Number of obs   =    968
Time variable : year                   Number of groups =    88
Number of instruments = 76              Obs per group: min =    11
Wald chi2(11) = 201.97                  avg =    11.00
Prob > chi2 = 0.000                     max =    11
-----
```

	DIV	Coef.	Corrected Std. Err.	z	P> z	[95% Conf. Interval]
L1DIV		.2395345	.0792373	3.02	0.003	.0842322 .3948367
ROA		.7408067	.2439798	3.04	0.002	.2626151 1.218998
LIQ		.3302192	.1585097	2.08	0.037	.019546 .6408925
LMD		-.0610441	.1197179	-0.51	0.610	-.295687 .1735987
SD		-.0697588	.0574139	-1.22	0.224	-.1822879 .0427704
SIZE		-.0325032	.0168557	-1.93	0.054	-.0655398 .0005334
WCR		.0545547	.0575773	0.95	0.343	-.0582948 .1674042
GrowthGDP		.0066623	.0045483	1.46	0.143	-.0022522 .0155767
INV		-.0195607	.0223009	-0.88	0.380	-.0632696 .0241482
GROW		.0352617	.0180265	1.96	0.050	-.0000695 .0705929
INF		.4198376	.5504328	0.76	0.446	-.6589909 1.498666
_cons		.8180137	.3546237	2.31	0.021	.122964 1.513063

GROW		.0352617	.0180265	1.96	0.050	-.0000695	.0705929
INF		.4198376	.5504328	0.76	0.446	-.6589909	1.498666
_cons		.8180137	.3546237	2.31	0.021	.122964	1.513063

Instruments for first differences equation

Standard

D.(ROA LIQ SIZE LMD SD GROW WCR GrowthGDP INV INF)

GMM-type (missing=0, separate instruments for each period unless collapsed)

L(1/10).L1DIV

Instruments for levels equation

Standard

ROA LIQ SIZE LMD SD GROW WCR GrowthGDP INV INF

_cons

GMM-type (missing=0, separate instruments for each period unless collapsed)

D.L1DIV

Arellano-Bond test for AR(1) in first differences: z = -3.61 Pr > z = 0.000

Arellano-Bond test for AR(2) in first differences: z = 1.88 Pr > z = 0.060

Sargan test of overid. restrictions: chi2(64) = 208.04 Prob > chi2 = 0.000
(Not robust, but not weakened by many instruments.)

Hansen test of overid. restrictions: chi2(64) = 74.50 Prob > chi2 = 0.174
(Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:

GMM instruments for levels

Hansen test excluding group: chi2(54) = 62.25 Prob > chi2 = 0.206

Difference (null H = exogenous): chi2(10) = 12.25 Prob > chi2 = 0.268

iv(ROA LIQ SIZE LMD SD GROW BFR GrowthGDP INV INF)

Hansen test excluding group: chi2(54) = 61.56 Prob > chi2 = 0.224

Difference (null H = exogenous): chi2(10) = 12.94 Prob > chi2 = 0.227

ANNEXES

ANNEX 06: Lintner and Tobit Analysis

```
. xtabond2 DIV L1DIV EAR , gmm( L1DIV) iv ( EAR )robust twostep
Favoring space over speed. To switch, type or click on mata: mata set matafavor speed, pe:
Warning: Two-step estimated covariance matrix of moments is singular.
Using a generalized inverse to calculate optimal weighting matrix for two-step estimation
Difference-in-Sargan/Hansen statistics may be negative.
```

Dynamic panel-data estimation, two-step system GMM

```
-----
Group variable: ID                               Number of obs   =       956
Time variable : year                             Number of groups =        87
Number of instruments = 67                       Obs per group: min =        10
Wald chi2(2)   =       205.12                      avg =       10.99
Prob > chi2    =        0.000                      max =        11
-----
```

	DIV	Coef.	Corrected Std. Err.	z	P> z	[95% Conf. Interval]
L1DIV		.6498316	.1330663	4.88	0.000	.3890265 .9106368
EAR		.2796023	.1010692	2.77	0.006	.0815103 .4776943
_cons		-2.45e+07	1.17e+07	-2.09	0.037	-4.75e+07 -1482090

```
-----
Instruments for first differences equation
Standard
D.EAR
GMM-type (missing=0, separate instruments for each period unless collapsed)
L(1/10).L1DIV
Instruments for levels equation
Standard
EAR
_cons
GMM-type (missing=0, separate instruments for each period unless collapsed)
D.L1DIV
-----
```

```
Arellano-Bond test for AR(1) in first differences: z = -1.92 Pr > z = 0.055
Arellano-Bond test for AR(2) in first differences: z = 1.54 Pr > z = 0.123
```

ANNEXES

	DIV	Coef.	Corrected Std. Err.	z	P> z	[95% Conf. Interval]	
L1DIV		.6514361	.1329292	4.90	0.000	.3908996	.9119727
EAR		.2774564	.1001728	2.77	0.006	.0811214	.4737914
_cons		-2.2929	1.130133	-2.03	0.042	-4.50792	-.0778806

Instruments for first differences equation

Standard

D.EAR

GMM-type (missing=0, separate instruments for each period unless collapsed)

L(1/10).L1DIV

Instruments for levels equation

Standard

EAR

_cons

GMM-type (missing=0, separate instruments for each period unless collapsed)

D.L1DIV

Arellano-Bond test for AR(1) in first differences: z = -1.92 Pr > z = 0.055

Arellano-Bond test for AR(2) in first differences: z = 1.55 Pr > z = 0.122

Sargan test of overid. restrictions: chi2(64) = 549.27 Prob > chi2 = 0.000
(Not robust, but not weakened by many instruments.)

Hansen test of overid. restrictions: chi2(64) = 73.30 Prob > chi2 = 0.200
(Robust, but weakened by many instruments.)

Difference-in-Hansen tests of exogeneity of instrument subsets:

GMM instruments for levels

Hansen test excluding group: chi2(54) = 57.03 Prob > chi2 = 0.363

Difference (null H = exogenous): chi2(10) = 16.27 Prob > chi2 = 0.092

iv(EAR)

Hansen test excluding group: chi2(63) = 61.52 Prob > chi2 = 0.529

Difference (null H = exogenous): chi2(1) = 11.78 Prob > chi2 = 0.001

ANNEXES

```
import excel "C:\Users\Azur Computer\Desktop\AVRI 2024\DATA\LAG DIV.xlsx", sheet("Feuil3") firstrow clear

. tobit DIV EAR L1DIV, ll(0)

Tobit regression                               Number of obs   =           968
                                                LR chi2(2)       =       1263.72
                                                Prob > chi2      =         0.0000
Log likelihood = -2690.4253                    Pseudo R2       =         0.1902
```

DIV	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
EAR	.2904209	.0222589	13.05	0.000	.2467396	.3341023
L1DIV	.7129838	.0275747	25.86	0.000	.6588705	.7670971
_cons	-16.05698	1.172047	-13.70	0.000	-18.35703	-13.75693
/sigma	27.20656	.8471031			25.54419	28.86893

```
447 left-censored observations at DIV <= 0
521 uncensored observations
0 right-censored observations
```

ANNEXES

```
import excel "C:\Users\Azur Computer\Desktop\PRATIQUE\lintner secteur.xlsx", sheet("MANUFACTURING ") firstrow
tobit DIV EAR L1DIV, ll(0)

obit regression                                Number of obs   =       363
                                                LR chi2(2)      =      121.80
                                                Prob > chi2     =      0.0000
og likelihood = -3560.6417                    Pseudo R2       =      0.0168
```

DIV	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
EAR	.0830898	.0181971	4.57	0.000	.0473041	.1188754
L1DIV	.6432432	.0941652	6.83	0.000	.458062	.8284244
_cons	-7.01e+07	9748048	-7.19	0.000	-8.93e+07	-5.10e+07
/sigma	1.33e+08	7396558			1.18e+08	1.47e+08

191 left-censored observations at DIV <= 0						
172 uncensored observations						
0 right-censored observations						

```
import excel "C:\Users\Azur Computer\Desktop\lintner secteur.xlsx", sheet("AGRIBUSINESS") firstrow clear
. tobit DIV EAR L1DIV, ll(0)

Tobit regression                                Number of obs   =       275
                                                LR chi2(2)      =      195.60
                                                Prob > chi2     =      0.0000
Log likelihood = -3339.8794                    Pseudo R2       =      0.0284
```

DIV	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
EAR	.0748728	.021165	3.54	0.000	.0332054	.1165402
L1DIV	1.012038	.0649347	15.59	0.000	.8842019	1.139875
_cons	-6.26e+08	1.06e+08	-5.92	0.000	-8.34e+08	-4.18e+08
/sigma	1.30e+09	7.78e+07			1.15e+09	1.46e+09

129 left-censored observations at DIV <= 0						
146 uncensored observations						
0 right-censored observations						

```
import excel "C:\Users\Azur Computer\Desktop\lintner secteur.xlsx", sheet("RETAIL and Services") firstrow clear
tobit DIV EAR L1DIV, ll(0)

obit regression                                Number of obs   =       329
                                                LR chi2(2)      =      122.16
                                                Prob > chi2     =      0.0000
og likelihood = -4152.2157                    Pseudo R2       =      0.0145
```

DIV	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
EAR	.2891542	.0282504	10.24	0.000	.2335787	.3447296
L1DIV	-.0318773	.0784813	-0.41	0.685	-.1862693	.1225147
_cons	-4.77e+07	1.03e+07	-4.65	0.000	-6.79e+07	-2.75e+07
/sigma	1.40e+08	7150243			1.26e+08	1.54e+08

127 left-censored observations at DIV <= 0						
202 uncensored observations						
0 right-censored observations						

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