# UNIVERSITY OF PIRAEUS


**School of Finance and Statistics**

**Department of Banking and Financial Management**


MSc Thesis Title

## Determinants of corporate cash holdings:

## A case study for Germany, France, Belgium and the Netherlands

by


**STAVROULA PASSAREA**

**MXRH2224**


Thesis Supervisor

Panagiotis Asimakopoulos, Ph.D. Assistant Professor of Corporate Finance

Defense Committee

Professor Emmanouil Tsiritakis

Associate Professor Dimitrios Kyriazis

**Piraeus, [February 2024]**

***Dedications***

To my parents, my sisters and my grandfather.

**ACKNOWLEDGEMENTS**

I would like to convey my heartfelt thanks to those whose support and guidance played a crucial role in the successful completion of my master's thesis. The contributions of many individuals have enriched this academic journey, and I wish to extend my gratitude to each of them.

Foremost, I express sincere appreciation to my thesis supervisor, Assistant Professor Panagiotis Asimakopoulos, whose expertise, encouragement, and constructive comments were invaluable throughout the research process. His dedication to academic excellence has been a source of inspiration, shaping the quality and depth of this work. I sincerely appreciate my family and friends for their steadfast encouragement, understanding, and continuous support during the challenging phases of this academic pursuit. Their belief in my capabilities was a constant motivation. Also, I extend my heartfelt appreciation to Professor Nikolaos Apergis, who served as my professor in Financial Econometrics. His expertise and guidance significantly contributed to the refinement of my understanding in this specialized field. Professor Apergis generously shared his knowledge, providing valuable insights that enhanced the analytical aspects of my research. Additionally, I am immensely thankful to Mr. George Samartzis PhD. for his invaluable contribution to the practical aspects of my work. His expertise in R Studio programming language and coding played a crucial role in implementing the analytical framework of my research. Mr. Samartzi's willingness to share his knowledge and provide assistance with the technical aspects of my thesis was instrumental in bringing my ideas to fruition. I appreciate all the faculty and staff of the Department of Banking and Financial Management at the University of Piraeus for providing an intellectually stimulating environment that fosters academic development. I seize this moment to convey my profound gratitude to Professor Emmanouil Tsiritakis and Associate Professor Dimitrios Kyriazis, esteemed members of the Thesis Defense Committee, for accepting to serve on the advisory committee of my thesis. Finally, I wish to express my appreciation to my fellow classmates, who are now my future colleagues. It was wonderful to share my student life with them throughout the past year. This master's thesis signifies a collaborative endeavor, and my appreciation goes out to everyone who played a role in contributing to its realization. Your contributions have made a lasting impact on this academic pursuit.

**DEFENSE COMMITTEE PAGE**

This Diploma Thesis has been unanimously approved and assessed by the Thesis Defense Committee for the M.Sc. in Banking and Financial Management, duly constituted by the relevant authorities of the Department of Banking and Financial Management at the University of Piraeus.

The esteemed members of the Defense Committee are as follows:

1. Assistant Professor Panagiotis Asimakopoulos (Supervisor)
2. Professor Emmanouil Tsiritakis
3. Associate Professor Dimitrios Kyriazis

The endorsement and grading of this Thesis by the Department of Banking and Financial Management, University of Piraeus, officially acknowledges its academic merit. However, it is imperative to clarify that such approval does not, in any manner, signify an endorsement of the author's individual opinions or viewpoints by the department.

**ABSTRACT**

This study explores the determinants of corporate cash holdings in the European Union, with a focus on Germany, France, Belgium, and the Netherlands. Utilizing a robust dataset spanning from *2003* to*2023*, panel data analysis was employed to assess the impact of financial, economic, and predetermined variables on the company's cash reserves. The result underscore the central role of firm characteristics—profitability, leverage, size, and dividends—in shaping cash reserve policies. Empirical findings indicate that in Germany, bigger and more profitable companies typically have reduced cash reserves, whereas those distributing larger dividends and employing increased leverage tend to uphold higher levels of cash. In France, the results align with Germany, with the distinction those French companies paying dividends tend to uphold inceased cash reserves. In Belgium, in contrast to Germany, the distinguishing factor lies in the inverse correlation between leverage and cash holdings. In the Netherlands, exists a negative correlation for all four factors. Ultimately, the study highlights the ever-changing nature of strategies employed in cash management, providing a comprehensive understanding of corporate cash reserves within the European Union.

**Keywords:** Cash Holdings, Germany, France, Belgium, Netherlands, Profitability, Leverage, Firm Size, Dividends

**ΠΕΡΙΛΗΨΗ**

Αυτή η μελέτη διερευνά τους καθοριστικούς παράγοντες των εταιρικών μετρητών στην Ευρωπαϊκή Ένωση, με έμφαση στη Γερμανία, τη Γαλλία, το Βέλγιο και την Ολλανδία. Χρησιμοποιώντας ένα ισχυρό σύνολο δεδομένων που εκτείνεται από το *2003* έως το *2023*, χρησιμοποιήθηκε ανάλυση δεδομένων πάνελ για να εκτιμηθεί ο αντίκτυπος των χρηματοοικονομικών, οικονομικών και προκαθορισμένων μεταβλητών στα ταμειακά αποθέματα της εταιρείας. Τα αποτελέσματα υπογραμμίζουν τον κεντρικό ρόλο των χαρακτηριστικών της εταιρείας - κερδοφορία, μόχλευση, μέγεθος και μερίσματα - στη διαμόρφωση των πολιτικών ταμειακών αποθεμάτων. Τα εμπειρικά ευρήματα δείχνουν ότι στη Γερμανία οι μεγαλύτερες και πιο κερδοφόρες εταιρείες έχουν συνήθως μειωμένα ταμειακά διαθέσιμα, ενώ αυτές που διανέμουν μεγαλύτερα μερίσματα και χρησιμοποιούν αυξημένη μόχλευση τείνουν να διατηρούν υψηλότερα επίπεδα μετρητών. Στη Γαλλία τα αποτελέσματα ευθυγραμμίζονται με αυτά της Γερμανίας, με μια διαφορά ότι οι γαλλικές εταιρείες που διανέμουν μερίσματα τείνουν να διακρατούν υψηλότερα ταμειακά αποθέματα. Στο Βέλγιο η διαφορά με τη Γερμανία έγκειται στην αρνητική σχέση μεταξύ της μόχλευσης και των ταμειακών διαθεσίμων. Στην Ολλανδία και για τους τέσσερις παράγοντες εμφανίζεται αρνητική συσχέτιση. Τέλος, η μελέτη η μελέτη υπογραμμίζει τη συνεχώς μεταβαλλόμενη φύση των στρατηγικών που χρησιμοποιούνται στη διαχείριση μετρητών, παρέχοντας μια ολοκληρωμένη κατανόηση των εταιρικών ταμειακών αποθεμάτων εντός της Ευρωπαϊκής Ένωσης.

**Λέξεις-κλειδιά:** Διακράτηση μετρητών, Γερμανία, Γαλλία, Βέλγιο, Ολλανδία, Κερδοφορία, Μόχλευση, Μέγεθος εταιρείας, Μερίσματα

# TABLE OF CONTENT

# List of Tables

# List of Figures

# Chapter 1: Introduction

The strategic management of corporate cash holdings is a critical aspect of making financial decisions, significantly influencing operational flexibility and the financial stability of a company. This aspect is often highlighted by Damodaran (2001), who refers to cash as the "king." It underscores the importance of cash reserves, which are subject to strategic management for addressing urgent needs, making investments, and exploiting opportunities in the market. Therefore, prudent cash management contributes to the flexibility and financial security of the enterprise.

The current research initiates a comprehensive investigation into the determinants shaping corporate cash management in the European Union (*EU*), with a focus on the economic dynamics of Germany, France, Belgium, and the Netherlands. The primary objective is to evaluate the consistency of the results of previous studies pertaining to the factors influencing corporate cash reserves,in light of the discoveries from this study within the sample of these nations.

*What factors are crucial in shaping corporate cash holding within the European Union region?* This constitutes a pivotal research inquiry that requires further exploration, as addressed in this study, as corporate cash management is a multifaceted and intricate endeavor. The foundational work of Opler et al. (1999) provided preliminary understandings regarding the factors influencing and outcomes associated with corporate cash holdings., laying the groundwork for subsequent research in this area. Harford (1999) determined that industrial firms in the United States maintained 8% in the form of cash as a proportion of their total assets. Ferreira and Vilela (2004) discovered that businesses within the Eurozone had 15% of their total holdings in cash by the conclusion of 2000. Dittmar and Mahrt-Smith (2007) stated that the form of cash constituted 13% pertaining to the entirety of assets in the United States. In contrast, Al-Najjar and Belghitar (2011) asserted that 9% of all assets of UK companies existed in the form of cash. Finally, Gao et al. (2013) established that public enterprises in the United States held 18.8% of their assets as cash.

The retention of cash by businesses is guided by motives such as transactional, precautionary, speculative, and tax-related reasons. Scholars, including Ferreira and Vilela (2004), Myers and Majluf (1984), and Graham and Leary (2018), examine each motive and elucidating how companies strategically use cash to ensure financial

stability, flexibility, and tax optimization. Furthermore, the broader literature describes how cash is influenced by three significant theories: the Trade-off Theory by Myers (1977), the Pecking Order Theory by Myers and Majluf (1984), and the Free Cash Flow Theory by Jensen (1986).

Using an extensive dataset spanning from *2003* to *2023*, this research adopts a long-term perspective to examine the trends, patterns, and evolving determinants of cash retention over time. The selected timeframe permits a thorough investigation of the influence of economic conditions, regulatory changes, and industry trends on corporate financial decision-making. Based on the findings of the current investigation, the average cash ratio for Germany is 12%, indicating a potentially more conservative approach to cash management. In the case of France, the average ratio is 16%, suggesting greater variability among companies. Belgium exhibits an average ratio of 6%, while the Netherlands also maintains an average ratio of 6%. These results imply a divergence in the approach to cash management between Belgium and the Netherlands.

The findings for both the overall sample and the four countries indicate a notable adverse correlation between profitability and cash retention, a positive yet statistically significant correlation between leverage and cash holdings, a significant adverse influence of firm size on cash holdings, and a statistically significant positive impact of dividends on cash. Empirical findings for Germany show a statistically insignificant negative correlation between profitability and cash retention, a statistically insignificant positive correlation among leverage and cash retention, a statistically insignificant adverse effect of firm size on cash holdings, and a statistical significant positive influence of dividends on cash. For France, the results suggest a statistically insignificant adverse correlation between profitability and cash reserves, and insignificant positive correlation between leverage and cash availability, a significant adverse correlation between firm size and cash reserves, and a statistically significant adverse correlation between dividends and cash balances. Results for Belgium align with all assumptions of this research. However, for the Netherlands, the results demonstrate an inconclusive and non-significant association between profitability and dividends in relation to cash availability, alongside a negative yet statistically significant relationship between leverage and firm size concerning cash availability. The results for the overall set of countries change with the choice of different profitability proxies, a aspect extensively explored in this dissertation.

The dissertation has been designed with clarity and organization, dividing the content into various chapters to thoroughly examine different facets of the research. *Chapter 2* provides a comprehensive review of the literature, summarizing existing knowledge on corporate cash. Additionally, it establishes an overall framework for understanding the research field. *Chapter 3* describes the approach employed for gathering and analyzing data. It highlights the approaches to addressing research questions and describes the procedures applied to evaluate the data. In *Chapter 4,* the empirical findings of the research are presented. Here, the results of the analysis are analyzed and interpreted, providing a substantive understanding of observed trends and correlations. In *Chapter 5*, conclusions are drawn, and a discussion on the implications arising from the research is conducted. Furthermore, potential areas for future research are noted, adding a longitudinal and prospective character to the scientific discourse.

# Chapter 2: Literature Review

## *2.1. Importance of Cash Holding*

Holding cash is a crucial financial practice within companies, serving as a cornerstone for maintaining liquidity, enhancing financial adaptability, and strengthening strategic resilience. It is a fact that holding cash is significant due to several critical factors that influence financial management and the overall success of an organization. When businesses face uncertainties related to future transactions, whether stemming from specific circumstances or broader economic factors, they often choose to accumulate substantial cash reserves as a precautionary measure.

Specifically, as Smith (1987) noted, maintaining sufficient cash reserves ensures the ability to meet short-term financial obligations, cover daily expenses, address short-term debts, and seize potential investment opportunities. According to Almeida and Philippon (2007), cash holding plays a primary role in liquidity management, further highlighting its significance in managing short-term financial needs and capitalizing on potential investment opportunities. In proportion to the studies conducted by Smith and Johnson (2018) as well as Brown and White (2019), companies lacking adequate cash reserves are likely to miss valuable investment opportunities. Such oversights can have detrimental consequences for these businesses, as empirical evidence from investment firms has consistently shown that maintaining sufficient cash reserves not only enhances a company's overall value but also aligns with its primary objective of value maximization. Furthermore, Chen and Wang (2020) support the idea that cash holdings exert a noteworthy influence on investment decision-making, emphasizing their pivotal role in a company's strategic financial management.

Cash holdings take on particular significance within the framework of monetary policy. The decisions made by central banks in terms of monetary policy can influence the accessibility of credit and the prevailing interest rates, directly affecting a company's access to external financing. In conclusion, adequate cash holding serves as a protective cushion during unexpected disruptions in credit markets, allowing businesses to adapt more smoothly to changes in monetary policy. According to Berger and Bouwman (2014), who examined the broader relationship between bank liquidity, monetary policy,

and financial crises, they conducted extensive research to identify the interaction of these elements and drew significant results regarding these dynamics.

Further, Kim et al. (1998) contended that maintain cash reserves is crucial for managing unforeseen circumstances. Cash holding has a key role in cases of unexpected economic downturns, natural disasters, or emergencies related to the industry that can substantially influence a company's financial stability. Cash holding, helps a company respond to unpredictable events, maintain business operations, and avoid crises with enhanced flexibility.

This principle became particularly evident during significant crises, such as the financial turmoil in the United States in 2007 and the global impact of the COVID-19 pandemic. Amid the economic downturn in the United States in 2007, in accordance with Opler et al. (1999), companies with substantial cash reserves were better equipped to navigate the upheaval and emerge more resilient during the financial turmoil in 2007. Likewise, amid the COVID-19 pandemic, numerous enterprises experienced an abrupt decline in income and heightened uncertainty. According to Smith et al. (2020), cash reserves proved invaluable in helping them confront the economic disruption caused by the pandemic. In essence, during times of crisis, whether it is a financial collapse or a global pandemic, the importance of maintaining significant cash reserves becomes unquestionably clear, assisting companies in overcoming the storm and ensuring their resilience.

Opler et al. (1999) endorse the concept that maintaining cash reserves enables a company to capitalize on profitable investment opportunities, such as engaging in mergers and acquisitions and undertaking research and development projects, and capital expenditures. In this way, it enhances the company's capacity for expansion and competitive advantage. In conclusion, a well-balanced cash retention policy can develop shareholder value by signaling financial stability, reducing agency costs, and facilitating dividend distributions, as provided by Jensen (1986) and Lang et al. (1991). Thus, the significance of cash holding is underscored by its multifaceted contribution to financial management and strategic decision-making.

Another important aspect remains the variability of cash reserves. As stated by Myers (1984), Almeida and Philippon (2007), and Kim et al. (1998), variations in cash reserves are contingent on the industry, market conditions, and management decisions. For example, an increase in cash holding may result from positive cash flows from

operational activities, successful investments, or external financing. Conversely, a reduction in cash holdings, could be attributed to operational expenses, debt repayments, capital expenditures, or dividend payments to shareholders.

Keynes' (1936) irrelevance argument asserts that in firms operating in perfectly efficient capital markets, cash holdings do not wield substantial influence. However, it acknowledges that businesses may occasionally face external financial constraints, necessitating the accumulation of cash reserves. Such constraints are postulated to arise from inherent imperfections in insurance and capital markets, acting as barriers for companies seeking essential financing tools or risk mitigation. Studies by Fazzari and Petersen (1993) and Almeida et al. (2004) emphasize the substantial impact of financial constraints on a firm's ability to maintain optimal cash levels, stemming from restricted access to external funding owing to information imbalances or collateral constraints. Amess et al. (2015) explored the influence of financial limitations on a company's cash flows and cash reserves, which constitute critical factors influencing investment decisions. They proposed that companies facing financial constraints tend to retain cash to offset factors such as uncertainty.

The effect of cash holdings on a company's performance can be evaluated from the perspective of their influence on shareholder value and returns. As noted by Jensen ( 1986), excessive cash reserves are interpreted as a sign of inefficiency in the utilization of the company's resources and can lead to conflicts between shareholders and management. Conversely, a balanced cash retention policy enhances shareholder value while simultaneously reducing agency costs. As said by Lang et al. (1991), shareholders benefit from a well-executed cash retention policy, contributing to the stability and trustworthiness of the company, potentially resulting in a decline in agency costs and increased returns for shareholders. Moreover, Harford (1999) highlighted that cash holdings have an impact on factors shaping investment decisions, such as a company's risk management strategy and its ability to address adverse situations and unforeseen obligations. Myers (1977) introduced the concept of financial flexibility, a critical notion in corporate finance, as it relates to a firm's investment decisions and influences its financial management to facilitate adaptation to changing circumstances. Almeida et al. (2004) noted that companies can seize opportunities and finance research and development initiatives through cash retention. In summary, the management of cash reserves plays a crucial role as it not only influences financial flexibility but also

impacts investment strategies, the ability to address adverse and unforeseen situations, and enhances shareholder value.

When exploring the factors that make cash holding important, it is worth noting that there are five motives aimed at ensuring financial stability and flexibility, all of which are driven by the business's operational needs. Precisely, the transaction motive, as indicated by Ferreira and Vilela (2004), implies that companies preserve capital as cash holdings to facilitate ordinary operational transactions, such as payments for goods and services, taxes, and other expenses, thereby reducing costs and avoiding the need to convert assets into cash for payments. The precautionary motive, as emphasized by Myers and Majluf (1984), involves accumulating cash as a safety reserve to address adverse conditions or limited entry into capital markets when necessary financing business growth. According to Opler et al. (1999), this rationale is employed to ensure liquidity to cope with unexpected fluctuations in cash flows. In other words, cash retention serves as a safety net.

The speculation motive, as mentioned by Smith and Stulz (1985) involves holding excess cash for strategic investment opportunities and aims to generate profits when favorable market conditions arise. Nishimura and Ozaki (2003) highlight the role of the speculative motive in influencing a company's cash holdings. Besley and Brigham (2005) noted that the speculation motive contributes to exploiting opportunities for potential future acquisitions. The speculation motive is particularly important for businesses in the presence of greater entrepreneurial prospects or capital investments, as they maintain cash holdings as a speculative measure for future options.

Moreover, the tax motive indicates companies' concerns about retaining cash to avoid taxes related to repatriating income. As noted by Graham (2000) to minimize a company's tax obligations, it is called upon to employ strategies such as aligning cash flows and capitalizing tax credits. Daher (2010) suggests that tax incentives assume a crucial role in shaping the magnitude of cash reserves in business. According to a study on multinational corporations, Foley et al.(2006) found that tax laws encourage multinational companies to retain available funds rather than distribute them to their shareholders. According to Jensen and Meckling (1976), the agency motive constitutes a significant factor for publicly traded companies, as it involves the interests and actions of management. Cash holding may be influenced by managerial incentives, executive compensation structures, and possible conflicts of interest between shareholders and management. Regarding the existing empirical data on the agency motive, estimates

vary. For instance, studies by Harford (1999) and Opler et al. (1999) do not discover a significant role for agency costs in determining cash holdings. In contrast, research by Harford et al. (2008) observed that companies with anticipated weak governance uphold lower cash reserves, while rapidly acquire machinery, leading to an increase in executive compensation.

## *2.2. Theories*

The possession of cash is a critical aspect of financial management within organizations, and its dynamics are influenced by a range of established theories and models. A primary concern in this regard is the agency Theory, as introduced by Jensen and Meckling (1976), which focuses on the principal-agent relationship within organizations, emphasizing the need for mechanisms to align interests and mitigate conflicts. The preference for cash holding can be attributed to the ability to reduce risk for businesses and enhance their liquidity. Jensen (1986) supports that companies, where the cost of managerial discretion is significant, have a tendency to uphold elevated levels of liquid assets than what is strictly necessary for shareholder wealth maximization. Dittmar et al. (2003) note that businesses have a tendency to maintain larger cash reserves when organizational issues are significant. Pinkowitz and Stulz (2006) and Dittmar and Smith (2007) discover that problems related to higher agency conflicts between internal and external stakeholders lead to an undervaluation of cash assets. Dittmar and Smith (2007) and Harford et al. (2008) observed that entrenched managers, although prone to amass surplus cash, also have a tendency to deplete cash reserves swiftly.

### *2.1.1. Trade-off Theory*

According to the Trade-off Theory, Tobin (1956) and Miller and Orr (1966). have noted that the optimal level of cash reserves is determined by individual firms. Simultaneously, an evaluation of the Trade-off involves assessing the incremental costs and benefits of holding cash at the margin. Ferreira and Vilela (2004) have highlighted the importance of keeping reserves provides advantages by reducing the risk of facing

financial distress, providing flexibility for firms to pursue their investment objectives without financial constraints, and the potential to minimize expenses related to external financing or the sale of existing assets. However, it also entails a cost from cash holding, which comprises the loss of potential capital returns that could be invested in liquid assets. In line with Opler et al. (1999), the Trade-off companies evaluate the advantages and drawbacks of maintaining of cash holding while considering elements like agency expenditures and asymmetric information. Guizani (2017) observes that the a company achieves its highest value when the benefits derived from holdings cash are optimized outweigh the associated costs. Maintaining a specific level of cash holding yields benefits such as mitigating the risk of financial crisis, reducing transaction expenses, and generating possibilities for pursuing investment initiatives that would otherwise be impractical due to financial restrictions.

### *2.1.2. Pecking Order Theory*

Within the framework of financing decisions, the Pecking Order of the financing hierarchy model, as described by Myers and Majluf (1984), provides insights into the preferred sources of financing for firms, revealing a hierarchy that favors internal capital, followed by debt and equity issuance. They also argue that the model is consistent in maximizing shareholder wealth. In detail, they propose that firms prioritize the use of internal resources, including cash, to finance investments due to information imbalances and the increased expenses linked to obtaining funds from external sources The Theory suggests that the primary concern for financing investments is retained earnings, where firms should utilize internally generated profits. If retained earnings are insufficient, firms resort to safe debt financing, namely turning to safer forms of debt financing. In cases where additional capital is needed, they contemplate the possibility of utilizing riskier forms of debt. Ultimately, should all alternative avenues be depleted, they turn to the ultimate recourse of equity issuance.

### *2.1.3. Free Cash Flow Theory*

The Free Cash Flow Theory, as formulated by Jensen (1986), centers on the management of excess cash flows, addressing the challenges posed by available cash flows and their potential influence on a company's value. He predicts that companies retain excess cash as a result of amassing internal funds, and the expenses for future projects and acquisitions are only slightly higher. According to Ferreira and Vilela (2004), maintaining cash reserves can relieve managers from the pressure to achieve optimal returns and provide them with the freedom to invest in projects aligned with their preferences, even if these projects may not necessarily benefit shareholders. Jensen (1986) also indicates that managers might be motivated to retain cash for the expansion of their control over the company's assets and exercise greater discretion in investment decisions. In conclusion, a firm's preference for retaining cash for projects or corporate investments outweighs the payment of dividends to shareholders. Research conducted by Dittmar and Mahrt–Smith (2007) and Pinkowitz et al. (2006) supports the idea that cash holdings are undervalued when managers engage in conflicts with external shareholders.

### *2.1.4. Differences in Theories*

The literature presents differences in theories regarding the cash retention decisions of a firm. The expense of external funding plays a more pronounced role in the pecking order of the financing hierarchy model compared to the Trade-off model. According to the pecking order of the financing hierarchy model, firms with high cash flows are expected to retain larger cash holdings. Shyam-Sunder and Myers (1998) argue that these companies will possess an increased market –to-book ratio. In contrast, companies that pay higher dividends maintain lower cash reserves. Firms that invest more should rely less on internal funds and consequently, have lower cash reserves. On the contrary, the Trade-off model suggests that companies with increased capital expenditures hold more liquid assets, and there are scale economies in these assets, resulting in an adverse influence of company size on the availability of cash. A fundamental distinction between the two theories lies in their predictions regarding the correlation between cash reserves and investments. The Trade-off Theory posits a positive correlation, while the

Pecking Order Theory predicts a negative correlation. The cash-holding perspective perceives debt and cash as complementary components representing various components of a company's financial framework.

Subsequently, the Trade-off Theory implies that companies aim to find an equilibrium among the advantages stemming from the tax advantages of leveraging and the possible risks linked to bankruptcy. Conversely, the Pecking Order Theory, as postulated by Myers and Majluf (1984), asserts that there exists no ideal debt level. Instead, managerial financing decisions adhere to a hierarchy with a preference for accumulated profits, succeeded by indebtedness and the issuance of new equity. These choices are contingent upon the specific requisites and circumstances of the company. According to the Trade-off Theory, companies establish the ideal amount of cash reserves by evaluating the incremental advantages and disadvantages involved in making such a choice. Benefits encompass considerations such as reduced transaction expenses, diminished financial distress risk, and the capacity to fund investment projects that might otherwise be restricted due to capital shortages. It is imperative to consider the forfeited potential benefits associated with capital invested in assets that can be quicly converted. Nevertheless, it is noteworthy that the Pecking Order Theory and the Free Cash Flow Theory do not espouse the notion of predefined target levels for cash retention, as opposed to the Trade-off Theory. To summarize, as per these theories, companies manage their accessible cash resources based on their specific needs and prevailing circumstances, abstaining from stipulating precise benchmarks for cash retention.

## *2.3. Empirical Review*

According to Rajan & Zingales (1995), Bancel & Mittoo (2004), and Laeven and Levine (2009), geographical variations are evident in the impact of cash retention determinants. While there may be similarities in the impact of these determinants across regions, it is worth noting that exceptions arise due to institutional regulations specific to each geographic area. For this reason, this research presents an interesting opportunity to be conducted among four European Union countries. Specifically, the choice of Germany, France, Belgium, and the Netherlands was determined using the Hofstede country comparison tool, considering various combinations of countries, with

Germany and France forming one group and Belgium and the Netherlands another. Geert Hofstede is a Dutch social psychologist who examined how culture influences values in the workplace. He developed a model consisting of five cultural dimensions that facilitate the comparison and differentiation of cultures.

In particular, according to Hofstede, G. (2011), there are six cultural dimensions consisting of power distance, which measures the level of hierarchy and inequality within a society; individualism versus collectivism, which helps understand individualistic cultures with an emphasis on personal goals or collectivist cultures; masculinity versus femininity, focusing on emotional roles between genders; uncertainty avoidance, which measures individuals' emotions in a society marked by unpredictability, and the differentiation between long-term and short-term prespectives, identifying cultures that focus on short-term gains from those focusing on future gains.

The focus on the countries Germany, France, Belgium, and the Netherlands in this research, based on Hofstede's country comparison framework, was conducted for various reasons. Firstly, these countries are economically developed regions for Europe, with strong financial sectors and multinational corporations. Furthermore, they represent a wide range of cultural characteristics, such as business and administrative practices. Based on the country comparison tool, it is purposeful to achieve an in-depth understanding of cultural dimensions. In conclusion, the selection of these countries enables an in-depth study of how cultural factors can influence financial practices like cash retention within the context of an economically significant region, such as Western Europe.

### *2.3.1 Country Comparison Tool Hofstede*

More precisely, it would be intriguing to classify the nations into two distinct clusters: placing France and Germany together in one group, while situating Belgium and the Netherlands in another.

**Figure 1 : Country Comparison Tool - Hofstede Dimensions**

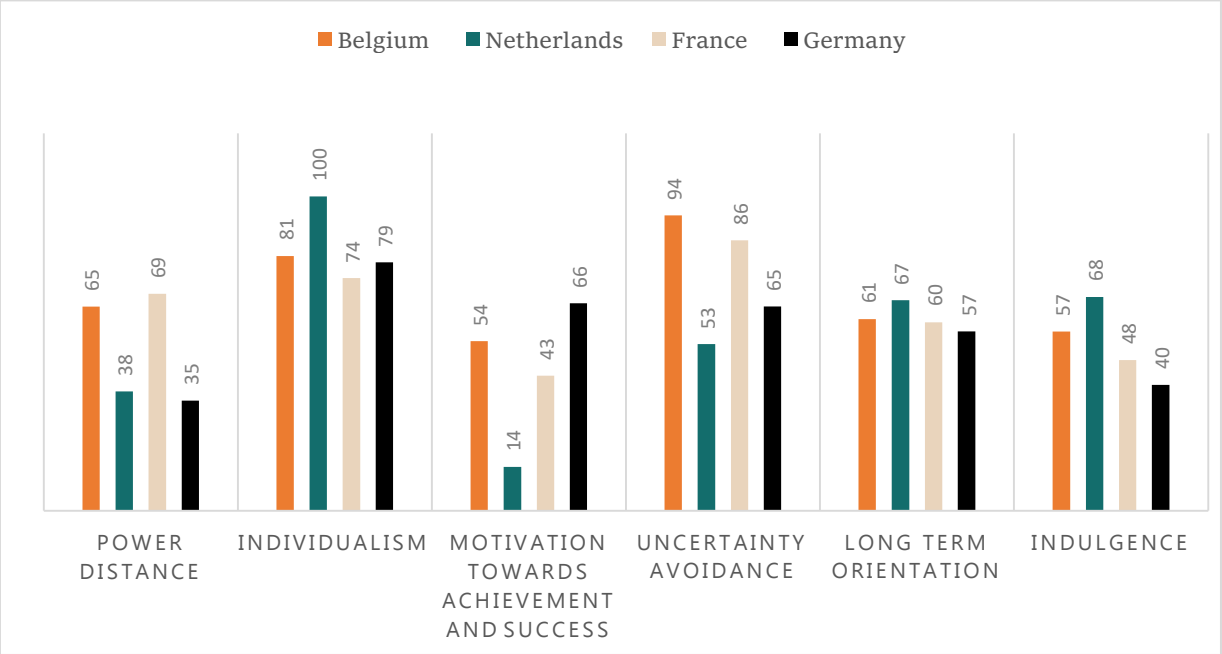


***Figure 1*** represent Hofstede's Cultural Dimensions in a Country Comparison Tool - a concise visual aid for cross-cultural analysis.

As shown in the graph above, their scores tend to converge for the most part. As previously mentioned, this study is based on these countries due to their different geographical, cultural, financial, and economic environments, as well as their positions within the European Union. They are noteworthy for comparative purposes, given the availability and reliability of their data, which facilitates empirical research and strengthens the relevance of findings in the European corporate finance landscape.

### *2.3.2. Determinants of Corporate Cash Holding*

Prior research, has thoroughly explored the factors influencing the accumulation of cash by corporations, with profitability emerging as a primary factor. Profitability strongly influences firms' decisions regarding cash retention and working capital management. As noted by Opler et al. (1999), profitability provides insights into the financial health of businesses and is measured using indicators such as Return on Assets (*ROA*), computed by taking the ratio of net earnings to the total value of assets. A higher result in this ratio indicates greater profitability and less excess cash holdings. Additionally, Return on Equity (*ROE*) is another measurement indicator, determined by

dividing the net profit by the equity held by shareholders. A higher *ROE* suggests a more profitable business. Finally, profitability can also be assessed using Earnings Before Interest and Taxes (*EBIT*), determined by taking the ratio of *EBIT* to the overall revenue. A higher *EBIT* margin signifies increased profitability.

#### *2.3.2.1. Profitability*

As per the findings of studies conducted by Opler et al. (1999), Nguyen (2005), and Al-Najjar and Clark (2017), a positive correlation exists among corporate cash reserves and profitability. These studies underscore that companies with robust profitability tend to maintain higher cash reserves. Profitable enterprises can distribute dividends, meet their obligations, and hold cash, relying less on debt issuance for investments and project financing and avoiding the issuance of additional equity due to high costs. On the other hand, empirical research by Al-Najjar and Belghitar (2011) consistently reveals a adverse correlation among cash reserves and profitability. This phenomenon is primarily attributed to the increased financial flexibility enjoyed by these businesses and their ability to take advantage of investment prospects. As their profitability rises, their financial capacity to fulfill their requirements through the generation of internal capital also increases, reducing the need for excessive cash balances. In Germany, France, Belgium, and the Netherlands, companies with high profitability tend to maintain relatively lower levels of cash assets.

#### *2.3.2.2. Leverage*

A different factor that affects cash reserves in businesses is leverage, typically quantified by the ratio of debt to equity. Research and findings in the literature provide insights into the correlation among leverage and cash reserves. Specifically, Ferreira and Vilela (2004) suggest that companies having a high level of leverage may maintain cash as a precautionary step to alleviate the risk associated with bankruptcy, default on obligations, and other potential financial difficulties. Furthermore, research by Saddour (2006), which investigated the factors influencing the accumulation of cash in French companies over the period from *1998* to *2002* employing the Trade-off Theory and the

Pecking Order Theory, suggests the lower levels of leverage could result in increased cash reserves. Consequently, the correlation among leverage and cash reserves in France is positive.

Pedro et al. (2008) undertook a research project on the factors influencing cash reserves and found several correlations. They observed that leverage also shows a positive correlation with cash reserves. This suggests that larger companies in these particular nations are inclined to uphold elevated levels of cash reserves. In contrast, Weidemann (2016) contends that employing leverage functions as a commitment strategy to alleviate agency expenses stemming from surplus cash flows, which might otherwise negatively affect cash reserves. Overall, the correlation among leverage and cash reserves is intricate and impacted by various factors and the specific conditions of each business and country. It is important to consider economic conditions, industry, business size, legal regulations, taxation policies, and growth prospects when analyzing this relationship.

#### *2.3.2.3. Firm Size*

In proportion to the study by Gill and Shah (2012), a significant determinant of cash holding is firm size, typically measured by a company's total assets, serving as an indicator of unequal information and, consequently, the charges related to external financial support. Miller and Orr (1966) propose that larger corporations maintain reduced cash levels due to the efficiencies gained through efficiencies gained through scaling in cash management. Whited (1992) and Fazzari and Petersen (1993) argue that smaller companies encounter elevated expenses when seeking external funding and borrowing constraints, leading them to hold significant cash reserves for safety. As a company's size increases, Ferri & Jones (1979), Titman and Wessels (1988), and Rajan and Zingales (1995) propose a higher benefit from diversification, minimizing the likelihood of encountering financial turmoil by maintaining stable cash flows. Opler et al. (1999) observe that sizable companies with robust creditworthiness maintain lower levels of cash reserves.

Ferreira and Vilela (2004) introduce another reason for large companies to hold excess cash: the presence of numerous shareholders, which can lead to managerial discretion. Ozkan and Ozkan (2004) note that the connection between a company’s size and its

cash reserves is more evident among established companies characterized by low competition and robust balance sheets. Nguyen (2005) found that as firm size increases, cash holdings decrease. Bates et al. (2009) acknowledge that more substantial enterprises could sell non-essential assets to acquire liquidity, while smaller, recently listed companies have a tendency to augment their cash reserves. Al-Najjar and Belghitar (2011) assert that more substantial companies enjoy convenient entry to a variety of funding sources not available to smaller firms. Kim et al. (1998) and Opler (1999) demonstrate an overall inverse correlation among cash reserves and firm size. Pedro et al. (2008), Daher (2010), Lins et al. (2010), Sola et al. (2013), Qiu and Wan (2015), and Weidemann (2016) all support an adverse relationship among cash reserves and firm size.

In some instances, deviations occur, indicating a positive correlation among the size of a firm and its cash holdings. Ozkan and Ozkan (2004) and Liu et al. (2015) found that shareholders within extensive enterprises with greater external discipline and reduced information asymmetry may allow management to hold more cash. This aligns with the positive connection among firm size and cash holdings predicted by the Pecking Order Theory and the Free Cash Flow hypothesis. In summary, the precise relationship among cash holdings and firm size is complex and uncertain, highlighting the need for further research to fully understand the determinants of corporate cash reserves. Regarding the determinants of cash holdings in various European countries, firm size appears to have diverse impacts. Similarly, investigations conducted by Saddour (2006) in France and Ferreira and Vilela (2004) within countries in the Economic and Monetary Union (*EMU*) reveal a direct link between the magnitude of businesses and their levels of cash holdings. In Belgium, Deloof (2003) explored the correlation among operational capital administration and the financial success of a dataset comprising 1,009 prominent non-financial companies in Belgium from *1992* to *1996* revealing that sizable enterprises exhibit an inclination to uphold elevated cash reserves, illustrating a positive connection among a company's magnitude and its holdings in cash. Similar conclusions were drawn by Schwetzler and Reimund (2004), researchers who explored the impact of corporate cash holdings on valuation using a dataset encompassing 547 publicly traded German companies and a cumulative total of 5,126 firm-years.

#### *2.3.2.4. Dividend Policy*

An additional critical factor influencing cash holding is dividend policy. To compute the dividend payout ratio, one must divide the sum of distributed dividends by the overall equity. Building on prior research, Shleifer and Vishny (1993) have demonstrated that dividend-paying firms have the flexibility to easily access capital, as opposed to non-dividend-paying firms that rely on external capital markets. In contrast, Ozkan and Ozkan (2004) propose an alternative perspective, suggesting that dividend-paying firms should maintain cash reserves to meet dividend obligations. Nguyen's (2005) research indicates a direct correlation between a corporation's cash holdings and its specific risk, but a negative relationship with the industry-level risk. Furthermore, Brav et al. (2005) suggest that firms distributing dividends may benefit from stronger external oversight and more accessible external financing, potentially leading to reduced cash reserves if they choose to limit dividend disbursements, although they may hesitate to do so. Moreover, the research conducted by Pinkowitz, et al. (2016) suggests that within countries with robust investor protections, the influence of cash reserves on a company's valuation and the connection between a firm's value and dividend disbursements are more prominent. Conversely, these associations hold less significance within nations with less robust safeguards for investors.

The findings from the empirical literature regarding the impact of dividends on corporate cash holdings are mixed. Opler et al. (1999), Chen et al. (2012), and Hill et al. (2014) have established a connection where dividend disbursements and cash reserves exhibit a positive correlation, indicating that firms engaging in dividend payments tend to possess elevated cash levels. Conversely,, Ozkan and Ozkan (2004), Ferreira and Vilela (2004), Afza and Adnan (2007), Drobetz and Grüninger (2007), Bates et al. (2009), Al-Najjar and Belghita (2011), Khieu and Pyles (2012), Julio and Yook (2012), and Weidemann (2016) discovered an inverse association between dividend payouts and cash reserves, signifying that companies distributing dividends maintain diminished levels of cash. In summary, it should be emphasized that the connection between dividends and cash levels is ambiguous and lacks a consistent sign across various studies.

The impact of dividend payments shows diverse relationships in different European countries. In Belgium, Germany and the Netherlands according to Deloof (2003), and in Schwetzler and Reimund (2003) observed an inverse correlation among dividends

and cash holdings. Additionally, the distribution of dividends could potentially exert an adverse impact on cash holdings in French firms, as companies distributing dividends might potentially reduce their cash reserves to raise capital, as observed by Sadour (2006).

#### *2.3.2.5. Financial Distress*

Financial distress, characterized by the possibility of insolvency and liquidity constraints, emerges as a pivotal factor influencing cash holdings. Specifically, aligning with the Theory of financial distress, as articulated by Titman and Wessels (1988), Harris and Raviv (1990), and Shleifer and Vishny (1992), when the market-to-book ratio is high, firms face substantial financial distress costs. Consequently, businesses choose to hold larger sums of liquid assets as a precautionary measure shielded from this risk and to ensure liquidity. This rationale aligns with the findings of Shleifer and Vishny (1992), Opler and Titman (1994), and Williamson (1998), argue that companies engaged in research and development (R&D) may face heightened financial distress costs attributed to the elevated information asymmetry linked to such investments. As a result, these firms are inclined to hold more liquid assets.

Furthermore, holding cash serves additional purposes in mitigating financial distress risks. Dittmar and Duchin (2016) claim that CEOs with a history of financial challenges demonstrate heightened awareness of the potential consequences of financial distress, leading them to maintain higher cash levels as a precautionary measure. This argument is supported by the research carried out by Aldoseri et al. (2022), which validates the importance of cash reserves in the face of expected losses when obtaining funds from the capital market is costly.

However, there are other reasons why firms maintain cash reserves to mitigate financial distress. For instance, Ferreira and Vilela (2004) stress the point that maintaining cash can lower the likelihood of financial turmoil and unforeseen setbacks, allowing firms to allocate resources to investment plans. These findings suggest that businesses in Germany, France, Belgium, and the Netherlands may share commonalities in their cash-holding strategies, utilizing cash as a buffer against financial distress risks. While some studies, like those by Kariuki et al. (2015), suggest an adverse relationship among cash holdings and financial distress, the overall pattern supports the idea that cash reserves

are crucial for safeguarding against the potential consequences of financial distress in these European countries.

#### *2.3.2.6. Investment Opportunities*

The final factor influencing cash holdings is investment opportunities. Earlier research endeavors, exemplified by studies conducted by Smith and Watts (1992) and Jung (1996), evaluate a company's investment prospects by utilizing the market-to-book ratio. They note that companies with elevated ratios are anticipated to maintain increased cash reserves due to the significant costs linked to financial distress. Based on Opler et al. (1999), companies should be willing to sacrifice valuable projects if they lack sufficient cash reserves when they have numerous profitable investment opportunities. As suggested by Acharya et al. (2007), companies tend to hold cash instead of reducing their debt when operational income is correlated with investment opportunities. Denis and Sibilkov (2009) observed that firms exploit investment opportunities by retaining cash reserves, especially when acquiring external funds involves high costs.

Researchers such as Williamson (1988), Harris and Raviv (1990), Shleifer and Vishny (1992), Kim et al. (1998), Opler et al. (1999), Ferreira and Vilela (2004), Ozkan and Ozkan (2004), Bates et al. (2009), and Kim et al .(2011) have identified positive association between cash holdings and investment opportunities. In summary, companies hold more liquid assets, maintaining the level of asymmetric information, to capitalize on investment prospects while avoiding financial distress and bankruptcy risks.

As observed by Dittmar et al. (2003), investment opportunities are less critical in nations with insufficient safeguards, as companies in these regions tend to hold more cash. The significance of investment opportunities as a determining factor for cash retention varies among different European Union countries, such as Germany, France, Belgium, and the Netherlands, due to variations in their regulatory economic environments and market dynamics. Similarly, in all four countries, researchers such as Ferreira and Vilela (2004), Weidemann (2016), Harford et al. (2008), and Subramaniam et al. (2011) have noted a positive relationship between cash holdings and investment opportunities.

**Figure 2: Framework based on Determinants of Corporate Cash Holding**

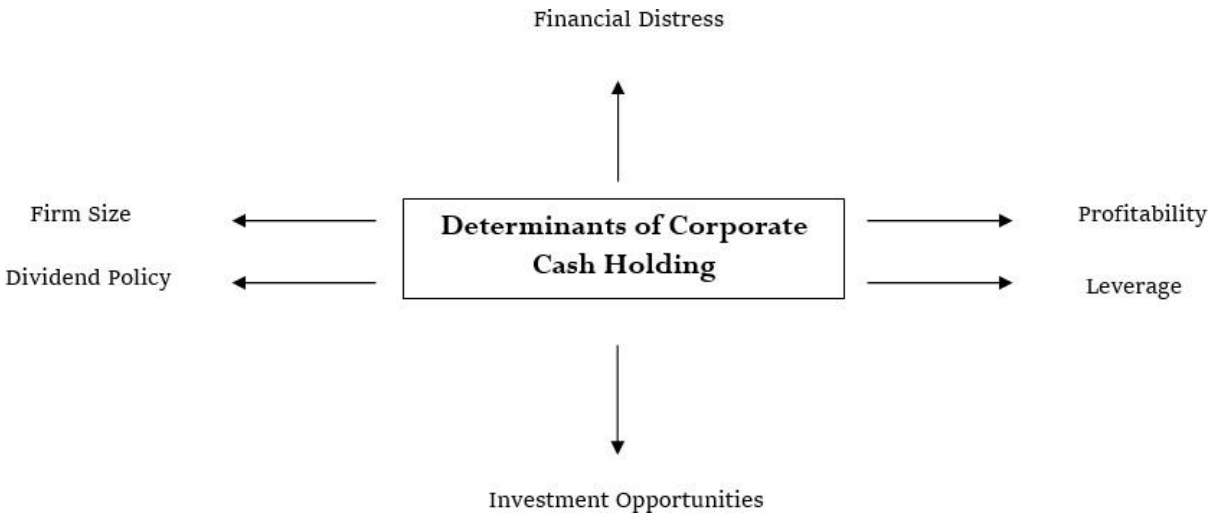


***Figure 2*** *illustrates the determinants influencing corporate cash holdings, providing a concise visual guide for understanding the key factors shaping cash holding decisions*.

### *2.3.3. Hypothesis Development*

The primary objective is to conduct a thorough examination and assessment of certain hypotheses that contribute to understanding how key factors affect the cash-holding tendencies of firms within the European Union. As previously mentioned, the extensive literature observes both negative and positive relationships between various factors and cash holdings. This research focuses on four factors in accordance with the results of Opler et al. (1999) and the hypotheses that will be tested. Specifically, the focus is on key factors such as profitability, leverage, firm size and dividend .

Myers and Majluf (1984) argue that companies with higher profitability may find it more feasible to maintain their profits internally by reducing reliance on external financing. Bates et al., (2009) also point out that profitable businesses have more capital generated internally to cover investment opportunities and financial obligations,

reducing the need for external financing. Therefore, given the constraints of this study, the first hypothesis proposed is the following:

***Hypothesis 1: Profitability***

*Null Hypothesis ($H_0$): Profitability and cash holdings are negatively related to each other.*

Leverage is considered a viable alternative to holding cash since it reduces moral hazard and enhances the firm's discipline, as suggested by Ozkan and Ozkan (2004). According to Myers and Majluf (1984), the Pecking Order Theory suggests that higher leverage is associated with lower cash holdings. This results from the reality that organizations with elevated levels of debt may be more inclined to use external financing instead of maintaining cash. In other words, they prefer utilize internal funding avenues, such as retained profits, before resorting to external debt. For these reasons, the upcoming hypothesis is presented in the context of the ongoing investigation:

***Hypothesis 2: Leverage***

*Null Hypothesis ($H_0$): Leverage has a negative effect on cash holdings.*

Based on the discussion regarding the Trade-off Theory and Pecking Order Theory, it has been identified that the size of the company may impact the level of corporate cash holdings. The Trade-off Theory, according to Bates et al. (2009), implies a negative correlation between company size and cash retention and proposes that larger companies may not need to maintain as much cash because they can easily liquidate non-core assets in times of need. Additionally, Whited (1992) concludes that smaller enterprises encounter elevated expenses when seeking external funding and might encounter constraints in borrowing, supporting the idea that larger companies have an advantage in managing their cash levels. Therefore, in accordance with the theories deliberated upon and the literature review elucidated, it is proposed that:

***Hypothesis 3: Firm Size***

*Null Hypothesis ($H_0$): Firm size has a significant negative effect on cash holdings.*

Earlier investigations conducted by Bates et al. (2009) discovered that companies facing challenges in accessing external capital, coupled with robust internal cash flows and promising investment opportunities, keep up higher levels of cash. Furthermore, their study highlighted a negative association among cash holdings and several factors, including firm size, net working capital, leverage, and the status of being a dividend-paying firm. Moreover, the Trade-off Theory forecasts that companies disbursing dividends to their shareholders are more capable of raising low-cost capital when needed by reducing dividend disbursements Opler et al., (1999),thus there is an inverse correlation among dividend disbursements and levels of cash. Given these observations and insights, the present study puts forth the following hypothesis:

***Hypothesis 4: Dividend***

*Null Hypothesis ($H_0$): Dividend has a positive effect on cash holdings.*

In conclusion, the determinants of corporate cash holdings are complex and multifaceted, varying across different countries and regulatory frameworks. This comprehensive review of the literature highlights key factors influencing companies' propensity to retain cash, including profitability, leverage, firm size, dividend policy, financial distress, and investment opportunities.

# Chapter 3: Data Methodology

## *3.1. Financial Market Dynamics and Cash Management Strategies*

According to Al-Najjar (2013), financial markets are characterized by their dynamic nature and significantly influence a company's cash management strategies. He also points out that markets, whether developed or developing, are not perfect, necessitating firms to adapt to changing market conditions to safeguard their financial stability. These dynamic markets encompass an institutional framework consisting of regulatory bodies, legal structures, and financial institutions. La Porta et al. (1998), when examining developed markets, supported the idea that these markets offer a stable and secure environment for businesses due to robust regulatory structures and financial institutions. On the other hand, Djankov et al. (2003) suggested that developing markets may pose risks to businesses as their institutional frameworks are weaker. Consequently, companies are likely to maintain higher cash reserves to address uncertain situations. Following Stiglitz (1975) and Beck et al. (2017), dynamic markets characterized by information asymmetry and evolving investment opportunities prompt businesses to retain cash reserves to manage risks and seize potential opportunities.

To delve into the relationship between cash management strategies and market dynamics, it is essential to analyze several factors influencing this relationship. The primary factor is market instability, which, according to Smith and Stulz (1985), can give rise to a wide array of financial risks. To shield businesses from these risks, as highlighted by Opler and Titman (1994), they maintain cash reserves as a protective shield against economic disruptions. Another critical factor to consider is effective cash flow management. Mian (1996), who examined the determinants of hedging decisions and investigated a sample of 3,022 firms, pointed out that market conditions affect the consistency of cash flows, resulting in companies being obliged to balance cash holdings with investments in profitable assets. In conclusion, businesses are required to maintain flexibility in their cash flow management approaches due to the dynamic nature of financial markets.

## *3.2. Analysis of Institutional Framework*

As previously discussed, according to the *Hofstede Country Comparison Tool*, the empirical analysis will be conducted in four European countries: Germany, France, Belgium, and the Netherlands. It is imperative to perform an extensive analysis of the institutional framework in each country, considering broader aspects such as the political and legal systems, and key institutions, as well as more detailed information regarding the banking channel, the tax system, and market size.

### *3.2.1. Political System*

The political system of France is characterized as a semi-presidential system as it is represented by both a President, who heads the government and a Prime Minister who acts as the head of state [Legifrance (2018)] . Germany's political system is a multi-party democracy with a federal parliamentary republic structure. It divides the Bundestag into two parts: the Bundesrat and the Bundestag. It is further described as a federal parliamentary democracy and is represented by a President who serves as the head of state and a Chancellor who leads the government [Deutscher Bundestag. (2022)] . Belgium is an example of a federal parliamentary constitutional monarchy. It is represented by a King, who is the head of state, a Prime Minister, who heads the government, and a federal bicameral parliament consisting of the Senate and the Chamber of Representatives [The World Factbook. (2022)] . The Netherlands is a parliamentary constitutional monarchy, represented by King Willem-Alexander in the capacity of the head of state and a Prime Minister leading the government and it has a bicameral parliament [Government of the Netherlands. (2022)] .

### *3.2.2. Legal System*

The legal system of France originates from Roman law and is based on the Civil Code, which was drafted by Napoleon Bonaparte in 1804. Additionally, the judicial authority is distinct from the executive and legislative branches. [Annex (2012)] Germany's legal system follows continental European, German-speaking, and formally codified law. Its

roots trace back to Roman-Germanic law, and a significant legal code in the country is the Basic Law for the Federal Republic of Germany. [Berger (2023)]. Belgium's legal system is influenced by the Napoleonic Code and follows the civil law legal system. De Witte (2004) noted that this system consists of statutory laws. [Steven et al. (2023)] The legal system of the Netherlands is characterized as robust and multifaceted, with various areas of law and codified laws. Its foundation is rooted in civil law with influences from Roman-Dutch law. The basis of the judicial system is the Dutch Civil Code (*Burgerlijk Wetboek*). [Susanne (2023)]

### *3.2.3. Judiciary*

In France, the legal system is divided into two branches: the administrative branch, consisting of the Council of State (*Conseil d'État*), and the judicial branch, including the Court of Cassation (*Cour de Cassation*). Additionally, France has the Constitutional Council (*Conseil Constitutionnel*), responsible for legal matters [Chavent-Leclère et al. (2023)]. In Germany, primary and secondary courts are state courts, while the courts of last resort are federal. The courts are divided into two categories: those responsible for constitutional matters, specifically the Federal Constitutional Court (*Bundesverfassungsgericht*), and those handling civil and criminal cases, the Federal Court of Justice (*Bundesgerichtshof*) [Turner et al. (2023)]. Belgium has incorporated the European Convention on Human Rights. It comprises various courts that deal with legal matters, such as the Court of Cassation (*Cour de Cassation/Hof van Cassatie*), based in Brussels, and courts specializing in constitutional issues, including the Constitutional Court (*Cour Constitutionnelle*) [Gibens et al. (2023)]**.** In the Netherlands, every citizen, following the European Convention and the Constitution, can access regional courts, appellate courts, and the Supreme Court of the Netherlands (*Hoge Raad*). [Susanne (2023)]

### *3.2.4. Regulatory Agencies*

In France, financial regulatory authorities include the Financial Markets Authority (*Autorité des Marchés Financiers - AMF),* which oversees financial markets and

investment companies, and the Prudential Control and Resolution Authority (*Autorité de Contrôle Prudentiel et de Résolution - ACPR*). The ACPR is an independent regulatory authority separate from the Central Bank of France, Banque de France. [Learn, Microsoft Compliance (2023)]. The regulatory authority in Germany is the Federal Financial Supervisory Authority (*BaFin*), managed by the Executive Board. BaFin supervises banks, financial services, and insurance companies. [BaFin (2023)]. Financial regulatory authorities in Belgium consist of the National Bank of Belgium, which oversees various financial organizations, maintains monetary policy, and ensures the stability of the financial system. Additionally, there is the Financial Services and Markets Authority (*FSMA*), responsible for supervising financial information, products, and compliance with company regulations [Learn, Microsoft Compliance (2023)]. In the Netherlands, financial regulatory authorities include the Dutch Authority for the Financial Markets (*Autoriteit Financiële Markten - AFM*), an autonomous overseeing body for the markets of lending, savings, investments, and insurance.. The central bank of the Netherlands, (*De Nederlandsche Bank - DNB*), conducts proactive supervision of financial organizations in the Netherlands and implements monetary policy. [Susanne (2023)]

### *3.2.5. Taxation*

France's tax system is known for its high taxes, including corporate taxes imposed on employers, income taxes levied on employees, value-added tax (VAT), and social security contributions. [Shennan et al. (2023)]. Germany's tax system comprises a variety of levies, including income taxation, corporate levies, and value-added taxation (VAT). Its tax rates are higher compared to those in other countries due to its extensive social services system. [Turner et al. (2023)]. Belgium's taxation system comprises taxes at the national, local (including community taxes and property taxes), and federal levels, including income tax, corporate tax, social security contributions, and value-added tax (VAT). It is important to note that tax rates in Belgium are high when compared to other European countries [Taxes in Belgium (2023)]. The Dutch taxation system consists of three categories of taxable income: income from profits, employment, and property, known as the WOZ (*Waardering Onroerende Zaken - Real Estate Valuation*) value, income generated derived from considerable interest, as well as earnings from savings and investments. [Taxes in the Netherlands (2023)]

### *3.2.6. Banking Channel*

The banking system in France is characterized as advanced, in association with some of the most esteemed financial institutions globally. Apart from the major 266 banks in the country, there are over 300 credit institutions, both mutual and municipal credit banks, operating in parallel. [French Banks (2023)].Germany's banking system includes private commercial banks, public savings banks, and cooperative banks. Notably, the central banking segment in Germany is small and mainly consists of smaller regional banks. [Banking in Germany (2023)]. Belgium's banking sector is well-developed, with both Belgian and foreign banks operating in the country. The National Bank of Belgium (*Banque Nationale de Belgique- BNB*) promotes stability in the financial system and conducts monetary policy [Murphy et al. (2023)]. The banking sector in the Netherlands is well-developed and consists of ninety-six international and domestic banks. The Dutch Central Bank (*De Nederlandsche Bank - DNB*), is responsible for overseeing the banking system and regulating banking services [Expatica (2023)].

### *3.2.7. Market Size*

France is one of the largest markets in the European Union and globally. It attracts businesses by providing opportunities for investments in various sectors, such as technology, industry, and tourism, thanks to its talented workforce, innovation, and high-quality infrastructure [CT Corporation Staff (2020)]. Germany holds the position of the primary trading ally of the United States in Europe, and it ranks sixth in terms of market breadth in American exports. Additionally, Germany is the largest consumer market in the European Union, having a populace of 82.4 million people [Germany Country Commercial Guide. (2023)]. Belgium, possessing a population of 11.58 million people, has one of Europe's highest per capita incomes., offering access to a reasonably large market with a relatively balanced income distribution that results in widely distributed purchasing power among its citizens [International Trade Administration Belgium (2023)]. The Netherlands is characterized as a densely populated country with a population of 17 million citizens and an exceptionally strategic commercial location. Furthermore, it ranks as the seventeenth-largest economy globally and the fifth-largest

in the Eurozone. Additionally, it enjoys optimal business conditions according to extensive international research [International Trade Administration Netherlands Belgium (2023)].

In conclusion, the four European countries possess a broad institutional framework, offering opportunities and advantages for businesses. Gaining insight into the political, legal, and regulatory landscape is essential as these are critical factors leading to a successful market entry in each country.

### *3.3. Criteria for Sample Inclusion*

The utilization of the Refinitiv Eikon Database ensures a comprehensive and reliable dataset for the present research, facilitating a thorough examination of corporate cash holdings and their determinants across various European markets. The sample composition includes many companies from four European countries, with a total of 667 companies with 11621 observations. Specifically 374 companies from Germany with 6488 observations, 40 firms from France with 793 observations , 122 companies from Belgium with 2243 observations, and 131 companies from the Netherlands with 2105 observations. This diverse sample aims to provide a representative reflection of corporate financial dynamics within these economies. The dataset spans two decades, from *2003* to *2023*, allowing the study to adopt a long-term perspective. This extended period enables the examination of trends, patterns, and potential changes in the factors influencing cash holdings throughout the years. Such a comprehensive temporal scope provides a robust foundation for assessing the impact of diverse economic conditions, regulatory changes, and industry trends on corporate financial decision-making.

Furthermore, including companies from multiple countries adds complexity and richness to the analysis, allowing for the identification of common and unique factors influencing cash management strategies across different national contexts. By considering a diverse range of firms, the study aims to contribute valuable insights that transcend individual country-specific considerations, offering a broader understanding of corporate financial behavior in the European landscape.

### *3.4. Definition of Variables*

In this empirical study, the selection of variables influencing cash reserves (*CASH*) is crucial. The primary focus of the research is on cash variables, where Opler et al. (1999) choose cash in combination with marketable securities, as opposed to net assets, which are determined by subtracting cash and marketable securities from all assets.. On the other hand, Ozkan and Ozkan (2004) solely rely on the amount of liquid assets, including cash and equivalents, in proportion to the overall asset base. The choice of independent variables in this study is guided by their theoretical relevance and empirical support from previous research in the field of corporate finance.

The performance of assets (*ROA*), based on studies by Almeida et al. (2004) and Bates et al. (2009), indicates that companies with higher returns on assets may require fewer cash reserves, reflecting the efficient use of assets. Similarly, Return on Equity (*ROE*) provides information about the profitability and efficiency of a business in generating returns for shareholders, as mentioned by Faulkender and Wang (2006). Earnings Before Interest and Taxes (*EBIT*), in agreement with findings from Opler et al. (1999) and Almeida et al. (2004), serve as a a measurement of a company's operating profitability against interest and taxes, significantly influencing its cash reserves.

Furthermore, leverage (*LEV*) is another key independent variable influencing the cash holdings level of firms. According to Capkun and Weiss (2007), companies with higher leverage levels may allocate more resources to debt repayment instead of maintaining extensive cash reserves, in line with research findings such as Frank and Goyal (2009) and Faulkender and Wang (2006).

The size of the company (*SIZE*) is an important component influencing cash reserves, with larger enterprises expected to maintain lower cash reserves because of scale economies and reduced information asymmetries, according to Bates et al. (2009). According to Harford (1999), dividend per share (*DIV*) can impact cash retention, as companies distributing higher dividends tend to retain less cash.

ESG score, especially environmental, social, and governance assessments, as studied by El Ghoul et al. (2011) and Flammer (2013), are recognized as events influencing economic decisions. Higher environmental, social, and governance scores (*ESG score*) indicate better risk management, significantly affecting cash retention.

Research and Development (*R&D*), as emphasized by Denis and Denis (1995), signals an innovative group, influencing potential cash needs. Capital expenditures (*CAPEX*) and the interest coverage ratio (*ICR*), as highlighted in studies by Faulkender and Wang (2006) and Bates et al. (2009), are considered, as they can influence the need for cash reserves. The tax rate (*TR*), according to studies by Almeida et al. (2004) and Frank and Goyal (2009), affects cash flows and, consequently, cash availability.

Finally, the management of Working Capital (*WC*), as noted by Bates et al. (2009), is crucial, with fluctuations in increasing working capital requirements affecting cash availability. Following preliminary studies, variables introduced by Ferreira and Vilela (2004), Drabbet and Grüninger (2007), and Hall et al. (2009) are analyzed comprehensively in Table 1. These variable definitions serve as a robust foundation for empirical analysis, allowing a clear examination of the factors influencing corporate cash reserves in various dimensions.

***Table 1: Variable definition and measurement***

| *Type* | *Name* | *Abbreviation* | *Measurement method* |
|---|---|---|---|
| Dependent variable | Cash Holdings | CASH | Total cash and equivalents/Total assets |
| Independent variables | Return on Equity | ROE | Net Income / Average Shareholder's Equity |
| | Return on Assets | ROA | Net Income / Average Total Assets |
| | Earnings Before Interest and Taxes | EBIT | Operating Income – Interest Expense |
| | Leverage | LEV | Total Debt to Total Equity |
| | Size | SIZE | ln(Total Assets) |
| | Dividend | DIV | Dividends Declared / Number of Outstanding Shares |
| Control Variables | ESG Score | ESG | Measurement varies based on ESG rating |

| | | |
|---|---|---|
| | | agency |
| Research and Development | R&D | R&D Expenditures / Total Sales |
| Interest Coverage Ratio | ICR | EBIT / Interest Expense |
| Capital Expenditures | CAPEX | Long-term assets / Net assets. |
| Tax Rate | TR | Income Tax Expense / Profit Before Tax |
| Working Capital | WC | Current Assets - Current Liabilities |

The regression model is as follows:

$$\begin{aligned} &\mathrm{CASH}_{ijt} \\ &= \boldsymbol{b_0} + \boldsymbol{b_1} ROA_{ijt} \\ &+ \boldsymbol{b_2} LEV_{ijt} + \boldsymbol{b_3} SIZE_{ijt} \\ &+ \boldsymbol{b_4} DIV_{ijt} + \boldsymbol{b_5} ESG\ Score_{ijt} + \boldsymbol{b_6} R\&D_{ijt} + \boldsymbol{b_7} ICR_{ijt} + \boldsymbol{b_8} CAPEX_{ijt} + \boldsymbol{b_9} TR_{ijt} + \boldsymbol{b_{10}} WC_{ijt} + \mathrm{e}_{ijt} \end{aligned}$$

Where:

***i*** *is a Country observation*

***j*** *is a Company observation*

***t*** *is a Year observation*

$\boldsymbol{b_0}$ *represents the intercept*

$\boldsymbol{b_1}$ *through* $\boldsymbol{b_{10}}$ *denote the coefficients for the respective independent variables*

$\boldsymbol{e_{it}}$ *is the error term*

## *3.5. Filters*

As previously mentioned, the dataset encompasses a total of 11,621 observations spanning all four countries of the European Union. To address missing values, standard filtering procedures were employed for effective data management. A thorough check for missing values was conducted, and observations with any such values were

systematically removed based on overall statistical considerations. Moreover, an additional filter was applied to exclude companies lacking pertinent information on total assets. Specifically, only rows where total assets exceeded 0 were retained. This practice aligns with established methodologies in the literature, with studies such as Akbar, Ur Rehman, and Ormrod (2013) using comparable methodologies in their studies. Following these initial filtering steps, further refinement was undertaken for numerical covariates to ensure the inclusion of valid information for each variable in the analysis. In summary, a rigorous and systematic filtering process was implemented to manage missing values and safeguard the integrity of the dataset. It is noteworthy that data from the years *1997* to *2002* were initially part of the dataset but were subsequently omitted from the study due to inconsistent availability of data for each country in every year. Consequently, the final sample comprises 3,108 observations, ensuring a more focused and consistent dataset for the analysis.

***Table 2: Methodology for Sample Selection***

| ***Criterion*** | ***Number of Firms*** |
|---|---|
| Initial sample  EU areas companies collected from Refinitiv Eikon Datastream | 11,621 |
| Minus the companies whose financial statement data is missing | 8,513 |
| Final sample | 3,108 |

*Source: Stavroula Passarea own collection*

# Chapter 4: Empirical Results

## *4.1. Descriptive Statistics*

In this foundational chapter, it is crucial to delve deep into the sphere of descriptive statistics to generate a comprehensive overview of the fundamental variables under scrutiny in the present study. Descriptive statistics serve as the initial lens through which an examination and understanding of the dataset's central tendencies and distributions occur. As the analysis is founded on the complex landscape of corporate cash holdings and their determinants, the use of descriptive statistical elements becomes of utmost importance to illuminate the fundamental characteristics that form the basis of empirical analysis. Descriptive statistics were conducted for the four countries examined in this study collectively - *Germany, France, Belgium, and the Netherlands* - and individually for each of these countries.

***Table 3: Descriptive Statistics Overall Sample***

| *Variable* | *Mean* | *St.d* | *Median* | *Min* | *Max* |
|---|---|---|---|---|---|
| CASH | 0.01 | 0.06 | 0.007 | 0.00 | 0.34 |
| ROE | 0.02 | 0.07 | 0.001 | -0.28 | -0.42 |
| ROA | 0.01 | 0.04 | 0.0004 | -0.16 | 0.27 |
| EBIT | 0.27 | 1.04 | 0.0001 | -0.08 | 7.26 |
| LEV | 0.05 | 0.14 | 0.004 | 0.00 | 0.89 |
| SIZE | 2.65 | 10.16 | 0.0001 | 0.0001 | 72.16 |
| DIV | 0.03 | 0.01 | 0.0002 | 0.0001 | 0.11 |
| ESG Score | 0.09 | 0.24 | 0.008 | 0.0023 | 0.93 |
| R&D | 0.15 | 0.69 | 0.0001 | 0.0001 | 6.16 |
| ICR | 0.09 | 0.52 | 0.002 | -0.41 | 6.60 |
| CAPEX | 0.07 | 0.22 | 0.0001 | 0.0001 | 1.28 |
| TR | 0.05 | 0.24 | 0.007 | -0.03 | 3.16 |
| WC | 0.19 | 0.64 | 0.0001 | -0.33 | 3.83 |

***Table 3*** displays the descriptive statistics for all countries' variables along with the total number of observations. *3108*. Every variable has a definition in ***Table 1***.

## *Table 4: Descriptive Statistics Germany*

| *Variable* | *Mean* | *St.d* | *Median* | *Min* | *Max* |
|---|---|---|---|---|---|
| CASH | 0.12 | 0.11 | 0.08 | 0.01 | 0.34 |
| ROE | 0.17 | 0.14 | 0.17 | -0.28 | 0.42 |
| ROA | 0.08 | 0.09 | 0.08 | -0.16 | 0.27 |
| EBIT | 2.27 | 2.19 | 2.03 | -0.08 | 7.26 |
| LEV | 0.35 | 0.26 | 0.33 | 0.03 | 0.89 |
| SIZE | 22.33 | 21.11 | 12.92 | 0.57 | 72.16 |
| DIV | 0.02 | 0.03 | 0.01 | 0.00 | 0.11 |
| ESG Score | 0.73 | 0.16 | 0.77 | 0.41 | 0.93 |
| R&D | 1.24 | 1.66 | 0.28 | 0.03 | 6.16 |
| ICR | 0.73 | 1.37 | 0.27 | -0.41 | 6.19 |
| CAPEX | 0.56 | 0.36 | 0.64 | 0.03 | 1.28 |
| TR | 0.36 | 0.62 | 0.25 | -0.03 | 3.16 |
| WC | 1.56 | 1.16 | 1.72 | -0.33 | 3.83 |

***Table 4*** provides the descriptive statistics for all 777 observations recorded for the variables utilized in Germany. Every variable has a definition in ***Table 1***.

## *Table 5: Descriptive Statistics France*

| *Variable* | *Mean* | *St.d* | *Median* | *Min* | *Max* |
|---|---|---|---|---|---|
| CASH | 0.09 | 0.08 | 0.07 | 0.00 | 0.40 |
| ROE | 0.16 | 0.10 | 0.15 | -0.04 | 0.60 |
| ROA | 0.05 | 0.04 | 0.05 | -0.06 | 0.23 |
| EBIT | 1.65 | 1.29 | 1.01 | -0.61 | 11.52 |
| LEV | 0.71 | 0.73 | 0.43 | 0.03 | 4.80 |
| SIZE | 3.74 | 1.03 | 3.76 | 1.43 | 5.72 |
| DIV | 0.02 | 0.01 | 0.02 | 0.00 | 0.06 |
| ESG Score | 0.78 | 0.13 | 0.83 | 0.42 | 0.94 |
| R&D | 0.44 | 0.49 | 0.91 | 0.06 | 1.70 |
| ICR | 0.32 | 0.41 | 0.17 | -0.44 | 1.13 |
| CAPEX | 0.73 | 0.66 | 0.33 | 0.04 | 1.32 |
| TR | 0.26 | 0.31 | 0.24 | -0.24 | 3.12 |
| WC | 0.27 | 0.90 | 0.36 | -5.65 | 0.84 |

***Table 5*** provides the descriptive statistics for all 777 observations recorded for the variables utilized in France. Every variable has a definition in ***Table 1***.

## *Table 6: Descriptive Statistics Belgium*

| *Variable* | *Mean* | *St.d* | *Median* | *Min* | *Max* |
|---|---|---|---|---|---|
| CASH | 0.06 | 0.10 | 0.01 | 0.000 | 0.38 |
| ROE | 0.07 | 0.12 | 0.10 | -0.27 | 0.28 |
| ROA | 0.0002 | 0.08 | 0.02 | -0.24 | 0.10 |
| EBIT | 0.54 | 0.72 | 0.16 | -0.72 | 2.13 |
| LEV | 0.27 | 0.21 | 0.28 | 0.00 | 0.69 |
| SIZE | 1.63 | 1.41 | 1.14 | 0.05 | 3.23 |
| DIV | 0.02 | 0.02 | 0.00 | 0.00 | 0.04 |
| ESG Score | 0.66 | 0.13 | 0.65 | 0.42 | 0.86 |
| R&D | 0.23 | 0.14 | 0.22 | 0.10 | 0.58 |
| ICR | 0.59 | 0.69 | 0.08 | -8.46 | 0.57 |
| CAPEX | 0.42 | 0.43 | 0.12 | 0.01 | 1.04 |
| TR | 0.29 | 0.44 | 0.20 | 0.02 | 2.05 |
| WC | 0.81 | 0.39 | 0.34 | 0.22 | 2.45 |

***Table 6*** provides the descriptive statistics for all 777 observations recorded for the variables utilized in Belgium. Every variable has a definition in ***Table 1***

## *Table 7: Descriptive Statistics Netherlands*

| *Variable* | *Mean* | *St.d* | *Median* | *Min* | *Max* |
|---|---|---|---|---|---|
| CASH | 0.06 | 0.06 | 0.001 | 0.00 | 0.37 |
| ROE | 0.13 | 0.11 | 0.001 | -0.01 | 0.63 |
| ROA | 0.03 | 0.07 | 0.04 | -0.16 | 0.34 |
| EBIT | 1.17 | 2.09 | 1.11 | -0.04 | 11.28 |
| LEV | 0.53 | 0.61 | 0.40 | 0.00 | 2.98 |
| SIZE | 2.91 | 2.27 | 3.30 | 0.37 | 6.09 |
| DIV | 0.01 | 0.01 | 0.01 | 0.00 | 0.02 |
| ESG Score | 0.71 | 0.22 | 0.83 | 0.23 | 0.94 |
| R&D | 0.53 | 0.63 | 0.27 | 0.00 | 1.81 |
| ICR | 0.10 | 0.59 | 0.06 | -2.44 | 2.91 |
| CAPEX | 0.46 | 0.68 | 0.83 | 0.00 | 1.85 |
| TR | 0.49 | 0.67 | 0.19 | -0.55 | 1.63 |
| WC | 0.77 | 0.89 | 1.25 | -0.04 | 1.63 |

***Table 7*** provides the descriptive statistics for all 777 observations recorded for the variables utilized in the Netherlands. Every variable has a definition in ***Table 1***.

Specifically, starting with the available cash (*CASH*), defined according to the methods of Opler et al. (1999) as Cash and Cash Equivalents divided by Net Equity, the average value of this ratio is 1%, the standard deviation is 6%, and the median is 0.7%. Specifically for Germany, the average ratio is 12%, possibly indicating a more conservative approach to cash management, with a standard deviation of 11% and a median of 8%. For France, the average ratio is 16%, suggesting greater variability among companies, with a standard deviation of 10% and a median of 15%. For Belgium, the average ratio is 6%, the standard deviation is 10%, and the median is 0.1%. Finally, for the Netherlands, the average ratio is 6%, the standard deviation is 6%, and the median is 0.01%. The approach to cash management for Belgium and the Netherlands appears to be different.

The return on equity (*ROE*), return on assets (*ROA*), and earnings before interest and taxes (*EBIT*) are variables that measure a significant aspect of financial performance and profitability. Regarding return n equity (*ROE*) for all countries combined, the average is 2%, the standard deviation is 7%, and the median is 0.1%, indicating low profitability and significant variability among companies. Specifically, for Germany, the average *ROE* is 17%, indicating moderate return on equity with a right-skewed distribution. The standard deviation of 14% shows moderate variability in *ROE* among German companies. The median appears at 17%. For France, the average *ROE* is 16%, indicating even lower return on equity with a right-skewed distribution. The standard deviation of 10% shows low variability in *ROE* among French companies. The median appears at 15%. For Belgium, the average *ROE* is 7%, the standard deviation is 12%, and the median is 10%. For the Netherlands, the average *ROE* of 13% indicates even lower return on equity with a right-skewed distribution. While the standard deviation is 11%, the median appears at 0.1%. Overall, Germany has a higher average *ROE*, while France has lower returns with lower variability. Belgium and the Netherlands show lower returns, with the Netherlands having the lowest variability.

Regarding the return on assets (*ROA*) for all countries combined, the average is 1%, the standard deviation is 4%, and the median is 0.4%, indicating low profitability and significant variability among companies. Specifically, for Germany, the average *ROA* of 8% indicates relatively low return on assets with a right-skewed distribution. The standard deviation of 9% shows moderate variability in *ROA* among German companies and the median appears at 8%. For France, the average *ROA* of 5% indicates minimal return on assets, with a right-skewed distribution. The standard deviation of 4% shows

low variability in *ROA* among French companies and the median appears at 5%. For Belgium, the average *ROA* is 0.02%, the standard deviation is 0.8%, and the median is 0.02%. For the Netherlands, the average *ROA* is 0.3%, the standard deviation is 0.7%, and the median is 0.04%.

As for earnings before interest and taxes (*EBIT*) for all countries, the average is 27%, with a high standard deviation of 104%, indicating significant variability in *EBIT* values across a wide range of financial performances. The median is minimal at 0.01%. Specifically for Germany, the average *EBIT* is 227%, showing the average operating profitability. The standard deviation of 219% indicates significant variation in *EBIT* among German companies, with a median of 203%. For France, the average *EBIT* is 165%, with a standard deviation of 129% and a median of 101%. For Belgium, the average *EBIT* is 54%, with a standard deviation of 209% and a median of 111%. For the Netherlands, the average *EBIT* is 54%, with a standard deviation of 72% and a median of 16%.

The next variable is leverage (*LEV*), calculated according to Bates et al. (2009) as the ratio of total debt to total assets. The overall average *LEV* among countries is 5%, indicating that the average debt level is 5% of the capital structure of sample companies. The standard deviation is 14%, and the median leverage is 0.4%, indicating moderate uncertainty. In Germany, the average *LEV* is slightly higher at 35%, suggesting relatively higher dependence on debt in the capital structure. The standard deviation is 26%, and the median *LEV* is 33%, indicating lower variability than the overall dataset. France has an average *LEV* and standard deviation of 71%, with a median at 43%, implying higher variability. Belgium has an average *LEV* of 27%, a standard deviation of 21%, and a median of 28%. Finally, the Netherlands has an average *LEV* of 53%, a standard deviation of 61%, and a median of 40%, indicating similar levels of variability.

The size of the firm (*SIZE*) is defined according to the research of Gill and Shah (2012), Saddour (2006), and Bates et al. (2009) as the logarithm, employing the natural base of the aggregate assets. This approach highlights the relative scale of firms in different countries based on the outcomes of the current study. Therefore, according to the current study's results, the *SIZE* ranged from 0.01 to 72.16 for all countries, with an average of 2.65. Specifically, for Germany, it ranged from 0.57 to 72.16, with an average of 22.33. For France, it ranged from 1.43 to 5.72, with an average of 3.74. For Belgium, it ranged from 0.05 to 3.23, with an average of 1.63. Finally, for the Netherlands, it ranged from 0.23 to 6.09, with an average of 2.91.

Subsequently, dividends (*DIV*) were used as a standalone variable rather than a dummy variable, as utilized by Ferreira and Viela (2004), to facilitate statistical model analysis and provide a more straightforward interpretation of results, better reflecting the nature of the data. For the countries examined in this study, it presented an average value of 3%, indicating an average *DIV* of 3%, a standard deviation of 1%, signifying relatively low dispersion around the average *DIV*, implying a certain level of consistency in dividend distributions. The median is 2%, indicating a slightly right-skewed distribution with a significant number of countries having lower *DIV*. In Germany, the mean *DIV* is 2%, the standard deviation is 3%, and the median is 1%. In France, both the mean *DIV* and median are 2%, with a standard deviation of 1%, indicating a relatively stable distribution of dividends. Belgium has an average *DIV* and standard deviation of 2%, and the median is 0%. Finally, in the Netherlands, the mean, median, and standard deviation of dividends are all 1%, indicating a relatively stable distribution of dividends.

Next, some control variables are examined, such as Environmental, Social, and Governance Score (*ESG Score*). *ESG scores* provide information about a company's commitment to sustainability and ethical practices. For the overall countries, the average *ESG Score* is 9%, with a standard deviation of 24% and a median of 0.8%. This shows a relatively high average commitment to ESG practices among the companies in the sample. In Germany, the average *ESG Score* is 73%, the standard deviation is 16%, and the median is 77%. This suggests that a predominant number of companies in Germany exhibit elevated scores in environmental, social, and governance matters. In France, the average *ESG Score* is 78%, with a standard deviation of 13% and a median of 83%. In Belgium, the average *ESG Score* is 66%, with a standard deviation of 13% and a median of 65%. Finally, in the Netherlands, the average *ESG Score* is 71%, with a standard deviation of 22% and a median of 83%.

The subsequent control variable is Research and Development (*R&D*) expenses. The average *R&D* expenditure for all countries is 15%, indicating low investment in this area. The standard deviation for *R&D* is 69%, indicating substantial disparity exists across nations, with some having high investments and others lower. The median *R&D* expenditure is 0.01%. In Germany, the average *R&D* expenditure is 124%, with a standard deviation of 166% and a median of 28%. In France, the average Research and Development (*R&D*) expenditure is 44%, with a standard deviation of 49% and a median of 91%. This indicates that French companies, on average, have lower *R&D* investments compared to Germany. In Belgium, the average *R&D* expenditure is 23%,

with a standard deviation of 14% and a median of 22%. Finally, in the Netherlands, the average *R&D* expenditure is 53%, the standard deviation is 63%, and the median is 27%. The higher standard deviation indicates notable variability in *R&D* expenses, reflecting differences in innovation strategies among the sampled companies.

Additionally, the Interest Coverage Ratio (*ICR*) is another significant control variable, representing a company's ability to meet its interest obligations with its operational income. For all countries, the average *ICR* is 9%, the standard deviation is 52%, and the median is 0.02%, indicating a relatively satisfactory ability to cover interest expenses with operational income. However, there are significant differences between countries. In Germany, the average *ICR* is 73%, with a standard deviation of 137% and a median of 27%, indicating that companies there have a strong ability to cover interest expenses with their profits. In France, the average *ICR* is 32%, with a standard deviation of 41% and a median of 17%. Belgium stands out with an average *ICR* of 59%, a standard deviation of 69%, and a median of 8%. In the Netherlands, the average is 10%, the standard deviation is 59%, and the median *ICR* is 6%, indicating challenges in this area.

Another notable control variable is Capital Expenditure (*CAPEX*), which represents the capital expenses measuring the amount of capital a company invests in acquiring, upgrading, or maintaining physical assets such as properties, facilities, or equipment. The average *CAPEX* for all countries is 7%, with a standard deviation of 22% and a median of 0.01%. This indicates significant variation in *CAPEX* expenses among countries, with some having high capital investments and others lower. Specifically, in Germany, the average is 56%, higher than the overall average, with a standard deviation of 36% and a median of 64%. In France, the average is 73%, higher than the overall average, with a standard deviation of 66% and a median of 33%. In Belgium, the average is 42%, higher than the overall average, with a standard deviation of 43% and a median of 12%. In the Netherlands, the average is 46%, with a standard deviation of 68% and a median of 83%.

Another control variable is the Tax Rate (*TR*), which measures the percentage of profits paid in taxes. For all countries combined, the average tax rate is 5%, the standard deviation is 24%, indicating some variability in *TR* in the sample, and the median tax rate is 0.07%. Specifically for Germany, the average is 36%, with a standard deviation of 62% and a median of 25%. In France, the average *TR* is 26%, the standard deviation is 31%, and the median is 24%. Belgium prossesses an average TR of 29%, accompanied by a standard deviation of 44%, and a median of 20%. Finally, the

Netherlands shows an average *TR* of 49%, with a standard deviation of 67%, and a median of 19%.

In addition, Working Capital (*WC*), the last control variable used by Ferreira and Vilela (2004), is also employed in this analysis as a crucial financial measure reflecting operational liquidity and short-term financial health. The average *WC* for all countries is 19%, indicating the typical level of short-term assets and liabilities held by a company, with a standard deviation of 64%, indicating significant variability in working capital values among countries, reflecting differences in how companies handle their current resources and obligations. The median is 0.01%, representing the median value when all working capital values are sorted in ascending order. Specifically, focusing on Germany, the average *WC* is 156%, with a standard deviation of 116% and a median of 172%. In France, the average *WC* is 27%, the standard deviation is 90%, and the median is 36%. For Belgium, the average *WC* is 81%, the standard deviation is 34%, and the median is 39%. Finally, in the Netherlands, the average *WC* is 77%, the standard deviation is 89%, and the median is 125%.

Finally, the data analysis strongly confirms the hypothesis that Germany and France exhibit more significant similarities in terms of variables and results compared to Belgium and the Netherlands, which belong to a group with common findings. Further detailed analyses indicate specific trends and characteristics that may influence this coherence.

### *4.2. Correlation Matrix*

The next step involves conducting a correlation matrix test to check for multicollinearity issues in the data, meaning to examine correlations in a regression of one or more predictor variables as the goal is to avoid invalid results. The approach to assessing multicollinearity involves the Pearson correlation matrix. If the correlation is close to -1, it indicates that the two variables have a negative linear relationship, while if it is close to +1, it indicates a positive linear relationship. This strong relationship can lead to problems with the distortion of regression results, known as multicollinearity or multicollinearity issues.

***Table 8: Correlation Matrix Overall Sample***

| | ***ROE*** | ***ROA*** | ***EBIT*** | ***LEV*** | ***SIZE*** | ***DIV*** | ***ESG Score*** | ***R&D*** | ***ICR*** | ***CAPEX*** | ***TR*** | ***WC*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROE | 1 | | | | | | | | | | | |
| ROA | *0.95* | 1 | | | | | | | | | | |
| EBIT | 0.62 | 0.45 | 1 | | | | | | | | | |
| LEV | 0.57 | 0.37 | 0.69 | 1 | | | | | | | | |
| SIZE | 0.53 | 0.36 | 0.95 | 0.77 | 1 | | | | | | | |
| DIV | 0.73 | 0.87 | 0.25 | 0.22 | 0.21 | 1 | | | | | | |
| ESG Score | 0.69 | 0.56 | 0.81 | 0.82 | 0.82 | 0.48 | 1 | | | | | |
| R&D | 0.45 | 0.30 | 0.92 | 0.58 | 0.94 | 0.17 | 0.70 | 1 | | | | |
| ICR | 0.61 | 0.77 | 0.16 | 0.11 | 0.13 | 0.91 | 0.33 | 0.12 | 1 | | | |
| CAPEX | 0.62 | 0.44 | 0.87 | 0.84 | *0.88* | 0.27 | *0.91* | 0.76 | 0.15 | 1 | | |
| TR | 0.22 | 0.19 | 0.29 | 0.48 | 0.33 | 0.19 | 0.51 | 0.24 | 0.15 | 0.52 | 1 | |
| WC | 0.58 | 0.47 | 0.67 | 0.72 | 0.64 | 0.30 | 0.84 | 0.51 | 0.15 | 0.85 | 0.62 | 1 |

*Source: R Studio*

Specifically, in all countries of Table 8, which represents a correlation table using th Karl Pearson method for the independent and control variables utilized in this dissertation, several strong correlations provide valuable information regarding general trends in various financial and non-financial indicators. Specifically, a strong positive correlation of 0.95 between Return on Equity (*ROE*) and Return on Assets (*ROA*) indicates that when Return on Equity increases, there is a tendency for an increase in Return on Assets. This may suggest the potential for companies to efficiently utilize their capital to create value. Furthermore, the strong positive correlation of 0.91 between Environmental, Social, and Governance factors (*ESG Score*) and Capital Expenditures (*CAPEX*) further strengthens the trend that companies more committed to environmental, social, and governance practices (*ESG*) tend to have higher capital expenditures (*CAPEX*). This may indicate that companies investing in environmentally and socially responsible practices are likely to have significant expenses for acquiring capital equipment, research and development, and other sustainability-related investments. Finally, a strong positive correlation of 0.88 between Capital Expenditures (*CAPEX*) and Company Size (*SIZE*) indicates a consistent pattern across all countries, suggesting that larger companies tend to engage in higher capital expenditures, reflecting significant investments in growth and development.

***Table 9: Correlation Matrix Germany***

| | ***ROE*** | ***ROA*** | ***EBIT*** | ***LEV*** | ***SIZE*** | ***DIV*** | ***ESG Score*** | ***R&D*** | ***ICR*** | ***CAPEX*** | ***TR*** | ***WC*** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROE | 1 | | | | | | | | | | | | |
| ROA | *0.92* | 1 | | | | | | | | | | | |
| EBIT | 0.21 | -0.02 | 1 | | | | | | | | | | |
| LEV | -0.03 | -0.30 | 0.30 | 1 | | | | | | | | | |
| SIZE | 0.003 | -0.20 | 0.89 | 0.48 | 1 | | | | | | | | |
| DIV | 0.53 | 0.79 | -0.34 | -0.56 | -0.41 | 1 | | | | | | | |
| ESG Score | -0.24 | -0.45 | 0.80 | 0.40 | 0.81 | -0.70 | 1 | | | | | | |
| R&D | 0.02 | -0.14 | 0.88 | 0.24 | *0.93* | -0.29 | 0.72 | 1 | | | | | |
| ICR | 0.47 | 0.71 | -0.26 | -0.45 | -0.31 | *0.91* | -0.58 | -0.20 | 1 | | | | |
| CAPEX | 0.10 | -0.23 | 0.71 | 0.53 | 0.73 | 0.55 | 0.84 | 0.60 | -0.46 | 1 | | | |
| TR | -0.25 | -0.20 | -0.09 | 0.18 | -0.02 | -0.17 | 0.16 | -0.07 | -0.10 | 0.23 | 1 | | |
| WC | -0.01 | -0.10 | 0.25 | 0.26 | 0.17 | -0.39 | 0.55 | 0.11 | -0.38 | 0.57 | 0.43 | 1 | |

*Source: R Studio*

Specifically, tables were created to examine each country separately. In Table 9, which pertains to Germany, the strong positive correlation of 0.93 between dividends (*DIV*) and interest coverage ratio (*ICR*) suggests that German companies, when able to distribute high dividends, have the ability to cover their interest obligations from their operational income. Additionally, the strong positive correlation of 0.93 between firm size (*SIZE*) and research and development (*R&D*) indicates that larger companies are more likely to invest significantly in research and development activities. A significant positive correlation of 0.91 between Return on Equity (*ROE*) and Return on Assets (*ROA*) suggests that when Return on Equity increases, there is a tendency for an increase in Return on Assets. This possibly indicates that German companies have the ability to efficiently utilize their own capital to create value.

***Table 10: Correlation Matrix France***

| | ***ROE*** | ***ROA*** | ***EBIT*** | ***LEV*** | ***SIZE*** | ***DIV*** | ***ESG Score*** | ***R&D*** | ***ICR*** | ***CAPEX*** | ***TR*** | ***WC*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROE | 1 | | | | | | | | | | | |
| ROA | 0.20 | 1 | | | | | | | | | | |
| EBIT | 0.14 | 0.09 | 1 | | | | | | | | | |
| LEV | 0.45 | -0.44 | -0.09 | 1 | | | | | | | | |
| SIZE | 0.10 | -0.28 | 0.55 | 0.37 | 1 | | | | | | | |
| DIV | -0.03 | 0.12 | 0.41 | -0.14 | *0.61* | 1 | | | | | | |
| ESG Score | -0.09 | -0.06 | 0.28 | 0.10 | 0.46 | 0.20 | 1 | | | | | |
| R&D | 0.20 | -0.01 | 0.23 | 0.17 | 0.54 | 0.32 | 0.38 | 1 | | | | |
| ICR | 0.13 | 0.61 | 0.02 | -0.37 | -0.27 | 0.21 | -0.20 | -0.17 | 1 | | | |
| CAPEX | -0.03 | -0.14 | *0.67* | 0.03 | 0.61 | 0.29 | 0.32 | 0.15 | -0.09 | 1 | | |
| TR | 0.36 | -0.15 | 0.15 | 0.20 | 0.16 | 0.06 | -0.04 | 0.04 | 0.02 | 0.11 | 1 | |
| WC | -0.20 | 0.08 | 0.58 | -0.14 | 0.56 | 0.19 | 0.40 | 0.34 | -0.17 | *0.77* | -0.11 | 1 |

*Source: R Studio*

In Correlation Table 10 for France, lower correlations are observed compared to Germany, providing key insights into the relationships between various financial and non-financial variables. Specifically, the strong positive correlation of 0.77 between capital expenditures (*CAPEX*) and working capital (*WC*) suggests that when companies in France invest more in capital projects, they need additional capital to cover their operational needs. Furthermore, the positive correlation of 0.67 among earnings before interest and taxes (*EBIT*) and capital expenditures (*CAPEX*) indicates that French companies with high pre-tax profits invest in capital projects for expansion or improvement of their facilities. In conclusion, the correlation of 0.61 between firm size (*SIZE*) and dividends (*DIV*) suggests that larger companies in France are associated with higher dividend payments. These strong correlations provide valuable information for stakeholders, highlighting the interconnection of size, financial performance, and dividend distributions among companies in the French context.

***Table 11: Correlation Matrix Belgium***

| | ***ROE*** | ***ROA*** | ***EBIT*** | ***LEV*** | ***SIZE*** | ***DIV*** | ***ESG Score*** | ***R&D*** | ***ICR*** | ***CAPEX*** | ***TR*** | ***WC*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROE | 1 | | | | | | | | | | | |
| ROA | 0.87 | 1 | | | | | | | | | | |
| EBIT | 0.59 | 0.57 | 1 | | | | | | | | | |
| LEV | 0.46 | 0.30 | 0.73 | 1 | | | | | | | | |
| SIZE | 0.21 | 0.10 | 0.83 | 0.84 | 1 | | | | | | | |
| DIV | 0.37 | 0.33 | 0.93 | 0.82 | *0.94* | 1 | | | | | | |
| ESG Score | 0.48 | 0.37 | 0.75 | 0.60 | 0.70 | 0.76 | 1 | | | | | |
| R&D | -0.74 | -0.78 | -0.11 | -0.06 | 0.32 | 0.07 | -0.07 | 1 | | | | |
| ICR | 0.84 | 0.85 | 0.48 | 0.41 | 0.11 | 0.33 | 0.44 | *-0.88* | 1 | | | |
| CAPEX | 0.28 | 0.25 | 0.86 | 0.85 | *0.96* | 0.92 | 0.68 | 0.20 | 0.22 | 1 | | |
| TR | 0.21 | 0.07 | 0.31 | 0.35 | 0.30 | 0.36 | 0.27 | -0.09 | 0.19 | 0.30 | 1 | |
| WC | -0.30 | -0.38 | 0.45 | 0.47 | 0.78 | 0.63 | 0.40 | 0.77 | -0.41 | 0.70 | 0.19 | 1 |

*Source: R Studio*

In Correlation Table 11 for Belgium, several strong correlations emerge, providing valuable insights into the interdependencies between key financial and non-financial variables. Specifically, a significantly strong positive correlation of 0.96 between capital expenditures (*CAPEX*) and firm size (*SIZE*) indicates that larger companies in Belgium are associated with higher capital expenditures, possibly reflecting increased investments in infrastructure and expansion projects. Additionally, the correlation of 0.94 between firm size (*SIZE*) and dividends (*DIV*) shows that larger companies in Belgium tend to distribute higher dividends compared to smaller companies in Belgium. Finally, noteworthy is the strong negative correlation of -0.88 between research and development expenses (*R&D*) and the interest coverage ratio (*ICR*), indicating that Belgian companies investing more in research and development may face greater challenges in covering their debt interest payments.

***Table 12: Correlation Matrix Netherlands***

| | ***ROE*** | ***ROA*** | ***EBIT*** | ***LEV*** | ***SIZE*** | ***DIV*** | ***ESG Score*** | ***R&D*** | ***ICR*** | ***CAPEX*** | ***TR*** | ***WC*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROE | 1 | | | | | | | | | | | |
| ROA | 0.64 | 1 | | | | | | | | | | |
| EBIT | 0.01 | 0.30 | 1 | | | | | | | | | |
| LEV | 0.26 | 0.02 | -0.09 | 1 | | | | | | | | |
| SIZE | -0.19 | 0.06 | 0.61 | -0.04 | 1 | | | | | | | |
| DIV | -0.14 | 0.15 | 0.47 | -0.05 | 0.69 | 1 | | | | | | |
| ESG Score | -0.08 | 0.29 | 0.41 | 0.12 | *0.83* | 0.60 | 1 | | | | | |
| R&D | -0.17 | 0.01 | 0.46 | -0.11 | 0.69 | *0.82* | 0.55 | 1 | | | | |
| ICR | 0.26 | 0.06 | 0.06 | -0.30 | 0.10 | 0.02 | 0.09 | 0.03 | 1 | | | |
| CAPEX | -0.14 | 0.07 | 0.70 | -0.10 | 0.75 | 0.79 | 0.46 | *0.86* | 0.02 | 1 | | |
| TR | -0.10 | -0.11 | -0.06 | -0.08 | -0.22 | -0.12 | -0.31 | -0.10 | 0.01 | -0.07 | 1 | |
| WC | 0.02 | 0.21 | -0.04 | -0.22 | 0.75 | 0.54 | 0.54 | 0.62 | 0.09 | 0.78 | -0.10 | 1 |

*Source: R Studio*

In Correlation Table 12 for the Netherlands, several strong correlations shed light on significant relationships between various financial and non-financial variables. Specifically, a strong positive correlation of approximately 0.86 between research and development (*R&D*) and capital expenditures (*CAPEX*) suggests that companies in the Netherlands investing more in research and development tend to incur higher capital expenses. Additionally, the positive and strong correlation of 0.83 between the size of companies (*SIZE*) and environmental, social, and governance factors (*ESG Score*) indicates that larger businesses in the Netherlands, due to their broader scale and greater social impact, more frequently adapt practices that respect the environment, exhibit social sensitivity, and follow good governance practices. Finally, the positive correlation between dividends (*DIV*) and research and development (*R&D*) suggests that Dutch companies investing in innovation and product improvement are able to provide returns to their shareholders through higher dividends.

In conclusion, the correlation tables presented for all countries, as well as individual countries such as Germany, France, Belgium, and the Netherlands, reveal valuable information about the relationships between various economic and non-financial variables. It is observed that larger companies in the countries examined in this dissertation tend to invest more in capital projects, have higher dividend payouts, and

follow good governance practices, thus having a higher social impact. Furthermore, it can be concluded that companies investing in research and development are likely to undertake higher capital expenditures. Regarding concerns about multicollinearity, it's crucial to note that although there are robust associations, the majority of the values fall within a reasonable range, and there is no indication of extreme multicollinearity. Most correlation values do not approach -1 or +1, mitigating the risk of distortion in regression results.

## *4.2. Liquidity Management Trends*

The Figure 3 illustrates the business profitability trends over the span of *2003* to *2023* for four European countries: Germany, France, Belgium, and the Netherlands. It is observed that business profitability in Germany displays fluctuations, reaching its peak in *2020* and subsequently experiencing a significant decline in *2023*. This decline justifies further investigation into economic conditions and specific challenges. Additionally, Germany demonstrates a consistent use of cash and equivalents, maintaining a relatively stable percentage over the years, indicating a balanced approach to liquidity management, with a peak in 2009.

***Figure 3: Cash Average Analysis***

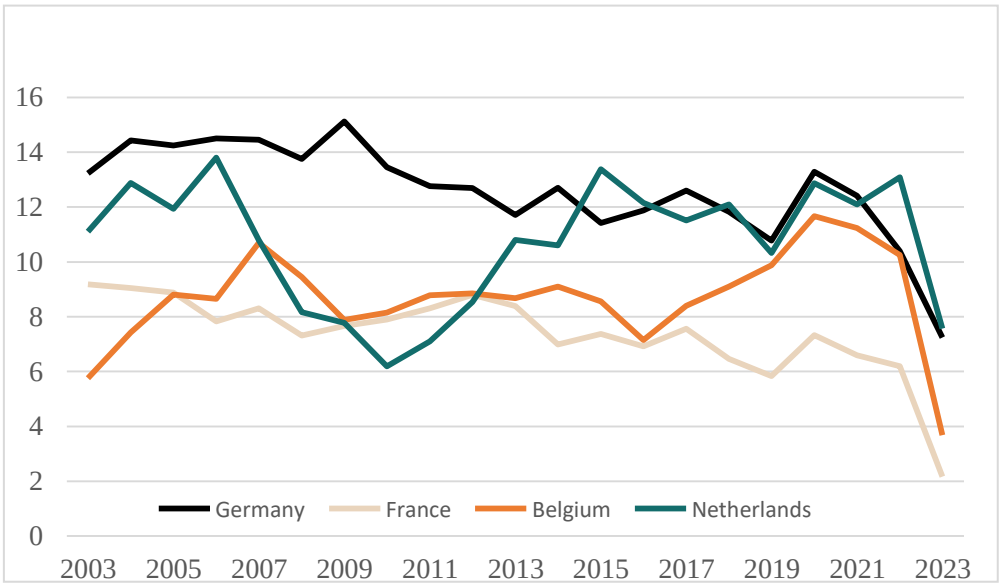


***Figure 3*** *represent Cash and Cash Equivalent as a Percentage (%) of Total Assets in European Countries (2013-2023)*

On the other hand, France exhibits mixed trends, generally maintaining lower prices compared to Germany, experiencing a slight decrease from *2004* to *2005*. Also observed a notable decline in *2014*, a recovery in *2015*, and a continuous reduction in business profitability from 2020 to *2023*, raising economic concerns. Belgium faces challenges, marked by a significant increase in *2007* and then *2014* and a notable decline in *2023*, prompting an exploration of potential changes in financial strategies or economic conditions. The Netherlands appears relatively resilient, maintaining a more stable trajectory, with a peak in 2006, followed by a significant decline. From *2011* onwards, there is an increase.. A slight decrease in *2023* suggests the need for future in-depth analysis of contributing factors. In conclusion, the year *2020*, defined by the global COVID-19 pandemic, had diverse impacts on the different facets of cash holding according to Khatib and Nour (2021) and specifically on these four European countries, with Germany and the Netherlands experiencing an increase, while France and Belgium encountered significant challenges.

## *4.3. Panel Regression*

In the present section, a report is provided regarding the outcomes of the regression analysis conducted using R Studio. The primary focus of the research is to comprehend how various factors affect the holding of cash. In the analysis, a 3-way dimension matrix was used, incorporating the dimension variables Country, Company and Year. Choosing a 3-way dimensional matrix analysis is critical to capture the complex dynamics and potential interactions between the defined dimensions. This approach allows a more comprehensive investigation of how cash fluctuations are affected not only by individual characteristics of companies but also by contemporaneous factors related to different countries and the time dimension during the years studied. In their study, Jin et al. (2023) consider a latent factor model characterized by three dimensions, omitting any explicit regressors. They propose a two-step estimation procedure based on principal component analysis (*PCA*) to reveal the underlying factor structure. Similarly, Balazsi, Matyas, and Wansbeek (2015) introduce estimators designed for the widespread three-dimensional (*3D*) context. It is worth noting that the estimators are particularly adequately equipped to tackle endogeneity issues and bolster the reliability of the estimates in panel data analysis.

### *4.3.2. Pooled OLS*

In this present investigation, it is notable that no unit root tests were conducted, as it was observed that they are not commonly employed according to the broader literature. This can be attributed to the fact that, as the dimensions of the data increase, the quantity of time periods diminishes in comparison to the number of countries and companies. Concurrently, there is an increased likelihood of data missingness, further reducing observations. Unit roots typically pose a challenge in datasets with long-term time series. The assumption is that time series remain stationary over time, and the addition of companies or countries to the analysis may create issues due to the lack of sufficient observations. Therefore, the limited addition of new dimensions to the data may explain the absence of studies examining the issue of unit roots.

***Table 13: Pooled OLS for Overall Sample***

| ***Coefficient*** | ***M1*** | ***M2*** | ***M3*** | ***M4*** | ***M5*** |
|---|---|---|---|---|---|
| (Intercept) | 1.912e-02 *** | 1.909e-02 *** | 1.871e-02 *** | 1.595e-02 *** | -0.002 . |
| | (1.414e-03) | (1.425e-03) | (2.255e-03) | (2.414e-03 ) | (0.0010) |
| ROA | -1.229e-07 . | -4.473e-06 | -4.489e-06 | -7.591e-05 *** | -0.4940 *** |
| | (6.257e-08) | (5.011e-06) | (4.957e-06) | (1.575e-05) | (0.0628) |
| LEV | | 4.452e-07 | 4.468e-07 | 7.263e-06 *** | 0.0018 |
| | | (4.853e-07) | (4.801e-07) | (1.516e-06) | (0.0150) |
| SIZE | | | -9.577e-05 * | -1.367e-04 ** | -0.0044 *** |
| | | | (3.716e-05) | (4.839e-05) | (0.0005) |
| DIV | | | | 1.524e+00 *** | 4.7348 *** |
| | | | | (2.058e-01) | (0.3050) |
| ESG Score | | | | | 0.3084 *** |
| | | | | | (0.01056) |
| R&D | | | | | 0.03864 *** |
| | | | | | (0.0050) |
| ICR | | | | | -0.0361 *** |
| | | | | | (0.0050) |
| CAPEX | | | | | -0.1345 *** |
| | | | | | (0.0161) |
| TR | | | | | 0.0149 ** |
| | | | | | (0.0055) |
| WC | | | | | -0.0174 *** |
| | | | | | (0.0038) |
| R-squared | 0.0637 | 0.0023 | 0.0141 | 0.0894 | 0.9432 |
| Country Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Company Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Total Number of Obs | 3,108 | | | | |

*Std. Errors are in parentheses.*

**, **, *** points to the level of significance at 10%, 5%, 1% respectively.*

*Source: R Studio*

In the initial stage of the study, a regression analysis was conducted for the dependent variable CASH by adding independent variables to each new model, including control variables, to assess the statistical significance of each model. Table 13 displays the outcomes of the regression analysis for the four European countries examined in this research for the years 2003-2023, with 3,108 observations. The focus is on how cash holdings are influenced by various factors. According to Park (2011), the Pooled OLS Model defines the intercept, which in this specific case represents the estimated values of the variables and the estimations of the coefficients of the independent variable in each econometric model. The assumptions governing the regression are outlined as follows:

$H_0$: The coefficient is not statistically significant.

$H_1$: The coefficient is statistically significant.

Specifically, in Model 1 (*M1*), you examine the statistical significance between the variables and the independent variable *ROA*, which shows a negative and non-statistically significant relationship with *CASH*. The R-squared value is 0.0637, indicating that *ROA* accounts for a minimal proportion of the variability in cash holdings. In conclusion, the analysis suggests that the model may not be very effective in explaining the observed variability in cash based on the given independent variable *ROA*. The relationship between these variables appears statistically insignificant, and the impact of *ROA* on cash is indistinguishable from random fluctuation.

In Model 2 (*M2*), the independent variable *ROA* also exhibits a negative and non-statistically significant relationship with *CASH*, while the inclusion of the independent variable *LEV* in the model shows a positive yet non-statistically significant relationship with *CASH*. The R-squared value increases to 0.0023, indicating a decrease in explaining the observed variability at lower levels. Overall, the model demonstrates even less ability to explain the variance in *CASH*.

Moving on to Model 3 (*M3*), the independent variable *ROA* continues to show a negative and non-statistically significant relationship with *CASH*, similar to the previous models. The inclusion of the independent variable *LEV* in the model maintains a

positive and non-statistically significant relationship with *CASH*, similar to Model 2 (*M2*). The addition of the independent variable SIZE reveals a statistically significant negative relationship with *CASH*. The R-squared value remains low at 0.0141, indicating limited explanatory power. Although there is a slight improvement compared to Model 2 (*M2*), the overall explanatory ability of the model remains limited. In conclusion, the addition of the independent variable *SIZE* marginally enhances the model's explanatory power, as it is the only variable that appears to be statistically significant in relation to the dependent variable *CASH*.

Model 4 (*M4*) explores the relationship between the dependent variable *CASH* and five independent variables: *ROA*, *LEV*, *SIZE*, and *DIV*. The independent variable ROA shows a negative and statistically significant relationship with *CASH*. The independent variable *LEV* maintains a positive and now statistically significant relationship with *CASH*. The independent variable *SIZE* continues to be statistically significant, showing a negative relationship with *CASH*. The additional independent variable *DIV* appears to have a positive and statistically significant relationship with *CASH*. The R-squared value is 0.0894, indicating that the independent variables explain a percentage of the variance in *CASH*. Despite the increase compared to previous models, the R-squared value remains relatively low.

Model 5 (*M5*) includes the latest examined model, incorporating all dependent and independent variables, as well as additional control variables that play a significant role in determining the results regarding statistical significance. Specifically, it explores the relationship between the dependent variable *CASH* and the independent variables from Model 4 (*M4*), adding control variables *ESG Score*, *R&D*, *ICR*, *CAPEX*, *TR*, and *WC*. The independent variable *ROA* continues to exhibit a negative and statistically significant relationship with *CASH*, consistent with Model 4 (*M4*). The independent variable *LEV* still shows a positive and statistically significant relationship with *CASH*. The independent variable *SIZE* remains statistically significant and presents a negative relationship with *CASH*. The last independent variable *DIV* appears to have a positive and statistically significant relationship with *CASH*, as before. As for the additional control variables, all of them are statistically significant, with *ESG Score*, *R&D*, and *TR* having a positive relationship with *CASH*, and *ICR*, *CAPEX*, and *WC* having a negative relationship with *CASH*. The R-squared value is 0.9432, indicating a substantial increase, suggesting that the independent variables and control variables explain 94% of the variance in *CASH*.

Significant interpretations of the results involve the sign displayed by each variable (independent and control) concerning the dependent variable *CASH*. This contributes to forming an understanding of the assumptions of this research. Specifically, for the independent variable *ROA* with a negative coefficient, the result aligns with *Hypothesis 1* of this research, indicating that an increase in profitability by one unit results in a decrease in cash holdings by as much as 0.4940 units. Aligns with earlier research, as seen in the studies like Pinkowitz and Williamson (2001) and Al-Najjar (2013). This finding contrasts with the findings of Myers and Majluf (1984) and, more specifically, with the Pecking Order Theory, which suggests that companies prefer internal financing (retained earnings) over external financing. The application of the Trade-off Theory supports the interpretation of the results of this study, suggesting that companies prefer the use of external financing, leading to a reduction in their cash holdings. This choice may result from a preference for specialized forms of financing, such as external loans, rather than maintaining high levels of cash reserves. Additionally, these findings can be used to shape practical approaches for businesses. For example, high-performing companies may consider better management of their cash flows and finding investment opportunities, rather than maintaining high levels of cash reserves. This approach contributes to improving the performance of businesses and enhances the efficiency of their financial management.

For the independent variable *LEV*, the positive coefficient contradicts *Hypothesis 2* of this research. Specifically, an increase by one unit in leverage leads to an increase in cash holdings by as much as 0.0018 units. Faulkender and Wang (2006) support the idea that companies with higher leverage may prefer to maintain more cash as a precautionary measure to mitigate the costs of financial distress. Additionally, Aldoseri et al. (2022) found a positive relationship between leverage and cash holdings. Therefore, this result contradicts the second hypothesis of the thesis, suggesting that leverage has a positive impact on cash retention.

As for the independent variable *SIZE*, the negative coefficient aligns with *Hypothesis 3* of this research. Specifically, an increase of 1 percent in firm size results in a decrease in cash holdings by to the same extent as 0.0044%. This contrasts with the Pecking Order Theory but aligns with the Trade-off Theory, where larger companies may have better access to external financing, reducing the need for high cash reserves. However, Drobetz and Grüninger (2007) substantiated the inverse association among firm size and the retention of cash. According to Al-Najjar and Belghitar (2011), larger companies are

less susceptible to bankruptcy costs and have lower chances of accumulating cash. This result aligns with the third hypothesis of the thesis, highlighting that firm size exerts a notable adverse influence on cash holdings.

Regarding the independent variable *DIV*, the positive coefficient aligns with *Hypothesis 4* of this research, indicating that when companies pay dividends to their shareholders, cash holdings increase by as much as 4.7348 units. Shyam-Sunder and Myers (1998) and the Pecking Order Model suggest that companies paying higher dividends tend to have higher cash holdings. This is in line with research conducted in studies like Chen et al. (2012) and Hill et al. (2014), which observed a significantly positive relationship in the Japanese and German markets. Additionally, Teruel et al. (2009), Gogineni et al. (2012), Ali & Yousaf (2013), and Kuldeep and Misra (2019) supported the positive correlation between dividends and cash holdings. However, several studies, including Bates et al. (2009), Ferreira and Vilela (2004), Kim et al. (2011), Khieu and Pyles (2012), Julio and Yook (2012), Weidemann (2016), and Ahmad and Adaoglu (2019) identified a substantial inverse correlation between dividend disbursements and cash holdings in various contexts.

Next, the first control variable is the *ESG Score* with a positive coefficient of 0.3084, indicating that a higher *ESG Score* is associated with increased cash holdings. Companies with better environmental, social and governance practices may have better access to financing and a lower likelihood of financial distress. Additionally, the positive relationship could be attributed to improved access to capital and reduced financial risks associated with ethical and sustainable business practices, as suggested by Flammer (2013).

Regarding the control variable *R&D*, the negative coefficient of 0.03864 suggests that higher expenses on research and development are linked to higher cash holdings. Wang et al. (2014), He and Wintoki (2016), Chauhan et al. (2018), and Hu et al. (2018) discovered a positive correlation among research and development expenditures and cash holdings. In other words, companies may maintain higher cash reserves when there is an increase in working capital requirements due to higher spending on research and development. In contrast to this finding, Bates et al. (2009) and Maheshwari & Rao (2017) identify a negative correlation between them.

As for the control variable *ICR*, with a negative coefficient of -0.0361, it indicates that a higher interest coverage ratio is associated with lower cash holdings. If companies

have a higher interest coverage ratio, it implies the ability to cover interest obligations with the profit they generate. However, the inverse relationship with cash availability suggests that companies with a high *ICR* do not typically uphold elevated levels of cash reserves. This contradicts the findings of Faulkender and Wang (2006), who argue that companies with a higher interest coverage ratio are generally associated with increased cash holdings.

For the control variable *CAPEX*, the negative coefficient of -0.1345 suggests that higher capital expenditures are associated with lower cash holdings. This outcome is in line with the findings of Dittmar et al. (2003), who found a negative relationship for capital expenditures, as well as Bates et al. (2009) and Oler and Picconi (2014). In conclusion, companies that invest significantly in capital projects may have lower immediate liquidity.

For the control variable *TR*, with a positive coefficient of 0.0149, it indicates that higher tax rates are associated with higher cash holdings. This suggests that companies facing higher taxes tend to maintain more cash, possibly to cover their tax obligations and as a financial reserve. This result is consistent with the findings of Opler et al. (1999), emphasizing that companies facing higher tax rates tend to have higher cash reserves, highlighting the role of tax considerations in cash management. The inclusion of taxes essentially implies that the cost of liquidity reserves increases with the marginal tax rate of the company.

For the last control variable *WC*, with a negative coefficient of -0.0174, it implies that an increase in working capital is associated with lower cash holdings. Bates et al. (2009), Al-Najjar (2013), and Maheshwari & Rao (2017) also find a negative correlation between working capital and cash holdings. In other words, companies may have lower cash reserves when there is an increase in working capital requirements.

In conclusion, the analysis reveals that cash management decisions are influenced by various factors. Profitability remains a critical factor, with more profitable businesses maintaining lower cash reserves. Additionally, leverage emerges as a positively correlated factor with cash holdings, indicating that companies using debt may tend to maintain higher cash reserves. Company size proves to be significant, with larger companies tending to maintain higher levels of cash. Finally, concerning dividends, companies paying high dividends may maintain higher cash levels, representing a preference for storing significant financial reserves rather than distributing profits. The

introduction of additional variables and control measures enhances the explanatory power of the model, revealing complex relationships between various financial and non-financial factors and cash holdings. The findings of this study contribute to existing literature on corporate finance and provide practical implications for companies aiming to optimize their cash management strategies in dynamic economic environments.

***Table 14: Pooled OLS for Germany***

| ***Coefficient*** | ***M1*** | ***M2*** | ***M3*** | ***M4*** | ***M5*** |
|---|---|---|---|---|---|
| (Intercept) | 1.238e-01 *** | 1.246e-01 *** | 1.207e-01 *** | 1.154e-01 *** | 0.1282 |
| | (6.903e-03) | (6.987e-03) | (1.064e-02) | (1.266e-02) | (0.1726) |
| ROA | -9.662e-09 | -9.633e-07 | -1.101e-06 | -2.582e-05 | -0.5080 * |
| | (1.184e-07) | (9.454e-06) | (9.052e-06) | (3.096e-05) | (0.2322) |
| LEV | | 9.228e-08 | 1.060e-07 | 2.469e-06 | 0.0309 |
| | | (9.156e-07) | (8.767e-07) | (2.979e-06) | (0.0707) |
| SIZE | | | -1.444e-04 * | -2.053e-04 * | -0.0035 |
| | | | (7.166e-05) | (9.370e-05) | (0.0022) |
| DIV | | | | 4.829e-01 | 4.1416 * |
| | | | | (4.159e-01) | (1.3814) |
| ESG Score | | | | | 0.1139 |
| | | | | | (0.2642) |
| R&D | | | | | 0.0360 . |
| | | | | | (0.0182) |
| ICR | | | | | -0.0350 . |
| | | | | | (0.0189) |
| CAPEX | | | | | -0.1274 . |
| | | | | | (0.0600) |
| TR | | | | | 0.0142 |
| | | | | | (0.0204) |
| WC | | | | | -0.0098 |
| | | | | | (0.0173) |
| R-squared | 2.212e-05 | 6.13e-05 | 0.0302 | 0.0419 | 0.8952 |
| Country Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Company Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Total Number of Obs | 777 | | | | |

*Std. Errors are in parentheses.*

**, **, *** points to the level of significance at 10%, 5%, 1% respectively.*

*Source: R Studio*

Subsequently, a regression analysis was conducted for Germany, covering the time period 2003-2023 and including 777 observations. The hypotheses used for the regression analysis are as follows:

$H_0$: The coefficient is not statistically significant.

$H_1$: The coefficient is statistically significant.

In Model 1 (*M1*), the statistical significance of the relationship between the variables and the independent variable *ROA* was estimated. *ROA* exhibits a negative relationship with *CASH* but is not statistically significant. The p-value for the R-squared is 2.212e-05, which is excessively low. This suggests that ROA explains a significantly small, if not negligible, portion of the variance in CASH. Therefore, it can be concluded that Model 1 (*M1*) is not effective in explaining the observed variability in cash based on *ROA*.

In Model 2 (*M2*), the independent variable *ROA* continues to show a negative but non-statistically significant relationship with *CASH*. The addition of the independent variable *LEV* to the model appears to be positively, but also non-statistically, associated with *CASH*. The R-squared value increases to 6.13e-05, indicating a decrease in the explanatory power of the observed variance but remaining at low levels. Thus, Model 2 seems to have minimal ability to explain the variability in *CASH*.

In Model 3 (*M3*), the independent variable *ROA* maintains its negative, yet non-statistically significant, relationship with *CASH*, continuing the overall trend of previous models. The independent variable *LEV* shows a positive relationship, but again without statistical significance. The addition of the independent variable *SIZE* to the model seems to be statistically significant with *CASH*, presenting a negative relationship. The R-squared improves compared to Model 2 (*M2*) but remains at low levels at 0.0302, indicating limited explanatory power. Overall, the addition of the *SIZE* variable slightly improves the model's explanatory capacity for the variance in *CASH*, as it is the only variable that appears to have a statistically significant connection with the dependent variable *CASH*.

Model 4 (*M4*) examines the relationship between the cash level (*CASH*) and four independent variables: *ROA*, *LEV*, *SIZE*, and *DIV*. The independent variable *ROA* continues to exhibit a negative and non-statistically meaningful association with *CASH*, indicating that its impact on cash is not significant. Additionally, the independent

variable *LEV* maintains its positive and non-statistically significant relationship with *CASH*. The variable *SIZE* remains statistically significant and is negatively associated with *CASH*. On the other hand, the added independent variable *DIV* appears to have a positive but non-statistically significant relationship with *CASH*. Overall, the R-squared is 0.0419, indicating that the model explains a limited percentage of the variance in *CASH*, showing improvement but remaining at a relatively low level of explanatory power.

Model 5 (*M5*) includes all variables from Model 4 (*M4*) along with additional control variables that play a significant role in determining the results regarding statistical significance. Specifically, it explores the relationship between the dependent variable *CASH* and the independent variables from Model 4 (*M4*), adding control variables *ESG Score*, *R&D*, *ICR*, *CAPEX*, *TR*, and *WC*. The independent variable *ROA* exhibits a negative and statistically significant relationship with *CASH*. This result aligns with *Hypothesis 1* of this research, indicating that an increase in profitability by one unit results in a decrease in cash holdings by as much as 0.5080 units. The independent variable *LEV* maintains its positive and non-statistically significant relationship with *CASH*, contrary to *Hypothesis 2*. The variable *SIZE* changes to non-statistically significant and presents a negative relationship with *CASH*, supporting *Hypothesis 3*. The last independent variable, *DIV*, appears to have a positive and now statistically significant relationship with *CASH* compared to Model 4 (*M4*). This result contradicts *Hypothesis 4*, suggesting that when companies pay dividends to shareholders, cash holdings would increase by as much as 4.1416 units.

Regarding the additional control variables, all of them are non-statistically significant. *ESG Score*, *R&D*, and *TR* have a positive relationship with *CASH*, while *ICR*, *CAPEX*, and *WC* have a negative relationship. The R-squared value is 0.8952, indicating a high improvement and suggesting that the independent variables and control variables explain 90% of the variance in *CASH*.

The results regarding the sign of the independent and control variables indicate that their relationship with *CASH* remains at the same levels as the results for the overall sample. However, the difference lies in the statistical significance. Specifically, in this analysis for Germany as the base country, it is observed that a statistically meaningful relationship with *CASH* is only present for the independent variables *ROA* and *DIV*. In essence, the independent variable *ROA* is negatively signed, aligning with the findings of Al-Najjar and Belghita (2011) and Al-Najjar (2013). The independent variable *DIV*,

with a positive sign, is consistent with the results of Shah (2011) and Chauhan et al. (2018). This indicates that, within the German market context, the effects of these variables on *CASH* are statistically significant, while other variables may not be statistically robust or may present ambiguous results.

***Table 15: Pooled OLS for France***

| ***Coefficient*** | ***M1*** | ***M2*** | ***M3*** | ***M4*** | ***M5*** |
|---|---|---|---|---|---|
| (Intercept) | *5.874e-04**** | 5.629e-04 *** | 7.930e-04 *** | 6.408e-04 *** | 30571e-03 *** |
| | (4.375e-05) | (6.061e-05) | (1.718e-04) | (1.811e-04) | (3.984e-04) |
| ROA | -3.954e-01 *** | -4.114e-01 *** | -4.510e-01 *** | -7.540e-01 *** | -1.323e-01 |
| | (7.041e-02) | (7.55e-02) | (-00219) | (1.350e-01) | (1.781e-01) |
| LEV | | 1.894e-03 | 1.176e-02 . | 1.032e-02 | 1.137e-02 |
| | | (3.238e-03) | (6.717e-03) | (6.905e-03) | (1.094e-02) |
| SIZE | | | -1.123e+05 ** | -4.542e+04 | -3.041e+05 ** |
| | | | (3.482e+04) | (3.937e+04) | (1.306e+05) |
| DIV | | | | -1.119e+00 *** | -2.384e+00 ** |
| | | | | (2.322e-01) | (7.443-01) |
| ESG Score | | | | | -1.906e-01 *** |
| | | | | | (4.378e-02) |
| R&D | | | | | 1.954e+05 *** |
| | | | | | (4.219e+04) |
| ICR | | | | | 5.366e-02 ** |
| | | | | | (1.654e-02) |
| CAPEX | | | | | 3.806e+03 |
| | | | | | (1.945e+04) |
| TR | | | | | 8.322e-03 |
| | | | | | (1.704e-02) |
| WC | | | | | 4.932e+04 ** |
| | | | | | (1.744e+04) |
| R-squared | 0.0481 | 0.0486 | 0.1247 | 0.1864 | 0.6159 |
| Country Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Company Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Total Number of Obs | 777 | | | | |

*Std. Errors are in parentheses.*

**, **, *** points to the level of significance at 10%, 5%, 1% respectively.*

*Source: R Studio*

Additionally, a regression analysis was conducted for France, covering the time period 2003-2023 and including 777 observations. The hypotheses used for the regression analysis are as follows:

$H_0$: The coefficient is not statistically significant.

$H_1$: The coefficient is statistically significant.

In Model 1 (*M1*), the statistical significance of the relationship between the cash level and the independent variable *ROA* was analyzed. It was observed that *ROA* shows a negative and statistically significant correlation with *CASH*. The R-squared value, which is 0.0481, indicates that *ROA* explains a limited percentage of the variance in *CASH*. Therefore, it can be concluded that Model 1 (*M1*) is not sufficiently effective in explaining the observed variability in cash based on *ROA*.

In Model 2 (*M2*), the independent variable *ROA* continues to exhibit a negative and statistically significant relationship with *CASH*. The addition of the independent variable *LEV* to the model seems to be positively associated but without statistical significance with *CASH*. The R-squared value, 0.0486, remains at the same levels as Model 1 (*M1*), suggesting that it equally explains a limited percentage of the variance in *CASH*. Thus, Model 2 (*M2*) also lacks the ability to adequately explain the variance in *CASH*.

In Model 3 (*M3*), it is observed that the independent variable *ROA* maintains the negative and statistically significant relationship with *CASH*, confirming the overall trend of the previous models. The independent variable *LEV* shows a positive relationship, but again without statistical significance. The addition of the independent variable *SIZE* to the model appears to be statistically significant, showing a negative relationship with *CASH*. While the R-squared improves compared to Model 2 (*M2*), it remains at low levels with a value of 0.1247, indicating limited explanatory power. Overall, the addition of the *SIZE* variable only slightly enhances the model's ability to explain the variance in *CASH*.

Model 4 (*M4*) examines the relationship between the cash level and four independent variables: *ROA*, *LEV*, *SIZE*, and *DIV*. The independent variable *ROA* continues to show a negative and statistically significant relationship with *CASH*, indicating that its impact on cash is significant. Additionally, the independent variable *LEV* maintains its positive and non-statistically significant relationship with *CASH*. The variable *SIZE* is negatively associated with *CASH* but not statistically significant. In contrast, the additional independent variable *DIV* appears to have a negative and statistically significant relationship with *CASH*. Overall, the R-squared is 0.1864, where the model explains a limited percentage of the variance in *CASH*, showing minimal improvement but remaining at a relatively low level of explanatory power.

Model 5 (*M5*) encompasses the final examined model, including all dependent and independent variables from Model 4 (*M4*), as well as additional control variables that play a significant role in determining the results regarding statistical significance. Specifically, it explores the relationship between the dependent variable *CASH* and the independent variables from Model 4 (*M4*), adding control variables *ESG Score*, *R&D*, *ICR*, *CAPEX*, *TR*, and *WC*. The independent variable *ROA* shows a negative but non-statistically significant relationship with *CASH*. This findings is consistent with the findings of Bahir (2014) and is consistent with *Hypothesis 1* of the current research specifically that an increase in profitability results in a decrease in cash holdings by as much as 1.323e-01 units. The independent variable *LEV* maintains its positive and non-statistically significant relationship with *CASH*. This result contradicts *Hypothesis 2* of the current research, indicating that an increase in leverage leads to an increase in cash holdings by as much as 1.137e-02 units. The independent variable *SIZE* changes to be statistically significant and presents a negative relationship with *CASH*. This result aligns with *Hypothesis 3* of the current research, specifically that a 1 percent increases in firm size leads to a decrease in cash holdings by as much as 3.041e+05 percent. The last independent variable, *DIV*, appears to have a negative and statistically significant relationship with *CASH*, similar to Model 4 (*M4*). This result aligns with *Hypothesis 4* of the current research, indicating that when companies pay dividends to shareholders, cash holdings would decrease by as much as 2.384e+00 units.

Regarding the added control variables, the majority of them appear to be statistically significant, with a positive relationship with *CASH* for the variables *R&D*, *ICR*, and *WC*, and a negative and statistically significant relationship with *CASH* for the variable *ESG Score*. Finally, the variables *CAPEX* and *TR* show a positive but non-statistically significant relationship with *CASH*. The R-squared value is 0.6159, indicating that the independent variables and control variables explain 62% of the variance in *CASH*.

The results indicate that the relationship of these variables with *CASH* differs from the results concerning the overall sample. The difference is particularly noticeable in the sign of the variable *DIV* and its statistical significance. Specifically, in the present analysis for France as the base country, a statistically significant relationship with *CASH* is observed only for the independent variables *SIZE* and *DIV*. In other words, the independent variable *SIZE* shows a negative sign, consistent with findings from studies conducted by Ngueyen (2005) and Daher (2010). Similarly, the independent variable *DIV* also exhibits a negative sign, aligning with results from studies such as those by

Sun et al. (2012) and Jia and McMathon (2019). In conclusion, within the context of the French market, the effects of these variables on *CASH* demonstrate statistical significance, while for other variables, statistical significance may be less pronounced or may present ambiguous parameters.

***Table 16: Pooled OLS for Belgium***

| ***Coefficient*** | ***M1*** | ***M2*** | ***M3*** | ***M4*** | ***M5*** |
|---|---|---|---|---|---|
| (Intercept) | 6.977e-04 *** | 7.300e-04 *** | 1.119e-03 *** | 8.180e-04 *** | 7.676e-04 |
| | (6.365e-05) | (5.102e-05) | (1.371e-04) | (1.180e-04) | (1.305e-03) |
| ROA | -1.328e-03 *** | -3.487e-01 *** | -3.159e-01 *** | -3.940e-01 *** | -4.997e-02 *** |
| | (1.708e-04) | (4.941e-02) | (7.599e-02) | (1.115e-01) | (3.762e-01) |
| LEV | | -1.122e-03 | -2.320e-02 . | -2.488e-03 | -1.708e-01 |
| | | (7.200e-04) | (1.338e-02) | (9.646e-03) | (2.095e-01) |
| SIZE | | | -1.700e+05 ** | -9.545e+04 * | -6.426e+05 * |
| | | | (5.107e+04) | (3.739e+04) | (9.136e+05) |
| DIV | | | | 4.940e-02 | 4.346e+00 |
| | | | | (1.055e-01) | (4.478e+00) |
| ESG Score | | | | | -2.248e-01 |
| | | | | | (1.604e-01) |
| R&D | | | | | 7.734e+06 |
| | | | | | (7.254e+06) |
| ICR | | | | | -1.675e-02 |
| | | | | | (2.476e-02) |
| CAPEX | | | | | 8.574e+04 |
| | | | | | (1.259e+06) |
| TR | | | | | -8.974e-04 |
| | | | | | (3.064e-02) |
| WC | | | | | -6.260e+05 |
| | | | | | (5.429e+05) |
| R-squared | 0.1099 | 0.0948 | 0.2032 | 0.125 | 0.9014 |
| Country Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Company Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Total Number of Obs | 777 | | | | |

*Std. Errors are in parentheses.*

**, **, *** points to the level of significance at 10%, 5%, 1% respectively.*

*Source: R Studio*

Following, a regression analysis was conducted for Belgium, covering the period 2003-2023 and including 777 observations. The hypotheses used for the regression analysis were the same in each case:

$H_0$: The coefficient is not statistically significant.

$H_1$: The coefficient is statistically significant.

In Model 1 (*M1*), the statistical significance of the relationship between the variables and the independent variable *ROA* was analyzed. It was observed that *ROA* exhibits a negative and statistically significant correlation with *CASH*. The R-squared value, which is 0.1099, indicates that *ROA* accounts for a minimal proportion of the variability in cash holdings. Therefore, Model 1 (*M1*) is not notably effective in explaining the observed variability in cash based on *ROA*.

In Model 2 (*M2*), the independent variable *ROA* continues to show a negative and statistically significant relationship with *CASH*. The addition of the independent variable *LEV* to the model appears to be negatively associated with *CASH* but lacks statistical significance. The R-squared value, at 0.0948, is lower compared to Model 1 (*M1*), signifying a limited explanatory power for the variance in *CASH*. Hence, Model 2 (*M2*) cannot adequately explain the variability in *CASH*.

In Model 3 (*M3*), it is observed that the independent variable *ROA* maintains its negative and statistically significant relationship with *CASH*, confirming the overall trend of the previous models. The independent variable *LEV* shows a negative relationship but is not statistically significant. The introduction of the independent variable *SIZE* to the model appears to be statistically significant, indicating a negative relationship with *CASH*. Despite the improvement in the R-squared value compared to Model 2 (*M2*), it remains at low levels with a value of 0.2032, indicating limited explanatory power. Overall, the addition of the *SIZE* variable marginally enhances the model's ability to explain the variance in *CASH*.

Model 4 (*M4*) explores the association between the magnitude of cash (*CASH*) and four independent variables: *ROA*, *LEV*, *SIZE*, and *DIV*. The independent variable *ROA* continues to exhibit a negative and statistically significant relationship with *CASH*, indicating that its impact on cash is significant. Additionally, the independent variable *LEV* shows a negative relationship but lacks statistical significance. The variable *SIZE* is negatively associated with *CASH* and is statistically significant. Conversely, the added independent variable *DIV* appears t have a positive but statistically insignificant relationship with *CASH*. Overall, the R-squared is 0.125, which is less favorable compared to the previous model, meaning it explains a smaller and somewhat limited percentage of the variance in *CASH*.

Model 5 (*M5*) includes the latest explored model, encompassing all dependent and independent variables, along with additional control variables that shape the determination of results regarding statistical significance. Specifically, the relationship between the dependent variable *CASH* and independent variables from Model 4 (*M4*) is investigated by adding control variables *ESG Score*, *R&D*, *ICR*, *CAPEX*, *TR*, and *WC*. The independent variable *ROA* shows a negative and statistically significant relationship with *CASH*. This conclusion aligns with *Hypothesis 1* of the current study, namely, an increase by one unit in profitability leads to a decrease in cash holdings as much as 4.997e-02 units. The independent variable *LEV* maintains a negative but statistically insignificant relationship with *CASH*. This finding is in accordance with *Hypothesis 2* of the current study, indicating that an increase by one unit in leverage results in a decrease in cash holdings as much as 1.708e-01 units. The independent variable *SIZE* remains statistically significant and indicates a negative relationship with *CASH*. The result aligns with *Hypothesis 3* of the current study, specifically, an increase by 1 percent in firm size leads to a decrease in cash holdings as much as 6.426e+05%. The last independent variable, *DIV*, appears to have a positive but statistically insignificant relationship with *CASH*, similar to Model 4 (*M4*). This result aligns with *Hypothesis 4* of the current study, suggesting that when companies pay dividends to shareholders, cash holdings would increase as much as 4.346e+00 units. Regarding the additional control variables, all of them appear to be statistically insignificant, with *R&D* and *CAPEX* showing a positive relationship with *CASH*, and *ESG Score*, *ICR*, *TR*, and *WC* showing a negative relationship with *CASH*. The R-squared value is 0.9014 with a high ascent, indicating that the independent variables and control variables explain 90% of the variance in *CASH*.

The results regarding the signs of independent and control variables show that their relationship with *CASH* differs from the results concerning the overall sample. The difference is observed in terms of statistical significance. Specifically, in the present analysis for Belgium as the base country, a statistically significant relationship with *CASH* is observed only for the independent variables *ROA* and *SIZE*. Specifically, the independent variable *ROA* appears with a negative sign, consistent with findings from studies conducted by Pinkowitz and Williamson (2001). The independent variable *SIZE* also shows a negative sign, in line with results from studies such as Islam (2012) and Anjum and Malik (2013). In conclusion, in the context of the Belgian market, the effects of these variables on *CASH* demonstrate statistical significance, while for the

remaining variables, statistical significance may be less pronounced or exhibit ambiguous parameters.

***Table 17: Pooled OLS for Netherlands***

| *Coefficient* | *M1* | *M2* | *M3* | *M4* | *M5* |
|---|---|---|---|---|---|
| (Intercept) | 9.633e-04 *** | 1.085e-03 *** | 1.199e-03 *** | 1.299e-03 *** | 4.979e-04 |
| | (5.171e-05) | (6.095e-05) | (1.039e-04) | (1.156e-04) | (6.265e-04) |
| ROA | -2.343e-01 *** | -3.336e-01 *** | -6.448e-02 | -2.368e-02 | -1.158e-02 |
| | (2.759e-02) | (3.323e-02) | (9.226e-02) | (1.054e-01) | (2.086e-01) |
| LEV | | -7.697e-03 ** | -1.254e-02 | -3.117e-03 | -2.287e-02 ** |
| | | (2.773e-03) | (8.521e-03) | (9.349e-03) | (2.155e-02) |
| SIZE | | | -1.814e+05 *** | -1.863e+05 *** | -5.330e+05 ** |
| | | | (3.005e+04) | (3.095e+04) | (1.481e+05) |
| DIV | | | | -2.598e-01 | -7.988e+00 . |
| | | | | (6.014e-01) | (4.568e+00) |
| ESG Score | | | | | 2.138e-01 |
| | | | | | (1.327e-01) |
| R&D | | | | | 2.032e+05 |
| | | | | | (1.892e+05) |
| ICR | | | | | -1.064e-02 |
| | | | | | (1.956e-02) |
| CAPEX | | | | | 5.933e+04 |
| | | | | | (3.998e+04) |
| TR | | | | | 2.753e-03 |
| | | | | | (7.277e-03) |
| WC | | | | | 1.170e+04 |
| | | | | | (2.488e+04) |
| R-squared | 0.1065 | 0.1518 | 0.1867 | 0.2315 | 0.5175 |
| Country Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Year Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Company Fixed Effect | Yes | Yes | Yes | Yes | Yes |
| Total Number of Obs | 777 | | | | |

*Std. Errors are in parentheses.*

**, **, *** points to the level of significance at 10%, 5%, 1% respectively.*

*Source: R Studio*

Finally, a regression analysis was conducted for the Netherlands, covering the time period from 2003 to 2023 and including 777 observations. The hypotheses used for the regression analysis are the same in each case:

$H_0$: The coefficient is not statistically significant.

$H_1$: The coefficient is statistically significant.

In Model 1 (*M1*), the regression analysis explored the statistical significance of the relationship between the cash variable (*CASH*) and the independent variable *ROA* for the Netherlands. It was observed that ROA exhibits a negative and statistically significant correlation with *CASH*. The R-squared value, which is 0.1065, indicates that *ROA* clarifies a modest portion of the variability in cash holdings. Therefore, Model 1 (*M1*) is not effective in explaining the observed variability in cash based on *ROA*.

Moving on to Model 2 (*M2*), the independent variable *ROA* continues to show a negative and statistically significant relationship with *CASH*. The addition of the independent variable *LEV* to the model appears to be negatively correlated with *CASH*, and it is statistically significant. The R-squared value, which is 0.1518, is slightly higher compared to Model 1 (*M1*), implying that it explains an equally limited percentage of the variance in *CASH*. Therefore, Model 2 (*M2*) cannot adequately explain the variability in *CASH*.

In Model 3 (*M3*), it is observed that the independent variable *ROA* maintains a negative but now statistically insignificant relationship with *CASH*, rejecting the overall trend of the previous models. The independent variable *LEV* presents a negative and statistically significant relationship with *CASH*. The introduction of the independent variable *SIZE* to the model appears to be statistically significant with *CASH*, indicating a negative relationship. Despite the slight increase in the R-squared compared to Model 2 (*M2*), it remains at low levels with a value of 0.1867, suggesting limited explanatory power. Essentially, the addition of the *SIZE* variable minimally improves the model's explanatory capacity for the variance in *CASH*.

Model 4 (*M4*) explores the relationship among the cash variable (*CASH*) and four independent variables: *ROA*, *LEV*, *SIZE*, and *DIV*. The independent variable *ROA* continues to exhibit a negative and statistically insignificant relati nship with *CASH*, indicating that its impact on cash is not significant. Next, the independent variable *LEV* sh ws a negative and statistically insignificant relati nship with *CASH*. The *SIZE* variable is negatively associated with *CASH* and is statistically significant. Additionally, the added independent variable *DIV* appears t have a negative and statistically insignificant relati nship with *CASH*. Overall, the R-squared value is 0.2315, remaining low and indicating a limited ability t explain the variance in *CASH*.

In Model 5 (*M5*), the latest m del includes all dependent and independent variables from Model 4 (*M4*), along with additi nal control variables contributing to result specification c ncerning statistical significance. Essentially, the relationship between the dependent variable *CASH* and the independent variables is explored, adding control variables *ESG Sco*re, *R&D*, *ICR*, *CAPEX*, *TR*, and *WC*. The independent variable *ROA* shows a negative and statistically significant relationship with *CASH*. This result is consistent with *Hypothesis 1* of the current research specifically that an increase of one unit in profitability leads t a decrease in cash holdings as much as 1.158e-02 units. The independent variable *LEV* maintains a negative but statistically insignificant relationship with *CASH*. This result contradicts *Hypothesis 2* of the current research, stating that an increase of one unit in leverage leads to a decrease in cash holdings as much as 0.0018 units. The independent variable *SIZE* remains statistically significant and indicates a negative relationship with *CASH*, aligning with *Hypothesis 3* of the current research, where a 1 percent growth in firm size leads to a reduction in cash holdings to the same extent as 5.330e+05%. The last independent variable *DIV* appears to have a positive and statistically insignificant relationship with *CASH*, similar to Model 4 (*M4*). This result remains consistent with *Hypothesis 4* of the current research, suggesting that when companies pay dividends to shareholders, cash holdings decrease as much as 7.988e+00 units.

Regarding the additional control variables, all of them appear to be statistically insignificant, with *ICR* having a positive relationship with *CASH*, while *ESG Score*, *R&D*, *CAPEX*, *TR*, and *WC* have a negative relationship. The R-squared value is 0.5175, indicating a moderate increase, suggesting that the independent and control variables explain 52% of the variance in *CASH*. Nevertheless, the explanation is not sufficiently robust.

The results regarding the sign of the independent and control variables indicate that their relationship with *CASH* differs from the results concerning the overall sample. The difference is observed in terms of the sign of the variable *DIV* and the variable *LEV* is statistical significance. Specifically, in this analysis for the Netherlands as the base country, it is observed that a statistically significant relationship with *CASH* appears only for the independent variable *LEV* and the independent variable SIZE. Specifically, the independent variable *LEV* shows a negative sign, consistent with findings from studies conducted by Megginson and Wei (2014). The independent variable *SIZE* also shows a negative sign, aligning with results from studies such as Nyborg and Wang

(2014) and Hu et al. (2018). In conclusion, within the context of the Dutch market, the effects of these variables on *CASH* show statistical significance, while for the remaining variables, statistical significance may be less pronounced or exhibit unclear parameters.

### *4.3.3. Hausman Test : Fixed vs Random Effects*

Subsequently, estimators of fixed effects (*FE*) and random effects (*RE*) were examined, as well as their combination, as explored by Huang et al. (2019) and Wang et al. (2016). The independent estimators determine the asymptotic distributions of these estimators using a condition local to exogeneity. Additionally, they calculate the asymptotic risk of the estimators based on the framework introduced by Hansen (2017). According to Nerlove (2002), the fixed effects model in panel data has its roots in the least squares methods used by astronomers Gauss (1809) and Legendre (1805). Random effects models, or variance components models, trace their origin to the work of the English astronomer George Biddell Airy, who explicitly applied a variance components model for the analysis of astronomical data. According to Adefemi (2017), recognized as a stochastic elements model, it is also a widely utilized approach for conducting panel data analysis. This approach accommodates diversity and remains temporally constant, yet the individual impact doesn't exhibit correlation with the explanatory variables.

Specifically, according to the fixed effects model, it allows for correlation but does not allow for direct interactions between variables and variables that are time-invariant. The issues with these silent restrictions are not identified because common fixed and random effects models lack overall model fit tests in the saturated model.

According to the fixed effects model, the hypothesis are as follows :

$H_0$: The common effect is zero

$H_1$: The common effect isn’t zero

According to the random effects model, the hypothesis are as follows:

$H_0$: The average of the true effects is zero.

$H_1$: The average of the true effects isn't zero.

***Table 18: Fixed Effect - Random Effect in Overall Sample***

| *Coefficient* | *Fixed Effect* | *Random Effect* |
|---|---|---|
| (Intercept) | - | -0.0019204 . |
| | - | (0.0010) |
| ROA | -0.5072 *** | -0.4940 *** |
| | (0.0621) | (0.0629) |
| LEV | -0.0318 . | 0.0018 |
| | (0.0187) | (0.0150) |
| SIZE | -0.0034 *** | -0.0044 *** |
| | (0.0006) | (0.0005) |
| DIV | 4.1158 *** | 4.7346 *** |
| | (0.3675) | (0.3050) |
| ESG Score | 0.1083 | 0.3086 *** |
| | (0.0700) | (0.0156) |
| R&D | 0.0360 *** | 0.0387 *** |
| | (0.0049) | (0.0049) |
| ICR | -0.0348 *** | -0.0386 *** |
| | (0.0050) | (0.0049) |
| CAPEX | -0.1272 *** | -0.1345 *** |
| | (0.0161) | (0.0161) |
| TR | 0.0142 ** | 0.0149 ** |
| | (0.0055) | (0.0055) |
| WC | -0.0096 * | -0.0174 *** |
| | (0.0046214) | (0.0038) |
| R-squared | 0.8869 | 0.9432 |
| P-value | <2.22e-16 | <2.22e-16 |

*Std. Errors are in parentheses.*

**, **, *** points to the level of significance at 10%, 5%, 1% respectively.*

*Source: R Studio*

Table 18 presents, in its 1st column, the estimates and statistical results for the fixed effects model. The negative estimate for the independent variable *ROA* is 0.5072, and the statistical significance indicates that the performance of assets significantly affects cash availability. The estimate for the independent variable *LEV* is negative at 0.0318, and it has a significant correlation with cash holdings. The estimate for the independent variable *SIZE* is negative at 0.0034 and statistically significant. The estimate for the *DIV* independent variable is 4.1158 and also statistically significant.

For the control variable *ESG Score*, the positive estimate of 0.1083 indicates a lack of statistical significance. The control variable *R&D* has a positive coefficient of 0.0360, with a statistically significant relationship. The control variable *ICR* has a negative coefficient of 0.0348, with a non-significant relationship. The control variable *CAPEX* has a negative impact on cash holdings with a coefficient of 0.1272, and the result is statistically significant. The control variable *TR* has a positive coefficient of 0.0142 with a significant influence on cash holdings. Finally, the control variable WC has a negative impact on cash with a coefficient of 0.0096 and is statistically significant.

The overall p-value <2.22e-16, below the 10% significance level, indicates that there is evidence to reject the null hypothesis that all coefficients of the fixed effects model are zero. Therefore, the model as a whole provides a statistically significant explanation of cash retention. The R-squared value of 0.8869 indicates a strong level of explanatory power. Essentially, the model accounts for 89% of the variability in cash reserves included variables, suggesting that the fixed effects model is reasonably effective in elucidating the observed fluctuations in cash reserves among the examined factors.

Table 18 presents in the 2nd column the estimates and statistical results for the random effects model. The negative estimate for the independent variable *ROA* is 0.4940, and its statistical significance. The estimate for the independent variable *LEV* suggests that the performance of assets has a positive impact at the 0.0018 significance level, with no significant relationship to cash in contrast to the fixed effects model. The calculation for the independent variable *SIZE* is negative at -0.0044 and statistically significant. The estimate for the *DIV* variable is 4.7346 and equally statistically significant.

For the control variable *ESG Score,* the positive estimate of 0.3086 is statistically significant. The control variable *R&D* has a positive coefficient of 0.0387 with a statistically significant relationship. The control variable *ICR* has a negative coefficient of 0.0386 with no statistical significance. The control variable *CAPEX* has a negative impact on cash holdings with a coefficient of 0.1345 and statistical significance. The control variable *TR* has a positive coefficient of 0.0149 with a significant influence on cash holdings. Finally, the control variable *WC* has a negative impact on cash with a coefficient of 0.0174 and is statistically significant.

The overall p-value < 2.22e-16, below the 10% significance level, indicates that there is evidence to reject the null hypothesis that all coefficients are zero. Thus, the random effects model, as a whole, provides a statistically significant explanation of cash

holdings. The R-squared value for the random effects model is 0.9432, indicating a strong level of explanatory power. Essentially, 94% of the variability in cash reserves is accounted for by the incorporated factors, suggesting that the random effects model is reasonably effective in elucidating observes disparities in cash holdings among the examined factors.

Upon the initial inspection of Table 18, it is evident that there are more statistically significant variables in the random effects application. To reinforce this conclusion, researchers often conduct a test to identify the optimal model, specifically using the Hausman (1978),the specification test is conducted to identify breaches of the random effects assumption, i.e., the assumption that explanatory variables are independent of the outcomes of the units.. Essentially, the Hausman test allows researchers to distinguish between random and fixed effects models. It is important to clarify that the Hausman test relies on certain assumptions. Firstly, it assumes that both models with fixed and random effects are consistent, meaning that both provide reliable estimates. Additionally, it assumes that the null hypothesis is preferable since there is no significant correlation between the effects and explanatory variables. More specifically, the following assumptions are examined:

$H_0$: Best model is random.

$H_1$ : Best model is fixed.

***Table 19: Hausman Test in Overall Sample***

| *chisq* | *df* | *P-Value* |
|---|---|---|
| 8.5991 | 10 | 0.5705 |

*Source: R Studio*

According to the findings in Table 19, the p-value is 0.5705, which exceeds the conventional significance level of 10%. This means that there is not enough statistical evidence to reject the null hypothesis, confirming that the model with random effects fits the data better. However, it should be noted that accepting the model does not necessarily indicate its correctness. There is also a possibility that the Pooling Ordinary Least Squares (*OLS*) model, whose results are depicted in Table 13 for the overall sample, might hold true.

### *4.3.4. Breusch-Pagan Lagrange: Pooling OLS vs Random Effects*

According to Wooldridge (2009), a significant model beyond fixed effects and random effects models is the Pooled Ordinary Least Squares (*OLS*) model. Specifically, as noted by Baltagi (2008), Pooled OLS for panel data is a commonly used econometric technique for analyzing cross-sectional datasets over time. This method assumes a constant relationship across individual entities over time, treating the panel as a unified large dataset. The Pooled OLS model estimates coefficients for each variable without accounting for individual heterogeneities or time-related effects. While it provides a straightforward approach, it may overlook potential issues arising from unobserved individual factors or factors related to time dynamics, as mentioned by Wooldridge (2010). Specifically, it assumes that specific effects are constant across all entities and time periods, which may not hold in dynamic settings. The following assumptions are examined:

$H_0$: Variances between panels are zero. Therefore, the best model is Pooled OLS.

$H_1$: Variances between panels aren't zero. Therefore, the best model is not Pooled OLS.

***Table 20: Lagrange Multiplier Test - (Breusch-Pagan) in Overall Sample***

| *chisq* | *df* | *P-Value* |
|---|---|---|
| 1.262 | 1 | 0.2613 |

*Source: R Studio*

According to the Breusch-Pagan Lagrange test, the p-value is 0.2613, which is higher than the 10% significance level. This suggests insufficient statistical evidence to dismiss the null hypothesisd, leading to the conclusion that the Pooled OLS model handles heteroscedasticity well. Therefore, the preferred model is Pooled OLS. However, it is crucial to acknowledge that accepting the random effects model does not necessarily validate its correctness, and there remains the possibility that the Pooled OLS model could be a suitable alternative.

### *4.3.5. Robustness Checks : Profitability Proxies*

The inclusion of a robustness check in the regression analysis for the overall sample, substituting the variable *ROA* with the independent variable *ROE,* is a pivotal measure to assess the stability and reliability of the research findings. This step is crucial in determining whether the results are consistent across different proxies for profitability. Specifically, the goal is to assess if the model's explanatory capacity for cash variations remains robust when utilizing Return on Equity (*ROE*) as an alternative to Return on Assets (*ROA*).

The presentation of the results from this robustness check and their comparison with the original findings is essential for a comprehensive evaluation of the study's outcomes. If the results exhibit stability or only minor changes, it bolsters the confidence in the initial analysis and suggests that the identified relationships are robust to variations in the choice of the profitability proxy. On the other hand, significant differences in the results may raise questions and warrant further exploration to understand the underlying factors contributing to these variations. This process contributes to a more thorough understanding of the dynamics involved in the relationships under investigation.

Furthermore, the execution of additional robustness checks involving the use of the independent variable *EBIT* as an alternative proxy for profitability provides an additional layer of validation. The consistent alignment of the relationships with all hypotheses in these supplementary analyses enhances the overall robustness and reliability of the research outcomes. This dual-check approach, employing both ROE and EBIT as proxies for profitability, contributes to a comprehensive understanding of the studied phenomena, acknowledging the potential nuances associated with different financial indicators. Additionally, it reinforces the generalizability of the findings and underscores the resilience of the established relationships across distinct dimensions of profitability.

As shown in Table 21, the underlining represents the estimated values of variables. The assumptions for the regression remain as follows:

$H_0$: The coefficient is not statistically significant.

$H_1$: The coefficient is statistically significant.

***Table 21: Robustness Check for Overall Sample - ROE***

| *Coefficient* | *M1* | *M2* |
|---|---|---|
| (Intercept) | 0.0133 *** | -0.0020 * |
| | (0.0015) | (0.0010) |
| ROE | -0.2614 *** | -0.2422 *** |
| | (0.0163) | (0.0291) |
| LEV | | 0.0313 . |
| | | (0.0170) |
| SIZE | | -0.0050 *** |
| | | (0.0006) |
| DIV | | 4.3090 *** |
| | | (0.2679) |
| ESG Score | | 0.3208 *** |
| | | (0.0148) |
| R&D | | 0.0424 *** |
| | | (0.0057) |
| ICR | | -0.0400 *** |
| | | (0.0049) |
| CAPEX | | -0.1281 *** |
| | | (0.0163) |
| TR | | 0.0110 . |
| | | (0.0056) |
| WC | | -0.0204 *** |
| | | (0.004) |
| R-squared | 0.1396 | 0.9451 |
| Country Fixed Effect | Yes | Yes |
| Year Fixed Effect | Yes | Yes |
| Company Fixed Effect | Yes | Yes |
| Total Number of Obs | 3108 | |

*Std. Errors are in parentheses.*

**, **, *** points to the level of significance at 10%, 5%, 1% respectively.*

*Source: R Studio*

In Model 1 (*M1*), you estimate the statistical significance of the relationship between the variables and the independent variable *ROE,* which shows a negative and statistically significant connection with *CASH*. The R-squared value is 0.1396, indicating that *ROE* accounts for a minimal proportion of the overall variability in cash holdings. From these results, you infer that the model may not be particularly effective in explaining the observed variance in cash based on the given independent variable *ROE*. The low R-squared value suggests that the contribution of *ROE* to explaining the variance in cash is limited. This approach could be seen as a guiding idea for the

importance of *ROE* in the model, emphasizing the possible need for further examination or modification of the model to enhance its effectiveness in predicting the variance in cash.

Model 2 (*M2*) includes all dependent and independent variables, along with additional control variables that play a significant role in determining the results regarding statistical significance. The independent variable *ROE* shows a negative and statistically significant relationship with *CASH*. The result continues to align with *Hypothesis 1* of this research, an increase by one unit in profitability leads to a decrease in cash holdings by as much as 0.2422 units. The independent variable *LEV* presents a positive relationship that is not statistically significant with *CASH*. This result contrasts with *Hypothesis 2* of this research, specifically that an increase by one unit in leverage leads to a decrease in cash holdings by as much as 0.0313 units. The independent variable *SIZE* indicates a statistically significant and negative relationship with *CASH*. This result is consistent with *Hypothesis 3* of this research, suggesting that a 1% increase in firm size leads to a decrease in cash holdings by as much as 0.0050%. The last independent variable, *DIV*, seems to demonstrate a positive and statistically significant correlation with *CASH*. This outcome is in concordance with *Hypothesis 4* of this research, stating that when companies pay dividends to shareholders, cash holdings decrease by as much as 4.3090 units.

As for the additional control variables, all of them are statistically significant, with *ESG Score*, *R&D*, and *TR* having a positive relationship with *CASH*, and *ICR*, *CAPEX*, and *WC* having a negative relationship. The R-squared value is 0.9451, indicating that the independent and control variables explain 95% of the variance in *CASH*.

Comparing Model 5 (*M5*) from Table 13 with Model 2 (*M2*) from Table 21, there are noticeable differences and an impact of replacing the variable *ROA* with *ROE* on the results. In Model 5 (*M5*), the coefficient of *ROA* is -0.4940, and in Model 2 (*M2*), the coefficient of *ROE* is -0.2422, appearing less negative. The other independent variables in the two models remain relatively stable, as seen from their constant coefficients and significances. The R-squared in Model 5 (*M5*) is 0.9432, slightly lower than the R-squared in Model 2 (*M2*) at 0.9451. This suggests that replacing the explanatory variable does not have a significant impact on the explanatory power of the model. Overall, replacing the variable *ROA* with *ROE* does not seem to have a dramatic impact on the results, with the two models providing similar estimates and explanations.

The addition of a final robustness check to the regression analysis for the overall sample involves replacing the variable *ROA* with the variable *EBIT* as a proxy for profitability. This is done to examine the impact of pre-tax earnings (*EBIT*) on cash holdings. The purpose of this procedure is to verify whether the findings remain consistent with the use of different variables. The hypothesis for this check remains unchanged:

$H_0$: The coefficient is not statistically significant.

$H_1$: The coefficient is statistically significant.

***Table 22: Robustness Check for Overall Sample - EBIT***

| ***Coefficient*** | ***M1*** | ***M2*** |
|---|---|---|
| (Intercept) | 0.0188 *** | -0.0021 . |
| | (0.0014) | (0.0011) |
| EBIT | -0.0033 *** | -0.0151 *** |
| | (0.0009) | (0.0038) |
| LEV | | -0.0401 * |
| | | (0.0170) |
| SIZE | | -0.0035 *** |
| | | (0.0006) |
| DIV | | 3.1832 *** |
| | | (0.2603) |
| ESG Score | | 0.3601 *** |
| | | (0.0160) |
| R&D | | 0.0400 *** |
| | | (0.0056) |
| ICR | | -0.0369 *** |
| | | (0.0055) |
| CAPEX | | -0.1446 *** |
| | | (0.0181) |
| TR | | 0.02228 *** |
| | | (0.0061) |
| WC | | -0.0253 |
| | | (0.0040) |
| R-squared | 0.0060 | 0.9301 |
| Country Fixed Effect | Yes | Yes |
| Year Fixed Effect | Yes | Yes |
| Company Fixed Effect | Yes | Yes |
| Total Number of Obs | 3108 | |

*Std. Errors are in parentheses.*

**, **, *** points to the level of significance at 10%, 5%, 1% respectively.*

*Source: R Studio*

In the context of Model 1 (*M1*), the significance of statistically significant correlations between the variables and the independent variable *EBIT* is examined. *EBIT* shows a negative and statistically significant relationship with *CASH*. Despite statistical significance, the low value of the R-squared 0.0060 indicates that *EBIT* explains only a very small percentage of the overall variance in cash. This deviation diminishes the model's ability to fully explain the variations in cash based on the selected variable *EBIT*. Additionally, the efficiency of the model improves when considering the overall variety of variables, but the low explanation from *EBIT* suggests that adding this variable may not be very useful for explaining observed variations in cash.

Model 2 (*M2*) includes all dependent and independent variables, along with additional control variables. The independent variable *EBIT* shows a negative and statistically significant relationship with *CASH*. The result aligns with *Hypothesis 1* of this research, indicating that an increase by one unit in profitability results in a decrease in cash holdings by as much as 0.0151 units. The independent variable *LEV* presents a positive and statistically insignificant relationship with *CASH*. This result contradicts *Hypothesis 2* of this research, suggesting that an increase by one unit in leverage leads to an increase in cash holdings by as much as 0.0401 units. The independent variable *SIZE* indicates a statistically significant and negative relationship with *CASH*, confirming *Hypothesis 3*, stating that a 1% increase in firm size leads to a decrease in cash holdings by as much as 0.0044%. The last independent variable, *DIV*, shows exhibits a significant positive correlation with *CASH*, consistent with *Hypothesis 4*, indicating that when companies pay dividends, cash holdings decrease by as much as 3.1832 units.

Regarding the additional control variables, all of them are statistically significant, with *ESG Score*, *R&D*, and *TR* having a positive relationship with *CASH*, and *ICR*, *CAPEX*, and *WC* having a negative relationship. The R-squared value is 0.9301, indicating that the independent and control variables explain 93% of the variance in *CASH*.

Comparing Model 5 (*M5*) from Table 13 with Model 2 (*M2*) from Table 21 and Model 2 (*M2*) from Table 22, there are differences in the proxies used for profitability. Specifically, in Model 5 (*M5*), the coefficient of *ROA* is -0.4940, and in Model 2 (*M2*) with *ROE* as a proxy, the coefficient is -0.2422, appearing less negative. In Model 2 (*M2*) with *EBIT* as a proxy, the coefficient is even less negative at -0.0151. The other independent variables in the two models remain relatively stable, as indicated by their coefficients and significance levels.

The R-squared in Model 5 (*M5*) is 0.9432, in Model 2 (*M2*) with *ROE* as a proxy is slightly higher at 0.9451, while in Model 2 (*M2*) with *EBIT* as a proxy is lower at 0.9301. This suggests that replacing the independent variable does not significantly impact the explanatory power of the model. Overall, the replacement of *ROA* with *EBIT* or *ROE* does not seem to substantially influence the outcomes of the model, enhancing confidence in the stability of the findings. The fact that the coefficients remain relatively stable indicates that substituting *ROA* with *ROE* or *EBIT* does not significantly distort the model and its ability to explain the variance in cash holdings.

***Table 23: Direction of Coefficients in Determining Factors – Overall Sample***

| ***Determinants*** | ***Predictions*** | ***Results*** |
|---|---|---|
| Profitability (*ROA*) | - | - |
| Leverage | - | + |
| Firm Size | - | - |
| Dividend | + | + |

| ***Determinants*** | ***Predictions*** | ***Results*** |
|---|---|---|
| Profitability (*ROE*) | - | - |
| Leverage | - | + |
| Firm Size | - | - |
| Dividend | + | + |

| ***Determinants*** | ***Predictions*** | ***Results*** |
|---|---|---|
| Profitability (*EBIT*) | - | - |
| Leverage | - | - |
| Firm Size | - | - |
| Dividend | + | + |

Finally, Table 23 describes the expected predictions and observed results regarding the coefficients associated with the four determinants explored through four hypotheses in this research for overall sample. For each determinant involving three different Pooled OLS, such as profitability with the *ROA* proxy, profitability with the *ROE* proxy, and profitability with the *EBIT* proxy, the table furnishes a summary of the predicted direction of the coefficient and the actual observed results. Predictions and results are indicated by symbols: "-" representing a negative relationship and "+" representing a positive relationship. Overall, it is observed that the findings of this study align with the expectations set by the hypotheses for the profitability factors, firm size, and dividend share, thereby enhancing the reliability of the research. The result for the leverage factor differs from *Hypothesis 2* in cases where the *ROA* or *ROE* independent variables are used as proxies for profitability, while with the use of the *EBIT* independent variable, all hypotheses are compatible.

***Table 24: Direction of Coefficients in Determining Factors – Germany***

| ***Determinants*** | ***Predictions*** | ***Results*** |
|---|---|---|
| Profitability (*ROA*) | - | - |
| Leverage | - | + |
| Firm Size | - | - |
| Dividend | + | + |

In Table 24, the anticipated predictions and actual outcomes related to the coefficients associated with the four determinants investigated through the four hypotheses in this research for Germany are presented. The research findings align with the anticipated expectations for factors such as profitability, firm size, and dividend share, contributing to the overall credibility of the study. However, it's noteworthy that the outcome for the leverage factor deviates from what was hypothesized in *Hypothesis 2*. Despite this discrepancy, the overall alignment of the results with the established hypotheses enhances the robustness and reliability of the research.

***Table 25: Direction of Coefficients in Determining Factors – France***

| ***Determinants*** | ***Predictions*** | ***Results*** |
|---|---|---|
| Profitability (*ROA*) | - | - |
| Leverage | - | + |
| Firm Size | - | - |
| Dividend | + | - |

Table 25 outlines the anticipated predictions and actual results concerning the coefficients linked to the four determinants examined through four hypotheses in the context of the research conducted for France. The findings demonstrate a general alignment with the expected outcomes set by the hypotheses, particularly in relation to profitability factors and firm size. This consistency reinforces the overall dependability of the research outcomes. However, it's noteworthy that the results for the leverage and dividend factors deviate from what was hypothesized in *Hypothesis 2* and *Hypothesis 4*, respectively.

***Table 26: Direction of Coefficients in Determining Factors – Belgium***

| ***Determinants*** | ***Predictions*** | ***Results*** |
|---|---|---|
| Profitability (*ROA*) | - | - |
| Leverage | - | - |
| Firm Size | - | - |
| Dividend | + | + |

Table 26 provides an overview of the expected predictions and observed results concerning the coefficients associated with the four determinants explored through four hypotheses in the research conducted for Belgium. The overall observation is that the research findings align consistently with the expectations established by the hypotheses for all determinant factors. In essence, the results fully conform to the predictions

regarding these relationships. In simpler terms, the outcomes are in complete agreement with the anticipated patterns, strengthening the overall reliability and validity of the research.

***Table 27: Direction of Coefficients in Determining Factors – Netherlands***

| ***Determinants*** | ***Predictions*** | ***Results*** |
|---|---|---|
| Profitability (*ROA*) | - | - |
| Leverage | - | - |
| Firm Size | - | - |
| Dividend | + | - |

Table 27 presents the projected predictions and observed results associated with the coefficients related to the four determinants investigated through four hypotheses in the research conducted for the Netherlands. The results exhibit a broad agreement with the anticipated outcomes established by the hypotheses, especially concerning profitability factors and firm size. It is important to highlight that while there is general consistency, there are noteworthy deviations in the results for the leverage and dividend factors when compared to the hypotheses, specifically *Hypothesis 2* and *Hypothesis 4*.

# Chapter 5: Conclusion

This dissertation delves into the determining factors influencing firms to maintain cash reserves for Germany, France, Belgium, and the Netherlands annually from *2003* to *2023*. The analysis conducted in this investigation aimed to explore the determinants of cash holdings in businesses, utilizing various econometric techniques and diagnostic tests. The research focused on key determinants, including profitability factors, leverage, firm size, and dividend policies, examining their impact on financial performance. The examination of key hypotheses has yielded results contributing to a differentiated understanding of the factors influencing cash retention. Specifically, for the overall sample, the analysis supports *Hypothesis 1*, indicating a negative and significant relationship between profitability and cash retention. The empirical evidence aligns with the idea that more profitable businesses tend to maintain lower cash levels, possibly as a result of efficient resource utilization and higher investment levels in more ergonomic areas, thereby contributing to increased performance.

Furthermore, *Hypothesis 3*, defining a significant negative impact of firm size on cash holdings, is confirmed by the findings. Larger companies appear to maintain lower cash reserves, possibly because of improved entry to financial markets or increased levels of financial complexity. Subsequently, it is observed that the empirical results align with *Hypothesis 4*, indicating a positive and significant effect of dividends on cash holdings. Companies distributing dividends seem to maintain higher cash balances, reflecting a commitment to delivering value to shareholders. In contrast to the initially assumed an insignificant and adverse correlation among leverage and cash holdings , the analysis reveals a positive correlation. This unexpected result implies that greater leverage correlates with heightened cash reserves, challenging *Hypothesis 2*.

In particular, the meticulous analysis of financial determinants in four European countries, namely Germany, France, Belgium, and the Netherlands, provides a valuable addition to understanding the complexity shaping their business landscapes. The research results broadly align with the initial hypotheses regarding profitability factors, firm size, and dividend policies, thereby enhancing the overall reliability of the findings.

However, it becomes evident that variations in the results regarding leverage exhibit some deviations from the expectations outlined in *Hypothesis 2*, especially in certain cases. The findings regarding Germany reveal a nuanced perspective, especially

concerning the leverage component, which appears to be statistically insignificant. This observation echoes the broader trends in the study and emphasizes the necessity for prudence and additional scrutiny in interpreting these outcomes. In the context of France, despite an overall conformity with anticipated patterns, the variability in results concerning leverage is insignificant, while dividends are significant, implying potential fluctuations in the dynamics specific to the French business landscape. Conversely, for Belgium, the complete alignment of determinant factors with expected directions underscores the stability and reliability of the study outcomes. his correspondence offers valuable insights into the consistent dynamics shaping the economic landscape in Belgium, contributing significantly to the comprehension of the local business environment. Lastly, with respect to the Netherlands, the overall alignment of predictions with observed results is notable, with the exception of the dividends factor, which appears to be statistically insignificant. These insights collectively contribute to a thorough comprehension of the diverse dynamics influencing the economic landscapes of these four countries.

Additionally, findings from the application of fixed and random effects models, along with the Hausman test, highlight the importance of choosing an appropriate methodology, depending on the data characteristics and research hypotheses. Specifically, in this analysis, the conclusion was drawn that the optimal choice is the random effects model with greater statistically significant variables. The random effects model is often favored when assuming that the effects of unobserved variables not considered in the model are random and could be connected with the dependent variables. However, the choice of the Ordinary Least Squares (*OLS*) model might be preferable, as indicated by the rejection of the null hypothesis in the Breusch-Pagan test. This suggests the presence of homoscedasticity, making the OLS model potentially more suitable for the given analysis.

It is noteworthy that the results regarding the leverage factor deviate from *Hypothesis 2* when *ROA* indicators are employed in the overall sample. Specifically, a positive and statistically insignificant relationship between leverage and cash retention is observed. Furthermore, an additional robustness check was conducted using Pooled OLS, employing *ROE* as a profitability proxy, revealing no substantial change in the results compared to the *ROA* variable. However, additional robustness checks using *EBIT* as an independent variable for profitability indicate that the relationships remain consistent and statistically significant across all scenarios. This dual verification process enhances

the resilience of the research findings, emphasizing the validity of established relationships at various profit points.

Specifically, the focus on four European Union countries implies that the results may not be generalized to other regions. Additionally, there exists a potential for endogeneity in estimating parameters and the precision of outcomes depends on the underlying model assumptions. Finally, the reliability of findings is contingent upon the quality and availability of the data used.

This study highlights the significance of optimal capital management for cash retention. Businesses can explore ways to improve their capital performance and reduce capital costs. The need for flexibility in financial strategy is crucial, as companies should adapt to changing market conditions and be prepared for various challenges. Dividend distribution management should be approached with caution, considering its impact on cash reserves, requiring a balance between shareholder returns and capital preservation. Banks and regulatory authorities can take into account the outcomes concerning the connection among leverage and cash retention when determining lending policies. Gaining an understanding about the sources and factors of cash retention can help banks enhance their liquidity management policies. Governments evaluate the influence of their measures on the financial robustness of enterprises and promote policies that strengthen stability. Finally, institutional authorities can develop more effective oversight measures, taking into account the parameters influencing cash retention.

## *5.1.Future Suggestions*

This study advances our comprehension of the intricate interplay among financial determinants and outcomes, paving the way for informed decision-making in different economic contexts. However, future research could broaden the spatial framework by including more countries for a more comprehensive understanding. The significant economic downturn in *2023* in all countries raises questions about the broader economic landscape, requiring future analysis to predict possible challenges or opportunities. Further analysis, considering economic, political, and industry-specific factors, will enhance our understanding of observed patterns and assist in making strategic decisions for businesses operating in these areas. Additionally, examining other factors that affect cash not considered in previous studies. For instance, Wang et al. (2014) discovered that

macroeconomic conditions within a country could impact cash reserves. A more extensive investigation could consider incorporating macroeconomic variables, such as the inflation rate, into their study. Finally, conducting detailed studies for specific periods, such as *2019-2020* during the COVID-19 pandemic, could provide additional interest and specialized understanding of the pressures and reactions of businesses in crisis periods.

# Appendix

## Key literature overview

| *Paper \| Sample \| Variables* | *Results* |
|---|---|
| Opler et al (1999) "The determinants and implications of corporate cash holdings" \| 87,117 publicly traded US firms 1971-1994 \|<br>*Independent Variables:*<br>► Investment opportunity (+)<br>► Cash flow volatility (+)<br>► Firm Size (+)<br>► Dividend (+)<br>► Access to capital markets (-)<br>*Dependent Variables:*<br>► Cash holding<br>*Control Variables:*<br>► R&D spending<br>► Capital expenditures<br>► Industry sigma | Supporting the Trade-off Theory, the study reveals that a powerful precautionary motive influences corporate cash holding.<br>Companies with riskier cash flows and robust growth prospects exhibit higher cash levels.<br>Conversely, firms with high credit ratings and larger corporate sizes maintain lower cash levels, due to enhanced access to capital markets.<br>Operating losses emerge as a key factor driving significant fluctuations in cash levels.<br>Well-performing firms tend to hold more cash than anticipated, underscoring the impact of financial performance on cash management strategies. |
| Deloof (2003) "Does Working Capital Management Affect the Profitability of Belgian Firms?" \| 1,009 large Belgian non-financial firms for the 1992-1996 period \|<br>*Independent Variables:*<br>► Accounts Receivable and Inventories (-)<br>► Accounts Payable (-)<br>► Cash Conversion Cycle (-)<br>*Dependent Variables:*<br>► Gross operating income | Efficient working capital management, including the reduction of accounts receivable and inventory days, emerges as a key driver for enhancing profitability in Belgian firms.<br>A noteworthy correlation indicates that less profitable firms tend to defer payments, as evidenced by the negative relationship with accounts payable. |
| Ferreira and Vilela (2004) "Why do firms hold cash?" \| 400 EMU (Economic and Monetary Union) Countries 1978-2000 \|<br>*Independent Variables:*<br>► Investment opportunity (+)<br>► Internal cash flow (+)<br>► Liquid asset (+)<br>► Bank debt (-) | Aligning with the Trade-off Theory, their findings are in harmony with the idea of balancing financial Trade-offs rather than following the Pecking Order Theory.<br>Companies operating in nations with enhanced investment protections tend to maintain higher levels of cash. |

- Leverage (-)
- Size (-)

*Dependent Variables:*

- Cash holding

*Control Variables:*

- Year effect
- Industry effect
- Investor protection

Ozkan and Ozkan (2004) "Corporate cash holdings: An empirical investigation of UK companies" | 1029 UK Firms 1995 to 1999 |

*Independent Variables:*

- Bank debt (+)
- Investment opportunity (+)
- Internal cash flow (-)
- Liquidity ratio (-)

*Dependent Variables:*

- Cash holdings

The cash-holding decisions of firms are notably impacted by the ownership structure.

Unobserved firm heterogeneity significantly influences cash holdings, with managerial ownership playing a distinct role based on control concentration. The primary determinants affecting cash holdings include bank debt, leverage, liquid assets, cash flows, and growth options of the firms.

Nguyen (2005) "How sensitive are Japanese firms to earning risk? Evidence from cash holdings" | 1.528 Japan non-financial firms listed on Tokyo Stock Exchange 1992-2002 |

*Independent Variables:*

- Investment opportunity (+)
- Profitability (+)
- Dividend (+)
- Firm size (-)
- Leverage (-)
- Sales growth (-)

*Dependent Variables:*

- Cash holdings

*Control Variables:*

- Firm that has a financial institution as their major shareholder (+)

This outcome aligns with the Pecking Order Theory and is generally in line with the Trade-off model.

Cash holdings exhibit a positive correlation with firm-level risk but demonstrate a negative association with industry risk.

Saddour (2006) "The determinants and the value of cash holdings: Evidence from French Firms" | 297 French companies 1998 to 2002 |

Growth Companies old higher levels of cash than

Growing companies tend to maintain elevated cash reserves.

The interplay between expanding companies and their cash management involves significant contributions from

| | |
|---|---|
| mature companies<br>*GrOwth COmpanies:*<br>► Size (-)<br>► Liquid asset (-)<br>► Leverage (-)<br>*Mature Companies:*<br>► Size (+)<br>► Investment level (+)<br>► Dividend (+)<br>► Trade credit (-)<br>► • R&D expense (-) | both the Trade-off and pecking order Theories. |
| Afza and Adnan (2007) "Determinants of Corporate Cash Holdings: A Case Study of Pakistan" \| 205 public Pakistani firms listed at KSE 1998-2005 \|<br><br>*Independent Variables:*<br>► Firm Size (+)<br>► Internal cash flow (+)<br>► Investment Opportunity (-)<br>► NWC (-)<br>► Leverage (-)<br>*Dependent Variables:*<br>► Cash holding | Larger firms exhibit a positive correlation with cash holdings, aligning with the Pecking Order Theory, suggesting a preference for financing investments and avoiding illiquidity.<br>The presence of agency problems in Pakistani firms is evident, as cash holdings show negative associations with investment opportunities, liquidity asset substitutes, leverage, and dividends. |
| Drobetz and Grüninger (2007) "Corporate cash holdings: Evidence from Switzerland." \| Swiss non-financial firms 1995 to 2004 \|<br>*Independent Variables:*<br>► Dividend payment (+)<br>► Operating cash flows (+)<br>► CEO duality (+)<br>► Asset tangibility (-)<br>► Firm size (-)<br>► Managerial ownership (-)<br>*Dependent Variables:*<br>► Cash holding | This research supports the Pecking Order Theory. No significant link observed between growth opportunities and cash holdings.Transaction costs and precautionary motives explain most findings.<br>Managerial ownership in Swiss firms has a non-linear link with cash holdings, indicating incentive alignment and risk aversion.Firms with CEOs as COBs maintain higher cash reserves. |
| Pedro J. García-Teruel, Pedro Martínez-Solano (2008) "On the Determinants of SME Cash Holdings: Evidence from Spain" \| 860 small and | Companies experiencing greater information asymmetry tend to maintain higher levels of liquid assets.<br>The presence of bank debt is linked to reduced cash holdings, implying that establishing relationships with |

| | |
|---|---|
| medium-sized firms from Spain during the period 1996–2001\|<br>*Independent Variables:*<br>► Cash Flow (+)<br>► Liquid Assets (-)<br>► Interest Rates (-)<br>► GDP (-)<br>*Dependent Variables:*<br>► Cash holdings | credit institutions can mitigate agency costs and information asymmetry, consequently lowering external financing expenses. |
| Bates, Kahle, Stulz (2009) "Why do US firms hold so much more cash than they used to?" \| 13.599 US firms from 1980 to 2006 \|<br>*Independent Variables:*<br>► Investment opportunity (+)<br>► R&D expense (+)<br>► Cash flow (+)<br>► Capital expenditure (+)<br>► Firm size (-)<br>► Net working capital (-)<br>► Leverage (-)<br>► Dividend (-)<br>*Dependent Variables:*<br>► Cash holding<br>*Control Variables:*<br>► Loss dummy<br>► T-bill<br>► IPO1/2/3/4<br>► Credit spread | The findings deviate from the agency motive, revealing that certain companies hold more cash not necessarily due to agency problems.<br>The increase in cash ratios is attributed to shifts in firm characteristics, with firms in sectors exhibiting high idiosyncratic volatility, recent IPO listings, and a lack of dividend distribution experiencing an increase. This growth is driven by heightened risks in R&D expenditures and cash flow, coupled with declines in capital expenditures and inventories. |
| Al-Najjar and Belghita (2011) "Corporate cash holdings and dividend payments" \| 400 non-financial firms for the period from 1991 to 2008 \|<br>*Independent Variables:*<br>► Growth (+)<br>► Size (+)<br>► Risk (+)<br>► Profitability (-)<br>► Dividend (-) | The research concludes that common determinants influence both cash holdings and dividend policy, and this relationship diminishes when considering endogeneity.<br>Dynamic behavior analysis aligns with the notion that firms maintain target levels for both cash and dividends, making swift adjustments to deviations from these targets. |

- Leverage (-)

*Dependent Variables:*

- Cash holdings

*Control Variables:*

- Working Capital Ratio (-)

Gill, & Shah. (2012) "Determinants of corporate cash holdings: evidence from Canada." | 166 Canadian firms listed on Toronto Stock Exchange for a period of 3 years (from 2008-2010) |

*Independent Variables:*

- Cash flow (+)
- Leverage (+)
- Board size (large) (+)
- CEO duality (+)
- Market to book ratio (-)
- Net working capital (-)
- Firm Size (-)

*Dependent Variables:*

- Cash holdings

The results align with the Trade-off Theory of cash holdings, indicating that precautionary and transaction motives are essential in explaining the determinants of cash holdings for Canadian firms.

Al-Najjar and Clark (2017) "Corporate governance and cash holdings in MENA: Evidence from internal and external governance practices" | 430 non-financial firms in the MENA region for the period from 2000 to 2009 |

*Independent Variables:*

- Board independence (+)
- Firm size (+)
- Profitability (+)
- Dividend policy (-)
- Board size (-)
- External governance (-)
- Leverage (-)

*Dependent Variables:*

- Cash holdings

This research adds valuable insights to the cash holdings literature by examining the connection between governance factors and financial choices in the MENA region.

It underscores practical implications for policymakers, emphasizing the potential for enhancing corporate governance and adherence to global standards in developing nations.

Weidemann, J. F. (2016) "The determinants of cash holdings: Evidence from meta-regression analysis." | Focus on North America, Europe, and Asia, or they are derived from a global sample |

Cash holdings decrease with rising total assets,

*Independent Variables:*

- Governance Quality (+)
- Market-to-Book Ratio(+)
- R&D Expenditures (+)
- Total assets (+)
- Investment Expenditures (-)
- Investment activities (-)
- Leverage (-)
- Net Working Capital (-)
- Financial Distress (-)

*Dependent Variables:*

- Cash holdings

investment activities, net working capital, leverage, cash flow, and dividend payments.

On the other hand, the cash ratio of corporations rises with the market-to-book ratio, R&D expenditures, financial distress, and the quality of corporate goverance.

# Bibliography


1. About BaFin. Federal Financial Supervisory Authority, Available at: https://www.bafin.de/EN/DieBaFin/diebafin_node_en.html
2. Acharya, V. V., Almeida, H., & Campello, M. (2007). Is cash a negative debt? A hedging perspective on corporate financial policies. *Journal of Financial Intermediation*, 16(4), 515-554.
3. Adefemi, A. A. (2017). Panel data regression model in Reviews: Pooled OLS, fixed or random-effect model?
4. Afza, T., & Adnan, M. (2007). Determinants of corporate cash holdings: Evidence from Canada. *International Research Journal of Finance and Economics*, (7), 39-52.
5. Ahmad, W., & Adaoglu, C. (2019). Cash management in the travel and leisure sector: evidence from the United Kingdom. *Applied Economics Letters, 26*(7), 618–621.
6. Ahmed, R., Qi, W., Ullah, S., & Kimani, D. (2018). Determinants of corporate cash holdings: An empirical study of Chinese listed firms. *Corporate Ownership & Control*, 15(3), 57-65.
7. Ali, A., & Yousaf, S. (2013). Determinants of cash holding in German market, *Journal of Business and Management*, 12(6), 28-34.
8. Akbar, S., ur Rehman, S., & Ormrod, P. (2013). The impact of recent financial shocks on the financing and investment policies of UK private firms. *International Review of Financial Analysis*, 26, 59-70.
9. Aldoseri, M. M., Albaz, M. M., & Ghali, A. A. (2022). The Impact of Organizational Characteristics on Corporate Cash Holdings: Evidence from Saudi Arabia During COVID-19 Period. *Information Sciences Letters*, 11(4), 1131-1136.
10. Almeida, H., Campello, M., & Weisbach, M. S. (2004). The cash flow sensitivity of cash. *Journal of Finance*, 59(4), 1777-1804.
11. Almeida, H., & Philippon, T. (2007). The Risk-Adjusted Cost of Financial Distress. *Journal of Financ*e, 62(6), 2557-2586.

12. Al-Najjar, B. (2013). The financial determinants of corporate cash holdings: Evidence from some emerging markets. *International Business Review*, 22, 77-88.

13. Al-Najjar, B., & Belghitar, Y. (2011). Corporate cash holdings and dividend payments: Evidence from simultaneous analysis. *Managerial and Decision Economics*, 32(4), 231-241.

14. Al-Najjar, B., & Clark, E. (2017). Corporate Governance and Cash Holdings in MENA: Evidence from Internal and External Governance Practices. *Research in International Business and Finance*, 39, 1-12.

15. Amess, K., Banerji, S., & Lampousis, A. (2015). Corporate cash holdings: Causes and consequences. *International Review of Financial Analysis*.

16. Anjum, S., & Malik, Q. A. (2013). Determinants of corporate liquidity-An analysis of cash holdings, *Journal of Business and Management*, 7(2), 94-100.

17. Annex A (2012). The French legal system, Available at : https://www.lumsa.it/sites/default/files/UTENTI/u1291/The%20judiciary%20and%20the%20legal%20profession%20in%20France%2C%20Annex%20A%20-%20%28The%20French%20Judicial%20System%29.pdf

18. Anne-Sophie Chavent-Leclère , Yseult Marique & Marjolaine Roccati (2023). France, Region Western and Central Europe "National Report", *Global Access to Justice Project*, Available at: https://globalaccesstojustice.com/global-overview-france/

19. Baltagi, B. H. (2008). Econometric Analysis of Panel Data. *John Wiley & Sons*.

20. Bancel, F., & Mittoo, U. R. (2004). Cross-country determinants of capital structure choice: A survey of European firms. *Financial Management*, 33(4), 103-132.

21. Banking in Germany (2023). *Expatica*. Available at : https://www.expatica.com/de/finance/banking/banking-in-germany-1090571/

22. Banks and banking in the Netherlands (2023). *Expatica*. Available at : https://www.expatica.com/nl/finance/banking/banks-in-the-netherlands-159898/

23. Bashir. M. M. S. (2014). Determinants of Corporate Cash Holdings: Panal Data Analysis: Pakistan, *International Journal of Current Research*, 6(2), 5316-5318.

24. Bates, T. W., Kahle, K. M., & Stulz, R. M. (2009). Why do U.S. firms hold so much more cash than they used to? *Journal of Finance*, 64(5), 1985-2021.

25. Borsa, M. G. (2017). The financial determinants of corporate cash holdings in an oil-rich country: Evidence from the Kingdom of Saudi Arabia. *Istanbul Review*, 17(3), 133-143.

26. Beck, T., Degryse, H., De Haas, R., & Van Horen, N. (2017). When arm's length is too far: Relationship banking over the credit cycle. *Journal of Financial Economics*, 124(2), 294-319.

27. Berger, A. N., Bouwman, C. H. S., & Kick, T. (2010). The Interaction between Bank Liquidity and Monetary Policy. *Journal of Financial Services Research*, 37(1-2), 77-93.

28. Berger, E. (2023). The German Legal System. *European System.* Online. Published: 2023-08-08.

29. Besley, S., & Brigham, E.F. (2005). *Principles of Finance*. Thomson South-Western.

30. Brav, O., Graham, J. R., Harvey, C. R., & Michaely, R. (2005). Payout policy in the 21st century. *Journal of Financial Economics*, 77(3), 483-527.

31. Breusch, T. S., & Pagan, A. R. (1979). A simple test for heteroscedasticity and random coefficient variation. Econometrica, 47(5), 1287-1294.

32. Brown, A., & White, C. (2019). Cash Holdings and Investment Opportunities: Evidence from UK Firms. *Journal of Corporate Finance*, 34, 125-136.

33. Capkun, V., & Weiss, L. A. (2016). Bankruptcy Resolution and the Restoration of Priority of Claims. *HEC Paris Research*, Paper No. ACC-2016-1160.

34. Chauhan, Y., Pathak, R., & Kumar, S. (2018). Do bank-appointed directors affect corporate cash holding? *International Review of Economics & Finance*, 53, 39-56.

35. Chen, H., Schipper, K., Xu, Y., & Xue, Y. (2012). The impact of regulations on corporate cash holdings. *Journal of Banking & Finance*, 36(3), 817-830.

36. Chen, L., & Wang, Y. (2020). The Impact of Cash Holdings on Investment Decision-making: Insights from a Longitudinal Study of Chinese Companies. *Journal of Financial Management*, 22(3), 45-63.

37. CT Corporation Staff (2020). Doing business in France: Advantages & Disadvantages, Wolters Kluwer, Available at : https://www.wolterskluwer.com/en/expert-insights/doing-business-france
38. Daher, M. (2010). The determinants of cash holdings in UK public and private firms. Dissertation, *Lancaster University Management School*, Lancaster University.
39. Damodaran, A. (2001). *Corporate finance: theory and practice* (2nd ed). New York: John Wiley & Sons.
40. Deloof, M. (2003). Does Working Capital Management Affect the Profitability of Belgian Firms? *Journal of Business Finance & Accounting*, 30(3-4), 573-588.
41. Denis, D. J., & Denis, D. K. (1995). Performance changes following top management dismissals. *Journal of Finance*, 50(4), 1029-1057.
42. Denis, D. J., & Sibilkov, V. (2009). Financial constraints, investment, and the value of cash holdings. *Review of Financial Studies*, 22(1), 195-223.
43. Deutscher Bundestag. (2022). Germany's Political System. Available at : https://www.bundestag.de/en/parliament/politicalsystem/political_system
44. De Witte, B. (2004). The Legal System of Belgium. *European Business Law Review*, 15(2), 177-188.
45. Dittmar, A., & Duchin, R. (2016). Looking in the Rearview Mirror: The Effect of Managers' Professional Experience on Corporate Financial Policy. *The Review of Financial Studies*, *29*(3), 565–602.
46. Dittmar, A., & Mahrt-Smith, J. (2007). Corporate governance and the value of cash holdings. *Journal of Financial Economics, 83*(3), 599-634.
47. Dittmar, A., Mahrt-Smith, J., & Servaes, H. (2003). International corporate governance and corporate cash holdings. *Journal of Financial and Quantitative Analysis*, 38(1), 111-133.
48. Djankov, S., McLiesh, C., Nenova, T., & Shleifer, A. (2003). Who Owns the Media? *Journal of Law and Economics*, 46(2), 341-381.
49. Drobetz, W., & Grüninger, M. C. (2007). Corporate cash holdings: Evidence from Switzerland. *Financial Markets and Portfolio Management, 21*(3), 293-324.
50. El Ghoul, S., Guedhami, O., Kwok, C. C., & Mishra, D. T. (2011). Does corporate social responsibility affect the cost of capital? *Journal of Banking & Finance*, 35(9), 2388-2406.

51. Faulkender, M. W., & Wang, R. (2006). Corporate Financial Policy and the Value of Cash. *The Journal of Finance*, 61(4), 1957-1990.

52. Fazzari, S. M., & Petersen, B. C. (1993). Working capital and fixed investment: New evidence on financing constraints. *The RAND Journal of Economics*, 24(3), 328-342.

53. Ferreira, M. A., & Vilela, A. S. (2004). Why do firms hold cash? Evidence from EMU countries. *European Financial Management*, 10(2), 295-319.

54. Ferri, M. G., & Jones, W. H. (1979). Determinants of Financial Structure: A New Methodological Approach. *The Journal of Finance*, 34(3), 631-644.

55. Flammer, C. (2013). Corporate social responsibility and shareholder value: The environmental consciousness of investors. *Academy of Management Journal*, 56(3), 758-781.

56. Foley, C.F., Hartzell, J.C., Titman, S., and Twite, G., (2006). Why Do Firms Hold So Much Cash? A Tax-Based Explanation, *National Bureau of Economic Research*, NBER Working Paper Series, No. 12649.

57. Frank, M. Z., & Goyal, V. K. (2009). Capital structure decisions: Which factors are reliably important? *Financial Management*, 38(1), 1-37.

58. French Banks (2023). *Expatica*. Available at : https://www.expatica.com/fr/finance/banking/banking-in-france-1089107/

59. García-Teruel, P. J., & Martínez Solano, P. (2008). On the Determinants of SME Cash Holdings: Evidence from Spain. *Journal of Business Finance & Accounting*, 35(1-2), 127-149.

60. García-Teruel, P. J., Martínez-Solano, P., & Sánchez-Ballesta, J. P. (2009). Accruals quality and corporate cash holdings, *Accounting & Finance*, 49(1), 95-115.

61. Gauss, C. F. (1809). Theoria Motus Corporum Coelestium in Sectionibus Conicis

62. Germany Country Commercial Guide. (2023). Privacy Shield Framework. Available at : https://www.privacyshield.gov/ps/article?id=Germany-Market-Overview

63. Gill, & Shah. (2012). Determinants of corporate cash holdings: evidence from Canada. *International Journal of Economics and Finance*, 4(1).

64. Gogineni, S., Linn, S., & Yadav, P. (2012). Evidence on the determinants of cash holdings by private and public companies.

65. Government of the Netherlands. (2022). The Political System of the Netherlands. Available at: https://www.government.nl/topics/political-system-of-the-netherlands

66. Graham, J.R. and Leary, M.T., (2018). The Evolution of Corporate Cash. *The Review of Financial Studies*, Volume 31(11), pp. 4288–4344.

67. Guizani, M. (2017). The financial determinants of corporate cash holdings in an oil-rich country: Evidence from Kingdom of Saudi Arabia. *Borsa Istanbul Review*, 17(3), 133-143.

68. Hall, T., Mateus, C., & Mateus, I. B. (2009). What determines cash holdings at privately held and publicly traded firms? Evidence from 20 emerging markets. *International Review of Financial Analysis*, 33(2014), 104-116.

69. Hansen, B.E.(2017).A stein-like 2SLS estimator. *Econometric Reviews*, 36, 840-852.

70. Harford, J. (1999). Corporate cash reserves and acquisitions. *The Journal of Finance*, 54(6), 1969-1997.

71. Harford, J., Mansi, S. A., & Maxwell, W. F. (2008). Corporate governance and firm cash holdings in the US. *Journal of Financial Economics*, 87(3), 535-555.

72. Harris, M., & Raviv, A. (1990). Capital structure and the informational role of debt. *Journal of Finance*, 45(2), 321-349.

73. Hausman, J. (1978) Specification Tests in Econometrics. *Econometrica*, 46, 1251-1271.

74. He, Z., & Wintoki, M. B. (2016). The cost of innovation: R&D and high cash holdings in US firms, *Journal of Corporate Finance*, 41, 280-303.

75. Hill, M. D., Fuller, K., Kelly, G. W., & Washam, J. (2014). Corporate governance and the cash component of executive compensation. *Journal of Corporate Finance*, 27, 62-80.

76. Hi, M. A. (2010). Corporate cash holdings and CEO compensation incentives. Journal of Corporate Finance, 16(3), 302-331.

77. Hofstede, G. (2011). Dimensionalizing Cultures: The Hofstede Model in Context. Online *Readings in Psychology and Culture*, 2(1), 8.

78. Huang, B., Lee, T.-H., & Ullah, A. (2019). A Combined Random Effect and Fixed Effect Forecast for Panel Data Models. *Journal of Management Science and Engineering*, 4(1), 28-44.

79. Hu, Y., Li, Y., & Zeng, J. (2018). Stock liquidity and corporate cash holdings, Finance Research Letters.

80. International Trade Administration Belgium (2023). Market Overview. Available at : https://www.trade.gov/country-commercial-guides/belgium-market-overview

81. International Trade Administration Netherlands (2022). Market Overview. Available at : https://www.trade.gov/country-commercial-guides/netherlands-market-overview

82. Islam, S. (2012). Manufacturing firms' cash holding determinants: Evidence from Bangladesh, International *Journal of Business and Management*, 7(6), 172-184.

83. Jamil, S., Anwar, A., Afzaal, N., Tariq, A., & Asif, M. (2016). Determinants of Corporate Cash Holdings: Empirical Analysis of Pakistani Firms. *IOSR Journal of Economics and Finance* (IOSR-JEF), 7(3), 29-35.

84. Jensen, M. C, (1986), Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers, *American Economic Review*, American Economic Association, vol. 76(2), pages 323-329.

85. Jensen, M.C., Meckling, W.H., (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3, 305-360.

86. Jia, Z. T., & McMahon, M. J. (2019). Dividend payments and excess cash: an experimental analysis. *Journal of Behavioral and Experimental Economics*, *83*, 101458.

87. Julio, B., & Yook, Y. (2012). Political uncertainty and corporate investment cycles. *Journal of Finance*, 67(1), 45-83.

88. Jung, K. (1996). The relation between accounting measures of performance and bondholder wealth. *Journal of Financial and Quantitative Analysis*, 31(3), 373-386.

89. Kariuki, S. N., Namusonge, G. S., & Orwa, G. O. (2015). Factors Influencing Working Capital Management in the Kenyan SMEs. *International Journal of Economics, Commerce, and Management*, 3(9), 63-78.

90. Keynes, J. M. (1936). *The General Theory of Employment, Interest and Money. Macmillan Cambridge University Press, for Royal Economic Society*.

91. Khatib SFA, Nour ANI (2021) The impact of corporate governance on firm performance during the COVID-19 pandemic: evidence from Malaysia. J Asian *Financ Econ Bus*, Forthcoming.

92. Khieu, H., & Pyles, M. (2012). The Influence of a Credit Rating Change on Corporate Cash Holdings and Their Marginal Value. *Financial Review*, 47, 351-373.
93. Kim, C. S., Mauer, D. C., & Zhang, J. (1998). Evidence on the choice between investor-oriented and creditor-oriented debt contracts. *Journal of Financial and Quantitative Analysis*, 33(3), 427-451.
94. Kim, C., Mauer, D. C., & Sherman, A. E. (1998). The Determinants of Corporate Liquidity: Theory and Evidence. *Journal of Financial and Quantitative Analysis*, 33(3), 335-359.
95. Kim, J., Kim, H., & Woods, D. (2011). Determinants of corporate cash-holding levels: An empirical examination of the restaurant industry. *International Journal of Hospitality Management*, 30, 568-574.
96. Kim, W. S., Kristiansen, E., & Zurbruegg, R. (2008). Ownership and operating performance in an emerging market: Evidence from Thai IPO firms. *International Review of Financial Analysis*, 17(3), 592-605.
97. Nishimura, K.G., & Ozaki, H. (2003). "Liquidity Motives of Holding Money under Investment Risk: A Dynamic Analysis" (CIRJE F-Series CIRJE-F-232). CIRJE, Faculty of Economics, University of Tokyo.Laeven, L., & Levine, R. (2009). Bank governance, regulation, and risk-taking. *Journal of Financial Economics*, 93(2), 259-275.
98. Lang, L. H. P., Stulz, R. M., & Walkling, R. A. (1991). A test of the free cash flow hypothesis: The case of bidder returns. *Journal of Financial Economics, 29*(2), 315-335.
99. La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1998). Law and Finance. *Journal of Political Economy*, 106(6), 1113-1155.
100. Learn, Microsoft Compliance (2023). Dutch Authority for the Financial Markets andthe Central Bank of the Netherlands, *Microsoft*, Available at: https://learn.microsoft.com/en-us/compliance/regulatory/offering-afm-dnb-netherlands
101. Learn, Microsoft Compliance (2023). Financial Authority (AMF) and Prudential Authority (ACPR) France, *Microsoft* , Available at : https://learn.microsoft.com/en-us/compliance/regulatory/offering-amf-acpr-france

102. Learn, Microsoft Compliance (2023). National Bank of Belgium (NBB) and the Financial Services and Markets Authority (FSMA), *Microsoft*, Available at : https://learn.microsoft.com/en-us/compliance/regulatory/offering-nbb-fsma-belgium

103. Legendre, A.M. (1805). Nouvelles Méthodes pour la Détermination des Orbites des Comètes. Courcier, Paris. Pages 72–75 of the appendix reprinted in Stigler (1986, p. 56). English translation of these pages by H.A. Ruger and H.M. Walker in D.E. Smith, A Source Book of Mathematics. *McGraw-Hill Book Company*, New York, 1929, pp. 576–579.

104. Legifrance (2018). Constitution of France. Available at : https://www.legifrance.gouv.fr/en/constitution/constitution

105. Liker, J. K., Augustyniak, S., & Duncan, G. J. (1985). Panel Data and Models of Change: A Comparison of First Difference and Conventional Two-Wave Models. *Social Science Research*, 14, 80-101.

106. Lins, K. V., Servaes, H., & Tufano, P. (2010). What drives corporate liquidity? An international survey of cash holdings and lines of credit. *Journal of Financial Economics*, 98(1), 160-176.

107. Magerakis, E., Gkillas, K., Tsagkanos, A., & Siriopoulos, C. (2020). Firm Size Does Matter: New Evidence on the Determinants of Cash Holdings. *Journal of Risk and Financial Management*.

108. Maheshwari, Y., & Rao, K. T. V. (2017). Determinants of Corporate Cash Holdings. *Name of the Journal*, 18(2).

109. Megginson, W. L., Ullah, B., & Wei, Z. (2014). State ownership, soft-budget constraints, and cash holdings: Evidence from China's privatized firms, *Journal of Banking & Finance*, 48, 276-291.

110. Mian, S. L. (1996). Evidence on corporate hedging policy. *Journal of Financial and Quantitative Analysis*, 31(3), 419-439.

111. Miller, M. H., & Orr, D. (1966). A model of the demand for money by firms. *The Quarterly Journal of Economics*, 80(3), 413-435.

112. Murphy, A. B. , Doucy, . Arthur J.M. , Materné, . Jan Maria Juul , Wee, . Herman F.A. Van der , Lamberts, . Emiel L. and Molle, . Leen Van (2023). Belgium. *Encyclopedia Britannica*. Available at : https://www.britannica.com/place/Belgium/Economy

113. Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics*, 5(2), 147-175.

114. Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2), 187-221.

115. Nerlove, M. (2002). Essays in Panel Data Econometrics. *Hardcover*. Publisher.

116. Nguyen, P. (2005). The determinants of corporate cash holdings in Vietnam. *Global Finance Journal*, 16(2), 182-211.

117. Nyborg, K. G., & Wang, Z. (2014). Stock liquidity and corporate cash holdings: Feedback and the Cash as Ammunition Hypothesis, *Swiss Finance Institute Research*, Paper No. 13-36.

118. Oler, D. K., & Picconi, M. P. (2014). Implications of Insufficient and Excess Cash for Future Performance. *Contemporary Accounting Research*, 31(1), 253-283.

119. Opler, T. C. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics*, 52(1), 3-46.

120. Opler, T., & Titman, S. (1994). Financial Distress and Corporate Performance. *The Journal of Finance*, 49(3), 1015-1040.

121. Ozkan, A., & Ozkan, N. (2004). Corporate cash holdings: An empirical investigation of UK companies. *Journal of Banking & Finance*, 28(9), 2103-2134.

122. Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics*, 52(1), 3-46.

123. Park, H.M. (2011) Practical Guides to Panel Data Modeling: A Step-by-Step Analysis Using Stata. Tutorial Working Paper. *International University of Japan*, Minami Uonuma.

124. Pinkowitz, L., & Stulz, R. M. (2006). Does the Contribution of Corporate Cash Holdings and Dividends to Firm Value Depend on Governance? A Cross-Country Analysis. *The Journal of Finance, 61*(6), 2725-2751.

125. Pinkowitz, L., Stulz, R. M., & Williamson, R. (2016). Do U.S. Firms Hold More Cash than Foreign Firms Do? *The Review of Financial Studies*, *29*(2), 309–348.

126. Pinkowitz, L., & Williamson, R. (2001). Bank power and cash holdings: Evidence from Japan, *The Review of Financial Studies*, 14(4), 1059-1082.

127. Qiu, J., & Wan, K. M. (2015). Corporate cash holdings and political connections. *Journal of Corporate Finance*, 30, 57-77.

128. Rajan, R. G., & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. *Journal of Finance*, 50(5), 1421-1460.

129. Saddour, K. (2006). The Determinants and the Value of Cash Holdings: Evidence from French firms. *Cahier de recherche* n°2006-6.

*130.* Schwetzler, B., & Reimund, C. (2004). Valuation Effects of Corporate Cash Holdings: Evidence from Germany. *HHL Working Paper*.

131. Shah, A. (2011). The corporate cash holdings: Determinants and implications, *African Journal of Business Management*, 5(34), 12939-12950.

132. Shennan, J. , Flower, . John E. , Bachrach, . Bernard S. , Higonnet, . Patrice Louis-René , Elkins, . Thomas Henry , Bernard, . François , Wright, . Gordon , Weber, . Eugen , Tuppen, . John N. , Fournier, .Gabriel, Blondel, . Jean F.P. , Woloch, . Isser , Drinkwater, . John Frederick , Bisson, . T.N. and Popkin, . Jeremy David (2023). France. Encyclopedia Britannica. Available at : https://www.britannica.com/place/France/Economy

133. Shleifer, A., & Vishny, R. W. (1992). Liquidation values and debt capacity: A market equilibrium approach. *Journal of Finance*, 47(4), 1343-1366.

134. Shleifer, A., & Vishny, R. W. (1993). Dividend Policy. *Journal of Finance*, 49(4), 1039-1091.

135. Shyam-Sunder, L. and Myers, S.C. (1998) Testing Static Tradeoff against Pecking Order Models of Capital Structure. *Journal of Financial Economics*, 51, 219-244.

136. Smith, A. (1987). The Role of Cash Management in Maximizing Shareholder Wealth. *Journal of Finance*, 42(4), 863-876.

137. Smith, C. W., & Stulz, R. M. (1985). The determinants of firms' hedging policies. *Journal of Financial and Quantitative Analysis*, 20(4), 391-405.

138. Smith, C. W., Jr., Wang, R., & Wang, Y. (2020). Corporate Liquidity Management during a Financial Crisis. *Journal of Corporate Finance*, 62, 101-590.

139. Smith, C. W., & Watts, R. L. (1992). The investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of Financial Economics*, 32(3), 263-292.

140. Smith, J. R., & Johnson, M. S. (2018). The Role of Cash Holdings in Enhancing Firm Value: Empirical Evidence from US Publicly Traded Firms. *Journal of Financial Economics*, 45(2), 287-305.

141. Sola, D. M., Minondo, A., & Rubio, G. (2013). Why do some firms hold more cash than others? Evidence from panel data. *International Review of Economics & Finance*, 27, 1-12.

142. Solem Ambientium. F. Perthes and I. H. Besser, Hamburg. Reprinted in his Werke, Vol. 7, F. Perthes, Gotha, 1871. English translation by C. H. Davis (1857). Little, Brown, Boston. Reprinted in 1963, *Dover*, New York.

143. Steven Gibens , Bernard Hubeau & Stefan Rutten (2023). Belgium, Region Western and Central Europe : National Report, *Global Access to Justice Project*, Available at : https://globalaccesstojustice.com/global-overview-belgium/

144. Stiglitz, J. E. (1975). The Theory of "Screening," Education, and the Distribution of Income. *The American Economic Review*, 65(3), 283-300.

145. Susanne Peters (2023). Netherlands, Region Western and Central Europe National Report, *Global Access to Justice Project*, URL: https://globalaccesstojustice.com/global-overview-netherlands/

146. Subramaniam, V., Tang, M., Yue, H., & Zhou, H. (2011). Does the relation between the cost of equity capital and corporate cash holdings differ for firms with different levels of governance quality? *Journal of Corporate Finance*, 17(3), 733-749.

147. Sun, Q., Yung, K., & Rahman, H. (2012). Earnings quality and corporate cash holdings, *Accounting & Finance*, 52(2), 543-571.

148. Taxes in the Netherlands a guide to the Dutch tax system, *Expatica*. Available at : https://www.expatica.com/nl/finance/taxes/netherlands-tax-system-103981/

149. Taxes in Belgium : a guide to the Belgian tax system, Expatica. Available at : https://www.expatica.com/be/finance/taxes/taxes-in-belgium-100073/#resources

150. The World Factbook. (2022). Belgium. Availanble at : https://www.cia.gov/the-world-factbook/countries/belgium/

151. Turner, H. Ashby , Geary, . Patrick J. , Heather, . Peter John , Strauss, . Gerald , Duggan, . Lawrence G. , Leyser, . K.J. , Elkins, . Thomas Henry , Schleunes, . Karl A. , Barkin, . Kenneth , Bayley, . Charles Calvert , Kirby, . George Hall , Wallace-Hadrill, . John Michael , Sheehan, . James J. , Berentsen, . William H. and Hamerow, . Theodore S. (2023). Germany. *Encyclopedia Britannica*. Available at : https://www.britannica.com/place/Germany/Justice

152. Titman, S., & Wessels, R. (1988). The Determinants of Capital Structure Choice. *The Journal of Finance*, 43(1), 1-19.

153. Tobin, J. (1956). The Interest-Elasticity of Transactions Demand for Cash. *The Review of Economics and Statistics*, 38, 241-247.

154. Wang, Y. , Zhang, Y. & Zhou, Q. (2016). A Stein-like estimator for linear panel data models, *Economics Letters*, Elsevier, vol. 141(C), pages 156-161.

155. Weidemann, J. F. (2016). The determinants of cash holdings: Evidence from meta-regression analysis. *Proceedings EFMA 2016 Conference*.

156. Whited, T. M. (1992). Debt, liquidity constraints, and corporate investment: Evidence from panel data. *Journal of Finance*, 47(4), 1425-1460.

157. Williamson, R. (1988). An empirical analysis of the choice between public regulation and private contracting in the electric power industry. *Journal of Law and Economics*, 31(2), 265-295.

158. Wooldridge, J. M. (2010). Econometric Analysis of Cross Section and Panel Data. *MIT Press*.

159. Wooldridge, J.M. (2009) Introductory Econometrics: A Modern Approach. 4th Edition, South-Western College Publishing, *Cengage Learning*, Boston, 22-68.

160. Wang, Yanchao., Ji, Yu., Chen, Xu., & Song, Chunlei. (2014). Inflation, operating cycle, and cash holdings. China *Journal of Accounting Research*, 7, 263-276.