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WHAT MAKES BUSINESS CYCLE MANAGEMENT POSSIBLE: FINANCIAL POLICIES

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Abstract

Building upon the work of Navarro, Bromiley, and Sottile (2008, 2010), this dissertation investigates the application of Business Cycle Management (BCM) that proposes that firms can gain competitive advantage by adopting proactive, countercyclical strategies adapted to different phases of the economic cycle. BCM has seen limited application in corporate practice, particularly within financial management, and existing research overlooks how Cash Holdings can influence the execution of such a countercyclical approach. This study addresses that gap by investigating the relationship between Cash Holdings and the Business Cycle. Specifically, it examines how Cash Holdings vary across different phases of the cycle and how these resources are deployed in support of countercyclical strategies.

By analyzing how firms manage their Cash Holdings in response to macroeconomic conditions, this study contributes to a more comprehensive understanding of strategic and adaptative decisions. We hope the findings of this dissertation will offer both theoretical and practical insights, allowing managers to enhance firm performance by aligning financial planning with macroeconomic trends.

Keywords

Business Cycle Management; Cash Holdings; Firm Performance

Resumo

Com base no trabalho de Navarro, Bromiley e Sottile (2008, 2010), esta dissertação estuda a aplicação do Business Cycle Management, que propõe que as empresas podem obter vantagem competitiva ao adotar estratégias proativas e contracíclicas adaptadas às diferentes fases do ciclo económico. Esta perspetiva tem tido uma aplicação limitada na prática empresarial, em particular no âmbito da gestão financeira, e a investigação existente ignora a forma como Cash Holdings podem influenciar a execução de tal abordagem contracíclica. Este estudo aborda essa lacuna, investigando a relação entre as disponibilidades de tesouraria e o ciclo económico. Especificamente, examina a forma como Cash Holdings variam ao longo das diferentes fases do ciclo e como esses recursos são utilizados para apoiar estratégias contracíclicas.

Ao analisar a forma como as empresas gerem os *Cash Holdings* em resposta às condições macroeconómicas, este estudo contribui para uma compreensão mais abrangente das decisões estratégicas e adaptativas. Esperamos que os resultados desta dissertação ofereçam conhecimentos teóricos e práticos que permitam aos gestores melhorar o desempenho da empresa, alinhando o planeamento financeiro com as tendências macroeconómicas.

Palavras-Chave

Gestão do Ciclo Económico; Disponibilidades de Tesouraria; Desempenho da Empresa

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1. Introduction and Motivation

Firm-specific factors are frequently cited in studies examining firm performance. However, another significant influence is the macroeconomic environment, particularly the Business Cycle. While some researchers have investigated how macroeconomic factors impact company performance or strategy, Navarro et al (2008) introduced a novel perspective. These authors emphasized the importance of companies forecasting Business Cycles and, more notably, argued that firms should design their strategies based on the phases of the Business Cycle. They advocated for a proactive and countercyclical approach, which they termed Business Cycle Management (BCM), as a means of achieving competitive advantage. Subsequently, the same authors conducted empirical analyses and validated their initial hypothesis that executives should avoid the traditional conservative approach, particularly during challenging economic periods (Navarro et al, 2010).

Despite these preliminary findings, this topic has been relatively underexplored in the literature. As a result, BCM is not a well-established practice among managers. Strategic decisions, when made, are often compartmentalized within specific departments rather than integrated into a broader, company-wide strategy. Furthermore, such decisions frequently fail to incorporate predictions of the macroeconomic environment. Existing studies that corroborate this limited focus often examine specific areas such as Marketing, Human Resources, or Capital Expenditures and Acquisitions (Dhalla (1980); Greer & Stedham (1989); Mascarenhas & Aaker (1989); Harford (1999), as cited in Navarro et al (2008)).

To the best of my knowledge, no empirical or qualitative investigations have addressed how managers can manage Cash Holdings to enhance firm performance. Research on BCM has largely overlooked financial aspects, focusing instead on topics such as macroeconomic uncertainty (Baum et al, 2004), monetary policy, or firm-specific variables such as operating cycles (Wang et al, 2013). On the other hand, the literature that has examined the evolution of Cash Holdings throughout the Business Cycle centers itself on specific firm characteristics, such as size, ownership type (private vs. public), or financial constraints (Baum et al, 2004; Custódio et al, 2005). However, this body of work remains relatively sparse and highly fragmented.

This research aims to close the gap between the BCM framework developed by Navarro, et al (2008) and the financial dimension of Cash Holdings. The successful implementation of BCM needs adequate financial resources, and the levels of internal resources available to a company can, in turn, benefit from BCM. While the initial gap identified relates to a holistic

view of BCM that analyzes multiple sectors to create a comprehensive framework, this study focuses on exploring the financial strategies and tools that make BCM feasible. Specifically, it investigates how companies can gather resources at key moments in the Business Cycle to deploy them strategically, thereby enhancing performance relative to competitors. Considering that recessions are recurrent events, we hope that this work can also help practitioners develop firms' characteristics and capacities to help them get through the next business cycle.

This study adopts the BCM framework as a foundational theory to address its primary objectives. To implement countercyclical strategies effectively, firms must have access to resources during periods when credit conditions may be restrictive. Accordingly, this research examines: (1) how the levels of Cash Holdings vary over Business Cycles and (2) the relationship between Cash Holdings and countercyclical measures and investments undertaken during different phases of the Business Cycle (particularly during recessions). Such investments may include mergers and acquisitions (M&A), which are often more attractive during economic downturns.

2. Literature Review and Research Questions

One of the key aspects of the Business Cycle Management framework is analyzing and predicting macroeconomic business cycles. Right at this point we can find some authors arguing that such practice is not accurately feasible and that, although downturns appear with some regularity, its triggers and dynamics are different each time which makes the recommendation of designing strategies based on these predictions fall (Latham & Braun, 2011), (Kane, Brown, & Killough, 1994). However, in Autry & Navarro (2009), the authors point out that the "famous GDP Equation" set by Keynes is enough to predict economic trends and act accordingly. And as mentioned in the same source "*In today's dynamic environment, forecasting must become an important part of the job of every financial executive*": this sentence is so accurate in current days, or even more, than in 2009. Dye et al (2009) also mention that under uncertainty scenarios, the perks of scenario planning are even more accentuated. Autry & Navarro (2009) point out that ECRI Weekly Leading Index and the Yield Curve have shown incredible predictive power but emphasize that the company forecasting must look at both sides of the equation, this is, these two indicators are crucial to predict GDP, but one must also look at the remaining four indicators (Consumption, Investment, Government Spending and Net Exports). Bernanke & Blinder (1990) also add that, for the US, the interest rate on Federal funds is very informative about future movements of real macroeconomic variables. Another consideration to keep in mind when answering the critics of BCM is that, even if forecasting is not possible, a more prompt and appropriate reaction to the new macroeconomic environment may be enough to achieve a superior performance when compared to its rivals. As defined by Conti et al (2015), superior performance in times of recessions can mean two different scenarios: a firm can be less affected by the negative economic impacts than its competitors, even if its performance, in absolute terms compared to pre-recession numbers, is worst; or, in a second case, the company can benefit from the economic downturn and improve its performance.

2.1. Firm Strategies across BC stages

Lövegren (2024) identifies some of the most popular strategic decisions for recession periods. In terms of profitability, companies usually develop their internal process to improve efficiency, limit production, cut costs on non-core business activities, reorganize their corporate structure, and sell or discontinue unprofitable activities. In terms of growth, they

tend to invest in market opportunities, expand to new markets segments and increase production capacity. Cost-cutting measures are in fact one of the most mention actions in the literature in periods of economic downturn (Amin & Javeri, 2024; Campello et al, 2010; Rosa et al, 2023; Reeves & Deimler, 2009; Latham & Braun, 2011; Ruddock et al, 2014). However, Roberts (2003) alerts that not all costs should be cut as they are not all "bad". The author distinguishes between three types of costs: the "bad costs" should be pruned during recessions, but there are also "good costs" that should be increased and intensified during crisis (such as marketing and R&D) and "it depends costs" may be cut or intensified according to each firm's strategy. The same vision is shared by Gulati et al (2010) although with different labels. Rigby & Rogers (2000) add other common practices including strengthening the core business, creating strategic alliances and prudent acquisitions, identifying possible future scenarios, and developing a strategic contingency plan, quick and measured reaction, frequent and timely adjustments, and using previous lessons. On their survey to British construction companies, Ruddock et al (2014) compiled some of the most adopted strategies to immunize the organizations against economic downturns: building strategic relationships with supply chain partners', evaluating and exploiting future demands, developing a leaner business, getting ready for change, applying the lessons of the past to the vision of the future and investing in risk management. However, there is no common recipe, and it will always depend on the various specific characteristics that influence the firm's responses (K.N. & Thomas, 2024) but the existence of financial resources and cash reserves and the extensiveness and speed to which companies deploy its resources tend to help firms navigate the adverse economic conditions. While financial resources are not sources of competitive advantage per se, they do serve as the means to achieve so. First, because its possession proofs past success which is difficult to copy and second, they offer a broad range of strategic options in their applications and a high level of transferability to profit-yielding activities (Latham & Braun, 2008).

Conti et al (2015) divide the companies' course of action into two different stages: first achieve immediate returns and then, prepare for long-term success. Indeed, the BCM strategy aims to build competitive advantage for the firms' long-run, but this will not be possible without securing the present needs for survival (Reeves & Deimler, 2009) and companies that are able to find a balance between this inter-temporal choice tend to do better after the crisis pass (Gulati et al, 2010; Almeida et al, 2004). The same opinion is shares by Pearce II & Michael (2006) who suggest a two-step program: recession-proofing (a contingency plan for before the crisis) and recession-fighting (during the recession, to promote the business

and prepare to exploit the recovery); and by Latham & Braun (2011) that found that managers engage in both retrenchment, when they seek to stabilize the firm's financials via efficiency measures, and repositioning, when they adopt a more entrepreneurial posture. The inevitable growth that follows a recession will need to be financed with the firm's internal funds, since banks may not be willing to lend credit and the lack of cash reserves may mean the deprivation of attractive investment opportunities.

2.2. Reasons to Hold Cash

In fact, one motive to sustain cash reserves is the perspective that firms may encounter financing constrains which are particularly severe during periods of recessions, as troughs may significantly reduce access to external finance (Mielcarz et al, 2018; Latham & Braun, 2011). Financial constraints in capital markets can magnify the impacts of macroeconomic shocks on both cash flows and liquidity reducing some firms' access to low-cost finance and worsen their profitability (Fazzari et al, 1988). In this cases, the company's existing resources reach a premium relative to their value under stable conditions (Latham & Braun, 2008). Ivashina (2010) alerts for the fact that recessions can create stress on bank liquidity which in turn may decrease or even cut credit to firms. Campello et al (2010) found that constrained firms drew more significantly from their credit lines (also Acharya & Steffen (2020)), have to turn down attractive investment opportunities as they are unable to borrow enough external funds and will either cancel or postpone their planned investment during the crisis. In the end, it seems that during economic downturns, firms are faced with the risk of two kinds of default: financial default on their debt obligations and operational default with their customer commitments and so companies must choose between saving cash to protect from the first or investing it for the latter (Acharya et al, 2021). And so, while financial and operating hedging becomes substitutes, operational hedging can also reduce the risk of financial default by increasing the company's future cash flows. The effets of financial constrains are captures by a firm's propensity to save cash out of its cash flows and so, constrained companies have a positive cash flow sensitivity of cash because, as they face financing frictions, liquidity management become crucial for its corporate policy (Almeida et al, 2004). Ghemawat (2009) use the same concept with different words: the financial risk of investing versus the competitive risk of not investing. This claim is based on the research agenda that defends that internal and external capital are not perfect substitutes (Fazzari et al, 1988). And so, the investment capacity may depend on financial factors such as the availability for internal

funds, access to new debt or equity, or the functioning of the credit market. The availability of cash holdings will allow companies to undertake desirable investment projects without the need to resort to high-cost external finance. Furthermore, the cash reserves enhance the firm's balance sheet and lowers the cost of new debt and so, firms that have exhausted their internal resources are also more sensitive to fluctuations in their cash flow. Companies usually build their strategy to benefit from growing economies, but it is equally important to prepare for periods of economic decline to allow managers to act quicker and avoid losses.

Keynes (1936) suggested three main motives for cash holdings: 1) the transaction motive, which means the firm will hold cash to meet its daily commitments arising from its daily activities, 2) the precautionary motive, i.e., so the firm can meet any unexpected contingency, and 3) the speculative motive, i.e., the firm will hold cash to be able to pursue any profit-making opportunities that emerge. Opler et al (1999) reinforce that the costs of accessing outside markets induce the firm to use cash and liquid asset holdings as a buffer.

Baum et al (2004) add other reasons to the list of reasons of why firms hold high levels of cash. First, cash provides low-cost finance, if we consider imperfect financial markets, so firms tend to hold more cash than needed for their daily transactions to hedge against unfavorable economic changes (this point is also defended by Harford (1999) and Acharya & Steffen (2020) who also argue that the US corporate sector demonstrates a primacy for cash, especially during times of heightened risk). Furthermore, companies that face high levels of information asymmetry tend to accumulate more liquid assets to fight potential difficulties accessing external financing. Finally, uncertainty conditions hinder managers' ability to accurately forecast future cash flows, leading them to behave more conservatively and accumulating more cash to offset potential effects of shocks in the company's cash flow. These factors are also mentioned by Opler et al (1999) who adds the length of cash conversion cycle, the interest rates, the cost of raising debt, the easiness of selling assets, the cost of hedging risk and the size of the company's dividends. Besides, Ramelli & Wagner (2020) defend that investors perceived cash holdings as an advantage to cope with real effects of the recession as they were increasingly concerned about access to external financing. However, cash holdings' strategy must also weight in the opportunity cost of holding cash and adapt to environmental changes that arises with the business cycle (Wang et al, 2014).

2.3. Cash Holdings in the literature

Some other determinants for the levels of cash holdings are linked with firms' characteristics. For example, Wang et al (2014) and Faulkender (2002) found a positive relation between cash holdings and leverage, information asymmetry, corporate age and size and credit-ratings, as well as growth opportunities and level of diversification. Growth opportunities, cash flows' volatility, liquid assets, dividends' payout, leverage, and bank debt are also highlighted as important cash holding determinants (Ozkan & Ozkan, 2004). The flexibility of the company, i.e., the ability to adjust and adapt to environmental changes, in particular on financial and investment aspects are also a differentiative factor among organizations. Investment flexibility allows the company to adjust capital spending and modify its timing based on business prospects while financial flexibility is important to support changes in in the company's activities, especially when fixed costs are high (Barry et al, 2022). Lorange & Datson (2014) identify as one of the greatest challenges for managing the business cycles the recognition of the tension between efficiency and flexibility: in more stable periods businesses usually focus on making processes more efficient but these apparent improvements can freeze the organization and make it inflexible to react to economic shifts. Financial flexibility (high cash holdings, debt capacity and limit exposure to debt rollover risk) was also found to buffer the impact of stock prices variations during recessions and recovery periods and the importance of cash increases with the exposure of the firm to macroeconomic factors (Fahlenbrach et al, 2021; Acharya & Steffen, 2020). Conti, et al (2020) and Saebi et al (2017) found that firms that have propensity to recognize opportunities and improvisation capability to exploit them have superior performance and that investments made during recessions have the potential for higher returns as companies take advantage of increased availability and underpriced resources. Sufficient internal financial flexibility reduces the underinvestment problems but also may require reduce current investment plans and jeopardizes the effectiveness of control mechanisms for agency conflicts created by capital markets as cash provides freedom from due diligence for managers' decisions.

What is interesting is that excess cash holding was not proven to increase investment or acquisitions, which may corroborate the precautionary motive for holding cash and the managers' risk aversion that reflects in lower risk options at the expense of maximize firm's profitability. In the end, companies hold more cash than they needed for good investments, regardless of how many good investment opportunities they have (Harford, 1999) and just keep it for long periods of time (Opler et al, 1999). This finding may reflect the fact that

companies do not adjust their financial targets, in particular the levels of liquid assets, according to business cycle forecasting (Rigby & Rogers, 2000).

Studies that analyzed the levels of cash held by the firms throughout the business cycle have concluded that companies tend to start accumulating more cash when they anticipate a downturn (firms build cash reserves from external finance issuances when the cost of capital is low compared with their future expectations (Acharya & Steffen, 2020)), keeping these levels high until the trough is in the past and they can "unfreeze" their investment plans and breath again (Autry & Navarro, 2009; Rosa et al, 2023). Reeves & Deimler (2009) alert that such plan is more and more inadequate as the world is each day more likely to enter a slowdown of unpredictable duration and even after the upturn, the environment will not be the same. Business Week (March 2001) quoted by Baum et al. (2004) reported: "*So with the economy stalling and fears of recession rising, executives are becoming more concerned about protecting the cash they got*". Autry & Navarro (2009) argue that firms are doing the right thing for the wrong reason. Cash should be protected in times the economy starts showing signals of downturn but so it can be used in worst times in profit-making opportunities. A countercyclical strategy in this area would be to increase the cash holdings when the peak has passed but instead of holding on to them, the firm would be better off if it uses them to take advantage of the lower prices and to ramp up its growth when the economy starts to flourish once again (Autry & Navarro, 2009), as the use of external funds may be difficult as bank credit is restricted or more expensive and equity markets tends to "dry up" (Conti et al, 2015). Vassolo et al (2017) advocate that the ideal course of action is one that links the contemporaneous strategy with inter-temporal relationships.

2.4. Why BCM is not more implemented

One explanation for why the BCM framework is not mainstream is that increasing macroeconomic uncertainty will decrease the accuracy of cash flow foresting leading managers to behave more conservatively (Zona, 2012; Baum et al, 2004). Baum et al. (2004) tested this by analyzing the dispersion of the cash-to-ratio of a sample of firms that is more homogeneous during times of macroeconomic uncertainty and more scattered during times of economic expansion. Staw et al (1981) found that organizations can exhibit rigidity in their behaviors under stress situations which can manifest itself in conservative decision making, reliance on familiar routines and reluctance in exploring new solutions. However, in his several works on the topic over the years, Navarro (and his co-authors) argued that managers

should have a bolder approach towards investment opportunities in Business Cycle downturns (usually associated with increasing uncertainty) as these opportunities will grant the firms that adopt such strategies with competitive advantage. The existence of slack resources (resources in excess of the necessary to produce a certain level of output) slows the reaction of the company to external conditions, can even promote a mismatch between internal and external environments and desensitize managers to environmental shifts. But, on the other hand, enables the firm to withstand economic scarcity and affects the way executives perceive decision contexts, increasing their willingness towards innovation investments that, although risky, is fundamental to ensure long term success (Latham & Braun, 2011). Indeed, organizational slack can soften the conflict for resources within the company, facilitates innovation which promotes strategic change and smooths the adaptation to change in the environment by working as a buffer, improving the firm's overall response to economic shifts (Latham & Braun, 2008). The presence of readily available slack allows managers to increase the diversity of responses when facing uncertain outcomes and insulates the company against external pressures. During early stages of the recession firms with higher levels of slack experiences a lower level of performance, but, as the recession materializes, they are better cushion from external shocks and transfer slack resources to strategic areas, speeding recovery and securing post-recession ramp-up. Not only, it helps with short-term disturbances but also helps build and maintain long term competitive advantage. For this reason, slack resources should be planned to lever strategic reaction to macroeconomic changes.

Hudson & Morgan (2022) step forward with an alternative explanation to why managers behave more homogenously during recessions. These authors defend that firms tend to present a mimetic behavior and follow normative pressures that arise from managers' homogeneous educational and professional background and that is heightened during periods of economic downturns or recession. Based on the theory of institutional isomorphism of the paper by DiMaggio & Powell (1983), organizations can increase their similarities between each other due to coercive isomorphism (deriving from political influence or regulatory frameworks), mimetic isomorphism (that results from standardized responses to increasing uncertainty, often adopting to themselves the strategies they see others adopt) and normative isomorphism (associated with the fact that professionals occupying the same job positions often share the same academic background and professional networks making them also subject to mimetic and normative pressures, just like their companies are). This perspective is also supported by Hudson & Morgan (2022)

and by Conti et al (2015), that defend that, under uncertainty, firms wait to see the strategy of their peers so they can imitate them, reinforce the isomorphism view. Managers often complain that investment and effort spent in crisis preparation does not pay off when companies are hit by disruptions (Koronis & Ponis, 2018), and this claim can also be a justification to why BCM is not more prevailing.

These concepts might present themselves as an explanation to why firms keep following a cyclical strategy that is often conservative during economic downturns even though, as we mention before, preliminary empirical studies have showed that countercyclical strategies outperform procyclical ones (Ferreira et al, 2023; K.N. & Thomas, 2024). The probability of a company pursuit counter-cyclical investment is also based on two main characteristics: opportunity recognition and entrepreneurial orientation (Conti et al, 2015). In fact, Lorange & Datson (2014) also defend that the ability to recognize the opportunities to profit from the economy cyclicality represents a huge advantage for companies to act decisively and improve its competitive position. To pursue such strategy, it is important that executives identify how would the financial impact of the business cycle be in different parts of the company and assess if the organization has the required tools (timing, reserves, optionality) to exploit it.

2.5. Other concepts in the literature of BCM and Cash Holdings

A company with high cash reserves and low leverage is often perceived as a prudent organization and there is this notion that such cases will perform better during crisis. Mascarenhas & Aaker (1989) cite Field (1985) to argue that firms who rely on bank credit to grow during expansions have created a partnership with financial institutions that during periods of economic downturn have supported their clients with cancelled interests and principal payments. These leveraged companies leave the recession with new good-quality resources acquired at lower costs allowing them to ramp up during the new expansion and distance themselves from the more "prudent" ones.

The concept of firm resilience is also mentioned in the literature regarding business cycles, especially those targeting recessions (Bamiatzi et al, 2016; Grewal & Tansuhaj, 2001). The importance of combining firm resilience with crisis management for business cycle management is also highlighted by Williams, et al (2017) and Koronis & Ponis (2018) that argue that organizations need to develop such capacity to improve crisis management based on four pillars: preparedness, responsiveness, adaptability, and learning. A similar framework

is provided by Duchek (2020): anticipate, cope, adapt. Nowadays resilience means not only the ability to survive to immediate disruptions but also to achieve long term success. Rosa et al (2023) propose that, in times of recessions, this characteristic materializes itself both in the company's performance metrics (result) and stages of processing in temporal aspects of anticipation, coping and adaptation (process).

It seems to be quite consensual that economic downturns are a source of both risk and opportunities (Rigby & Rogers, 2000; Vassolo et al, 2017).

The resources, capabilities, and characteristics that firms possess before an economic turmoil seems to be of importance on the performance of the companies throughout the trough and the following expansion (Bamiatzi et al, 2016). These firm specific factors seem to be more critical than industry and country effects, especially during periods of recessions. Latham & Braun (2011) explain that initial conditions can either mitigate or exacerbate recessionary pressures, dictating the company's strategic decision-making and influencing its response, performance and ultimately its survival. Meyer (1982) however, argues that ideological and strategic aspects of the company were more predictive of effective adaptation to unexpected events that structural aspects or resource availability. From this it is important that firms develop clear strategies and foster adaptative culture to navigate such economic shifts, seeing them as opportunities for learning and innovating.

The dynamics of economic fluctuations can also have a positive impact in the long term and be perceived as a business cleaning agent in the sense that they cause companies operating in outdated conditions to withdraw from the market and help prevail those on more efficient and innovative arrangements (Rosa et al, 2023; Latham & Braun, 2011; Geroski & Gregg, 1993).

In Navarro et al (2010), the authors develop an empirical work to test multiple hypothesis regarding the impact of counter-cyclical measures in the firm performance. They also illustrate their advice with real-word cases of companies that by implementing a bold strategy in times where their rivels were being conservative could outperform them and leave the recessionary period stronger than before. The role of our research is neither to question nor to corroborate such findings. Instead, we look at what comes before. In order to be able to do such investments in times where the access to financing sources might be harder, the companies that want to pursue a BCM policy must ensure they have reasonable levels of cash that can be use if such investment opportunities arise in those difficult economic times.

We will analyze the cash-to-assets levels of Portuguese firms during the period of 2002 - 2022 and try to understand if countercyclical behavior of cash holdings is related to a superior performance. Our hypothesis is that a significant level of cash holding might be strategically used according to BCM framework to invest in business opportunities that arise in periods of economic downturn or recession at very appealing prices and that can ramp-up the firm performance when the economy overcomes the trough.

3. Methodology

3.1. Predictions

The scope of this research is to ultimately investigate whether Portuguese companies implement BCM in their management of Cash Holdings. The level of cash reserves is a crucial determinant of firms' ability to implement the proactive and countercyclical measures advocate by BCM (Navarro, Bromiley, and Sottile, 2008). While prior evidence suggests that this strategy enhances firm performance, this strategy is still not consensual and is rarely applied in the business world.

For this reason and considering that the Portuguese market tends to be behave more conservatively than the U.S in which such studies were based (Aníbal, 2017), we anticipate that firms in our sample will exhibit procyclical rather than countercyclical behavior. Specifically, we expect firms to accumulate cash reserves during expansions and holding on to in the recession stages, refraining from employing such resources in investment opportunities, resulting in persistently high levels to throughout the cycle. Conversely, we are expecting that the company's cash holdings may be used in expansionary phases, which means we are expecting to observe an increase in the levels of investment of the companies in our firm in moments of economic upturn.

3.2. Hypothesis

Based on the above reasoning, we reach the following hypothesis that we hope to answer in our research:

Hypothesis 1. Cash holdings of Portuguese firms vary procyclically with the Business Cycle.

Hypothesis 2. Cash holdings have a significant impact on firm investment decisions.

4. Data and Sample Summary Statistics

4.1 Macroeconomic Data

Before beginning with the analysis of the firm data base, it is important to analyze and classify the Portuguese Business Cycles.

According to the research conducted by *Comité de Datação dos Ciclos Económicos Portugueses (Portuguese Business Cycle Dating Committee)* (Reis, et al., 2023), it is possible to identify the following cycles in the Portuguese economy, using GDP per capital in local currency.

Table 1 - Portuguese Business Cycles' Classification

Date		Duration (in quarters)			
Peak	**Trough**	**Recession**	**Expansion**	**Cicle**	
		Peak to trough	Previous trough to peak	Trough since last trough	Peak since last peak
2002Q1	2003Q2	5	-	-	-
2008Q1	2009Q1	4	14	18	19
2010Q3	2013Q1	10	7	17	11
2019Q4	2020Q2	2	20	22	30
Mean		5	14	19	20

The troughs found in Table 1 are consistent with the events that shaped not only the national, but specially, the world economy. The euro adoption in 1999 brought with it some unbalances to the Portuguese economy that was still adapting to reduced interest rates, used to make credit more attractive to Portuguese families and businesses, when the national monetary and exchange policies where handed over to the European Central Bank. This brought new budget rules for the Portuguese economy, that in the meantime had spent its surplus to increase public spending leading to public accounts that weren't compatible with budget deficit targets. In the sequence of these frictions, the government quit which led to governmental instability, cuts in public spending and tax increases, retracting consumption and investment and ending in an inevitable recession in 2003 motivated only by internal conjecture. The 2009 crisis was a result of the American financial crisis that started in 2007 with problems in house credit lines and escalated one year later with the bankruptcy of Lehman Brothers.

Only one year and a half, while the world was still recovering from the last crisis, the public debt hit substantial levels as a result of stimulus programs and financial sector rescues carried out during the previous recession. The risk aversion and distrust contaminated the treasury bills purchases and the fear of non-compliance by several counties. The interest rates charged started rising to face this new risk perception and some peripheral countries, including Portugal, resented this shift greatly, as it not only had high levels of public and private debt but also came from a decade of weak economic growth. As the banking system had a long habit of externally finance themselves, Portugal's external dependence was accentuated.

The emergence of the pandemic known as COVID-19 in the end of 2019 marks the beginning of the most recent recession that impacted the Portuguese economy. The virus was first confirmed in the country in March 2020 leading to the imposition of restrictive sanitary measures to try to contain the virus which directly or indirectly impacted business activities and social dynamics. This period provoked a significant drop in both international trade and internal consumption which caused a steep decline in domestic product, felt mostly in the second quarter of 2020 (Reis, et al., 2023).

Contrary to what can be found in the NBER, from United States, Portugal doesn't have an updated yearly classification, and, for this reason, we have to begin by collecting and treating Portuguese GDP data in order to obtain the classification of the different stages so we can then compare it with the variation of the Cash Levels held by the firms in our sample. Based on the metrics used by *Comité de Datação dos Ciclos Económicos Portugueses (Portuguese Business Cycle Dating Committee)* (Reis, et al., 2023), we have collected and used the data available on World Data for GDP per capita in local currency to classify the years of our analysis. We understand that the literature agrees that a period of recession (expansion) is determined when two consequent quarts present declining (increasing) GDP. However, since the goal of our study is to relate this macroeconomic component with yearly financial data, we found the necessity of treat the data in such a way that makes this possible. We then compare the conclusions of our analysis with the findings of the mentioned paper and reckon that they essentially match. Consequently, below it is possible to find the yearly classification of the business cycle for the period under analysis. Based on this classification we have built a dummy variable whose value is 1 for the years of recession and 0 for the years of expansion based on the similar rational presented by (Hardford, 1999).

Table 2 - Annual Classification based on World Bank

Year	Classification
2002	Expansion
2003	Recession
2004 - 2008	Expansion
2009	Recession
2010	Expansion
2011 - 2013	Recession
2014 - 2019	Expansion
2020	Recession
2021 - 2022	Expansion

We acknowledged that some literature that investigates the behavior of the business cycles analyze these fluctuations based on the coincident indicator. However, as concluded by Mittnik & Wohlrabe(2007), GDP and coincident indicator behave very similarly and so, we will only use GDP to classify the different stages of the business cycles in Portugal as this is the reference indicator present in the key literature for our topic and it is the indicator used by our reference source *Comité de Datação dos Ciclos Económicos Portugueses (Portuguese Business Cycle Dating Committee)* (Reis, et al., 2023).

4.2. Firm Data and Sample

In this section, we describe how we reach our sample, the characteristics of the sample firms, and the key numbers for our sample period.

We expect to answer our research questions by analyzing a sample of Portuguese non-financial firms drawn from SABI over the period between 2002 - 2022. While many studies focus on BCM only during recession periods, this study will take a holistic analysis of business cycles as we hope that a higher time interval may include lagged effects (Conti, Goldszmidt, & Vasconcelos, 2015). Financial firms are excluded as their reasoning to hold cash might be linked to capital requirements (Custódio, Ferreira, & Raposo, 2005). We also exclude utility firms as their cash holding levels might be subject to regulatory supervision (Opler, Pinkowitz, Stulz, & Williamson, The Determinantes and Implications of Corporate Cash Holdings, 1999). The source of the data allows us to study both public and privately held companies, which might be an additional source of new information as empirical studies usually focus on public companies (Custódio, Ferreira, & Raposo, 2005). On the other hand, by conducting this study on Portuguese organizations, we have to acknowledge that the Portuguese Stock Index is not as dynamic as other external markets, which means that companies might not be able to rely on the stock market to financing their operations.

By analyzing a long period of time that includes several periods of recession in the country, the number of the companies might change over the years as they cease operations. As we are studying the impact of macroeconomic environment on firms' performance, the fact that an organization is not able to surpass the troubled times is also a source of information for this research. By doing so, we expect to eliminate the survival bias.

We will include companies from the autonomous regions of Azores and Madeira and will exclude companies included in NACEs 64, 65 and 66 (respectively, Financial service activities, except insurance and pension funding; Insurance, reinsurance and pension funding

except mandatory social security; Activities auxiliary to financial services and insurance) and in NACEs 35, 36, 37 and 38 (respectively, Electricity, gas, steam, air conditioning supply; Water collection, treatment and supply; Sewage; Waste collection, treatment and disposal activities, materials recovery). We have also excluded micro and small companies with the latest available number of employees being lower than 50, according to INE's definition.

We have also dropped companies whose creation date is after the beginning of the period under analysis (2002) this way we will assume that any missing information is due to liquidation of the company.

After applying these filters to our data, we are left with 4434 firms.

Table 3 - Summary Statistics

Variable	Obs	Mean	Median	SD	Min	Max
Cash / Total Assets	85503	.099	0.041	.141	-9.213	1
Investment/Total Assets	79957	-11572.947	0.036	3272458.6	-9.253e+08	3.125
ROA [1]	85511	4.718	3.428	14.493	-1647.806	634.591
GDPpc[2]	93135	17803.07	17601.699	820.709	16762.06	19867.158
Cash Flow / Total Assets	85503	.105	0.092	.146	-16.908	6.35
Liquidity	85466	2.192	1.377	21.556	-4.3	4601.685
Leverage	85484	.624	0.627	.506	0	38.283
Firm Size[3]	85511	8.93	8.881	1.55	0	17.214
Short Term Debt / Total Assets	57183	.099	0.056	.136	0	5.005
Long Term Debt / Total Assets	57166	.143	0.090	.204	0	18.74
Net Working Capital / Total Assets	85501	.06	0.078	.443	-37.35	5.87
Total Assets[3]	85511	42355.991	7194.937	467207.04	0	29922362

The table shows the mean, median, standard deviation, minimum, and maximum values of the model variables and other relevant metrics. (1) Return on Assets was calculated as Net Income divided by Total Assets; Firm Size was calculated as the log of Total Assets. (2) Expressed in Euros. (3) Expressed in Thousands of Euros. The sample consists of all nonfinancial and nonutility firms on SABI, from the fiscal year 2002 to 2022.

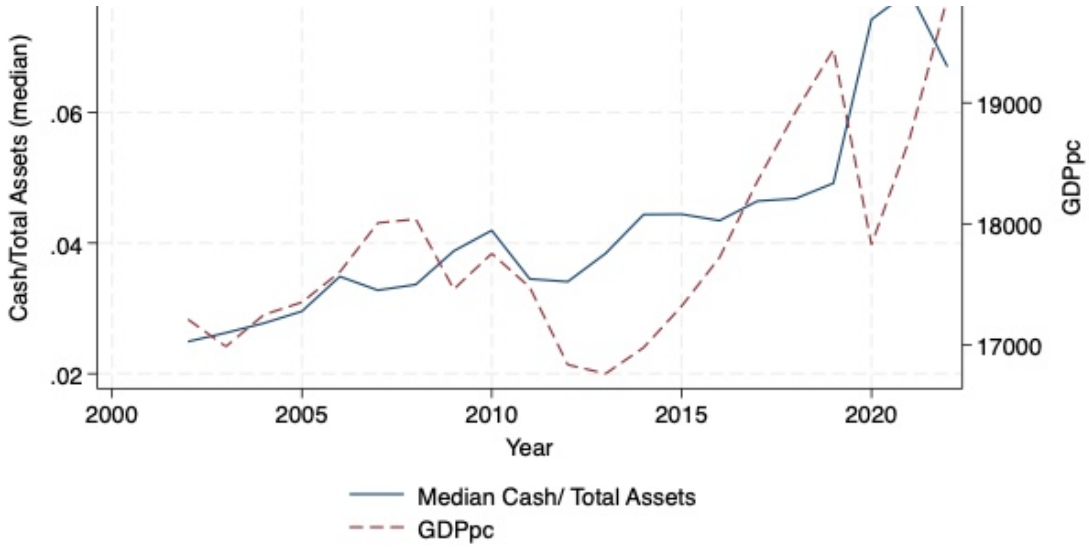
4.3. Variable description and empirical framework

A preliminary analysis on our data shows that the average firm has cash over assets of 9,9%, with substantial variation across firms and over time.

By looking at Table 3 we can observe some odd values, namely in the investment ratio. In a first moment we will continue with the data as it is, although we acknowledge these values are probably a result of human error when entering the information on Total Assets on SABI. Later on, we will proceed with the Winsorization process of our data sample and replicate the models that follows.

We then compare the Business Cycle conditions with our financial indicator being studied. To analyze the levels of cash holdings held by companies we use cash and marketable securities to compute the cash to total cash assets' ratio (Custódio, Ferreira, & Raposo, 2005).

Graph 1 - Cash and GDPpc Evolution



4.3.1. Business Cycle

This study tries to understand if the firms in our sample behave differently according to the external macroeconomic conditions. To pursue such investigation, we have to look at their financial statements but also confront them with the external conditions of the time. For that reason, and to try to capture the economic sentiment of the economy, two alternative proxy indicators for Business Cycles were used in this study, GDP per capita and, a dummy variable Recession. We began by using a dummy variable (Recession) that was calculated based on

the growth of the GDPpc, in years where this growth was negative, the dummy variable assumes the value 1 and we considered them to be a recession year; oppositely, when the growth is positive, the dummy variables take value 0 and we consider that year to be of expansion, as per Table 2. As mentioned above, this categorization matches that of the report put together by *Comité de Datação dos Ciclos Económicos Portugueses (Portuguese Business Cycle Dating Committee)* (Reis, et al., 2023). The decision to use GDP per capita in local currency was justified by those same authors in their report and, since this kind of classification was scarce for the Portuguese case, we decide to adopt the same indicator.

4.3.2. Cash Holdings

As the time period of the sample comprises information from different Portuguese accounting systems (*Plano Oficial de Contabilidade* and *Sistema Nacional de Contas*), to calculate the ratio for Cash Holdings variable we include information from the items *Depositos Bancários e Caixa* and *Caixa e depósitos bancários*. For simplification, we considered all the above to be "Cash and Cash Equivalents" and divide them by the firm's Total Assets of the respective year in order to obtain the variable to which we called *Cash* (Ozkan & Ozkan, 2004). We also use the lagged Cash to try to capture the dynamic effects and account for persistence in firms' policies.

4.3.3. Investment Levels

The level of investment is not directly provided in the data used from SABI. But based on what we did have, we were able to compute it. As we had the values for both Non-Current Assets and for Amortizations, we subtract the Non-Current Assets from previous period to the current ones and added the amount of Amortizations to obtain the level of Investment. The variable used in our model is the result of the ratio between the amount of investment and the firms' Total Assets in a given year.

4.3.4. Control Variables

We initiated our model construction based on the work of Ozkan & Ozkan (2004).

$$\begin{aligned}\mathbf{CASH}_{it} = {} & \gamma_1 \mathbf{CASH}_{it-1} + \gamma_2 \mathbf{CFLOW}_{it} + \gamma_3 \mathbf{LIQ}_{it} + \gamma_4 \mathbf{LEV}_{it} + \gamma_5 \mathbf{BANKDEBT}_{it} \\ & + \gamma_6 \mathbf{MKTBOOK}_{it} + \gamma_7 \mathbf{SIZE}_{it} + \gamma_8 \mathbf{DIVIDEND}_{it} + \alpha_i + \alpha_t + u_{it}\end{aligned}$$

We used the variable **CFLOW** to represent the Cash Flow of the company in a given year. This metric is a result of the ratio of the EBITDA and the company's Total Assets in a given year.

Then, and although our data sample apparently had data for it (*Liquidez Geral*), we computed **Liquidity** and try to match it to the one that was provided. We reached the same numbers by dividing the Current Assets by the Current Liabilities, in other words, the Current Ratio. However, following the model by of Ozkan & Ozkan (2004), and since the Current Ratio naturally includes corporate Cash and Cash Equivalents, we subtract it to Current Assets.

For the variable **Leverage** we followed the same process. Our data sample had information for *Alavancagem* but we still decided to compute our own ratio and them compare it to the one that was given. We made the ratio of Total Liabilities over Total Assets, but our results didn't match the information we had. We investigated further to understand the rationale behind SABI's formula and concluded they computed their metric by dividing the companies' Total Borrowings by their Total Equity, in other words the Gearing or Debt-to-Equity Ratio. These two metrics can be seen as substitutes for cash holdings, as firms can, for example, resort to borrowings and so leverage would act as a proxy for the own companies to issue debt (John, 1993). At the same time, the cost of funds used to invest in liquidity increases as the ratio of debt financing of the company increases, which could result in a reduction in cash holdings with the increase of debt in the capital structure of the firm (Baskin, 1987), which would reflect itself in a negative relation between the levels of cash and the company's leverage. However, higher debt levels might result in financial distress and in order to avoid such scenario, firms might be inclined to increase its levels of cash holdings to decrease the probability of such crisis. Such behavior would induce a positive relation between leverage and cash holdings. On the other hand, liquid assets can be converted into cash at a much lower cost than other type of assets and firms with enough levels of such items can use them and avoid turning to capital markets when in times of cash shortage.

Finally, **Firm Size** was computed, like the authors suggested, as the logarithm of the Total Assets. This characteristic can also impact the levels of cash holdings as they also impact the cost of an eventual financial distress situation. Literature has argued that large firms are more likely to be diversified and, consequently, have lower probability to experience financial distress. For this reason, we can expect that smaller firms hold relatively more cash to avoid such situations (Titman & Wessels, 1988).

We decided not to follow up with the remaining variables used by these authors as they were not interested in studying the relationship between company decisions and the economic environment and their sample comprised listed companies which allowed them to use other indicators in their model. Our sample on the other hand is mainly composed by privately held companies.

Table 4 - Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Cash	1.000									
(2) ROA	0.183*	1.000								
(3) Lagcash	0.818*	0.166*	1.000							
(4) LogGDP	0.093*	0.057*	0.102*	1.000						
(5) InterlogGDP	-0.010*	-0.058*	-0.027*	-0.451*	1.000					
(6) CFlow	0.143*	0.931*	0.128*	0.022*	-0.053*	1.000				
(7) Leverage	-0.136*	-0.413*	-0.134*	-0.040*	0.013*	-0.350*	1.000			
(8) FirmSize	-0.175*	0.035*	-0.176*	0.115*	-0.017*	-0.026*	-0.101*	1.000		
(9) Liquidity	-0.078*	0.347*	-0.045*	0.010*	0.003	0.263*	-0.774*	0.089*	1.000	
(10) Invest_ratio	-0.023*	0.001	0.002	0.000	-0.005	0.003	0.004	0.047*	-0.005	1.000

**** p<0.1, ** p<0.05, * p<0.01.* The table presents the correlation matrix for all dependent and independent variables we use. The sample consists of all nonfinancial and nonutility firms on SABI, from the fiscal year 2002 to 2022. (1) $Cash_t$ / Total Assets); (2) Return-on-Assets = Net Income / Total Assets; (3) $Cash_{t-1}$/$Total\ Assets_{t-1}$; (4) Log (GDPpc); (5) Recession * GDPpc , where Recession is a dummy variable calculated based on the evolution of GDPpc: in years when the growth is negative, it takes value 1 and we consider them to be or Recession, when the growth is positive, Recession = 0, and we consider the year to be of Expansion; (6) Cash Flow/Total Assets; (7) Leverage = Total Liabilities/ Total Assets; (8) FirmSize = log (Total Assets); (9) Liquidity = (Current Assets – Current Liabilities – Cash) / Total Assets (10) Invest_ratio = Investment / Total Assets

4.4. Empirical Methodology

In a first stage, we regress the levels of cash against the log of GDPpc and the levels of cash of the previous year. Based on this first model, we could see that the levels of cash of the firms in the sample varies positively with the business cycle, which means that in stages of recession, Portuguese companies increase, on average, their levels of cash. The coefficients are significant for 1%. Besides we can observe that the levels of cash of the previous period significantly contribute for the current levels of cash of the companies. This result may indicate that Portuguese companies maintain their levels of cash for precautionary reasons, i.e., to meet difficulties inherent from recession periods; rather than to pursue profitable

investment opportunities, since, as advocated by the BCM, recessions are the privileged moment to cease them due to their cyclical discount (Pearce II & Michael, 2006) (Navarro, Bromiley, & Sottile, 2008). Other motivations that might justify such relation between cash and the business cycle is the preference for cash as a source of financing (Acharya & Steffen, 2020)**,** organization rigidity a in its own behaviors that manifest itself in more conservative strategies (Staw, Sandelands, & Dutton, 1981) and ideological aspects of the company (Meyer, 1982).

We proceed by adding as control variables the leverage of the firm, its size, cash flow and liquidity. All the coefficients for this regression were significant and the adjusted R squared was 68,37%. Based on this model we are able to say that there is a positive relationship between the levels of GDPpc and the levels of cash of the company, which may indicate that companies save part of the cash that results from better business activity in periods of expansion. There is also a strong relation between the levels of cash from the previous period and the current levels of cash, as we have already concluded from the previous model. The leverage, net working capital and size of the firm on the other hand have a negative effect on the levels of cash. For the leverage, such findings go along with the literature that says that companies use cash holdings as a substitute of debt (Baskin, 1987; Ozkan & Ozkan, 2004), and so, the more leverage a company has the less cash it holds. The firm size relation can be explained by the fact that small-sized firms tend to hold more cash than their larger counterparts due to precautionary motives (Magerakis et al, 2020). With respect to the liquidity of the company, its relation can be justified by the trade-off theory as firms with more liquid assets are more likely to have less cash reserves as they serve as substitutes (Ferreira & Vilela, 2004; Ozkan & Ozkan, 2004; Opler et al, 1999).

$$Cash_{it} = \gamma_1 logGDPpc_t + \gamma_2 Cash_{it-1} + \gamma_3 Liquidity_{it} + \gamma_4 FirmSize_{it} + \gamma_5 CFlow_{it} + \gamma_5 Leverage_{it} + \alpha_t + \alpha_i + \mu_{it} \quad (1)$$

We finally added an interaction variable (interlogGDP) that results from the product of the logarithm of GDPpc with recession and tries to capture the additional effect of the change from an expansion year (Recession =0) to a recession year (Recession =1) on cash. The coefficient of such variable is significant to 1% level and is positive, which means that comparatively with years of expansion, on years of recession companies tend to hold more of its cash. This finding is extremely important for our study and its contrary to what

Navarro, Bromiley, and Sottile (2008) advocate on their BCM theory. But at the same time, it goes along to our own expectations as we explained on the predictions section.

$$Cash_{it} = \gamma_1 logGDPpc_t + \gamma_2 Cash_{it-1} + \gamma_3 Liquidity_{it} + \gamma_4 FirmSize_{it} + \gamma_5 CFlow_{it} + \gamma_5 Leverage_{it} + \gamma_7 interGDP_t + \alpha_t + \alpha_i + \mu_{it} \quad (2)$$

We then proceed by performing the test of Hausman Taylor for fixed and random effects to check which one would be a better fit. We analyzed whether the differences between coefficients were significant in which case the random effects would be inconsistent. As the p-value of this test was smaller than 1% we rejected the null hypothesis and continue by using fixed effects. By doing this, the coefficients for all variables remain significant (3).

To assess whether the regression residuals satisfy the homoskedasticity assumption, we used the Breusch–Pagan/Cook–Weisberg after the baseline regression (estat hettest). With the result of this test, we rejected the null hypothesis, indicating the presence of heteroskedasticity in the residuals. To address this issue, we progress by re-estimating our model with robust standard errors, which provide consistent inference under heteroskedasticity. With exception of the variable Cash Flow, our coefficients remained significant at 5% level (4).

Table 5 - Cash Holdings Regression Results

VARIABLES	(1)	(2)	(3)	(4)
logGDP	0.031***	0.057***	0.089***	0.089***
	(0.006)	(0.007)	(0.007)	(0.019)
interlogGDP		0.001***	0.001***	0.001***
		(0.000)	(0.000)	(0.000)
lagcash	0.767***	0.767***	0.518***	0.518***
	(0.002)	(0.002)	(0.003)	(0.055)
cflow	0.043***	0.043***	0.033***	0.033
	(0.002)	(0.002)	(0.002)	(0.022)
Liquidity	-0.051***	-0.051***	-0.082***	-0.082***
	(0.001)	(0.001)	(0.001)	(0.014)
Leverage	-0.041***	-0.041***	-0.067***	-0.067***
	(0.001)	(0.001)	(0.001)	(0.014)
FirmSize	-0.004***	-0.004***	0.003***	0.003**
	(0.000)	(0.000)	(0.001)	(0.001)
Constant	-0.214***	-0.472***	-0.805***	-0.805***
	(0.059)	(0.068)	(0.066)	(0.177)
Observations	79,939	79,939	79,939	79,939
R-squared	0.683	0.684	0.380	0.380
Number of firms			4,434	4,434

Note: Standard errors in parentheses, except for Equation (4), in which case we have Clustered Standard Errors.
*** p<0.01, ** p<0.05. * p<0.1

For the second hypothesis, we decided to start by calculating the investment ratio and regress it against the cash ratio and the log of GDP and we complement it with control variables that might help explain the impact of the levels of cash on the investment levels. We used the Cash from previous period, the Firm Size, the Cash Flow, and the interactive variable between logGDP and Recession. All the coefficients with exception of logGDPpc were significant (5). Following the same rationale as the previous model, we tested our model and continue fixed effects (6) and robust estimators (7).

$$Investment_{it} = \gamma_1 logGDP_t + \gamma_2 interGDP_t + \gamma_3 Cash_{it} + \gamma_4 Cash_{it-1} + \gamma_5 FirmSize_{it} + \gamma_6 CFlow_{it} + \gamma_7 Leverage_{it} + \gamma_8 Liquidity_{it} + \alpha_t + \alpha_i + \mu_{it} \quad (7)$$

Table 6 - Investment Regression Results

VARIABLES	(5)	(6)	(7)
logGDP	0.244	-0.987***	-0.987
	(0.200)	(0.217)	(0.797)
interlogGDP	0.005**	0.001	0.001
	(0.002)	(0.002)	(0.003)
cash	-0.802***	-0.937***	-0.937***
	(0.102)	(0.114)	(0.340)
lagcash	0.488***	0.509***	0.509**
	(0.099)	(0.105)	(0.216)
FirmSize	0.030***	0.284***	0.284
	(0.005)	(0.017)	(0.222)
cflow	1.731***	2.084***	2.084
	(0.060)	(0.071)	(1.445)
Leverage	0.145***	0.165***	0.165
	(0.027)	(0.040)	(0.153)
NWC	-0.058*	-0.158***	-0.158***
	(0.030)	(0.042)	(0.056)
Constant	-2.857	6.895***	6.895
	(1.958)	(2.072)	(5.825)
Observations	79,939	79,939	79,939
R-squared	0.011	0.016	0.016
Number of firms		4,434	4,434

As a result of further curiosity, we experiment analyzing the performance of the Portuguese using ROA. We regress this measure against cash, firm size, Leverage, Cash Flow, Liquidity (in Bates, Kahle, & Stulz (2009) the authors called it NWC, but the formula is the same) and Investment and the Business Cycle metric GDPpc and the interactive variable that relates GDPpc with the dummy variable Recession, explained above. This model (8) was based on

the work of (Bates, Kahle, & Stulz, 2009) with some adaptations based on the specifications of our sample and research questions, namely, we included variables to account for the business cycle and did not include neither variables that used data at market value nor dividend payout information, as our sample is mainly composed by privately held companies and such information is not available. Furthermore, the authors used R&D, Capital Expenditures and Acquisition metrics to account for investments as they consume cash but since we didn't have such discriminations, we used the variable Investment sized by Total Assets to account for such spendings, as already done in the previous models.

This means that the levels of cash are positively associated with the increase of the return on assets. Besides during times of economic recession, Portuguese companies, on average, decrease their ROA, which goes along the perspective that companies have worst performance in times of economic duress

Table 7 - ROA Regression Results

VARIABLES	(8)	(9)	(10)
cash	7.546***	5.967***	5.967***
	(0.133)	(0.154)	(0.326)
FirmSize	0.521***	1.494***	1.494***
	(0.012)	(0.028)	(0.092)
cflow	88.624***	93.337***	93.337***
	(0.128)	(0.116)	(1.464)
Liquidity	3.921***	2.376***	2.376***
	(0.064)	(0.070)	(0.461)
Leverage	0.134**	-0.559***	-0.559
	(0.057)	(0.065)	(0.565)
invest_ratio	0.025***	0.005	0.005
	(0.008)	(0.006)	(0.022)
logGDP	5.707***	0.975***	0.975
	(0.427)	(0.355)	(0.648)
interlogGDP	-0.013***	-0.019***	-0.019***
	(0.004)	(0.003)	(0.005)
Constant	-66.078***	-28.268***	-28.268***

	(4.176)	(3.392)	(6.034)
Observations	79,940	79,940	79,940
R-squared	0.885	0.913	0.913
Number of firms		4,434	4,434

Note: Standard errors in parentheses, except for Equation (10), in which case we have Clustered Standard Errors.
*** p<0.01, ** p<0.05, * p<0.1

We added fixed effects (9) and the conclusions changed: the variable Investment ratio increased its p-value becoming not significant for 10%, and the sign of the coefficient for Leverage changed.

When we added robust estimators (10), the variable Investment Ratio remained non-significant, and the variables Leverage and logGDP became also non-significant.

$$ROA_{it} = \gamma_1 GDPpc_t + \gamma_2 interGDPpc_t + \gamma_3 Cash_{it} + \gamma_4 FirmSize_{it} + \gamma_5 CFlow_{it} + \gamma_6 Liquidity_{it} + + \gamma_7 Leverage_{it} + \gamma_8 Investment_{it} + \alpha_t + \alpha_i + \mu_{it} \quad (10)$$

5. Data Winsorization and Model Replication

As we mentioned earlier, we came across some outliers in our database when analyzing the descriptive statistics of our variables. For this reason, we felt the need to replicate the models we previously estimated after we clean our data. To do so we have decided to proceed with the Winsorization technique. This statistical method enables the transformation of the most extreme values into more common ones. Instead of discarding outliers, which can lead to loss of information, Winsorization sets extreme values to a specified percentile. Specifically, we choose to make the cut off at percentiles 1st and 99th, which means that the observations with values in these percentiles are replaced by the last acceptable value. The following table presents the new descriptive statistics, and we can see that the values for Total Assets and for the Investment Ratio are stabilized.

Table 8 - Summary Statistics after Winsorization

	N	Mean	Median	SD	Min	Max
Cash / Total Assets	85503	.098	0.041	.133	0	.632
Investment/ Total Assets	79957	.064	0.036	.096	-.186	.466
ROA[1]	85511	4.907	3.428	9.214	-26.52	36.718
GDPpc[2]	93135	17803.07	17601.699	820.709	16762.06	19867.158
Cash Flow/ Total Assets	85503	.107	0.092	.098	-.184	.444
Liquidity	85501	.069	0.078	.253	-.723	.656
Leverage	85484	.608	0.627	.232	.09	1.364
FirmSize[3]	85511	8.927	8.881	1.497	5.292	13.05
Short Term Debt /Total Assets	57183	.096	0.056	.114	0	.535
Long Term Debt/ Total Assets	57166	.139	0.090	.158	0	.697
TotalAssets[3]	85511	25141.724	7194.937	61813.609	198.658	465085.9

The table shows the mean, median, standard deviation, minimum, and maximum values of the model variables and other relevant metrics. (1) Return on Assets was calculated as Net Income divided by Total Assets; Firm Size was calculated as the log of Total Assets. (2) Expressed in Euros. (3) Expressed in Thousands of Euros. The sample consists of all nonfinancial and nonutility firms on SABI, from the fiscal year 2002 to 2022.

After looking at the statistics, we replicate the steps given in Section 4.4. and present the results of the final models in Table 9.

Table 9 - Regression Results After Winsorization

	Cash				Investment			ROA		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Cash					-0.307***	-0.294***	-0.294***	7.114***	5.624***	5.624***
					(0.004)	(0.005)	(0.006)	(0.113)	(0.122)	(0.233)
Firm Size	-0.004***	-0.004***	0.005***	0.005***	-0.003***	0.011***	0.011***	0.448***	1.285***	1.285***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.009)	(0.020)	(0.054)
CFlow	0.070***	0.072***	0.074***	0.074***	0.190***	0.086***	0.086***	81.633***	87.244***	87.244***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.003)	(0.004)	(0.006)	(0.145)	(0.134)	(0.391)
Liquidity	-0.067***	-0.067***	-0.138***	-0.138***	-0.118***	-0.146***	-0.146***	4.246***	2.903***	2.903***
	(0.001)	(0.001)	(0.002)	(0.004)	(0.002)	(0.002)	(0.003)	(0.065)	(0.073)	(0.158)
Leverage	-0.073***	-0.073***	-0.141***	-0.141***	-0.043***	-0.048***	-0.048***	-1.822***	-3.110***	-3.110***
	(0.001)	(0.001)	(0.002)	(0.005)	(0.002)	(0.003)	(0.004)	(0.073)	(0.087)	(0.197)
Invest_ratio								-7.028***	0.083	0.083
								(0.144)	(0.113)	(0.206)
logGDP	0.011**	0.036***	0.047***	0.047***	-0.006	-0.082***	-0.082***	5.315***	1.183***	1.183***
	(0.005)	(0.006)	(0.006)	(0.007)	(0.008)	(0.008)	(0.009)	(0.327)	(0.255)	(0.369)
interlogGDP					-0.001***	-0.001***	-0.001***	-0.028***	-0.022***	-0.022***
		0.001***	0.001***	0.001***	(0.000)	(0.000)	(0.000)	(0.003)	(0.002)	(0.003)
Lag Cash	0.790***	0.789***	0.546***	0.546***	0.200***	0.204***	0.204***			
	(0.002)	(0.002)	(0.003)	(0.007)	(0.004)	(0.004)	(0.007)			
Constant					0.182**	0.814***	0.814***	-59.126***	-26.229***	-26.229***
	-0.008	-0.254***	-0.370***	-0.370***	(0.078)	(0.078)	(0.083)	(3.196)	(2.439)	(3.450)
	(0.053)	(0.062)	(0.061)	(0.070)						
Observations	79,939	79,939	79,939	79,939	79,939	79,939	79,939	79,940	79,940	79,940
R-squared	0.722	0.722	0.443	0.443	0.137	0.094	0.094	0.840	0.870	0.870
Number of firms			4,434	4,434		4,434	4,434		4,434	4,434

Standard errors in parentheses except for Equations (4), (7) and (10), in which case we have Clustered Standard Errors. *** p<0.01, ** p<0.05, * p<0.1

6. Conclusion

In this section we are looking for summarize the main findings of this research and using them, in a first moment, to draw some possible recommendations for practitioners and for future research on this area. In a second moment we will focus on the limitations we came across while executing and reviewing this work, hoping they can be used as leverage for future researchers.

6.1. Recommendations and Final Remarks

Our results seem to indicate that Portuguese company usually adopt a procyclical cash management strategy rather than the countercyclical approach advocated by BCM. Specifically, firms tend to accumulate cash during periods of expansion, probably due to improved performance and higher cash flows, but refrain from deploying such resources during recessions. This behavior contrasts with the theoretical proposition that downturns are optimal moments to invest due to cyclical discounts in asset and input prices (Navarro, Bromiley, & Sottile, 2008). As Cash varies positively with GDPpc, one may assume that companies tend to adopt precautionary rather than speculative and opportunistic cash policies (Keynes, 1936).

We can also see that higher levels of Cash did not translate into higher levels of investment specially during downturns. Instead, firms appear to be reluctant to use their liquidity to grow, which strengthen the perspective that cash is accumulated defensively rather than strategically.

Lastly, we could observe a positive relation between levels of cash and firm performance, but this relation weakens in recessionary periods, which may be consistent with the perspective that, as cash is not used to pursue profitable opportunities, this undermines the firm performance.

Overall, Portuguese firms appear to "chase the cycle" rather than anticipate it: saving in expansions and preserving reserves during recessions, rather than actively reallocating liquidity toward countercyclical investments. As mentioned by Autry & Navarro (2009), firms seem to be doing the right thing for the wrong reason, as cash should be horded in times the economy starts showing signals of downturn but so it can be converted during recession periods in profit-making opportunities.

Although these authors, and others (Wang, Ji, Chen, & Song, 2014), defend that cash strategies must adapt to macroeconomic changes, in practice, and as corroborated by our research, managers seem to follow a more conservative procyclical strategy. The findings of our study seem to sustain the BCM vision, at least at some extent, and practitioners may benefit from reassessing their cash management strategies. Keeping the mind and eyes open for investment opportunities even, and, we would say, specially, during recessions, could enhance the firm's long-term competitiveness, particularly when access to external financing may be restricted.

On a last note, a recommendation for policymakers. These agents may reflect on considering support mechanisms to encourage companies to allocate resources towards productive investments during recessions, thereby contributing to economic stabilization.

6.2. Limitations of the research

Throughout this study we have extensively used the data we obtain from SABI. Except for the filters we mention in the beginning of this section, we have used our models on the full extent of the observations. These might include extreme values used to compute the financial ratios leading to some bias results.

We also acknowledge the potential endogeneity between some of the variables used, namely cash holdings and investments which might call upon further investigation using, for instance, instrumental variables. The Return-on Assets was calculated using the Net Income and, in our models, we have also used the Cash Flow of the firm sized by the Total Assets. Evidently, by using such formulas we create a strong relation between these two variables.

We are aware that we start by modeling cash as a function of investment and proceed by modeling investment as a function of cash as separate models, when it seems to make sense that these two variables impact each other simultaneously. For this reason, a two simultaneous equation system could be in order., as once again, not only the dependent variable depends on the independent one, but the other way around is also true.

It would also be interesting for future research to disaggregate firms by industry sector and explore sector-specific dynamics.

As we divided our Business Cycles stages in only two phases, some nuances may be missing. In fact, as our data is annual, our analysis is not completely sensitive to variations in cash thought the integrity of the business cycle. For example, we know that companies increase their levels of cash during expansionary moments, but we do not know it they do this evenly

(procyclical strategy) or close to the peak as they foresee economic turmoil (countercyclical strategy (Autry & Navarro, 2009)). Besides we do not have information on the actual investment opportunities presented to the companies in the sample, neither do we know if they were profitable or not.

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