The value of SME's cash holdings in Europe. The role of internal and external moderators

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ABSTRACT

This paper examines, for the first time in a wide sample of European small and medium-sized enterprises (SMEs), the way in which cash stock affects firm operating performance. Precautionary arguments and the search for financial flexibility are supposed to be the dominant arguments for such informationally opaque firms. Our results suggest that cash holdings have a positive effect on operating performance, supporting the relevance of these perspectives for SMEs. Maintaining a buffer of money on hand, ready for use in any contingency, has a relevant positive effect that largely overcomes any potential opportunistic problems. Moreover, we find that firm-specific characteristics, such as debt, size, age, growth opportunities and ownership concentration, moderate our baseline relationship. In addition, the study also demonstrates that cash holdings have a stronger positive effect on operating performance in countries with poor institutional quality and less developed financial systems. Notably, we also find that the stock of cash had a relevant role in supporting firm performance during the recent global financial crisis. Finally, we report additional analyses to corroborate our baseline results.

Key words: Cash holdings, SMEs, firm operating performance, institutional context.

JEL classification: G32; G33

1. Introduction

In the last twenty years, the investigation of cash holdings of firms has gained a great deal of of attention in the literature (Opler et al. 1999; Guney et al. 2003; Ozkan and Ozkan 2004; Kalcheva and Lins 2007; Bigelli and Sánchez-Vidal 2012; Harris and Raviv 2017). This interest has been particularly motivated by the fact that enterprises hold significant amounts of cash in their balance sheets. Previous studies highlight that in the European Union (EU), the United States (US) and countries all over the world, firms hold significant amounts of cash in their balance sheets, ranging between 10% and 23%[1]. At the root of this behaviour, there are two possible motivations.

While general wisdom suggests that to hold cash is an inefficient managerial choice packed with opportunism, today, many firms seem to accumulate cash reserves to support the processes of growth and business development. First, cash holdings could generate agency problems associated with managerial discretion; management may pursue self-interests at the expense of other stakeholders (Jensen and Meckling 1976; Mietzner 2017). However, transaction costs and precautionary motives are two worthy reasons for firms to hold cash. Since Keynes, in 1936, it was suggested that cash holdings have an impact on firm value when the firm faces financial friction. Following Keynes (1936), Almeida et al. (2004), Denis and Sibilkov (2010) and Pinkowitz and Williamson (2007) show that for high-growth and constrained firms, cash holdings function as a buffer against possible adverse shocks in the future to maintain financial flexibility and catch growth opportunities, particularly when external financing is costly and institutional quality is poor.

A large majority of research has investigated whether cash holdings affect firm performance (Opler et al. 1999; Faulkender and Wang 2006; Pinkowitz et al. 2006, Kalcheva and Lins 2007; Pinkowitz and Williamson 2007). Surprisingly, these studies have examined the value of cash holdings essentially for large firms. The abovementioned issues related to cash holdings are documented in a few studies (Faulkender 2002; Belghitar and Khan 2013; Al-Najjar 2015) investigating the determinants of cash holdings for small and medium-sized enterprises (SMEs) as being very relevant worldwide, while no previous evidence for the cash holdings-performance relationship exists for such firms.

Faulkender (2002) finds that SMEs with higher costs of financial distress hold more cash and

[1] Some representative references are the following. Opler et al. (1999) report that the average cash-to-assets ratio (assets net of cash) for their sample of public US-traded firms is 17%. Ozkan and Ozkan (2004) find a cash-to-assets ratio of 10% for publicly traded United Kingdom (UK) firms. Ferreira and Vilela (2004) report a 14.8% cash-to-assets ratio for European firms, and Guney et al. (2003) observe an average cash ratio of 14%. Kalcheva and Lins (2007), using data from 31 countries, find that the average cash-to-assets ratio for their sample is 12%. Bates et al. (2009) estimate that the average cash-to-assets ratio of listed US industrial firms increases from 10.5% in 1980 to 23.2% in 2006. Based on a sample from 45 countries, Drobetz et al. (2010) report that companies hold on average 12.6% of their net assets (book value of total assets minus cash) in cash and cash equivalents. Bigelli and Sánchez-Vidal (2012) find a cash-to-assets ratio of 10% for private Italian firms. Even recently Harris and Raviv (2017), have highlighted the motivating interest underlying firms to have huge amounts of cash.

that SMEs facing higher asymmetric information maintain a larger buffer of cash stock. The author also finds that older SMEs, although having a track record and reputation that allows them better access to the capital market, carry more cash. In particular, Faulkender (2002) finds a relevant impact of financial friction and constraint problems on the cash holdings of small firms. With respect to agency problems associated with managerial discretion, Faulkender (2002), Belghitar and Khan (2013), and Al-Najjar (2015), argue that corporate governance is a relevant element associated with corporate cash holdings.

Our study focuses on the relationship between cash holdings and operating performance for a large sample of European SMEs. Considering that SMEs are typically informationally opaque firms (Berger and Udell 1998) with constraints in obtaining financial resources and easy access to the external capital market, we assume the perspectives of the precautionary and financial flexibility arguments[2] as the dominant factors affecting our main relationship. To accumulate a stockpile of cash can be a valuable buffer to successfully face any contingencies. Holding large cash reserves enables companies to seize growth opportunity to address any unforeseen contingencies that would restrict access to external capital markets (Almeida et al. 2004). In particular, we first examine the cash holdings-performance relationship. Second, we investigate whether the extent to which corporate cash holdings actually have an impact on firm performance depends on firm and country characteristics. It has been argued that firm and country characteristics influence the cash holding impact on firm value in different ways. Our study incorporates a more extensive range of firm-level characteristics than previous studies (Dittmar and Mahrt-Smith 2007; Drobetz et al. 2010; Ferreira and Vilela 2004; Nikolov and Whited 2014; Opler et al. 1999; Pinkowitz and Williamson 2007) that suggest that it could moderate cash holdings-performance relationship. These firms' characteristics include debt, firm size, firm age, growth opportunities and ownership structure. Another important feature of this paper is that we contend that SMEs cash holdings-performance relationship depend on the quality of institutional context and on country financial development (La Porta et al. 1999; Dittmar et al. 2003; Levine 2005; Pinkowitz et al. 2006; Kalcheva and Lins 2007; Drobetz et al. 2010). The success of SMEs is rooted in the context in which they are based and SMEs can grow and become competitive if they operate in an effective environment with good investor protection and with a high level of financial development in the capital market. Third, building on previous studies (e.g., Denis and Sibilkov 2010), we also examine whether the liquidity shock that occurred during the recent financial

[2] There is broad consensus that small and medium-sized enterprises' (SMEs) performance is directly related to their financial flexibility (Banos-Caballero et al. 2016, Faulkender and Wang 2006). In particular, financial flexibility refers to the ability of a firm to access and restructure its financing at a low cost (Banos-Caballero et al. 2016) and being able to react to unexpected expenses and investment opportunities (Denis 2011). Most corporate finance studies focus primarily on the role of capital structure in providing financial flexibility (see, for example, Andrieu et al. 2017). Alternatively, firms can also affect their financial flexibility through their cash holding policy (Faulkender and Wang 2006).

crisis that began in 2008 affected the relationship between cash holdings and performance.

The present study contributes to this area of research in that it seeks to verify how valuable is the financial strategy of SMEs to create a buffer of cash and if it is a financial decision that is effectively able to support the business increasing firm performance. Specifically, our paper contributes to the existing literature in many ways. First, we empirically investigate the cash holdings-performance relationship, with a focus on SMEs instead of large corporation. Financial strategies of SMEs differ from large companies in terms of higher informational opacity (Berger and Udell 1998), in the form of costly verification, adverse selection, and moral hazard; the difficulty in having access to the external capital market for funding suggests the potential relevant role of cash holding policy[3]. Second, we used a very wide cross-country analysis to have higher representativeness of our sample that depicts a valid estimate of the population characteristics of SMEs being studied. To have a cross-country analysis is worthwhile because it allows for greater generalizability of the results, excluding potential country-specific factors, such as specific regulations or some specific country characteristics of firms that could limit the validity of the results. Third, we enlarge the analysis verifying whether and how the effect of cash holdings on SME performance is conditioned by certain moderators, selected according to what is revealed in the main literature, by altering the direction (sign) and intensity (magnitude) of the baseline relationship. To our knowledge, no empirical study conducted in Europe has yet studied the factors that determine a changing of the impact on SME performance for corporate liquidity.

Our analysis is based on panel data comprising 273,487 SMEs (1,203,091 firm-year observations) during 2008-2015 for 36 European countries. Using data from several countries has a further benefit for our analysis. It allows us to obtain a representative sample to appreciate the relevance to our relationships investigated by differences in environment with regard to the quality of the institutional context and the capital market development (Ferreira and Vilela 2004; Pinkowitz et al. 2006) in SMEs. Our results suggest that cash holdings have a main and dominant positive effect on corporate performance, confirming the role of transaction arguments, financial flexibility and precautionary saving motives in holding a stock of liquidity to sustain growth patterns and support firm performance. In line with Faulkender and Wang (2006) and Banos-Caballero et al. (2016), SME performance is shown to be directly related to their financial flexibility. These results are robust under a range of estimation methods. In addition, the results for our interactive models highlight the statistical relevance of firm-specific characteristics, country-specific factors and liquidity shocks in shaping the baseline relationship between cash holdings and firm performance.

[3] According to Berger and Udell (1998) and La Rocca et al. (2011), the opportunities to invest in positive net present value projects may be constrained if potential providers of external finance cannot readily verify that the firm has access to a quality project (adverse selection problem), ensure that the funds will not be diverted to an alternative project (moral hazard problem), or costlessly monitor use of the revenue by the firm they invest in (costly state verification). Having a stock of cash can solve and circumvent problems in catching growth opportunity projects.

The paper is organized as follows. Section 2 provides a review of the literature and the development of the hypotheses. In Section 3, the data, methodology and variables are presented. The descriptive statistics, main results, the results of moderating effects and additional tests are presented in Section 4. Concluding remarks follow in Section 5.

2. Research Design and Hypothesis Development

2.1 Cash holdings and firm performance

A considerable amount of theoretical and empirical work has been devoted to examining whether corporate cash decisions have consequences on firm value.[4] Within trade-off theory, transaction costs and precautionary motives argue that ample cash on hand provides operational flexibility for managers. Cash-rich firms can finance potential investment opportunities when they arise or aggressively compete with their rivals in the product market. The transaction motive introduced by Keynes (1936) states that firms hold cash to avoid the transaction costs of selling illiquid assets, converting them into cash, or using capital markets to raise funds to secure resources to meet payments due. In the precautionary motive, cash holdings function as a buffer against possible adverse shocks in the future to maintain financial flexibility and catch growth opportunities. Considering that SMEs are typically subject to asymmetric information and suffer from information opacity in searching for funding (Berger and Udell 1998), they should apply specific financing strategies that exacerbate the use of cash reserves as a tool to safeguard their financial viability. Thus, in SMEs, the use of cash stock is suggested to be a voluntary choice that reduces the sensitivity to limited access to external capital markets, creating an internal capacity to sustain growth by self-created financial resources (Pinkowitz et al. 2006). Empirical studies suggest that cash holdings have a positive implication for firm value, particularly in the presence of market imperfections related to costly external financing (Almeida et al. 2004; Pinkowitz and Williamson 2007; Denis and Sibilkov 2010; La Rocca et al. 2012). Based on the assumption that corporate insiders are better informed than external shareholders, the pecking order theory (Myers 1984; Myers and Majluf 1984) suggests that firms prefer internal finance to external finance, which in this situation, is in the form of financial cash holdings. All these arguments suggest a positive relationship between cash holdings and firm operating performance.

Hypothesis 1$_A$: Cash holdings are positively related to firm operating performance.

[4] While in this paper we focus on a the cash holdings-performance relationship, other studies examine other questions related to cash holdings. For example, Tong (2011) measures the impact of firm diversification on the value of cash holdings, arguing that cash holdings serve as a potentially important channel through which firm diversification can affect firm value. When firms face a negative shock to the supply of external funding, Duchin et al. (2010) show that firms with low cash reserves experience the greatest decline in investment.

However, although it is reasonable to assume that SMEs hold some cash to finance day-to-day operations and to provide a buffer against the cost of externally financing their investments, holding cash resources may have negative implications on performance if managers use these liquid resources inefficiently. Managers could wish to have large cash holdings for opportunistic reasons (Pinkowitz et al. 2006; Dittmar and Mahrt-Smith 2007). A stock of cash under managerial discretion can be associated with agency problems, encouraging managers to increase their compensation and perquisites or to build empires. Jensen (1986) predicts that cash reserves could induce managers to engage in value-destroying business expansion or excessive continuation of inefficient projects (e.g., due to empire building tendencies). Managers have access to cash reserves, and they can exercise their personal discretion with respect to their use and can derive private benefits more easily. The misuse view of cash holdings may also be consistent with a lack of attractive investment opportunities. Based on the real options theory (Carlson et al. 2004), investment converts risky growth options into real assets, and excessive cash resources should be distributed to investors when investment opportunities are lacking (Mietzner 2017)[5]. Previous empirical studies on the agency costs of the free cash flow argument show results that are contradictory. Harford (1999) finds that cash-rich firms are more likely to attempt value-decreasing acquisitions. Faulkender and Wang (2006) examine the marginal value of corporate cash holdings under different corporate financial policies, showing that the marginal value of cash declines with larger cash holdings. In contrast, Mikkelson and Partch (2003) investigated firms that had more than one-fourth of their assets in cash and cash equivalents for a five-year period, finding that these firms had greater investment and higher growth in assets without sacrificing corporate performance. Thus, although previous arguments are mainly based on the separation between ownership and control, that by far is not the case for SMEs; the following competing hypothesis can be formulated:

Hypothesis 1$_B$: Cash holdings are negatively related to firm operating performance.

2.2 Role of firm- and country-level moderator variables

Past studies highlight that firm characteristics and country characteristics influence the cash holding impact on firm value in different ways in the theories under consideration (Opler et al. 1999; Pinkowitz et al. 2006). Specifically, we perform our analysis using several alternative variables that can moderate the cash holdings-performance relationship.

[5] Several recent theoretical and empirical studies look at the corporate investment decisions in a real options context, specifically based on real option theory, such as Carlson et al. (2004, 2006, 2010). For example, empirical studies address the risk dynamics surrounding seasoned equity offerings (SEOs), convertible bond offerings (CBOs) (Zeidler et al. 2012) and share repurchases (Mietzner 2016).

2.2.1 Leverage

The use of debt has a potential relevant role, as suggested by Graham and Harvey (2001), in terms of financial flexibility. In this regard, debt and cash holdings, sharing a similar potential linkage in terms of financial flexibility, can have a complementary or a substitution effect. Several papers (Opler et al. 1999; Dittmar et al. 2003; Ferreira and Vilela 2004; Ozkan and Ozkan 2004; Acharya et al. 2007; Bates et al. 2009) recognize that leverage plays a significant role in shaping firms' cash holdings. However, the sign of the conditioned effect between cash holdings and leverage is ambiguous (Ferreira and Vilela 2004).

On the one hand, according to a perspective that looks ahead at the future activities of the firm, SMEs with a high level of debt would probably face a higher probability of failure and will be interested in substantial cash reserves in order to safeguard the survival of the company from the risk of financial distress. Thus, the value of holding cash is amplified. According to Ferreira and Vilela (2004) leverage can increase the probability of bankruptcy due to the pressure that rigid amortization plans put on the firm treasury management. In this situation, having more stock of cash reduces the probability of experiencing financial distress and improves the probability to catch growth opportunities, achieving success in the long run. With a focus on SMEs, Faulkender (2002) finds that to reduce the probability of experiencing financial distress, firms with higher leverage are expected to hold more cash. Having a high level of debt, and so having difficulty in meeting scheduled interest payments, undermines firm performance because firms can miss net present value projects. In this situation, having a larger stock of cash improves the probability of the firm catching growth opportunities and achieving success in the long run. Thus, a higher and increasing level of debt amplifies the positive effect of cash holdings on firm performance. In this way, the role of cash in overcoming financial flexibility problems is magnified. On the other hand, other arguments lead to the opposite conclusion (Ferreira and Vilela 2004). According to a perspective that looks at the past activity of the firms, if SMEs show higher indebtedness, it could mean that they were able to easily access credit in the market, obtaining a larger amount of funds. To the extent that the leverage ratio can act as a proxy for debt capacity (the ability of the firms to issue debt), it would be expected that in firms with higher leverage, the value of cash holdings are reduced (Ferreira and Vilela 2004). Moreover, from a different point of view, a higher level of debt creates a need for the use of cash to pay back interest. In this way, the stock of cash is no longer as relevant to support the business and sustain better firm performance but is at the core of reimbursing interest and debt capital. Thus, as a consequence, having a stock of cash does not provide any relevant benefits in terms of greater capability to catch growth opportunities and attain superior performance.

Therefore, we test whether and how the relationship between cash holdings and performance changes, conditioned on debt. The following competing hypotheses are suggested:

Hypothesis 2_A: The relationship between cash holdings and operating performance is positively moderated by debt.

Hypothesis 2_B: The relationship between cash holdings and operating performance is negatively moderated by debt.

2.2.2 Firm size

The importance of precautionary cash varies substantially with a firm's size (Brennan and Hughes 1991; Fazzari and Petersen 1993; Barclay and Smith 1995; Ozkan and Ozkan 2004). In effect, small and medium-sized firms suffer more from problems associated with asymmetric information, such as adverse selection and moral hazard, and therefore, SMEs face higher costs of external financing (Brennan and Hughes 1991; Fazzari and Petersen 1993). Larger firms should have less information asymmetry between themselves and the markets, as larger firms generally have more complex banking and financial structures and are more likely to have raised capital more often (Faulkender 2002). Miller and Orr (1966) model demand for money by firms, suggesting that economies of scale exist in cash management. Despite economies of scale as a benefit of cash, financial constraint problems and asymmetric information issues should lead larger firms to hold less cash than smaller firms (Ferreira and Vilela 2004). Ozkan and Ozkan (2004) argue that large firms hold less cash because they are more likely to be diversified and, hence, less likely to experience financial distress (Titman and Wessels 1988). Even Faulkender (2002) argues that economies of scale exist in raising funds, suggesting that larger firms may hold relatively less cash than smaller firms because they are better able to obtain credit in the market since they have a lower likelihood of distress. Thus, smaller SMEs should be the ones holding a larger stock of cash for use in sustaining firm performance. As a consequence of the higher asymmetric information problems smaller firms face, cash holdings are more valuable for such firms. In line with the studies cited above, we expect a negative moderating effect of firm size on the cash holdings-performance relationship.

Hypothesis 3: The relationship between cash holdings and operating performance is negatively moderated by firm size.

2.2.3 Firm age

From its inception to maturity, the financial needs of a firm change by evolving financing preferences and modification in the nature of specific financial choices that a firm makes during its lifecycle. Firms in the earlier stages of their lifecycles, that arguably tend to have larger levels of

asymmetric information, more growth opportunities, and reduced size, should apply specific financing strategies that differ through the different phases of their lifecycles. Dittmar and Duchin (2016) provide evidence that firm age is an important determinant of cash holdings. The main literature suggests that younger firms are more sensitive to asymmetric information problems and financial constraint issues. According to Baker and Wurgler (2002), whereas young firms actively maintain a target cash ratio, which is largely determined by the precautionary savings motive and exploits high market valuations to raise cash, older firms adjust their cash ratios much more slowly, with significantly less regard for the precautionary savings motive. Older firms allow their cash balances to fluctuate with transitory financing deficits and surpluses. Opler et al. (1999) show that firms with lower, more volatile cash flows and higher investment opportunities hold more cash. Almeida et al. (2004) find that financially constrained firms save more cash out of cash flow; in addition, according to Faulkender (2002), older firms should have a longer history of capital market transactions and successful operations, which should, all else being equal, give them a better reputation and an improvement in the amount of information the markets have about them. Thus, the previous literature suggests that younger firms, which are strongly sensitive to asymmetric information and more financial constraint problems, typically hold higher stocks of cash. In line with the studies above, based on the precautionary savings motive, we expect a stronger positive association between cash holdings and firm performance in firms that are young. Alternatively, the positive association will be weaker in firms that are old.

Hypothesis 4: The relationship between cash holdings and firm operating performance is negatively moderated by firm age.

2.2.4 Growth opportunity

Firms with high growth opportunities have a higher cash requirement. Previous studies (Opler et al. 1999; Ferreira and Vileda 2004; Ozkan and Ozhan 2004) show that growth opportunities are positively associated with cash holdings. These results are sustained by a precautionary motive, suggesting that growing firms raise cash holdings to reduce the probability of financial distress. García-Tenuel and Martinez-Solano (2008) explain that SMEs with good investment opportunities are not able to support them financially due to higher costs of external financing that they face, forcing firm to use internal funds. Concerning the performance implication, Pinkowitz and Williamson (2007), supposing that growing firms raise cash to have the ability to finance the future investment opportunity set, find that firms with good growth options have their cash valued at a significant premium. Thus, we can expect that a key determinant of the value of cash holdings should be the firm's investment

opportunity set. Therefore, the role of growth opportunities in the relationship between cash holdings and performance is directly related to the role of financial flexibility and precautionary motivations. Larger cash reserves will be valuable and relevant in sustaining performance when the growth opportunities are greater as well as is the risk of missing them (Faulkender and Wang 2006). Thus, we formulated our hypothesis as follows:

Hypothesis 5: The relationship between cash holdings and firm operating performance is positively moderated by firm growth opportunities.

2.2.5 Ownership concentration

In SMEs, many CEOs are also founders or family members, which somewhat mitigates the principal-agent problems described by Jensen and Meckling (1976) but not the principal-principal problems (Dharwadkar et al. 2000). It suggests that agency costs arise as a result of conflicts between the principal and principal (i.e., the owners of the firm). Although CEOs or founders may hold a large ownership stake, they may not necessarily behave in ways that benefit other owners as well. Indeed, previous studies suggest that in most SMEs, family ownership concentration leads to risk aversion and consequently to less strategic change activities (Brunninge et al. 2007), for example, internationalization (George et al. 2005), even if the firm has a large set of investment opportunities. Concerning the cash holdings literature, the empirical evidence shows that the presence of families as controlling shareholders is associated with higher levels of cash holdings, which lead to lower firm values (Kalcheva and Lins 2007; Ozkan and Ozkan 2004). Accordingly, we could hypothesize that a higher ownership concentration leads to cash holding retention that can reduce operating performance. However, other arguments lead to the opposite conclusion. A lower level of agency conflicts in founder or family firms, because the controlling shareholders have sufficient incentives and information to run the firm efficiently (Anderson et al. 2003; Villalonga and Amit 2006), leads to a positive impact of cash holdings on firm performance (Lau and Block 2012). Therefore, these two competing hypotheses can be formulated.

Hypothesis 6$_A$: The relationship between cash holdings and firm operating performance is negatively moderated by ownership concentration.

Hypothesis 6$_B$: The relationship between cash holdings and firm operating performance is positively moderated by ownership concentration.

2.2.6 Institutional context

Since the work of La Porta et al. (1998), the role of country-level differences in economics has

been investigated. The environment provides the basic business support to foster the success of SMEs. SMEs are often weak economic actors if considered individually, but they can reach high levels of competitiveness if they work in an efficient environment. In general, many studies have tried to understand whether an efficient institutional context influences corporate activities. Previous studies on large corporations have highlighted the existence of systematic differences in cash holding antecedents and consequences related to the institutional contexts a firm is based on (e.g., Drobertz at al. 2010). The impact of holding cash on firm performance can change in magnitude and even direction according to the institutional differences in term of investor protection and financial development (Pinkowitz et al. 2006).

Several studies, in line with the agency costs of free cash flow, report that the positive relation between cash holdings and firm value is much weaker in poorer institutional context where controlling shareholders are more able to extract private benefits from cash holdings than in countries with better institutional context where controlling shareholders are less able to extract private benefits from cash holdings (Dittmar and Mahrt-Smith 2007; Pinkowitz et al. 2006; Kalcheva and Lins 2007; Harford et al. 2008).

Hypothesis 7_A: The relationship between cash holdings and firm operating performance is positively moderated by the institutional context.

In contrast to previous arguments, different forces can be in action. The decision to have a stockpile of cash may reflect an entrepreneurial choice, so as to avoid missing growth opportunities and have a buffer against negative contingencies, but it can also be due to inefficient institutions context. Therefore, other studies find that high levels of investor protection and financial development may also support corporate governance and transparency (Stulz 2005; Desai et al. 2007; Chen et al. 2014), which could allow firms to hold less cash. Thus, firms that operate in better functioning institutional context, being able to easily obtain financing and spur growth, are expected to report a reduced relevance of having stock of cash.

Specifically, the direct effects of institutions' quality in facilitating credit access and indirectly on decisions to hold cash may depend strictly on the abilities of these institutions to solve information problems, e.g., by engaging in screening, contracting, and monitoring activities (Beck et al. 2002). Thus, a negative relation between country development and cash holdings is assumed to be a by-product of financial constraint problems and precautionary motivation in holding cash (Chen et al. 2014). Financial constraint problems are magnified with regard to SMEs in that, as opaque firms, they typically have difficulty in accessing the credit market. In poor institutional context, where firms are more likely to experience stronger financial constraint problems, holding a stock of cash is assumed to

have a positive effect on firm performance due to firms' higher capability to safeguard financial flexibility, thanks to the buffer of liquidity (precautionary motivation in holding cash). Vice versa, better financial institutions reduce the need for a safe buffer of cash for potential negative contingencies by having a market readily available to fulfil the firms' requests. In this line, Faulkender and Wang (2006) show that the value of cash holdings decreases when access to credit improves. We thus formulate the following hypothesis:

Hypothesis 7b : The relationship between cash holdings and firm operating performance is negatively moderated by the institutional context.

3. Data and methodology

3.1 Dataset

Central to our analysis is the firm-level Orbis database provided by Bureau van Dijk. This dataset has the most extensive collection of financial and business information for SMEs across the globe. It further harmonizes the financial accounts to allow for accurate cross-country comparisons.

We used the Orbis Europe database, version 129, which was updated on 07/09/2017 (n° 16303), taking companies with the financial data during the period from 2007 to 2015 in 37 countries[6]. We treat the European countries as one product market because of the strong trade relationships among these countries. Even after the enlargement of the European Union, the EU countries in our sample represent approximately 90% of total EU gross domestic product (GDP) (based on Eurostat statistics for 2010). For the empirical analysis, all financial, insurance, government/public sector and education sectors are not included in the sample. These sample requirements are in line with those by Opler et al. (1999) and Ferreira and Vilela (2004).

We keep in our sample small and medium-sized firms that play a central role in the European economy and are a major source of entrepreneurial skills, innovation and employment. The definition of SMEs that we use is based on the Commission Recommendation 2003/361/EC.7. In accordance with Article 2, the definition of SMEs adopted by the European Commission is the following: (i) small and medium-sized enterprises (SMEs) are made up of enterprises that employ fewer than 250 persons and have an annual turnover not exceeding EUR 50 million and/or an annual balance sheet total not exceeding EUR 43 million; (ii) within the SME category, a small enterprise is defined as an enterprise that employs fewer than 50 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 10 million; and (iii) within the SME category, a microenterprise is defined as an firm

[6] To solve the reporting lag problem, we did not consider firms in 2016 because at the data of September 2017 not yet all the balance sheets were available. The number of firms in 2016 was lower of around 48% in comparison to our number of firms in 2015.

[7] EUR-LEX: 2003/361/EC: Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises, Official Journal of the European Union L124/36, 20.5.2003, p.36-41.

that employs fewer than 10 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 2 million. We exclude a firm from our dataset if at least one of the following two conditions is met: (a) the number of employees is fewer than 10 persons, and annual total assets do not exceed EUR 2 million, and (b) the total employment at the firm is more than 250 employees, and the annual balance sheet total exceeds EUR 43 million.

Then, we require reporting firms to have some basic financial information in their accounts over the years (i.e., data on total assets, cash and cash equivalents, and earnings before interest and taxes). We eliminate observations when there are input mistakes (e.g., non-positive values for total book assets and a negative number of years the firm has been operating). We had to eliminate from the sample all the observations concerning Romania. There was no information for some years (2008, 2009 and 2010), and for the period from 2011 to 2015, there was the strange result that all the firms had the same age. Thus, we had to eliminate 5,297 observations. Moreover, to limit the potential impact of outliers, we winsorize all variables at the 1st and 99th percentiles before performing data description and empirical analysis. To calculate the variable Growth Opportunity, based on sales growth, we lost the year 2007.

After performing our data selection, we ended up with an unbalanced panel, comprising 1,203,091 firm-year observations during the period 2008-2015 in 36 countries. The sample comprises SMEs from the following industries: manufacturing (52.16%), construction (24.76%), transportation (11.07%), agriculture, forestry and fishing (7.5%), sewerage, waste management and remediation activities (1.84%), electricity, gas, steam and air conditioning supply (1.47%), and mining and quarrying (1.10%). Finally, data on country-specific variables were obtained from the World Bank website for the years 2008 through 2015.

3.2 Methodology and variable definitions

We investigate the relationship between cash holdings and firm operating performance using the following baseline model:

$$ROA_t = \alpha + \beta \times Cash\ holdings_i + \sum_{j=1}^{N} \delta_j \times Firm\ Specific\ Controls_i^j + \\ + Year\ F.E. + Country\ F.E. + Industry\ F.E. + \varepsilon_i \qquad (1)$$

where *i* represents the firm, *t* represents the year and *j* denotes the number of control variables. We use as the main dependent variable, a proxy for operating performance. Operating performance (ROA) is measured as annual earnings before interest and taxes divided by total assets at the end of the

year. Following the literature on cash holdings (Almeida et al. 2004; Ozkan and Ozkan 2004; Arslan et al. 2006; Bates et al. 2009; La Rocca et al. 2012), our cash measure (Cash Holdings) is the ratio of total cash and equivalents divided by total assets.

Taking into account the previous literature (Opler et al. 1999; Ferreira and Vilela 2004; Han and Qiu 2007; Kalcheva and Lins 2007; La Rocca et al. 2012; Ehling and Haushalter 2014), we use Leverage, Size, Age, Growth Opportunities, Ownership Concentration, Tangibility, and Net Working Capital as the control variables. These firm-specific variables used in our analysis are described in detail in Table 1.

-Insert Table 1 about here-

Empirically, we estimate both cross-sectional and panel regressions to investigate the relationship between cash holdings and firm operation performance. In several cross-sectional models, we also control for year (Year F.E.), country (Country F.E.), and industry (Industry F.E.) fixed effects based on the three-digit NACE codes. Finally, we regress the changes in our operating performance variables on changes in the explanatory variables. The first differencing, approach explicitly considers how changes in cash holding over time affect changes in ROA over the same time period. This model reduces concerns about omitted variables in our previous (levels) specification. In the panel regression framework, we control for time-invariant firm-specific characteristics. This estimator reduces or even avoids bias with respect to any omitted variables.

In equation (1), in the baseline models, we evaluate the unconditioned impact of the variable Cash Holdings on operating performance. Equation (2) is used to investigate the impact of cash holdings as conditioned by different levels of firm-level and country-level determinants (from Hypothesis 3 to Hypothesis 8). Following Brambor et al. (2006), the interaction models should include all of the constitutive terms.

$$ROA_i = \alpha + \beta \times Cash\ \ holdings_i + \gamma \times Z_i + \xi \times Cash\ holdings_i \times Z_i$$
$$+ \sum_{j=1}^{N} \delta_j \times Firm\ Specific\ Controls_i^{\,j} +$$
$$+ Year\ \ F.E. + Country\ \ F.E. + Industry\ \ F.E. + \varepsilon_i \qquad (2)$$

where Z is the moderator variable (measured at the firm or country level). Specifically, Hypothesis 2 to Hypothesis 6 are tested by adding interaction terms between the variable Cash Holdings and firm-level characteristics (alternatively, the variables Leverage, Size, Age, Growth

Opportunity and Ownership Concentration). Moreover, Hypothesis 7 and Hypothesis 8 are tested by adding interaction terms between the variable Cash Holdings and country-level characteristics. In all cases, we estimate cross-sectional regressions including year, country and industry fixed effects.

According to Brambor et al. (2006), for multiplicative interaction models, much more useful information is obtained by plotting the marginal effect of the variable Cash Holdings, across the observed range of moderator variables, rather than using a traditional table of results. The marginal effect of Cash Holdings and its standard error conditional to Z are calculated, respectively, as:

$$\frac{\partial ROA_{it}}{\partial Cash\ holdings_i} = \beta + \xi \times Z_i \quad (3)$$

$$\sigma = \sqrt{\text{var}(\beta) + Z^2{}_i \times \text{var}(\xi) + 2 \times Z_i \times \text{cov}(\beta\xi)} \quad (4)$$

In particular, the Z variables refer, alternatively, to all our moderator variables. Thus, we consider the partial effect of cash holdings conditional on the level of our moderators, that can change sign and gain or lose significance according to the value of our moderators. To provide a concise report on these figures, we will graph the marginal effect of cash holdings, along with its 95% confidence intervals, across the range of moderators used.

4. Results

4.1 Descriptive statistics

Table 2 shows the descriptive statistics of the variables that we employ in our analysis. Based on a sample of SMEs from 36 European countries for the period 2008-2015, we find that the average firm in our sample has an ROA of 6.7% and holds 10% of its total assets as liquidity. Firms in the lowest first quartile have, on average, only 0.7% of their total assets in cash and cash equivalents. The median cash holding is 3.6%, whereas firms in the third quartile have a cash ratio of over 13%. The mean value of cash holdings in our sample of European SMEs follows the same pattern shown in prior studies, as reported in the review of the literature. For example, in the US, the mean cash holdings were 7% in the period 1980-1995 and 10% in the period 1995-2010 (Harris and Raviv 2017). As observed in Table 2, firms have a leverage ratio amounting to 16.9% in mean. The firm size is 4,261 million euros with and the mean firm age is 27 years. The average growth of SMEs in our sample is approximately 9.1%. The firms in the sample show, as expected, a very high degree of ownership

concentration, equal on average to 79.7%. The ratio of tangible assets to total assets equals 26.7%, and the ratio of net working capital to total assets is 20.8%.

-Insert Table 2 about here-

The correlation matrix in Table 3 represents the correlation coefficient of the firm-specific variables used in the model. The correlation matrix reveals that cash holdings and firm performance (ROA) are positively correlated, with a correlation coefficient of 0.22. Problems in correlations between variables that might affect the validity of the econometric results due to multicollinearity were also tested using variance inflation factors (VIFs). The maximum VIF that resulted from any of the models was 1.28, which is far above the generally employed cut-off of 10 (or, more prudently, 5) for regression models. The results show that the absence of multicollinearity is acceptable.

-Insert Table 3 about here-

To provide a big picture and a deeper understanding of the sample used to appreciate the reliability and validity of the empirical results, we added further univariate statistics following the same approach used by Pinkowitz et al. (2006).

-Insert Table 4 about here-

-Insert Table 5 about here-

In particular, Table 4 reports the means of the dependent and explanatory variables used in our model jointly with information on the number of firms available in our sample over the years. Similarly, Table 5 shows the means of the dependent and explanatory variables used in our model jointly with information on the number of firms available in our sample for all the countries considered in our sample. In Table 4, the statistics relating to the number of firms detail the distribution of firms in each year across countries, while in Table 5, the statistics relating to the number of firms detail the distribution of firms in each country across years.

Based on Table 4, the results exhibit very high stability in cash holdings over the years, with just two exceptions concerning the reduction between 2008 and 2009 and the increase between 2014 and 2015. The ROA shows a changing trend, similar to Leverage and Growth Opportunities. The degree of Ownership Concentration, Tangibility, Net Working Capital and the Age of the firms show a reduction

over the years. With regard to Table 5, as we would expect, there is substantial variation in Cash Holdings across countries. In terms of Cash Holdings, lower values are reported for the Republic of Moldova (equal to 2.7% on a mean of 40 firms per year), Montenegro (equal to 3.7% on a mean of 32 firms per year), and Slovenia (equal to 4.4% on a mean of 1,156 firms per year). In contrast, higher values of Cash Holdings are reported for Ireland (equal to 17.2% on a mean of 22 firms per year), France (equal to 15.9% on a mean of 11,163 firms per year) and Bulgaria (equal to 15.9% on a mean of 6,216 firms per year).

4.2. Empirical results

4.2.1 Baseline results

This section describes the results of an empirical analysis of the relationship between cash holdings and firm operating performance. The results from these regressions are shown in Table 6. Of primary interest in our analysis is the coefficient of the explanatory variable Cash Holdings. In effect, across all specifications in Table 6, the coefficient of cash holdings is significant at the 99% confidence level.

-Insert Table 6 about here-

In particular, Model 1 of Table 6 presents the baseline results of equation (1). The statistically significant and positive coefficient of the variable cash holdings is consistent with our assumption that cash holdings, in line with transaction and precautionary saving motives, is positively related to firm performance. Consequently, Hypothesis 1_A is confirmed. This finding is in line with the results of Almeida et al. (2004), Denis and Sibilkov (2010), and La Rocca et al. (2012). Concerning the control variables, Leverage, Size, Growth Opportunities, Ownership Concentration, and Net Working Capital have coefficients that are statistically significant.

We perform a set of further tests to check the consistency of the previous results. Model 2 is the same as the Model in column (1) but without Year, Country and Industry fixed effects and, in Model 3 we exclude Industry fixed effects. The results show that even with different combinations of Year, Country- and Industry-fixed effects the effect of Cash Holdings on firm operating performance remain the same. Finally, Model 4 shows that the positive association between cash holdings and firm operating performance persists in a panel regression framework, in which we control for both time-varying firm characteristics as well as for year-, country-, and firm-fixed effects. The models showed consistent estimators, exhibiting acceptable R^2 values across each performance equations. . In sum, in all the columns of Table 6, the results are qualitatively similar and confirm what is obtained in Model 1

regarding the overall positive effect of cash holdings on firm operating performance.

4.2.2 The effect of firm-specific moderator variables

Hypotheses 2 to 6 are tested in Table 7. Model 1 to Model 5 show the empirical evidence with regard to the relationship between cash holdings and performance moderated by firm-specific variables, according to the hypotheses formulated.

-Insert Table 7 about here-

Model 1 of Table 7 reports the regression results for the examination of the moderating effect of Leverage on the relationship between cash holdings and performance. Model 1 reveals that the coefficient on Cash Holdings x Leverage is negative, suggesting that the positive effect of cash holdings is negatively moderated by firms' leverage ratio. These findings suggest that the estimated coefficient of Cash Holdings is larger in Low-Leverage than in High-Leverage firms, so the effect of Cash Holdings on performance decreases with increasing debt. Consequently, Hypothesis 2_B is confirmed. This result is in line with Faulkender and Wang (2006) and shows that the additional value of corporate liquidity decreases for high levels of debt.

The results in column (2) confirm Hypothesis 3, showing that the effect of corporate liquidity on performance depends on firm size. Specifically, we find that the coefficient on Cash Holdings x Size is negative, suggesting that the positive effect of cash holdings on firm operating performance decreases in magnitude in larger SMEs than in smaller ones, confirming Hypothesis 3. These results are consistent with earlier analyses (e.g., Brennan and Hughes 1991; Ferreira and Vilela 2004) that find that information asymmetries are particularly strong for small firms. Thus, in smaller SMEs, the availability of cash holdings provides stronger support to sustain corporate performance.

We also examine firm Age as a moderator (Model 3), which may be related to the causal link between cash holdings and operating performance. We find that the coefficient on Cash Holdings x Age is negative, suggesting that the relationship between cash holdings and firm operating performance is negatively moderated by firm age, suggesting that cash holdings' effect on firm operating performance is greater for young firms compared to mature SMEs. Hypothesis 4 is confirmed. This result is consistent with the findings of Baker and Wurgler (2002), Faulkender (2002), Pinkowitz et al. (2013) and Dittmar and Duchin (2016).

The regression results reported in Table 7, Model 4 concern the marginal effect of cash holdings and how this is conditioned by the firm's growth opportunities. We find that the coefficient on Cash Holdings x Growth Opportunity is positive, conforming Hypothesis 5. The effect of cash holdings on

performance increases when SMEs have greater growth opportunities, suggesting that as the firms have greater investment opportunities, having a stock of cash is valuable for successfully catching them. These are situations in which firms' stockpiling cash is optimal to be able to fund potential future investment projects. This result is in line with the findings of Pinkowitz and Williamson (2007). Finally, Model 5 suggests that ownership also has a positive impact on the cash holdings-operating performance relationship because the coefficient on Cash holding x Ownership Concentration is positive. This result confirms hypothesis 6_B. The effect of cash holdings on performance increases for higher levels of ownership concentration, suggesting that stronger control inside the firm allows for better use of cash and stronger performance.

Following Brambor et al. (2006), Figures 1 (a) to 1 (e) exhibit the marginal effect for a one-unit increase in Cash Holdings across different levels of the observed range of firm-level moderator variables. The solid black line indicates how this marginal effect changes with ownership concentration. The 95% confidence intervals around this line allow us to determine the conditions under which the variable Cash Holdings has a significant effect. The marginal effect is significant whenever the upper and lower bounds of the confidence interval are above (or below) the zero line.

- Insert Figure 1 about here –

According to Figure 1 (a)–(c), the influence of Cash Holdings on firm performance is indeed dependent on the moderator variables studied. At low levels of these moderators, the estimated marginal effect of the cash holdings is positive and significant (the confidence band does not include the zero line). When the value of such moderators increases, the impact of cash holdings on firm performance changes. In particular, these figures suggest that cash holdings (the solid sloping lines) have a significant positive effect on firm performance, but this positive effect decreases with Leverage, Size and Age. Figure 1 (d) and (e) show that the positive effect of cash holdings on performance increases in regard to growth opportunities and ownership structure. Interestingly, we find that all these effects are significant for the entire range of the moderator variable. In summary, these graphical results confirm and reinforce the interpretation of the numerical results in Table 7.

4.2.3 The effect of country-specific moderators

Table 8 shows the empirical evidence with regard to the relationship between cash holdings and performance influenced by institutional country-based moderating variables. In particular, we use two types of factors. First, we consider the role of governance in affecting the value of cash holdings. The following three governance moderating variables are considered: (a) the Anti-Director Rights Index (ADRI), which is the "revised" version of the anti-director rights index that was provided by La Porta

et al. (1998) and used as a measure of legal shareholder rights protection (Spaman 2010). A low value of the index indicates a country that permits many restrictions on shareholder rights and does not protect minority shareholders against oppressive actions by controlling shareholders. (b) The Anti-Self Dealing Index (ASDI) concerns the extent of protection of minority shareholders that each country affords against expropriation, in terms of self-dealing or tunnelling by the management or by a controlling shareholder. It assesses, combining a variety of dimension of expropriation problems, the barriers that each country imposes on that self-dealing transaction. A low value of the index indicates a country that imposes few restrictions on self-dealing. (c) The Rule of Law Index (LAW) measures the overall quality of a country's legal system and other background institutions. This index, developed by the World Bank, is based on Kaufmann et al. (2004) and considers perceptions of crime, the effectiveness of the judiciary, and the enforceability of contracts.

Second, we consider the role of financial development in the capital market through three variables collected from the World Bank database: (a) total value of all listed shares in a stock market (market capitalization), based on the share price times the number of shares outstanding (including their several classes) for listed domestic companies, as a percentage of GDP; (b) domestic credit to private sector by banks as a percentage of GDP refers to financial resources provided to the private sector by banks, as through loans, that establish a claim for repayment; and (c) domestic credit provided by the financial sector as a share of GDP measures banking sector depth and financial sector development in terms of size. Credit, as an engine of productivity growth, is an important link in money transmission; it finances production, consumption, and capital formation, which in turn affect economic activity. The higher these measures are, the higher the financial resources or financing is to the private sector in a country, and so the greater the opportunity and space for the private sector to develop and grow. The better the private sector becomes and bigger role it has the in national economy, the better the health and development of the economy of this country. Even more than the stock market development, it is expected that the credit market development can affect the financial policies of SMEs.

-Insert Table 8 about here-

Table 8, from column (1) to column (6), reports the results concerning the role of the quality of the financial institutional context and financial development. The sample composition is lower compared to our main model because some country-based moderators are not availability for some countries (i.e. concerning the Rule of Law index we did not have information on Cyprus, Latvia, Lithuania, Luxembourg, Malta, Slovakia). Concerning the measures of the quality of the institutional context (Model 1 to Model 3), we in general confirm hypothesis 7_B. The coefficients on Cash Holdings x ADRI and on Cash Holdings x Law are negative and statistically significant. The coefficient on Cash

Holdings x ASDI is negative but not statistically significant. Thus, Hypothesis 7_B is mainly confirmed. Concerning the moderating effect of financial development proxies, comparing results in Table 8, Model 4 to Model 6, we note a significant negative coefficient on all interactive terms. Hypothesis 8 is also confirmed.

- Insert Figure 2 about here –

Figures 2(a) to 2(f) exhibit the marginal effect for a one-unit increase in the effect of cash holdings on performance across different levels of the observed range of country-level moderator variables. These figures suggest that the positive effect of cash holdings on performance decreases in all proxies of institutional quality, and these effects are significant for the entire range of institutional quality moderator variables.

Figure 2(d) to 2(f) need a further comment. Indeed, when market capitalization on GDP is higher than 1.5, the moderating effect is not significant (less than 1% of the firm-year observations or, to be precise, only 5 observations fall in the area of not being significant). Similar results occur for domestic credit by banks for values higher than 2.3 (less than 1% of the firm-year observations); in this case, the results become statistically non-significant beyond a threshold value that is of interest only for firms of Cyprus.

Therefore, to sum-up, our analysis shows that the differential value in cash holdings across countries is related to the institutional quality. The result that cash is worth more in countries with a low level of financial and economic development raises the concern that the higher value of cash in countries with low investor protection is due to precautionary motivation. The result that cash is worth more in countries with a low level of financial and low level of investor protection and shareholder rights suggest the relevance of precautionary motivations.

4.2.4 The value of Cash Holdings along the years

Faulkender and Wang (2006), Acharya et al. (2007), Denis and Sibilkov (2010) and Fresard (2010) provide evidence that the benefits from cash holdings are especially important when firms face negative shocks. The findings also indicate that the benefits of holding more cash around negative shocks, like those described by Harford et al. (2003), are greatest for small firms. For large firms, the ability to use external financing reduces the importance of internal financing around shocks. A financial crisis erupted in August 2007 with the bursting of the housing bubble in the United States. Contaminated balance sheets of financial institutions and excessive use of complex and opaque financial products caused the effects to spread rapidly around the world (European Commission 2009). By 2008, Europe was suffering severe recession, which continued in 2009. However, by 2010, most EU member states were experiencing at least a minimal degree of economic growth again (Cameron 2010). It is difficult to say in what year the financial crisis ended in Europe because this differs for each country. The economic contraction in the EU as a whole ended in the third quarter of 2009, but only in the second quarter of 2010 did the growth rate in the EU return to the level experienced before the crisis (Cameron 2010).

The literature provides ample evidence of how the financial crisis affects corporate cash holdings. For instance, Schwert (1989) shows that stock volatility increases during recessions and financial crises in the US from 1834 to 1987. He states that volatility of stock returns reflects uncertainty about future cash flows and discount rates and is therefore an important business cycle indicator. Arslan et al. (2006), studying the effects of a severe financial crisis in Turkey, find that in times of crisis, the ability of firms to raise external financing is reduced, which makes firms more liquidity constrained. Moreover, Arslan et al. (2006) find that during a financial crisis investments become more sensitive to internal funds. Duchin et al. (2010) find similar results for US firms during the recent financial crisis. They show that the supply of external financing contracted during the crisis and, as a result, corporate investments were more sensitive to internal resources. Also, Ivashina and Scharfstein (2010) find evidence of larger credit constraints during the crisis. They study bank lending during the recent financial crisis and find that lending falls across all types of loans. This decline in the supply of funding then imposes larger credit constraints on firms. Finally, Campello et al. (2010) survey chief financial officers (CFOs) in the United States, Europe and Asia to assess credit constraints during the financial crisis. In the US, almost 90% of constrained CFOs stated that they had to forego profitable investment opportunities because they were unable to attract external financing. Similar results are found for Europe and Asia.

Therefore, we conduct empirical analysis on the consequences of cash holdings on corporate performance along the years to understand the moderating effect of the financial crisis. To better do

this we needed to enlarge our sample to years previous to 2008. We got financial data for this further analysis concerning the period 2004-2007 from the Amadeus database version 7.04 published by Bureau van Dijk, which is dated August 2012 (n° 2155). Specifically, we had to deal with some problems: (a) we had to deal with the matching among the id code of the firm between the actual database and the database for the period 2004-2007, (b) the ownership concentration variable was not available any longer and (c) we were able to obtain the data for only 10 countries instead of 36.

Thus, we merged this dataset with our main data, having on the whole, a sample of 1,031,465 observations for the period 2004-2015 with regard to these countries: Belgium, the Czech Republic, Finland, France, Germany, Italy, Norway, Portugal, Spain, and the United Kingdom. Discarding other countries for the years from 2008 to 2015 generates a reduction of 35% in the sample (600,064 observations deleted). To test how the relationship between cash holdings and firm performance was affected by the financial crisis, we run our main model year by year.

-Insert Table 9 about here-

- Insert Figure 3 about here –

The regression results reported in Table 9, from column (1) to column (12), concern the relationship between cash holdings and firm performance over the years, showing the role of macroeconomic shocks, such as the recent financial crisis. We can identify three subperiods: (1) the pre-crisis period of 2003-2007, (2) the "hot crisis" period of 2008-2009 and (3) the post-"hot crisis" period of 2010-2015.

The results in Table 9 and Figure 3a show that the recent financial crisis strengthened the positive impact of cash holdings on corporate performance. Estimates reveal a positive effect of cash holdings on performance for firms over the pre-crisis period of 2004-2007 as well as for firms over the period of 2008-2009 and 2010-2015 (the coefficient of the variable Cash Holdings is significantly positive at the 99% confidence level in all the regressions). However, the positive effect of cash holdings jumped to become more strongly positive during the crisis years than in 2003-2007. The coefficient of the variable Cash Holdings for firm-year observations for the period pre-crisis 2004-2007 is 0.146, while it jumped during the crisis period, 2008-2009, to 0.198, and even in the upcoming years, it remained with the same impact (equal to 0.194 for the period 2010-2015)[8]. It is worth noting that while the effect of cash holdings on SME performance changed over the years, the mean value remained almost the same during the entire period. Figure 3b shows a significant reduction between

[8] We check that the results we got for the period 2008-2015 using the combined sample for on 10 countries, was absolutely similar to outcome obtained using our main sample based on 36 countries which include ownership concentration.

2007 and 2008 with a reverting trend in the following years. This means that during the financial crisis, SMEs tried to keep the same stock of cash, while it became more valuable to have a buffer of cash in supporting the business. The positive impact of corporate liquidity on performance became stronger than over the period before the crisis, implying that benefits from holding more cash around negative shocks are relevant for SMEs (e.g., Faulkender and Wang 2006; Acharya et al. 2007). According to the precautionary savings motive, comparing cash holdings for the pre-crisis period and the crisis period, SMEs tended to hold less cash during the crisis years. This is likely because during the crisis, SMEs used their stock of cash to address transactions, and this use of the cash holdings had a strong positive effect, thus sustaining firm performance. Therefore, cash holdings can play an active role in supporting firm financial needs.

4.3 Additional analysis

This section aims to offer a set of empirical analyses to test for robustness and support our main results concerning the effect of cash holdings on SMEs performance.

-Insert Table 10 about here-

Alternative proxies of dependent variables, different econometric estimators and different functional form. Table 10 (Model 1 and Model 2) shows the results of cross sectional regression with different measures of firm operating performance. For the dependent variable in Model 1, we use Ind. Adjusted ROA. Similar to the methodology in Cornett et al. (2007), Denis and Kruse (2000) and Lie (2001), this proxy is based on EBIT/total assets ratio, adjusted for the specific sector, subtracting, for each year of observations, the average value obtained from the same-industry-related firms. In Model 2, it is used Cash Flow ROA measured as EBITDA minus Δ Net Working Capital minus Taxes, all scaled by Total assets. Both the coefficients we obtain for firm cash holdings confirm our previous results.

To check for problems of persistence and stationarity in firm performance, controlling for time fixed effects, and to address a potential role of heteroscedasticity and endogeneity problems, we also apply the generalized method of moments (GMM-sys) technique (Arellano and Bond 1991; Arellano and Bover 1995; Blundell and Bond 1998). Model 5 in Table 10 shows these results. In this case, all the right-hand-side variables in the models lagged from t−1 to t−3 are used as instruments for the equations in differences jointly with additional instruments for the equations in levels (dummies country and industry, Leverage and Net Working Capital), as Blundell and Bond (1998) suggest. We find that all the orthogonal conditions hold. In particular, the Hansen test suggests the validity of the instrument and the absence of over-identification problems, while the AR2 test confirms the absence of

serial correlation. Concerning Cash Holdings coefficient, the findings are qualitatively similar to the results of our baseline models in Table 6.

Finally, to further check the robustness of our findings, we take into account that an optimum cash level may exist at which the value of the firm is maximum. Empirically, we test whether a non-linear (concave) relationship exists between cash holdings and firm value (Model 4). Based on the results of cash holdings and squared cash holdings in Model (6) of Table 10, a non-monotonic relationship seems to exist between liquidity and performance in SMEs, as Lundstrum (2003) and Harford et al. (2008) also suggest. However, Figure 4 shows that by the *de facto* the positive effect of cash holdings changes shape, turning negative for very high levels of liquidity that are out of any economic relevance. Considering that in the descriptives the maximum value of cash holdings is 0.81, the shape to the right of this point is economically meaningless. Thus we can argue that it is economically relevant the positive effect of cash holdings on SME performance. Consequently, Hypothesis 1_A is confirmed. Therefore, the positive (precautionary) effect of cash holdings on firm performance is the main perspective emerging. The non-linear effect, although statistically significant, has just the effect of slightly smoothing the main positive relationship.

- Insert Figure 4 about here –

Other control variables. We tested the robustness of our main model reported in Table 6 Column (1) including other accounting explanatory variables, to be sure that our main results are not affected by any spurious correlations. In particular, we include the variable Depreciation and Amortization (D&A) and the variable Research & Development (R&D), both scaled by Total Asset. D&A refers to the depletion of intangible assets and can be a major source of expenditure on the balance sheet of some companies. However, it is a non-cash expense and as long as there is sufficient taxable income to absorb it, D&A is a tax-deductible expense and reduces tax cost, which has a positive impact on the firm cash. Thus, there is a save of cash in the firm. Due to missing data for the variable D&A we have a sample reduction of 5.9%. Similarly, R&D refers to an important capital expenditure that sustains innovation, increasing growth and firm's future growth opportunities. An increase of R&D expenses systematically decreases the stock of cash[9]. With regard to the variable R&D, considering that the information is lacking for almost 99% of the sample, we substituted missing value with zero adding a dummy that is equal to 1 in case of missing replaced with zero. Column (3) of Table 10 shows that the effect of cash holdings on firm performance is unaffected by D&A and R&D changes.

To further check the robustness of our findings, we take into account the role of accounting standards.

[9] We consider the variable R&D at the same year of the variable cash holdings, without using lags, because we are not interested in the effect of R&S on performance but on the potential reduction on cash the R&D expenditure has.

As suggested by Ferreira and Vilela (2004), the differences in cash holdings between countries could result from the different accounting standards. Therefore, we collected data from BvD that provide information for each firm if IFRS or Local Gaap are used. Due to missing data we have a sample reduction of 4.2%. We use the variable D_acc.standards, which takes a value of 1 firms use IFRS and 0 if firms rely solely on local accounting standards. Overall, column (4) of Table 10 shows that the coefficient of the variable Cash Holdings is qualitatively similar to what resulted in our main model of Table 6.

Survivorship bias. Orbis from Bureau van Dijk has great advantages to cover many countries, to have the largest coverage in terms of pure companies count and to account even for companies of smaller size. However, the database by BvD can potentially suffer from survivorship bias into the sample. In many of the countries covered by BvD, if a firm defaults, BvD deletes its data five years thereafter. Specifically, a firm appears in Orbis as long as it files its financial statements, and it remains in the database only for four more years after its last filing (4+1 year). Although this is not what happens for all the countries (for example bankrupted firms are still included in the database of BvD Italy even after ten years) this could rise potential bias in our analysis. Thus, in order to overcome survivorship bias, following Klapper et al. (2004), we run our baseline model and the moderator analysis for a shorter period of time. We selected and limited our sample to a period from 2012 to 2015, that2015, which is not affected by survivorship bias. This new result, reported in Table 10, column (7), with regard to the baseline main model, and available on request for the other models with interactions, confirms our previous findings in terms of sign and magnitude.

Sub-sample analysis. To be sure that our results are not affected by the presence of single countries that dominated our sample composition, biasing our main results, we focus on a sub-sample analysis. We run our main model for two subsamples of firms including countries having similar number of observations. In particular, first of all, we consider a sample of countries that have at least 1,000 observations. Here the list of these countries: Belgium, Bulgaria, Croatia, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Norway, Poland, Portugal, Russian Federation, Serbia, Slovakia, Slovenia, Spain, Ukraine, United Kingdom. Second, we consider a sample of countries that have at least 45,000 observations. Here the list of these countries: Bulgaria, Czech Republic, Italy, Portugal, Russian Federation, Spain, Ukraine. In both cases, as showed in Table 10 columns (8) and (9), the results remain qualitatively identical.

5. Discussion and conclusions

In this study, we intend to disentangle the way that cash holdings can affect firm performance, considering different moderation effects, on a wide sample of 1,203,091 firm-year observations of SMEs based on 36 European countries for the period 2008-2015. Up to our knowledge, this is the first time the relationship between cash holdings and performance has been scrutinized for SMEs.

Our findings suggest a dominant positive effect of cash holdings on firm performance. That is, as cash holdings increase, we observe a positive (precautionary) effect. Cash holdings, in synergy with the importance of transaction and precautionary saving motives, are positively related to firm performance.

In terms of practical implications, holding a stock of cash in the firm is a valuable strategy adopted by SMEs for transaction and precautionary saving motives. The benefits of holding cash overcome and dominate the related costs. Maintaining a buffer of money on hand, ready for use in any contingency, as in times of crisis, has a relevant positive effect that overcomes potential opportunistic problems. It is particularly valuable for SMEs, which typically are financially constrained and have difficulty in obtaining credit, to have a stock of liquidity and to hold cash as a way to alleviate situations in which funds become necessary. Similarly, it is particularly beneficial to pile up significant amounts of cash as a cushion when growth opportunities are highly uncertain and future transactions, for example, with regard to acquisitions or decisions to internationalize the business, are not known. SMEs hold cash and equivalent liquid assets because they provide the flexibility that firms need in their transactions. To control the corporate financial equilibrium, being sure to face financial needs with internal resources, without dependence on external funding, allows SME managers to focus on the operational business and strategies in search of profitable growth patterns.

We also add to the literature in terms of the moderating role of firm and country characteristics. Specifically, testing the role of moderating factors in affecting the analysed relationship, our results reveal that firm debt, firm size and age, growth opportunities and ownership structure play important roles in the analysed relationship. In particular, we find that the effect of cash holdings on performance decreases with increasing debt. Moreover, observing that larger firms in our sample tend to hold lower levels of cash, the importance of precautionary cash seems to vary substantially with firm size. The effect of cash holdings on performance decreases with increasing size; that is, for smaller SMEs, holding cash has a stronger positive effect on firm performance than it does for larger SMEs. Furthermore, since young firms tend to hold much larger cash reserves than old firms, the relationship between corporate liquidity and performance is moderated by firm age. The effect of cash holdings on firm performance decreases with increasing firm age. The positive impact of corporate liquidity on

firm performance is stronger for young companies than for mature companies Moreover, the effect of cash holdings on performance increases when SMEs have higher growth opportunities, suggesting that as the firms have greater investment opportunities, having a stock of cash is valuable to catch them and avoid any problems in terms of the risk of missing valuable projects. Similarly, the effect of cash holdings on performance increases for a higher level of ownership concentration, suggesting that stronger control within the firm allows for better use of cash and better performance.

All the results obtained by analysing firm-specific moderators are in line with the general idea that the stock of cash supports firm performance for precautionary motivations.

The role of country-specific moderators leads to very interesting results. Comparison of the role of cash holdings on firm performance between different degrees of institutional quality and of financial development among countries suggests that SMEs, typically being financially vulnerable, are highly sensitive to country-specific conditions. Specifically, if the quality of a country's institutions is poor, SMEs compensate by maintaining a larger stock of cash to positively support firm performance; our results suggest that when the financial system's capability poorly supports SMEs, holding a stock of cash becomes a substitute tool in supporting SMEs' business. These results provide evidence of the relevance of the institutional context on which an SME is based (La Porta et al. 1999; Levine 2005; Dittmar et al. 2003). SMEs are financially vulnerable because of their dependence on country environments conditions for external funding. In this case, if SMEs have a stock of cash, this buffer allows them to sustain their business and catch growth opportunities.

Therefore, even country-specific moderators are in line with the precautionary motivations.

Finally, we observe that since the SMEs in our sample hold less cash during the crisis years, likely because they need to use it, the stock of cash shows a stronger positive impact on firm performance in the financial crisis period. For SMEs, having a stock of cash in their wallet does not mean "dead money" but a resource ready to use to successfully face any contingencies. During a crisis period, having a cash pile, being able to avoid dependence on bank credit, supports SME businesses in sustaining performance.

A clear avenue for further research is the integration of other internal governance characteristics. The inclusion of these elements could reveal what are the conditions that ensure an efficient use of internal funds. For example, Ozkan and Ozkan (2004) using a sample of UK listed firms and Kalcheva and Lins (2007) based on a sample of listed firm in the world, find that the presence of families as controlling shareholders is associated with higher levels of cash holdings, which leads to lower firm values. Lau and Block (2012) base on a sample of US listed firms, find that distinguishing between management and ownership dimension of family and founder firms is relevant to explain the value of corporate cash holdings. Arosa et al. (2010) on a sample of Spanish SMEs find that the presence of

independents on the board of directors has a positive effect on performance when the firm is run by the first generation bun no effect when the firm is run by subsequent generations.

In sum, our results of the analyses add new insights for the financial policies of SMEs. The findings may be useful for financial managers, investors and financial management consultants who are committed to manage cash funds in a manner that is valuable for the SME stakeholders. In addition to the possible avenues for future research described above, our results demonstrate the relevance of the country institutional context, whose degree of efficiency is at the core of potential SME growth and development.

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Table 1 Variable description of the general model.

Variables	Description
Dependent Variables:	
ROA	EBIT / Total assets
Explanatory Variables:	
Cash Holdings	Cash & Cash equivalents / Total assets
Leverage	(Loans + Long-term debt)/ Total assets
Size (000€)	Total assets in thousand euro
Size (log)	Natural logarithm of total assets
Age (years)	Number of years since incorporation
Age (log)	Ln (1+Age) = the natural logarithm of (1 + the number of years since incorporation)
Growth Opportunities	Percentage change in turnover from the year t to year t-1
Ownership Concentration	Percentage of shares hold by the first direct shareholder
Tangibility	Ratio of tangible assets to total assets
Net Working Capital	(Stock + Debtors - Creditors) / Total assets

Table 2 Descriptive statistics

Variable	Mean	S.D.	Min	25th Percentile	Median	75th Percentile	Max
ROA	0.067	0.159	-0.565	0.009	0.043	0.108	0.913
Cash Holdings	0.100	0.147	0.000	0.007	0.036	0.130	0.810
Leverage	0.169	0.206	0.000	0.000	0.082	0.286	0.865
Size (000€)	4218	5985	8.091	553	2064	5053	32030
Age (years)	27.450	31.143	2.000	8.000	16.000	29.000	162.000
Growth Opportunity	0.090	0.644	-0.948	-0.173	0.002	0.177	4.232
Ownership Concentration	0.797	0.244	0.000	0.551	0.961	1.000	1.000
Tangibility	0.267	0.245	0.000	0.053	0.201	0.431	0.930
Net Working Capital	0.208	0.302	-0.754	0.040	0.215	0.402	0.838

Table 3 Correlation matrix

		1	2	3	4	5	6	7	8	9
1	ROA	1.00								
2	Cash Holdings	0.22	1.00							
3	Leverage	-0.14	-0.26	1.00						
4	Size (log)	-0.15	-0.17	0.22	1.00					
5	Age (log)	-0.05	0.01	-0.05	0.15	1.00				
6	Growth Opportunity	0.15	0.02	0.01	0.05	-0.04	1.00			
7	Ownership Concentration	0.05	0.03	-0.03	-0.17	-0.15	0.02	1.00		
8	Tangibility	-0.10	-0.25	0.25	0.14	0.15	-0.00	-0.03	1.00	
9	Net Working Capital	0.06	-0.18	0.15	0.17	0.17	-0.05	-0.10	-0.20	1.00
	VIF		***1.18***	***1.20***	***1.14***	***1.13***	***1.01***	***1.05***	***1.28***	***1.23***

Notes: Correlations greater than 0.03 or lower than -0.03 are statistically significant at the 0.05 level or lower.

Table 4 Means by years

	ROA	Cash Holdings	Leverage	Size (000€)	Age (years)	Growth Opportunity	Ownership Concentration	Tangibility	Net Working Capital	Mean N. of firms per Country	Median N. of firm per Country	Min N.of firms per Country	Max N. of firms per Country
2008	0.080	0.093	0.182	4603	29.25	0.110	0.774	0.300	0.247	2998.0	886.5	2	25540
2009	0.052	0.098	0.177	4380	28.94	-0.052	0.778	0.296	0.246	3312.5	916	1	28244
2010	0.058	0.099	0.174	4549	28.52	0.200	0.782	0.287	0.245	3557.0	946	1	28839
2011	0.060	0.095	0.180	4664	28.88	0.184	0.784	0.280	0.238	3796.4	1107	2	31613
2012	0.059	0.096	0.176	4419	28.55	0.127	0.791	0.272	0.213	4359.5	1191	2	40135
2013	0.062	0.100	0.169	4242	27.61	0.070	0.801	0.261	0.198	4908.9	1256.5	2	47066
2014	0.070	0.101	0.160	3910	26.11	0.002	0.811	0.249	0.180	5384.6	1342.5	2	61704
2015	0.085	0.109	0.151	3577	24.49	0.105	0.822	0.233	0.154	6063.9	1425	2	82513

Table 5 Means of country-level variables across years

	ROA	Cash Holdings	Leverage	Size (000€)	Age (years)	Growth Opportunity	Ownership Concentration	Tangibility	Working Capital	Mean N. of firms per year	Median N. of firm per year	Min N. of firms per year	Max N. of firms per year
Austria	0.061	0.100	0.185	13334.93	36.155	0.320	0.800	0.297	0.239	655.625	694	415	934
Belgium	0.054	0.127	0.159	10374.1	29.534	0.048	0.838	0.234	0.253	1481.625	1501.5	1210	1725
Bosnia and Herzegovina	0.063	0.051	0.215	3865.322	75.134	0.113	0.895	0.477	0.198	870.75	936.5	434	955
Bulgaria	0.101	0.159	0.146	1949.778	107.133	0.179	0.866	0.362	0.200	6216.625	6072	3772	8654
Croatia	0.058	0.067	0.219	3562.607	13.418	0.115	0.952	0.362	0.263	1769.75	1747.5	1417	2159
Cyprus	0.071	0.106	0.311	10324.28	46.048	0.037	0.682	0.410	0.190	7.75	7	3	16
Czech Republic	0.069	0.150	0.111	2936.319	13.498	0.079	0.853	0.332	0.191	6876.75	7190	4916	8028
Denmark	0.029	0.089	0.136	20936.17	106.786	0.062	0.756	0.154	0.205	1.75	2	1	2
Estonia	0.055	0.102	0.236	2773.917	14.825	0.088	0.817	0.485	0.225	1157.5	1166.5	908	1422
Finland	0.067	0.106	0.231	4307.635	21.088	0.081	0.792	0.390	0.242	1071	1033.5	897	1277
France	0.053	0.159	0.103	5960.85	25.195	0.045	0.764	0.156	0.275	11163	10925.5	10147	12768
Germany	0.073	0.108	0.207	13882.02	32.383	0.059	0.810	0.350	0.244	1903.125	1937	1218	2440
Greece	0.039	0.095	0.256	6973.727	72.02	0.047	0.670	0.314	0.293	2063.125	2107	1712	2212
Hungary	0.033	0.096	0.102	8723.063	18.226	0.065	0.798	0.398	0.207	121.875	123	111	129
Iceland	0.097	0.120	0.281	9440.034	20.834	0.094	0.678	0.375	0.129	22.625	16	12	46
Ireland	0.060	0.172	0.260	13409.83	28.873	0.039	0.687	0.300	0.139	13.75	12.5	9	22
Italy	0.043	0.076	0.192	6109.664	20.858	0.071	0.709	0.250	0.250	35545.25	35874	25540	44982
Latvia	0.077	0.109	0.233	2061.688	13.227	0.152	0.858	0.434	0.161	1659.625	2027	444	2618

Lithuania	0.061	0.063	0.300	4713.073	14.304	0.120	0.797	0.427	0.198	381.125	392.5	298	477
Luxembourg	0.057	0.118	0.134	12514.72	43.588	0.089	0.853	0.219	0.276	47	48.5	36	56
Malta	0.083	0.112	0.256	10044.95	23.705	0.163	0.870	0.243	0.084	9.75	9.5	5	14
Montenegro	0.047	0.037	0.169	5274.972	34.950	0.121	0.800	0.465	0.184	32.375	23.5	5	124
Netherlands	0.046	0.074	0.162	20319.51	37.965	0.032	0.925	0.364	0.364	21.5	23	4	38
Norway	0.073	0.152	0.208	7313.706	14.086	0.143	0.816	0.301	0.211	2710.5	2812.5	1804	3506
Poland	0.063	0.076	0.172	7805.637	107.186	0.150	0.770	0.413	0.213	207.75	176.5	141	311
Portugal	0.032	0.089	0.298	4320.999	21.098	0.066	0.752	0.293	0.364	5268.125	5717.5	3942	6255
Republic of Moldova	0.008	0.027	0.143	4626.305	17.012	0.079	0.624	0.473	0.254	40.125	34.5	27	69
Russian Federation	0.104	0.099	0.139	1821.992	9.646	0.104	0.868	0.202	0.059	39361.13	29214	17861	82513
Serbia	0.075	0.048	0.204	3126.474	15.560	0.075	0.890	0.397	0.201	3219.25	3297.5	2914	3500
Slovakia	0.056	0.118	0.107	2768.021	12.340	0.099	0.840	0.386	0.171	2424	2484	1724	3170
Slovenia	0.043	0.044	0.284	4995.362	16.379	0.066	0.833	0.452	0.142	1156	1236.5	775	1491
Spain	0.034	0.092	0.228	5719.414	21.047	0.058	0.787	0.281	0.313	15228.63	15554	12380	16329
Sweden	-0.063	0.088	0.206	10468.98	102.683	0.145	0.497	0.196	0.246	15	16	11	19
Switzerland	-0.127	0.044	0.275	21424.34	55.823	0.522	0.736	0.831	0.002	2.125	2	2	3
Ukraine	0.072	0.070	0.062	1574.162	105.849	0.156	0.762	0.333	0.212	9088.125	9113.5	8529	9611
United Kingdom	0.080	0.128	0.232	10605.36	28.642	0.097	0.754	0.253	0.250	2900	3031	1679	3869

Table 6 Results of the relationship between cash holdings and firm operating performance

	(1) (Main Model) Cross-sectional regression	(2) Cross-sectional regression	(3) Cross-sectional regression	(4) Diff-in-Diff regressions	(5) Panel regression
Cash Holdings	0.236***	0.229***	0.236***	0.210***	0.214***
	(0.024)	(0.017)	(0.024)	(0.020)	(0.003)
Leverage	-0.082***	-0.077***	-0.082***	-0.155***	-0.125***
	(0.022)	(0.020)	(0.022)	(0.035)	(0.002)
Size (log)	-0.007**	-0.010***	-0.007**	0.021	0.018***
	(0.003)	(0.004)	(0.003)	(0.014)	(0.001)
Age (log)	-0.015**	-0.011	-0.015**	-0.019**	-0.008***
	(0.006)	(0.007)	(0.006)	(0.007)	(0.002)
Growth opportunity	0.037***	0.038***	0.037***	0.036***	0.035***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.000)
Ownership concentration	0.008*	0.015***	0.008*	0.000	0.000
	(0.005)	(0.005)	(0.005)	(0.007)	(0.005)
Tangibility	0.017	0.024***	0.017	0.010	0.006**
	(0.012)	(0.007)	(0.012)	(0.018)	(0.002)
Net working capital	0.093***	0.086***	0.093***	0.151***	0.117***
	(0.023)	(0.021)	(0.023)	(0.024)	(0.002)
Constant	0.102**	0.126**	0.102**	-0.004	-0.075***
	(0.040)	(0.048)	(0.040)	(0.051)	(0.007)
Year-fixed effects	YES	No	YES	YES	YES
Country-fixed effects	YES	No	YES	YES	YES
Industry-fixed effects	YES	No	No	YES	No
Firm-fixed effects	No	No	No		YES
R^2	0.127	0.111	0.127	0.104	0.095
N.Firms	273,487	273,487	273,487	214,938	273,487
Observations	1,203,091	1,203,091	1,203,091	905,508	1,203,091

Notes: For the description of the variables, see Table 1. In Column (4) we regress the changes 8between two consecutive years) in all the independent variables on change in dependent variable. . Robust standard errors clustered by countries in the Cross-sectional regression and by firms in the Panel regressions, are reported in brackets. ***: denotes significance at the 1% level; **: denotes significance at the 5% level; *: denotes significance at the 10% level.

Table 7 The moderating role of firm-level characteristics on the relationship among cash holdings and firm operating performance

	(1) Moderator: Leverage	(2) Moderator: Size (log)	(3) Moderator: Age (log)	(4) Moderator: Growth Opportunity	(5) Moderator: Ownership
Cash Holdings	0.249*** (0.024)	0.344*** (0.023)	0.306*** (0.041)	0.230*** (0.025)	0.203*** (0.026)
Leverage	-0.071*** (0.021)	-0.086*** (0.023)	-0.082*** (0.023)	-0.082*** (0.022)	-0.082*** (0.022)
Size (log)	-0.007** (0.003)	-0.005* (0.003)	-0.007** (0.003)	-0.007** (0.003)	-0.007** (0.003)
Age (log)	-0.015** (0.005)	-0.015** (0.005)	-0.013** (0.005)	-0.015** (0.005)	-0.015** (0.006)
Growth opportunity	0.037*** (0.004)	0.037*** (0.004)	0.037*** (0.004)	0.031*** (0.004)	0.037*** (0.004)
Ownership concentration	0.008* (0.005)	0.008 (0.005)	0.008* (0.005)	0.008 (0.005)	0.004 (0.005)
Cash Holdings x Leverage	-0.207*** (0.044)				
Cash Holdings x Size (log)		-0.017*** (0.003)			
Cash Holdings x Age (log)			-0.024* (0.012)		
Cash Holdings x Growth Opportunity				0.056** (0.021)	
Cash Holdings x Ownership Concentration					0.040*** (0.011)
Tangibility	0.017 (0.012)	0.016 (0.012)	0.016 (0.012)	0.017 (0.012)	0.017 (0.012)
	0.093***	0.093***	0.093***	0.093***	0.093***

Net working capital	(0.023) 0.017	(0.023) 0.016	(0.023) 0.016	(0.023) 0.017	(0.023) 0.017
Constant	0.094** (0.038)	0.087** (0.038)	0.093** (0.037)	0.107*** (0.038)	0.106** (0.040)
Year-fixed effects	YES	YES	YES	YES	YES
Country-fixed effects	YES	YES	YES	YES	YES
Industry-fixed effects	YES	YES	YES	YES	YES
R^2	0.128	0.128	0.128	0.129	0.127
N.Firms	273,487	273,487	273,487	273,487	273,487
Observations	1,203,091	1,203,091	1,203,091	1,203,091	1,203,091

Notes: The table reports cross sectional regressions. For the description of the variables, see Table 1. Robust standard errors clustered at country level, are reported in brackets. ***: denotes significance at the 1% level; **: denotes significance at the 5% level; *: denotes significance at the 10% level.

Table 8 The moderating role of country-level characteristics on the relationship among cash holdings and firm operating performance

	(1) Moderator: ADRI	(2) Moderator: ASDI	(3) Moderator: LAW	(4) Moderator: Market capitalization	(5) Moderator: Domestic credit by bank	(6) Moderator: Domestic credit by financial sector
Cash Holdings	0.223***	0.224***	0.477***	0.285***	0.350***	0.339***
	(0.019)	(0.024)	(0.033)	(0.048)	(0.025)	(0.015)
ADRI	0.002					
	(0.002)					
Cash holdings x ADRI	-0.009*					
	(0.005)					
ASDI		0.131***				
		(0.012)				
Cash holdings x ASDI		-0.094				
		(0.068)				
Law			-0.209***			
			(0.053)			
Cash holdings x Law			-0.367***			
			(0.059)			
Market capitalization				-0.066***		
				(0.024)		
Cash holdings x Market capitalization				-0.115*		
				(0.062)		
Domestic credit by bank					-0.040***	
					(0.008)	
Cash holdings x Domestic credit by bank					-0.128***	
					(0.023)	
Domestic credit by financial sector						-0.029***
						(0.004)

Cash holdings x Domestic credit by financial sector						-0.082***
						(0.010)
Debt	-0.045***	-0.045***	-0.078***	-0.081***	-0.077***	-0.079***
	(0.011)	(0.011)	(0.023)	(0.027)	(0.022)	(0.022)
Size (log)	0.004	0.003	-0.001	-0.008***	-0.003	-0.002
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)
Age (log)	-0.007***	-0.007***	-0.013***	-0.015***	-0.013***	-0.011***
	(0.002)	(0.002)	(0.003)	(0.005)	(0.004)	(0.003)
Growth opportunity	0.024***	0.024***	0.035***	0.033***	0.035***	0.035***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Ownership Concentration	-0.000	-0.000	0.005	0.007	0.005	0.005
	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
Tangibility	0.004	0.005	0.025**	0.020	0.019*	0.021*
	(0.011)	(0.011)	(0.011)	(0.016)	(0.011)	(0.011)
Net Working Capital	0.046***	0.048***	0.108***	0.093***	0.104***	0.106***
	(0.013)	(0.014)	(0.020)	(0.028)	(0.020)	(0.019)
Constant	-0.004	-0.035*	0.176	0.117***	0.088***	0.074**
	(0.024)	(0.019)	(4.025)	(0.035)	(0.029)	(0.030)
Year-fixed effects	YES	YES	YES	YES	YES	YES
Country-fixed effects	YES	YES	YES	YES	YES	YES
Industry-fixed effects	YES	YES	YES	YES	YES	YES
R^2	0.115	0.118	0.142	0.134	0.138	0.140
N.Firms	120,029	120,644	265,028	237,956	273,484	273,484
Observations	626,029	626,029	1,167,089	924,101	1,202,403	1,202,403

Notes: The table reports cross sectional regressions. For the description of the variables, see Table 1. Robust standard errors clustered by countries, are reported in brackets. ***: denotes significance at the 1% level; **: denotes significance at the 5% level; *: denotes significance at the 10% level.

Table 9 Results of the relationship between cash holdings and firm performance along the years for the period 2004-2015

	(1) 2004	(2) 2005	(3) 2006	(4) 2007	(5) 2008	(6) 2009	(7) 2010	(8) 2011	(9) 2012	(10) 2013	(11) 2014	(12) 2015
Cash Holdings	0.144***	0.144***	0.142***	0.154***	0.197***	0.199***	0.190***	0.192***	0.189***	0.191***	0.203***	0.204***
	(0.019)	(0.021)	(0.023)	(0.016)	(0.015)	(0.016)	(0.015)	(0.011)	(0.008)	(0.007)	(0.012)	(0.008)
R^2	0.105	0.109	0.115	0.120	0.136	0.120	0.116	0.122	0.116	0.115	0.127	0.124
Observations	73,572	84,904	93,956	105,849	63,733	70,459	75,142	80,850	91,175	94,546	96,972	100,307

Notes: All regressions are based on the baseline model (Cross sectional regression) without including Ownership Concentration (not available the initial years) but including Industry, Country and Year dummies. Robust standard errors clustered by country, are reported in brackets. ***: denotes significance at the 1% level; **: denotes significance at the 5% level; *: denotes significance at the 10% level.

Table 10 Robustness tests

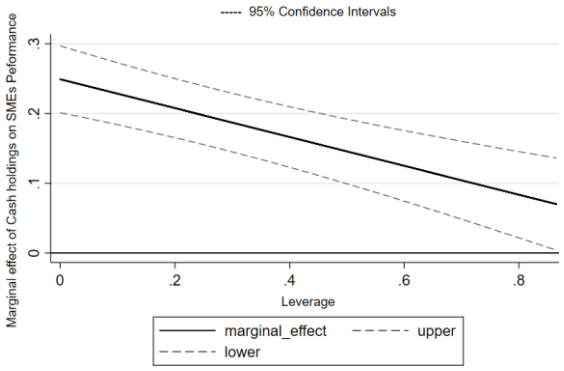
	(1) Alternative dependent variable: Adjusted-ROA Cross-sectional regression	(2) Alternative dependent variable: Cash Flow ROA Cross-sectional regression	(3) Other control variables: Depreciation & Amortization, R&D Cross-sectional regression	(4) Other control variables: Dummy Accounting Standard Cross-sectional regression	(5) Alternative estimator GMM-sys	(6) Non-Linearity model Cross-sectional regression	(7) Free-survivorship bias sample Cross-sectional regression	(8) Sub-sample analysis (Countries having more or 1,000 observations) Cross-sectional regression	(9) Sub-sample analysis (Countries having more or 45,000 observations) Cross-sectional regression
ROA_{t-1}					0.218***				
					(0.008)				
Cash Holdings	0.229***	0.177***	0.238***	0.256***	0.166***	0.303***	0.238***	0.236***	0.239***
	(0.024)	(0.008)	(0.024)	(0.026)	(0.011)	(0.037)	(0.026)	(0.025)	(0.034)
Cash Holdings Squared						-0.120***	0.238***		
						(0.029)			
Deprec.&Amm.			-0.225***						
			(0.066)						
R&D			-0.458**						
			(0.172)						
Account.Stand.				-0.062***					
				(0.014)					
Leverage	-0.079***	-0.041***	-0.081***	-0.092***	-0.046***	-0.079***	-0.085***	-0.083***	-0.085**
	(0.020)	(0.010)	(0.023)	(0.023)	(0.003)	(0.022)	(0.025)	(0.023)	(0.032)
Size (log)	-0.006*	-0.003**	-0.007**	-0.006	-0.006***	-0.007**	-0.010***	-0.007**	-0.009**
	(0.003)	(0.001)	(0.003)	(0.004)	(0.000)	(0.003)	(0.003)	(0.003)	(0.003)
Age (log)	-0.014**	-0.005**	-0.014***	-0.015***	-0.001	-0.015**	-0.015**	-0.015**	-0.017*
	(0.006)	(0.002)	(0.005)	(0.005)	(0.001)	(0.006)	(0.006)	(0.006)	(0.007)
Growth Opportunity	0.036***	0.031***	0.037***	0.043***	0.241***	0.037***	0.036***	0.037***	0.036***
	(0.004)	(0.005)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)

Ownership Concentration	0.007	0.004	0.008	0.010**	0.061***	0.009*	0.009*	0.008	0.005
	(0.005)	(0.005)	(0.005)	(0.004)	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)
Tangibility	0.031***	0.035**	0.027**	0.015	0.033***	0.017	0.020	0.017	0.015
	(0.011)	(0.016)	(0.013)	(0.012)	(0.004)	(0.013)	(0.015)	(0.013)	(0.019)
Net Working Capital	0.094***		0.093***	0.103***	0.074***	0.092***	0.091***	0.093***	0.094**
	(0.025)		(0.024)	(0.023)	(0.002)	(0.023)	(0.024)	(0.024)	(0.031)
R^2	0.114	0.128	0.130	0.138		0.128	0.129	0.127	0.132
Observations	1,203,091	843,528	1,131,491	1,151,707	929,604	1,203,091	726,253	1,189,001	918,444
AR2 test					0.38				

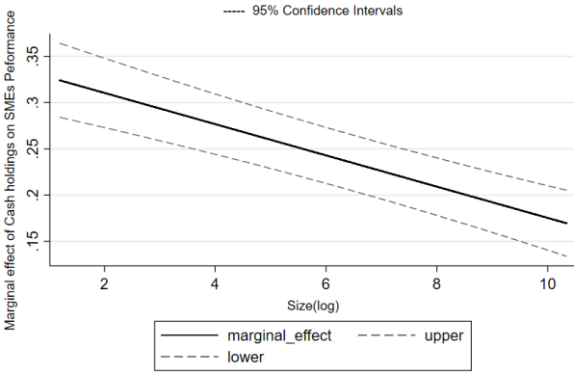
Notes: Model (1) shows cross sectional regression and include Country and Year dummies. Models (2), (4) and (5) show cross sectional regressions and include Industry, Country and Year dummies. In Model (3) it is applied the GMM technique, with one to three years' lags used for the dependent variable in the GMM style, jointly with the following instruments: Country dummies, Industry dummies, Leverage and NWC. In Column (3) it is included a dummy missing data for R&D, to account that many missing exits for this variables. The test AR2 in the GMM technique provides insights on the second order correlation. In column (3), the number of firms in the GMM model is 217,186, while in the main model was 273,487. In column (4) it is tested the different functional form. In column (5) it is tested for potential problem of survivorship bias running the main model for the sub-sample of 254,919 firms for the period 2012 – 2015. In column (6) this is the list of Countries included: Belgium, Bulgaria, Croatia, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Norway, Poland, Portugal, Russian Federation, Serbia, Slovakia, Slovenia, Spain, Ukraine, United Kingdom. Concerning column (7) this is the list of Countries included: Bulgaria, Czech Republic, Italy, Portugal, Russian Federation, Spain, Ukraine. For the description of the variables, see Table 1. Robust standard errors clustered by countries, are reported in brackets. ***: denotes significance at the 1% level; **: denotes significance at the 5% level; *: denotes significance at the 10% level.

Figure 1 Marginal effects of cash holdings on operating performance conditioned by firm-specific variables

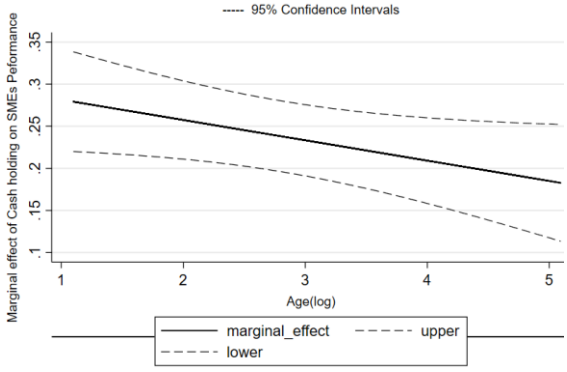
1(a): Marginal Effect of Cash holdings on operating performance as Leverage changes



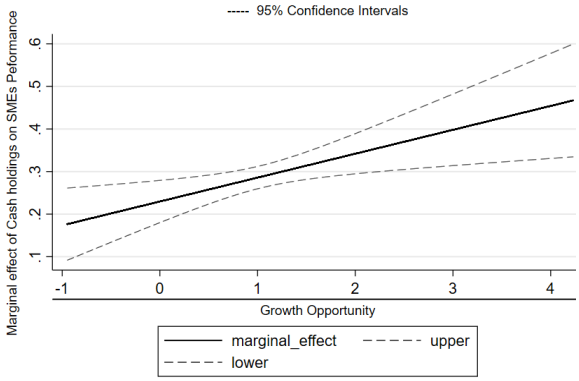
1(b): Marginal Effect of Cash holdings on operating performance as Size changes



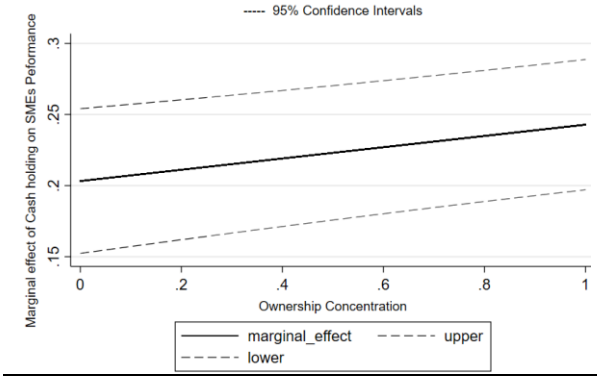
1(c): Marginal Effect of Cash holdings on operating performance as Age changes



1(d): Marginal Effect of Cash holdings on operating performance as growth opportunities changes



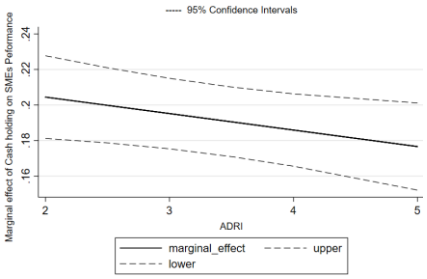
1(e): Marginal Effect of Cash holdings on operating performance as ownership concentration changes



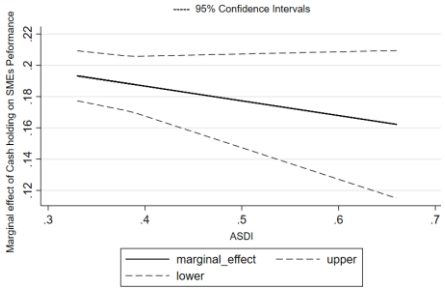
Notes: The solid line is the average marginal effect. The dotted lines delimit the 95% confidence interval and allow us to determine the conditions under which the variable cash holdings have a statistically significant effect on the variable operating performance. The marginal effect concerning the role of cash holdings on SME's operating performance is statistically significant whenever the upper and lower bounds of the confidence interval are either above or below the zero line.

Figure 2 Marginal effects of cash holdings on operating performance conditioned by country-specific variables

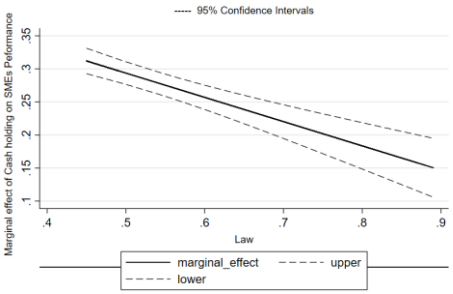
1(a): Marginal Effect of Cash holdings on operating performance as ADRI changes



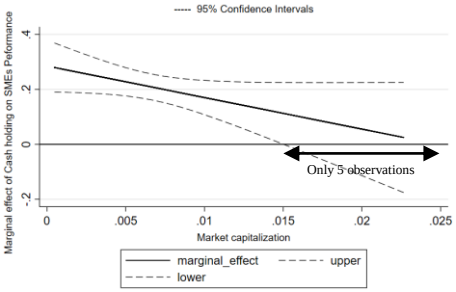
1(b): Marginal Effect of Cash holdings on operating performance as ASDI changes



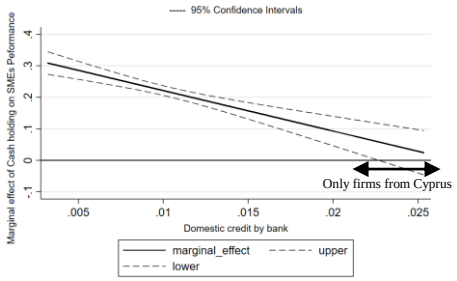
1(c): Marginal Effect of Cash holdings on operating performance as LAW changes



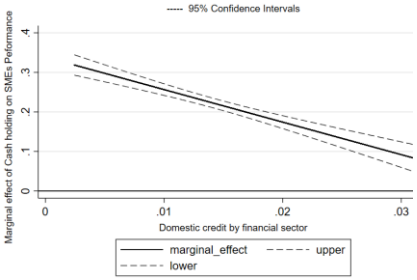
1(d): Marginal Effect of Cash holdings on operating performance as Market Capitalization changes



1(e): Marginal Effect of Cash holdings on operating performance as Domestic Credit by Bank changes



1(f): Marginal Effect of Cash holdings on operating performance as Domestic Credit by Fin.Sector changes



Notes: The solid line is the average marginal effect. The dotted lines delimit the 95% confidence interval and allow us to determine the conditions under which the variable cash holdings have a statistically significant effect on the variable operating performance. The marginal effect is statistically significant whenever the upper and lower bounds of the confidence interval are either above or below the zero line.

Figure 3 Mean of Cash Holding and effect of cash holdings of firm performance along the years for the period 2004-2015

Figure 3a: Effect of cash holdings of firm performance (2004-2015)

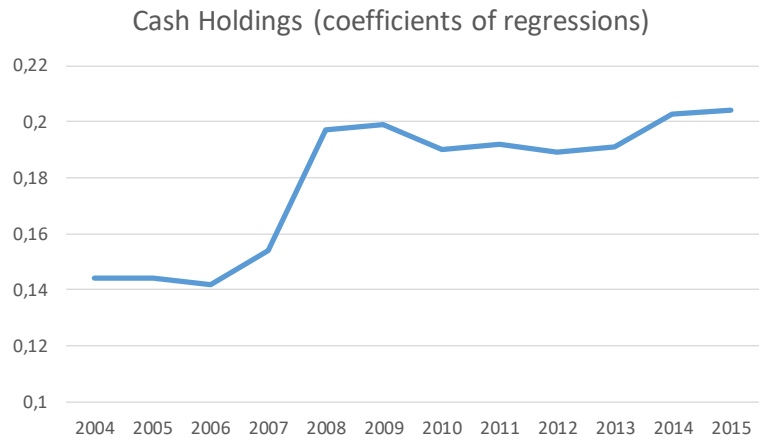


Figure 3b: Mean of Cash Holdings for the period 2004-2015

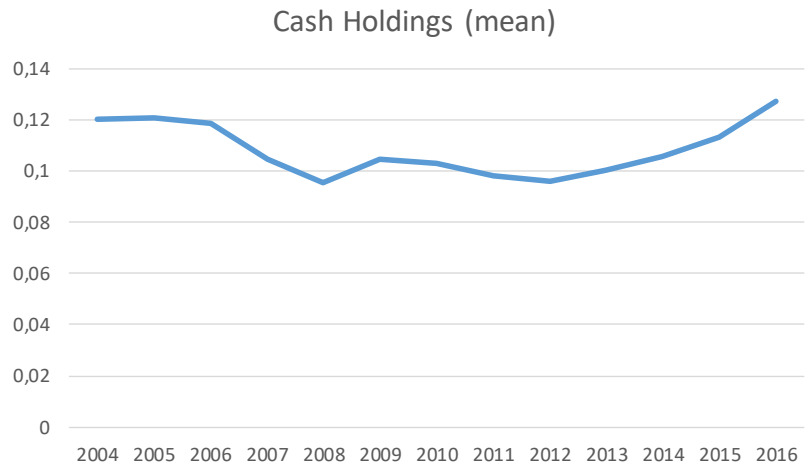


Figure 4 Graphic of the relationship between cash holdings and firm performance, based on results of Table 10 column (4).