

Determinants of corporate cash holdings: Evidence from Portuguese publicly traded firms

Determinantes de liquidez empresarial: Evidência das empresas cotadas em Portugal

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Abstract

This paper investigates the determinants of cash holdings of publicly traded Portuguese firms. We find that such firms hold less cash than similar companies operating in countries where both shareholders and creditors' rights are more tightly protected by the law. In addition, our regression results suggest that leverage, other liquid assets, and firm growth are negatively correlated with our sample firms' cash holdings whereas long-term debt and financial distress are positively correlated. Our findings cannot be reconciled with just one of the existent theories (trade-off, pecking order and free cash-flow theory), and emphasize the importance of a country's legal, institutional, and economic environment for explaining firms' cash holdings decisions.

Keywords: cash holdings; panel data; Portuguese publicly traded firms; liquidity.

Resumo

Este artigo investiga os determinantes de liquidez das empresas cotadas em Portugal. A análise efetuada sugere que estas empresas detêm menos meios líquidos em comparação com empresas similares de países que oferecem uma maior proteção legal aos direitos dos acionistas e credores. Os resultados da regressão sugerem ainda que a alavancagem, outros ativos líquidos, e crescimento da empresa estão negativamente correlacionados com a liquidez detida pelas empresas da amostra enquanto o financiamento de longo prazo e o 'distress' financeiro estão positivamente correlacionados. As conclusões deste artigo não são totalmente explicadas pelas teorias existentes (*trade-off*, *pecking order* e *free cash-flow*) e enfatizam a importância do ambiente legal, institucional e económico na explicação das decisões de liquidez nas empresas.

Palavras-chave: liquidez; dados de painel; empresas portuguesas cotadas; meios líquidos.



1. Introduction

Firms in the European Monetary Union (EMU) hold large amounts of liquid assets. For instance, in late 2000, publicly traded firms in such economic area held, on average, 14.8% of their total assets in the form of cash, and marketable securities (Ferreira & Vilela, 2004). Clearly, cash is important for such firms. But why?

Keynes (1936) is among the first to emphasize that cash acts as a safety buffer against unexpected contingencies. Three decades later, Miller and Orr (1966) present a trade-off model for determining firms' optimal cash holdings, which revolves around the idea of balancing the costs and benefits of holding cash. In contrast, the pecking order theory of Myers (1984), rooted in the theoretical work of Myers and Majluf (1984), suggests that no optimal cash level exists, as firms simply try to minimize the asymmetry of information-related costs they face when accessing external financing. The free cash flow theory of Jensen (1986) offers an alternative explanation, with the central idea being that managers tend to accumulate cash so they can maximize their own utility at shareholders' expense.

There is an extensive empirical literature on the determinants of U.S. firms' cash holdings (e.g., Kim, Mauer & Sherman, 1998; Opler, Pinkowitz, Stulz & Williamson, 1999; Faulkender, 2002; Almeida, Campello & Weisbach, 2004; Dittmar & Mahrt-Smith, 2007; Azar, Kagy & Schmalz, 2016; Jiang & Lie, 2016). Yet, evidence from other countries is still relatively scarce (e.g., Ozkan & Ozkan, 2004; Nguyen, 2006; García-Teruel & Martínez-Solano, 2008), and Portugal is no exception. However, exploring the cash holdings' determinants of firms trading on the major Portuguese stock exchange is interesting for several reasons. For instance, in contrast to the U.S., Portuguese law is rooted in the Roman tradition, thus providing both shareholders and creditors much weaker protection than that found in Anglo-American countries (La Porta, Lopez-de-Silanes, Shleifer & Vishny, 1997). In addition, corruption is still an issue in Portugal, with the country ranking 32 in the Transparency International 2011 "Perception of Corruption Index".¹ Together, such structural facts suggest that in Portugal investors are poorly protected by the law, and are at the mercy of an inefficient legal system (Tavares, 2002).

Furthermore, Portugal has lost economic ground relative to its European peers since 2000, despite the very low interest rates, low inflation, and large sums of external funding the country enjoyed after joining the European Union (EU). Indeed, the Eurostat refers that the Portuguese 2009 per capita Gross Domestic Product (GDP) stood at 77.3 purchasing power standards (PPS) as compared to the EU-27 average of 100 PPS.² Not surprisingly, in the beginning of this decade, Portugal was one of the most problematic countries within the EU area, suffering from low productivity growth, large and increasing unemployment, and expressive external and fiscal deficits, which culminated in an intervention by the International Monetary Fund, the European Union, and the European Central Bank in the spring of 2011.

Finally, the Portuguese stock market has some distinguishing characteristics that are worth mentioning. For instance, it is still small and relatively underdeveloped even by European standards. In particular, in 2008, the firms in the most important index of the Portuguese stock market (PSI-20) represent only 0.25% of the Euronext stock exchange's total

¹ See <http://cpi.transparency.org/cpi2011/results/> for details.

² This leaves Portugal in the last place among its Western European counterparts. See http://ec.europa.eu/economy_finance/publications/occasional_paper/2010/pdf/ocp74_fiches_en.pdf for details.

market capitalization.³ Pereira and Cutelo (2013) further argue that the average potential investor in Portugal has less wealth than his counterpart operating in any comparable market does.

Such unique legal, institutional, and economic aspects are surely important for understanding our empirical results. In particular, we find that the cash holdings of Portuguese listed firms average around 7% of total assets, which is much lower than the 17% reported by Opler *et al.* (1999) for U.S. publicly listed firms, and the 14.8% reported by Ferreira and Vilela (2004) for their EMU equivalents. Moreover, our regression results show that Portuguese listed firms' cash holdings decrease (increase) with leverage, other liquid assets, and growth (long-term debt and financial distress), and suggest that the dividend payout ratio, cash-flow, and firm size are *not* important for explaining our sample firms' cash holding decisions.

Our findings cannot be reconciled with just one of the three mainstream theoretical models currently available for explaining firms' cash holdings decisions. For instance, in line with our empirical results, both the pecking order and the trade-off theory predict a negative relation between cash holdings and the existence of other liquid assets. However, as posited by the free cash-flow theory, we find that financially distressed Portuguese firms hold more cash. Additionally, some of our empirical results contradict the predictions of such theories. In particular, the trade-off theory suggests that leverage should have a negative impact on firms' cash level but our regression results suggest just the opposite. Furthermore, we find that Portuguese publicly listed firms with better growth opportunities hold less cash, which is at odds with what one should expect under the pecking order theory. We would argue that such difficulty in linking our results to a single theoretical model emphasizes that a country's specific characteristics are very important for understanding firms' cash holdings decisions. We discuss this issue at length in Section 5.

The paper continues as follows. Section 2 summarizes some of the related literature, and Section 3 describes the sample and outlines the methodology. Sections 4 and 5 report and discuss our main findings and Section 6 concludes.

2. Related literature

Different theories help explain why firms choose to hold different levels of cash on their balance sheet. For instance, the trade-off theory suggests that firms weigh the benefits and costs of holding cash (Miller & Orr, 1966). Holding cash has two major benefits. First, it acts as a safety reserve, minimizing the likelihood of financial distress. In particular, cash helps deal with unexpected losses, creates a buffer that allows managing the operating cycle, and allows firms to deal more efficiently with external fund-raising constraints. Second, having readily available cash minimizes the likelihood of having to forgo new positive net present value (NPV) projects when access to new debt or equity is difficult. However, holding cash has a high opportunity cost, which is a direct consequence of the low return one can earn on liquid assets. The trade-off theory thus suggests that firms have an optimal cash level, which can be found by trading-off the marginal costs and benefits of holding cash.

³ See <http://www.cmvm.pt/EN/Estudos/Study%20Reports/Documents/2010consol1807CGRA2009ENGfinalsite.pdf> for details.

In contrast, Myers (1984) argues that firms face important information asymmetry-related costs, and as such, should always prefer internal over external sources of financing. This creates a pecking order, with firms resorting first to retained earnings to finance their investments, then to safe debt and risky debt, and finally to equity. Clearly, under the pecking order theory, firms do not have an optimal cash level. Rather, cash is simply a buffer between retained earnings and investment needs, with firms repaying debt (spending the accumulated cash), and accumulating cash (eventually going into debt) when their operational cash flow exceeds (lags) the required capital to implement new investment projects.

The free cash-flow theory of Jensen (1986) is an alternative, and argues that managers may systematically fail to comply with their fiduciary duty towards shareholders. This would be the case if managers act according to their own self-interest instead of taking actions that help maximize their firm's market value. Such agency relation between managers and shareholders is important in understanding firms' cash holding decisions. In fact, if the free cash-flow theory holds, managers may build up cash reserves simply to magnify their discretionary power over the firm's investment decisions. Under this set-up, holding large cash volumes potentially reduces firm value as shareholders realize that managers may use such reserves to maximize their own utility at their expense.

Voluminous empirical literature study what factors influence U.S. firms' cash holding decisions. For instance, Kim *et al.* (1998) look at this issue using a sample of publicly traded firms, and find that such firms' cash holdings increase with the market-to-book ratio, and cash-flow volatility but decreases with firm size, leverage, and the level of financial distress. In a parallel study, Opler *et al.* (1999) show that larger firms which, in theory, have better access to capital markets, and firms with good credit ratings tend to hold relatively less cash. More recent papers show that cash holdings decisions in the U.S. are also affected by corporate governance issues (e.g., Faulkender, 2002; Dittmar & Mahrt-Smith, 2007; Harford, Mansi & Maxwell, 2008), and the existence of binding financial constraints (e.g., Almeida *et al.*, 2004; Ferreira, Custódio & Raposo, 2005).

Non-U.S. evidence on the determinants of firms' cash holdings is, however, relatively scarce. The study by Ozkan and Ozkan (2004) is a notable exception. The authors consider a sample of non-financial U.K. listed firms, and conclude that such firms' cash holdings decisions are not related to firm-size or cash-flow volatility. In another contribution, Nguyen (2006) studies a sample of Japanese firms listed on the Tokyo Stock Exchange over the period of 1992 to 2002, and finds that such firms hold cash mostly due to precautionary motives, and to reduce the risk associated with operating earnings' volatility. García-Teruel and Martínez-Solano (2008) also show that Spanish Small and Medium Enterprises cash holdings' target level is higher when such firms have better growth opportunities and larger cash-flows.

A few other papers explore firms' cash holdings decisions using international samples. For instance, Pinkowitz and Williamsom (2001) observe that, on average, Japanese firms hold more cash than U.S. or German firms do. On the other hand, Guney, Ozkan and Ozkan (2003) show that cash holding decisions depend both on the firm's specific characteristics, and on the country's institutional and legal environment. In particular, these authors find that the negative correlation between cash holdings and cash-flow, and the positive association between cash holdings and debt maturity are an exclusive phenomenon of the U.K. and France, respectively. More recently, Dudley and Zhang (2016) emphasise that societal trust has a positive effect on firm cash holdings and this effect is stronger in firms located in countries

with weak institutions. Moreover, they find that investors value cash more highly in firms located in countries with higher levels of societal trust.

Two additional international studies include Portuguese firms in their research design. In particular, Dittmar, Mahrt-Smith and Servaes (2003) use a sample spanning 45 countries for the year 1998, and show that firms operating in countries where shareholders' protection is low, hold up twice as much cash as similar firms based in countries where shareholders' protection is relatively higher. On the other hand, Ferreira and Vilela (2004) focus on publicly traded firms originating from 12 EMU countries over the 1987 to 2000 period. The authors conclude that such firms' cash holdings are positively (negatively) correlated with investment opportunities, and cash-flow (leverage, alternative liquid assets, bank debt and firm-size).

Despite their importance and relevance, both these studies fail to provide detailed evidence on the factors affecting Portuguese firms' cash holdings decisions. In particular, Dittmar *et al.* (2003) ignore the peculiarities of each individual firm as virtually all empirical tests are carried out at the country-level. Similarly, Ferreira and Vilela (2004) typically present regression results for the EMU zone taken as a whole; and not for each specific country. As such, their results help understand which factors affect the cash holdings decisions of the firms in the EMU area, but not what occurs within each individual country. Below we complement these two studies by focusing exclusively on the cash holdings decisions of Portuguese listed firms.

3. Data and methodology

3.1. Data

We start with the 76 firms that traded on the Portuguese stock exchange over the 2005 to 2009 period. Drawing on Opler *et al.* (1999), we remove all firms competing in the financial industry (SIC codes 6000-6999), and delete all observations with incomplete data on the Compustat Global database.⁴ In the end, our sample consists of 24 firms.

3.2. Methodology

3.2.1. Dependent variable

We use two proxies for our dependent variable. The first ($Cash_1$) is the ratio of cash and short-term investments to total assets (Kim *et al.*, 1998; Ozkan & Ozkan, 2004). The second ($Cash_2$) is the ratio of cash and short-term investments to total assets minus marketable securities (Opler *et al.*, 1999).

3.2.2. Exogenous variables

We use eight independent variables in our work. The first is leverage (Lev), which we compute as a firm's total debt divided by total shareholders' equity (García-Teruel & Martínez-Solano, 2008). There is no clear theoretical relation between cash holdings and leverage, although most of the empirical literature finds that more financial leverage is usually associated with lower cash levels (e.g., Kim *et al.*, 1998; Opler *et al.*, 1999; Ferreira & Vilela, 2004; Ozkan & Ozkan, 2004). The free cash-flow theory suggests an inverse relation between leverage and cash holdings; since external monitoring increases as firms are more in debt. Similarly, the

⁴ See appendix A for a summary of all data items used in this study.

pecking order theory posits that firms will only increase their debt level when positive NPV investment projects are still available, but cash reserves are fully depleted. Under the trade-off theory, however, highly levered firms should hold more cash to reduce the likelihood of experiencing financial distress.

Our second explanatory variable is the debt maturity structure (*Ldebt*), measured as the ratio of long-term debt to total debt (Guney *et al.*, 2003; García-Teruel & Martínez-Solano, 2008). Two reasons explain why one should expect a negative relation between cash holdings, and the debt maturity structure. First, firms that rely heavily on short-term debt must renegotiate periodically their credit terms. Thus, such firms face higher financial distress-risk than similar firms using relatively more long-term debt, which helps explain why the trade-off theory predicts that debt maturity, and cash holdings should be negatively correlated. Second, firms with access to long-term debt are likely to face lower information asymmetry-related costs (García-Teruel & Martínez-Solano, 2008). Consequently, if the pecking order theory holds, such firms should carry less cash on their balance sheet. Despite such clear theoretical predictions, the extent of empirical research typically fails to find a significant relation between the debt maturity structure, and cash holdings (e.g., Guney *et al.*, 2003; Ferreira & Vilela, 2004; García-Teruel & Martínez-Solano, 2008).

Our third explanatory variable is the dividend payout ratio (*divpayout*), which we compute as the ratio of total dividends to income before extraordinary items (Opler *et al.*, 1999). Theoretically, the relation between cash holdings and the payout ratio can be positive or negative. The trade-off theory predicts that dividend-paying firms should hold less cash than comparable firms that do not pay dividends because they can increase their liquidity by cutting back on its dividend payout ratio. In contrast, the pecking order theory posits a positive relation between the dividend payout ratio and cash holdings. In particular, firms that pay dividends have less cash available to pursue their positive NPV projects. Thus, *ceteris paribus*, such firms should build up their cash reserves to avoid resorting to costly external funding or forgoing value-creating investments. There is no clear empirical relation between cash holdings and the dividend payout ratio. Opler *et al.* (1999) show that dividend-paying firms tend to hold less cash while Dittmar *et al.* (2003) report the exact opposite result; other studies find no significant relation between these two variables (e.g., Guney *et al.*, 2003; Ferreira & Vilela, 2004; Ozkan & Ozkan, 2004).

Cash flow (*cflow*) is our fourth explanatory variable, which we measure as the ratio of income before extraordinary items plus dividends minus capital expenditure to total assets.⁵ There are reasons to expect a positive (negative) relation between cash flow and cash holdings under the pecking order, and cash flow theories (trade-off theory). The pecking order theory posits that firms should always prefer internal over external financing due to the asymmetry of information-related costs, whereas the free cash flow theory argues that managers have an incentive to build up cash reserves so they can pursue their own interests at the expense of shareholders. Clearly, accumulating cash flow over time decreases firms' dependency on external funding and increases managers' discretionary power over firms' investment policy. Conversely, the trade-off theory argues that cash flow is a powerful substitute for cash, which justifies why high generating cash flow firms may choose to hold less cash in their balance.

⁵ We do not compute cash-flow as earnings after interests, dividends and taxes plus depreciation (e.g., Opler *et al.*, 1999), due to insufficiency data.

Our next, the fifth explanatory variable is firm size (*size*), which we compute as the natural logarithm of total assets (Ferreira & Vilela, 2004). Different theories put forward conflicting predictions about the relation between size and cash holdings. In particular, the trade-off theory suggests that larger firms should hold less cash as they enjoy economies of scale in cash management (Miller & Orr, 1966) and, all things being equal, are less likely to face financial distress (e.g., Rajan & Zingales, 1995). Similarly, the pecking order theory posits a negative association between size and cash holdings because larger firms are likely to endure lower asymmetry of information-related costs. The opposite, however, is to be expected if the free cash flow theory holds. In particular, larger firms tend to have larger shareholder dispersion, which leads to superior managerial discretion. Managers of such firms thus have an incentive to accumulate cash as they may effectively use firms' assets to maximize their own utility. The empirical literature, however, suggests that cash flow and cash holdings are negatively correlated (e.g., Opler *et al.*, 1999; Ferreira & Vilela, 2004; Ozkan & Ozkan, 2004).

The sixth independent variable is the existence of alternative liquid assets (*liq*), computed below as the ratio of working capital minus cash and short-term investments to total assets (Opler *et al.*, 1999; Ferreira & Vilela, 2004; Ozkan & Ozkan, 2004 and García-Teruel & Martínez-Solano, 2008). Both the pecking order and the trade-off theory suggest that the level of cash on the balance sheet should decrease as the amount of other liquid assets increases. In effect, such current assets act as a natural substitute for cash, and provide an insurance against any unforeseen loss of liquidity (Opler *et al.*, 1999). Such theoretical prediction is in-line with the results of several empirical studies (e.g., Kim *et al.*, 1998; Opler *et al.*, 1999; Ozkan & Ozkan, 2004; Ferreira & Vilela, 2004; García-Teruel & Martínez-Solano, 2008).

The next explanatory variable, the seventh, is the level of financial distress (*Z-score*).⁶ Both the pecking order and the trade-off theories posit that firms that are more likely to experience financial distress should hold relatively more cash on their balance sheets. This is because the costs associated with raising external funds increase with financial distress. Moreover, managers of financially distressed firms are more likely to be removed from office, and firms to be forced into bankruptcy (e.g., Hotchkiss, 1995; Hotchkiss & Mooradian, 1997). Numerous empirical studies support the predictions of the pecking order and the trade-off theory (e.g., Guney *et al.*, 2003, Ferreira & Vilela, 2004, and Ozkan & Ozkan, 2004). Yet, Kim *et al.* (1998) show that firms with higher distress risk have lower liquidity, while García-Teruel and Martínez-Solano (2008) find no significant relation between financial distress and cash holdings.

Our final and eighth explanatory variable is growth opportunities (*growth*), which we measure as the growth rate in sales over two consecutive years.⁷ According to both the pecking order and the trade-off theory, firms with greater growth opportunities should hold more cash. Indeed, external financing should, on average, be more costly for firms with greater growth opportunities, since the asymmetry of information between insiders and outside investors tends to be more severe for firms whose fundamental value is largely determined by

⁶ We use the Altman (1993) model to measure financial distress. In particular, firm-specific Z-scores are computed as: $Z\text{-score} = 0.717 * X_1 + 0.847 * X_2 + 3.107 * X_3 + 0.420 * X_4 + 0.998 * X_5$, where, X_1 is the ratio of working capital to total assets; X_2 is computed as retained earnings to total assets, X_3 is the ration of earnings before interest and taxes to total assets, X_4 is total shareholders' equity to total debt, and X_5 is the ratio of total revenue to total assets. As in Altman (1993), higher Z-score values indicate lower default risk.

⁷ We cannot compute book-to-market ratios as the Compustat Global database does not have information on firms' market value.

their growth options. In addition, the cost of incurring a cash shortage is higher for firms with a larger investment opportunity set, due to the expected losses that result from giving up valuable investment opportunities. Most of the empirical studies support such theoretical prediction (e.g., Kim *et al.*, 1998; Opler *et al.*, 1999; Ferreira & Vilela, 2004; Ozkan & Ozkan, 2004). Yet, the free cash-flow theory suggests a negative relation between cash holdings and growth opportunities. This is because managers have an incentive to build up cash pools especially when firms have poor investment opportunities. In effect, such cash reserves allow managers to implement negative NPV projects that maximize their own utility at the shareholders' expense (Ferreira & Vilela, 2004).

3.2.3. Empirical model

We empirically determine which factors help explain the cash holdings determinants of Portuguese listed firms using panel data methods. Our regression model is as follows:

$$\begin{aligned} \text{Cash}_{it} = & \beta_1 + \beta_2 \text{Lev}_{it} + \beta_3 \text{DebtStructure}_{it} + \beta_4 \text{Divpayout}_{it} + \beta_5 \text{Cflow}_{it} + \beta_6 \text{Size}_{it} + \beta_7 \text{Liq}_{it} + \\ & + \beta_8 \text{Z-score}_{it} + \beta_9 \text{Growth}_{it} + u_i + e_{it} \end{aligned} \quad (1)$$

where i is for the firm ($i=1, \dots, 24$), and t denotes time in years ($t=1, \dots, 20$); u_i is a firm specific effect and, by assumption, e_{it} is a random error, with $E[e_{it}] = 0$, and $E[e_{it}^2] = \sigma_e^2$. The dependent and independent variables are defined as in subsection 3.2.2.

4. RESULTS

4.1. Descriptive statistics

Table 1 presents summary statistics for our measures of cash holdings. As can be seen, the average ratio of cash to assets (Cash_1) is 6.3%; and the parallel figure for Cash_2 is 8.4%. Our results are at odds with those of Ferreira and Vilela (2004), and Dittmar *et al.* (2003), who report an average cash ratio for the Portuguese firms they cover of 5.1% and 3.6%, respectively. Such disparity in results can be due to sample period issues or differences in the cash holdings' proxies. More importantly, Table 1 clearly suggests that publicly listed firms in Portugal hold less cash than comparable firms in other countries. For instance, Opler *et al.* (1999), report a mean cash ratio of 17.0% for U.S. public listed firms, whereas Ferreira and Vilela (2004) report a parallel figure of 14.8% for their EMU counterparts. In addition, Ferreira and Vilela (2004) also show that the average cash ratio of Portuguese firms' ranks among the lowest in the EMU.

Table 1. Descriptive statistics

This table reports descriptive statistics for 75 firm year-observations between 1989 and 2009. *Cash₁* is the ratio of cash and short term investments to total assets; *Cash₂* is the ratio of cash and short term investments divided by total assets minus marketable securities; *Ldebt* is debt maturity structure as the ratio of long-term debt to total debt; *Lev* is leverage measure as total debt divided by total shareholders' equity; *Divpayout* is dividend payout define as the ratio of total dividends to income before extraordinary items; *Cflow* is the cash-flow compute as income before extraordinary items plus common dividends plus dividends minus capital expenditures over total assets; *Size* is computed as the total assets' natural logarithm; *Liq* is the liquidity structure, defined as the ratio of working capital minus cash and short term investments divided by total assets; *Z-score* measures financial distress, computed as in Altman's (1993); *Growth* is growth opportunities, compute as the ratio between *Sales_t* and *Sales_{t-1}* minus one.

Variable	Obs.	Mean	Median	Perc10	Perc90	Std. Dev.
Cash ₁	75	0.063	0.039	0.013	0.110	0.087
Cash ₂	75	0.084	0.041	0.013	0.124	0.190
Ldebt	75	0.656	0.706	0.413	0.892	0.226
Lev	75	2.746	1.829	0.667	5.625	3.477
Divpayout	75	0.574	0.472	0.120	0.868	0.681
Cflow	75	-0.010	0.003	-0.076	0.042	0.057
Size	75	7.427	7.459	5.801	8.929	1.426
Liq	75	-0.081	-0.073	-0.273	0.063	0.149
Z-score	75	1.461	1.182	0.677	2.393	0.957
Growth	75	0.075	0.052	-0.108	0.280	0.192

Table 1 further shows that Portuguese listed firms typically pay generous dividends (the mean dividend payout ratio is 57.4%; the median is 47.2%), but are highly levered. In particular, on average, debt exceeds shareholders' equity around 2.75 times (median = 1.8). Most of the debt is long-term; representing, on average, 66.0% of the total debt (the median is even higher: 70.6%). The propensity to pay dividends and the access to long-term debt suggest that our sample firms are mature. Table 1, however, also suggests that Portuguese listed firms are not financially sound. The average cash flow is negative (the median very close to zero), liquidity is poor (the mean = -8.1%; the median = -7.3%),⁸ and the average Z-score is 1.46 (the median = 1.1), well below the model's threshold for firms on the verge of filing for bankruptcy.⁹

Table 2 reports the correlation coefficients for our independent variables. As can be seen, in general these are not highly correlated; with the exception of size, and the debt maturity structure (correlation coefficient = 0.54; $p=0.01$). This suggests that serious multicollinearity is not an issue in our application.

⁸ Our measure of liquidity is working capital less cash and short-term investments. As such, our results indicate that cash and short-term investments are typically *larger* than firm's working capital.

⁹ This is an unexpected result as we work with the largest of the Portuguese firms. However, we use Altman's (1993) model to assess the financial distress level of Portuguese firms, with the model being developed exclusively for U.S firms.

Table 2. Correlation matrix

Ldebt is debt maturity structure as the ratio of long-term debt to total debt; *Lev* is leverage measure as total debt divided by total shareholders' equity; *Divpayout* is dividend payout define as the ratio of total dividends to income before extraordinary items; *Cflow* is the cash-flow compute as income before extraordinary items plus common dividends plus dividends minus capital expenditures over total assets; *Size* is computed as the total assets' natural logarithm; *Liq* is liquidity structure defined as the ratio of working capital minus cash and short-term investments divided by total assets; *Z-score* measures financial distress, computed as in Altman's (1993); *Growth* is growth opportunities, compute as the difference between *Sales₁* and *Sales₀* minus one. *Significant at 10%. **Significant at 5%. ***Significant at 1%.

	Ldebt	Lev	Divpayout	Cflow	Size	Liquidity	Z-score	Growth
Ldebt	1.000							
Lev	0.058	1.000						
Divpayout	-0.039	0.060	1.000					
Cflow	0.010	-0.200*	-0.234**	1.000				
Size	0.543***	0.184	-0.073	-0.221*	1.000			
Liq	0.019	-0.218*	0.059	0.241**	-0.027	1.000		
Z-score	-0.308***	-0.336***	0.153	0.180	-0.210*	0.246**	1.000	
Growth	0.223*	0.188	-0.034	-0.110	0.173	-0.102	-0.166	1.000

4.2. Regression results

Table 3 presents our multivariate results, and we discuss a few diagnostic tests before looking at the estimated coefficients. The first is a Ramsey Reset test, which is a general test against misspecification problems. Table 3 shows that such a test is significant when the independent variables are in levels; a problem we overcome by transforming the original variables using natural logs (Aitchison & Brown, 1957; Greene, 2002; Wooldridge, 2010).¹⁰ In effect, after such transformation, the Reset test is no longer significant at normal levels (the p-value for the regression using *Cash₁* is 0.87 and 0.70 for *Cash₂*).

Next, we determine whether to use a fixed effects (FE), random effects (RE) or pooled data specification to estimate our regression results. Table 3 shows that, in our case, pooling the data is not appropriated (the p-value of the F-test for *Cash₁* and *Cash₂* is 0.00), and that using FE is better than using RE (the p-value for the Hausman test for *Cash₁* and *Cash₂* is 0.00). Finally, both the Wooldridge and the modified Wald tests are significant at the 1% level; indicating that autocorrelation and heteroskedasticity are an issue in our panel. We use the Driscoll and Kraay (1998) estimator as adapted by Hoechle (2007) for unbalanced panel data to correct for this.¹¹

¹⁰ We add a constant to all observations of a given ratio when the minimum value for such ratio is negative. This ensures we work strictly with non-negative values before doing the log transformation. See Trigueiros (1995) for further details, and references.

¹¹ See <http://www.stata-journal.com/sjpdf.html?articlenum=st0128> for details.

Table 3. Determinants of Portuguese cash holdings

Table 3 reports the results for the determinants of cash holdings in Portuguese listed firms for 75 firm year-observations between 2005 and 2009 using the *Driscoll and Kraay* estimator. Column 1, reports the results on the independent variable *Cash₁*; Column 2 presents the results on the independent variable *Cash₂*; *Number of groups* expresses the number of firms; *Ramsey Reset* test is a general misspecification test. The *Poolability* test reports the result of a test that checks for the possibility of simply pooling the data in the regression. The *Hausman* test tests the null hypothesis that the individuals are correlated with other variables in the model. The *modified Wald* test tests the null hypothesis that the residuals are homoskedasticity. *Wooldridge autocorrelation* test tests the null hypothesis of non-existence of first order autocorrelation in the residuals.

Cash₁ is the ratio of cash and short term investments to total assets; *Cash₂* is the ratio of cash and short-term investments divided by total assets minus marketable securities; *Ldebt* is the logarithm of debt maturity structure as the ratio of long-term debt to total debt; *Lev* is the logarithm of leverage measure as total debt divided by total shareholders' equity; *Divpayout* is the logarithm of dividend payout define as the ratio of total dividends to income before extraordinary items; *Cflow* is the logarithm of cash-flow compute as income before extraordinary items plus common dividends plus dividends minus capital expenditures over total assets; *Size*' is the logarithm of size calculated as the total assets' natural logarithm; *Liq* is the logarithm of liquidity structure as the ratio of working capital minus cash and short term investments divided by total assets; *Z-score* is the logarithm of Z-score which measures financial distress measure as the version of Altman's (1993) Z-score; *Growth* is the logarithm of growth opportunities compute as the difference between Sales₁ and Sales₀ minus one. *Significant at 10%; **Significant at 5%; ***Significant at 1%.

	Cash₁	Cash₂
Ldebt	0.349**	0.376**
Lev	-1.306**	-1.372**
Divpayout	0.111	0.122
Cflow	-0.846	-0.836
Size	-1.888	-2.332
Liq	-2.391***	-3.254***
Z-score	-3.112***	-3.139***
Growth	-1.030***	-1.131***
Number of Observations	75	75
Number of Groups	24	24
Within R-squared	0.457	0.472
Ramsey reset test (Variables in levels)	F (3,63) = 2.92 Prob > F = 0.0049	F (3,63) = 5.08 Prob > F = 0.0033
Ramsey reset test (logarithmic transformation)	F(3,63)= 0.23 Prob > F= 0.8746	F(3,63)= 0.48 Prob > F= 0.6969
Poolability test	F (23,43) = 4.90 Prob > F= 0.0000	F (23,43) = 4.99 Prob > F= 0.0000
Hausman Test	Chi2 (24) = 31.02 p-value = 0.0001	Chi2 (24) = 120.75 p-value = 0.0000
Wald Chi2_(k)	Chi2 (24) = 6.0e+29 p-value = 0.0000	Chi2 (24) = 4794.36 p-value = 0.0000
Wooldridge Test	F (1,12) = 17.346 Prob > F = 0.0013	F (1,12) = 19.116 Prob > F = 0.0009

We now summarize our main results, which are very similar for both the regression using $Cash_1$, and the regression using $Cash_2$ as the dependent variable. In particular, Table 3 shows that Portuguese listed firms' cash holdings decrease with leverage, other liquid assets, and growth opportunities (i.e., the estimated coefficients for such variables are negative and statistically significant), and they increase with long-term debt, and financial distress (coefficients are positive and significant). Moreover, the coefficients estimated for the dividend payout ratio, cash-flow, and size are not statistically significant at normal levels; suggesting that, *ceteris paribus*, such firm-specific characteristics are *not* relevant in explaining our sample firms' cash holdings decisions.

How do our results compare with the previous empirical literature, and the three main theories we discussed in Section 2? The answer to this question is *not* clear. On the one hand, some of our findings fit well with such theories and are in-line with most of the empirical results that are available. For instance, we show that Portuguese firms hold less cash when other liquid assets are available. This is exactly what one should expect if the pecking order or the trade-off theory hold, with several researchers reporting very similar results (e.g., Kim *et al.*, 1998; Opler *et al.*, 1999; Ferreira & Vilela, 2004; Ozkan & Ozkan, 2004; García-Teruel & Martínez-Solano, 2008). Furthermore, in-line with Guney *et al.* (2003), Ferreira and Vilela (2004), and Ozkan & Ozkan (2004), we find that Portuguese firms tend to accumulate cash to minimize financial distress-related costs.¹² Both the pecking order and trade-off theories help rationalize such a finding. Finally, our regression results suggest that cash holdings and leverage are, *ceteris paribus*, negatively correlated in our sample. Kim *et al.* (1998), Opler *et al.* (1999), Ferreira and Vilela (2004), and Ozkan and Ozkan (2004), among others present similar evidence, and such a relation is to be expected under both the pecking order, and free cash flow theories.¹³

Some of our results, however, clearly contradict the previous empirical evidence and the predictions of the mainstream theories. For instance, Table 3 shows that Portuguese firms with better growth opportunities hold less cash in their balance sheets. Such a result is clearly at odds with the evidence in Dittmar and Mahrt-Smith (2007), Nguyen (2006), García-Teruel and Martínez-Solano (2008), among others, and challenges the rationale of the trade-off, and the pecking order theories.¹⁴ Similarly, we find that, all things being equal, cash levels of Portuguese firms increase as they access long-term debt. This is in opposition to most empirical studies, which typically report a negative correlation between the debt structure and firms' cash holdings (e.g., Dittmar & Mahrt-Smith, 2007; Nguyen, 2006) or no significant relation between the two (e.g., Guney *et al.*, 2003; Ferreira & Vilela, 2004; García-Teruel & Martínez-Solano, 2008). Such a result also contradicts the predictions of the trade-off and pecking order theories, which posit that firms should hold less cash as they gain access to long-term debt.

¹² Our regression results show a negative association between Z-score and cash holdings. Considering that higher Z-score values indicate lower default risk, the negative coefficient suggests that firms with higher financial distress-risk hold more cash.

¹³ One would have to assume that the Portuguese firms we analyze have ongoing investment projects that have depleted their cash reserves for the pecking order theory to hold. Sub-section 4.1., however, suggests otherwise as we find evidence that the typical sample firm is a mature firm.

¹⁴ One plausible explanation for our findings, however, relates to how one measures growth opportunities. Previous researchers use the market-to-book ratio but, due to the lack of market data, we employ the sales growth rate. Accordingly, our study measures *effective* growth (which requires spending money) while the previous literature focuses on *future* growth (which involves accumulating cash).

5. Discussion

This paper investigates the cash holdings' decisions of publicly traded Portuguese firms. Our empirical findings are not fully reconcilable with any of the three mainstream theories currently available in this domain. We would argue that one way forward is to consider how such decisions are influenced by Portugal's peculiar characteristics. Our univariate analysis shows that Portuguese listed firms are, to a large extent, in poor financial standing (i.e., have low liquidity, present negative cash-flow, and high levels of financial distress) but, paradoxically, continue to carry large sums of long term debt on their balance sheet, and maintain a particularly high dividend payout ratio. This puzzling piece of evidence suggests that Portuguese listed firms are likely to have accessed large sums of debt during our sample period. The 2010 annual report of *Comissão do Mercado de Valores Mobiliários* (the Portuguese Financial Regulatory Authority) supports this intuition. In fact, such report states that the Portuguese financial sector is one of the most levered in the EMU. Furthermore, the report shows that in 2010, the average debt-to-market-equity ratio of the non-financial Portuguese listed firms reached 153.7%; the counterpart value for the German and French publicly traded firms is 62.9%, and 69.3%, respectively.¹⁵ Together with Ferreira and Vilela (2004), these figures suggest that the dramatic increase in the Portuguese listed firms' indebtedness occurred over time, and specially so over the last 10 years.

The above-mentioned phenomenon is not surprising since the Portuguese Gross External Debt climbed from 100% of the GDP in the first quarter of 2000 to 230% ten years later.¹⁶ The main issue here is that Portugal joined the Euro-area in 1999, thus starting to have an unprecedented access to external funding at very low cost. This drove most economic agents operating in Portugal into debt (for instance, the public debt as a percentage of the GDP raised from 52% in 2000 to 88% in 2010),¹⁷ a process that years later culminated in an international bailout of the country, led by the International Monetary Fund, the European Union, and the European Central Bank.

The possibility of accessing cheap debt is, nevertheless, an important characteristic of Portugal during our sample period. Such feature is crucial for understanding how the country's publicly traded firms, which in our sample period are in poor financial condition, are at the same time able to maintain high dividend payout ratios, and carry large amounts of long-term debt in their balance sheets. Interestingly, the same characteristic provides a reasonable explanation for many of our empirical results. For instance, we show that Portuguese listed firms hold less cash as they are more in debt. Easy access to debt provides a reasonable explanation for this finding. In particular, if access to debt is straightforward and not expensive, managers simply resort to such source of funds whenever money is required. This drives firms into debt but no accumulation of cash on the balance sheet needs to occur. A similar mechanism explains why, *ceteris paribus*, Portuguese listed firms with higher short-term debt to total debt ratio tend to carry lower levels of cash.¹⁸ Such peculiar result suggests

¹⁵ See <http://www.pordata.pt/Portugal/Estado+stock+da+divida+directa+em+percentagem+do+PIB-989> for further details.

¹⁶ See [http://www.bportugal.pt/EstatisticasWEB/\(S\(gc313x45nbafs555cc52kj45\)\)/Default.aspx](http://www.bportugal.pt/EstatisticasWEB/(S(gc313x45nbafs555cc52kj45))/Default.aspx) for details.

¹⁷ See <http://www.pordata.pt/Portugal/Estado+stock+da+divida+directa+em+percentagem+do+PIB-989> for further details.

¹⁸ The coefficient for *Ldebt* in our regression is positive and significant, suggesting that Portuguese listed firms tend to accumulate cash as the percentage of long term debt to total debt increases.

that sample firms relying mostly on short-term debt do not fear the risk of re-financing. In turn, this can only be the case if access to debt (short- or long-term) is not difficult.

We also find that the cash holdings of Portuguese firms increase with financial distress; a result that can also be rationalized under the same mechanism we have been discussing. Indeed, in all likelihood, accessing debt gets harder as financial distress settles in. Consequently, firms that were used to resorting to debt but fall into financial distress face a severe financial constraint. As a consequence, such firms are likely to start accumulating cash to minimize distress-related costs. Finally, having access to cheap debt also explains why we find no significant relation between Portuguese listed firms' cash holdings and the dividend payout ratio, cash-flow or firm size. In effect, cash is important for paying dividends only when firms do not have access to external funding, such as debt. Moreover, firms should only be able to accumulate cash (in the absence of positive NPV projects) when cash-flows are positive. However, this needs not to be the case if such firms have access to debt. Finally, all firms in our sample are relatively large as they are the biggest operating in Portugal. As such, they should all have similar access to debt, which sheds light on why firm size is not correlated with firms' cash holdings in our sample.

Other peculiarities of the Portuguese economy are also relevant in our context. For instance, it is clear that the Portuguese capital market is still very under-developed even by EU-standards. It is easy to realize why this should occur in a country where debt was readily available for years. However, having an undeveloped capital market is also a key element to explain how, in general, Portuguese publicly listed firms were able to freely accumulate so much debt in their balance sheets. In effect, without a strong market for corporate control, managers did not have any incentive to keep their firms indebtedness within reason, as being removed from office for excess debt was highly unlikely. Furthermore, the poor legal system in Portugal does not provide shareholders with enough means to eventually fight-off this situation. In particular, lawsuits are very expensive and tend to drag-on in court for several years. As such, shareholders are more likely to be satisfied with the high dividend payout ratio the Portuguese public traded firms have offered in the last years or simply remove themselves from the market than use the law to discipline managers.

Overall, our results emphasize that cash holdings' decisions are better understood when considering the particularities of the country's legal, institutional and economic environment. Our discussion suggests that this issue is very important in the context of Portuguese listed firms.

6. Conclusion

Little is known about how firms operating in countries with distinct characteristics decide how much cash they should carry on their balance sheets. This paper starts filling this gap in the literature by examining the cash holdings decisions of Portuguese listed firms. We find that such firms hold around 7% of their total assets as cash. Our multivariate results further show that publicly traded Portuguese firms' cash holdings decrease with leverage, liquidity, and growth opportunities, whereas they increase with long-term debt and financial distress. In addition, we fail to find evidence to support that the dividend payout ratio, cash-flow and size are important for explaining Portuguese listed firms cash holdings' decisions.

Our empirical results are hardly reconcilable with just one of the three mainstream theoretical models in this area. In fact, one must consider the peculiar characteristics of

Portugal to fully understand our findings, namely that accessing debt was not an issue in Portugal during the sample period analysed; it being a direct consequence of the country's integration in the EMU.

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Appendix A: List of Compustat data itens

This appendix contains a list of Compustat data item numbers and definitions of mains variables used in this study.

Variable	Definition	Compustat data item #
Cash and Short Term Investments		Data 628
Total Assets		Data 107
Marketable Securities		Data 628
Long-term Debt		Data 135
Short-term Debt		Data 132
Total Debt		Data 135 + Data 132
Shareholders' Equity		Data 193
Total Dividends		Data 425
Income before Extraordinary Items		Data 378
Common Dividends		Data 422
Dividends	This variable is created trough the categories of cash dividends available from the statement of cash dividends provided by compustat Global.	
Capital Expenditures		Data 676
Total Revenue		Data 321
Working Capital	Current Assets - Current Liabilities	Data 638 – Data 650
Retained Earnings		Data 182
Earnings Before Interest and Taxes	Total Revenue – Operating Expense	Data 676 – Data 610
Sales		Data 608