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FEUC FACULDADE DE ECONOMIA  
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# **Why do SMEs Hold Cash? Evidence from Portugal**

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## Resumo

Manter um nível adequado de liquidez dentro da organização é fundamental para o bom funcionamento das empresas. Os gestores têm a tendência de manter grande parte dos activos da empresa sob a forma de disponibilidades e equivalente em dinheiro para investir em outros activos físicos, fazer pagamentos aos accionistas e manter o dinheiro dentro da empresa. O nível de disponibilidades que uma empresa mantém é influenciado pelas suas políticas de estrutura de capital, as necessidades de fundo de maneo, gestão de fluxo de caixa, pagamentos de dividendos, investimentos e gestão de activos. Este estudo centra-se em analisar os factores que determinam o nível de tesouraria das pequenas e médias empresas industriais portuguesas, para o período 2001-2007. Os resultados deste estudo estão em conformidade com as pesquisas anteriores e mostram que o tamanho da empresa, as suas oportunidades de crescimento, o relacionamento com as instituições financeiras, a incerteza dos fluxos de caixa, a estrutura de endividamento, a liquidez e a alavancagem afectam significativamente a tesouraria das PME não financeiras de Portugal.

**Palavras-chave:** Tesouraria, PMEs, o modelo de Trade-off, Pecking Order, Modelo Free Cash Flow

## **Abstract**

Maintaining an appropriate level of liquidity within the organization is fundamental towards the smooth operations of firms. Managers have a tendency to hold large proportion of firm assets in the form of cash and cash equivalents in order to reinvest on other physical assets, payments to stockholders and to keep cash inside the firm. The level of cash a firm maintains is influenced by its policies regarding capital structure, working capital requirements, cash flow management, dividend payments, investments and asset management. This study focuses on analyzing the factors that determine the level of corporate cash holdings of non-financial Portuguese manufacturing small and medium-sized firms, for the period 2001 to 2007. The findings of this study are in conformity with the earlier research and reflect that firm size, growth opportunity, relationship with banks, cash flow uncertainty, debt structure, liquidity and leverage significantly affect the cash holdings of non-financial SMEs in Portugal.

**Keywords:** Cash Holdings, SMEs, Trade-off Model, Pecking Order, Free Cash Flow Model

## **1. Introduction**

Why do firms hold large amounts of cash and cash equivalents? Various explanations have been offered for the incentives of firms to hold cash and various empirical studies tested the determinant factors of firms' cash levels.

It is argued that the main benefit of holding cash in an imperfect capital market is the increase in firms' ability to avoid excessive costs of external financing. However, it is also recognized that there are costs associated with holding cash. The most obvious of these costs is that managers and controlling shareholders can retain cash to pursue their own private objectives, which need not coincide with those of outside investors (Jensen, 1986). The investors do, however, have various internal control mechanisms available to reduce the conflict of interest, such as share blocks, the board of directors, compensation systems and the presence of institutional investors. In this context, in firms where ownership and control are firmly separated, as is the case of firms listed on organized markets, managers can use the funds on projects that do not clearly benefit the shareholders, or alternatively they may pursue personal objectives. But in small and medium-sized firms the ownership and management generally coincide, meaning that conflicts between managers and shareholders are rare or non-existent. Instead, the coincidence between ownership and control means that agency problems associated with debt are more significant (Berger and Udell, 2003).

Investment in liquid assets has an opportunity cost for the firm due to their low return, particularly if the firm forgoes more profitable investment to hold that level of cash. However, liquid assets have traditionally been justified for transaction motives, to meet the needs that come from the firm's normal activities, as well as for precautionary motives, to help to meet

unforeseen requirements for cash (Miller and Orr, 1966). Consequently, one would expect firms that are likely to incur higher transaction costs to hold greater amounts of liquid assets. On the other hand, the precautionary motive places more emphasis on the costs arising from the foregone investment opportunities. According to this approach, firms accumulate cash to meet their unanticipated contingencies that may arise and to finance their investments if the costs of their other sources of funding are prohibitively high.

If market imperfections did not exist, firms' financial decisions would not affect their value. In this situation, keeping liquid financial assets would be irrelevant. Indeed, the volume of cash kept for dealing with productive investments or temporary cash shortfalls could be obtained without problem and at a reasonable price. On the other hand, the absence of a premium for liquidity or taxes would mean that keeping cash would not have an opportunity cost or fiscal disadvantages, respectively. Thus, in these circumstances, decisions about investment in liquid assets would not affect shareholder wealth.

However, the presence of market imperfections implies that there is an optimal cash level that balances costs and benefits and maximizes the value of the firm. In addition, we should also bear in mind the firm's capacity to generate cash and its possibilities of obtaining funds, since these elements will also affect cash level decisions.

In relation to the benefits of keeping cash, in the first place the existence of information asymmetry makes it more expensive for firms to obtain external funding due to problems associated with adverse selection. From this perspective, Myers and Majluf (1984) argue that in the presence of information asymmetry firms establish a hierarchy in their use of financing sources. They will prefer to finance themselves with resources generated internally before resorting to the market. Agency conflicts between shareholders and creditors also make it more difficult and more expensive to obtain funds. All this can lead to distortions in the firms'

investments that generate underinvestment problems. In this situation, keeping liquid assets can reduce the costs of being dependent on external financing. Moreover, possessing certain cash levels reduces the likelihood of financial distress, especially for those firms with more volatile cash flows. On the base of these benefits and costs, the theoretical finance literature offers three alternative models to explain why firms hold cash: the Trade-off Model, Pecking Order Theory and Free Cash Flow Theory.

Most of the previous studies focused their analysis on large publicly traded companies, less attention being given to small and medium-sized enterprises (SMEs) and to the determinants of their level of cash holdings.

The goal of this paper is to contribute to the literature of corporate finance by providing empirical evidence on the determinants of cash holdings in small and medium-sized Portuguese firms.

While previous studies analysed the market imperfections that determine the decisions of cash holdings in large publicly traded companies, such as information asymmetry, agency conflicts or financial distress, the results obtained may not be applicable to the sector of small and medium-sized enterprises, due to the fact that the imperfections mentioned above are more serious in the case of SMEs. Actually, the main characteristic of SMEs, which distinguishes them from the larger firms, is their greater informational opacity, which worsens information asymmetry problems. On the other hand, the coincidence of ownership and control and the greater flexibility in operations in this type of firm makes the agency problems more serious. Moreover, the SMEs are more likely to suffer financial difficulties and their transaction costs are relatively higher, given the economies of scale associated with these costs.

In Portugal, in 2007 the SMEs represented 99,6% of the total organizations, providing more than 75% of total national employment and generating more than 56% of national

turnover<sup>1</sup>. Therefore, the small and medium-sized enterprises are the backbone of the economic life in Portugal and a major factor to the country's economic development.

Existing literature has mainly focused on evaluating the cash balances of large firms across different industries in order to establish a relationship between asset management practices and firm performance. The literature does not provide considerable research on determinants of corporate cash holdings for small and medium-sized firms.

This study extends and improves the currently available empirical literature in two ways. First, we analyse the determinants of cash holdings of SMEs, a sector little investigated by previous researches, but one of great importance in today's global economy. Second, it presents evidence for a sample of Portuguese SMEs, a country where an empirical study in the field of cash holdings determinants for small and medium-sized firms was not yet realized.

The results obtained shows that on average the Portuguese SMEs hold 4,77% of their total assets in cash and their decisions of cash holding are highly influenced by the information asymmetry and agency conflicts existing in this type of firms. Therefore, the SMEs with better relationship with the financial institutions and shorter debt structure have a lower level of cash holdings (a decrease of one standard deviation in the variable BANKR produces an increase in cash holdings by 1,3%). Moreover, the firms with greater probability of financial distress and those with high level of cash flows tend to hold more cash (an increase of one standard deviation in the variable FDISTRESS produces an increase in the cash held by firms by 13,1%).

The paper is structured as follows: Section 2 presents the theory and the empirical evidence, examining the main determinants of investment in liquid assets. In Section 3 are discussed the sample, the variables and the methodology used. In Section 4 are presented the results of the research. Finally, Section 5 concludes the paper.

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<sup>1</sup> Data from the Portuguese National Statistic Institute (INE) for 2007.

## 2. Why do firms hold cash?

### 2.1. Theories of cash holdings

Cash and cash equivalents are considered as some of the most important component of current assets and are the lifeline of corporate financial management. The managers hold a substantial portion of company assets in the form of cash and liquid securities for reinvestment in physical assets, distribution to investors and to keep cash inside the firm (Almeida et al, 2002). The corporate cash holdings patterns are usually explained in the framework of three theories, namely: the Trade-off Model, Pecking Order Theory and Free Cash Flow Theory.

According to the **Trade-off Model**, firms set their optimal level of cash holdings by weighting the marginal costs and marginal benefits of holding cash. Assuming that managers maximize the shareholders' wealth, they will set the firm's cash holdings in a way that the marginal benefit equals the marginal cost of holding cash. The optimal amount of liquid assets is given by the intersection of the marginal cost of liquid assets curve and the marginal cost of liquid asset shortage curve (Figure 1).

There are several benefits related with holding cash. First, cash holdings reduce the likelihood of financial distress as it acts as a safety reserve to face unexpected losses or external fund raising constraints. Second, cash holdings allow the pursuance of the optimal investment policy even when financial constraints are met. Otherwise, external fund raising constraints would force the firm to forgo investment projects with positive net present value (NPV). Finally, cash holdings contribute to minimize the cost of raising external funds or liquidating existing

assets as it acts like a buffer between the firm sources and uses of funds (Ferreira and Vilela, 2004).

The traditional marginal cost of holding cash is the opportunity cost of the capital due to the low return on liquid assets. In addition, agency problems between managers and shareholders may be exacerbated when cash levels are high. Furthermore, for some categories of shareholders, it may be more efficient from a tax point of view if firms were to distribute cash rather than to invest in liquid assets (Kim et al., 1998).

According to this theory, the main SMEs characteristics that are relevant to their cash holdings decisions are:

- a) *Leverage* – it is generally accepted that leverage increases the probability of bankruptcy due to the pressure that rigid amortization plans put on the firms treasury management. To reduce the probability of experiencing financial distress, firms with higher leverage are expected to hold more cash. On the other hand, the empirical evidence (Kim et al., 1998, Opler et al. 1999, Ferreira and Vilela, 2004, and Ozkan and Ozkan, 2004) demonstrates a reduction in cash levels when firms increase their financial leverage. This may be because the costs of the funds used to invest in liquid assets rise as financial leverage rise. Thus, the predicted relationship between cash holdings and leverage is ambiguous.
- b) *Size* – the traditional models to determine the optimal cash levels (Miller and Orr, 1966) demonstrate that there are economies of scale associated with the cash levels required to confront the normal transactions of the firm, so that larger firms can keep lower cash holdings. Also, it is argued that the fees incurred in obtaining funds through borrowing are uncorrelated with the size of the loan, indicating that such fees are a fixed amount (Peterson and Rajan, 2003). Thus, raising funds is relatively

more expensive to smaller firms encouraging them to hold more cash than larger firms. Therefore, it is expecting a negative relation between firm size and cash holdings.

- c) *Cash flow* – as cash flow represents an additional source of liquidity for the firm, it can be seen as a cash substitute (Kim et al., 1998). Thus, a negative relation between cash flow and cash holdings is expected.
- d) *Debt maturity structure* – as Guney et al. (2003) and Ferreira and Vilela (2004) demonstrate, the distribution of debt maturities between short and long term can also affect decisions concerning cash holdings. Firms that rely on short-term debt must renegotiate periodically their credit terms, and are subject to the risk of experiencing financial distress if constraints are met to the renewal of credit lines. Thus, one will expect debt maturity to be negatively related to cash holdings.
- e) *Liquidity* – the presence of liquid assets apart from cash and marketable securities (for example, debtors and inventories) can also affect a firm's optimal cash holdings, since they can be considered substitutes for cash. It is therefore expected for firms with more non-cash liquid assets to reduce their cash levels.
- f) *Relationships with Financial Institutions* – establishing banking relationships between borrower and lender reduces information asymmetry and agency problems, since valuable information about client quality can be disclosed. Therefore, building relationships with financial institutions will improve a firms' ability to access external financing, this suggesting that firms with a higher proportion of bank debt will be able to access external financing more easily, thus holding less cash (Ozkan and Ozkan, 2004). In the case of SMEs, maintaining bank relationships helps them improve the availability of funds, since they suffer less credit rationing in the bank

credit market (Petersen and Rajan, 1994, Harhoff and Korting, 1998, Bodt et al. 2001).

- g) *Financial Distress* – the cost of financial distress arise when the firm cannot meet its payment obligations contracted with third parties, either in the short or the long term. Guney et al. (2003), Ferreira and Vilela (2004) and Ozkan and Ozkan (2004) argue that firms in financial distress could raise their cash levels in order to reduce their default risk. On the other hand, Kim et al. (1998) expects firms with greater likelihood of financial distress to have lower levels of liquidity, as they cannot accumulate cash, since they will use any liquid resources available to pay what they owe.

The **Pecking Order Theory** emerges as a result of asymmetric information existing in the financial markets, that is, corporate managers often have better information about the health of their companies than outside investors. According to this theory (Myers 1984), firms finance investments firstly with retained earnings, then with safe debt and risky debt, and finally with equity (Figure 2). When current operational cash flows are sufficient enough to finance new investments, firms repay debt and accumulate cash. When retained earnings are not enough to finance current investments, firms use the accumulated cash holdings and, if needed, issue debt. The purpose of this order of financing is to minimize asymmetric information costs and other financing costs.

This theory suggests that firms do not have target cash levels, but instead, cash is used as a buffer between retained earnings and investment needs. When current operational cash flows are sufficient enough to finance new investments, firms repay debt and accumulate cash. When retained earnings are not enough to finance current investments, firms use the accumulated cash holdings and, if needed, issue debt.

The determinants of cash-holdings that result from this theory are:

- a) *Leverage* – according to the pecking order model, debt grows when investment exceeds retained earnings and falls when investment is less than retained earnings. Consequently, cash holdings fall when investment exceeds retained earnings and grow when investment is less than retained earnings. This relationship between cash, debt and investment suggest that there is a negative relation between leverage and cash holdings.
- b) *Size* – larger firms are presumably more successful, and therefore should have more cash, after controlling for investment (Opler et al.1999). Consequently, larger firms are expected to hold more cash.
- c) *Cash flow* – according to this theory, firms prefer to fund themselves with resources generated internally before resorting to the market. In these circumstances, firms with large cash flows will keep higher cash levels, as is confirmed by Opler et al. (1999) and Ozkan and Ozkan (2004), for the US and British markets respectively, or by Ferreira and Vilela (2004) for European Union countries.

Although the Trade-off Model and the Pecking Order Model are generally presented as conflicting theories, the distinction between the two is not as clear-cut. Indeed, the expected sign of the relationship between cash holdings and their determinants is sometimes ambiguous or is the same in both frameworks (Opler et al., 1999). In order to detect the real behaviour of firms concerning their cash holdings, one should distinguish between short run and long run determinants. While pursuing a cash holding target in the long run, firms use cash holdings to absorb shocks in the short run. In the short run therefore, the cash holdings are also dependent on cash inflows and outflows, which is consistent with the pecking order behaviour.

The **Free Cash Flow Theory** (Jensen, 1986) explains that managers have an incentive to hoard cash to increase the amount of assets under their control and to gain discretionary power

over the firm investment decision. With the cash holding, they do not need to raise external funds and could undertake investments that have a negative impact on shareholders wealth.

First, management may hold excess cash simply because it is risk averse. More entrenched management would therefore be more likely to hold excess cash because it can avoid market discipline. Hence, one would expect firms with anti-takeover amendments to be more likely to hold excess cash.

Second, management may accumulate cash to have more flexibility to pursue its own objectives. Cash allows management to make investments that the capital markets would not be willing to finance. In this sense, cash is not negative debt for management. While management can spend the cash whenever it wants to, it may not be able to raise debt whenever it wants to. By enabling management to avoid the discipline of capital markets, investing in cash can therefore have an adverse effect on firm value. To put it another way, increasing a firm's holdings of liquid assets by one euro may increase firm value by less than one euro. The possibility that management could be using cash for its own objectives raises the costs of outside funds, because outsiders do not know whether management is raising cash to increase firm value or to pursue its own objectives.

Third, management may accumulate cash because it does not want to make payouts to shareholders, and wants to keep funds within the firm. Having the cash, however, management must find ways to spend it, and hence chooses poor projects when good projects are not available (Opler, 1999).

In the light of this concept, if we were to apply this theory in studying the determinants of cash-holding of SME, we should focus on the following aspects:

- a) *Leverage* - low leverage firms are less subject to monitoring, allowing for superior managerial discretion. Therefore, it is expected that less levered firms hold more cash.

- b) *Size* – larger firms tend to have larger shareholder dispersion, which gives rise to superior managerial discretion. Moreover, larger companies are not likely to be the target of a takeover due to the amount of financial resources needed by the bidder. Thus, it is expected that managers of larger firms have more discretionary power over the firm investment and financial policies, leading to a greater amount of cash holdings.
- c) *Growth Opportunities* – as Myers and Majluf (1984) point out, firms whose value is largely determined by their growth opportunities have larger information asymmetry. Consequently, firms with greater growth opportunities incur higher external financing cost. They also face higher agency cost because firms with risky debt and greater growth opportunities are likely to pass up valuable investment opportunities in more states of nature (Myers, 1977). Hence it is expected that firms with more investment opportunities to keep higher liquidity levels, as various empirical studies have shown (Kim et al. 1998, Opler et al. 1999, Ferreira and Vilela, 2004, Ozkan and Ozkan, 2004).

As it turns out, the way the firms characteristics influence cash holdings is not a consensual matter among these models. Table 1 summarizes the main explanatory factors of firms' levels of cash holdings, according to the three above mentioned theories.

## **2.2. Empirical Evidence**

Existing literature has mainly focused on evaluating the cash balances across different firm sizes and industries of developed countries in order to establish a relationship between asset management practices and firm performance.

For example, Kim, Mauer and Sherman (1998) analyse the determinants of cash holdings for a sample of US companies. They report that firms facing higher costs of external financing, having more volatile earnings, and those firms with relatively lower returns on assets hold significantly larger liquid assets.

Opler et al. (1999) examine the determinants and implications of holding cash and cash equivalents by 1048 publicly traded US firms in the period 1971-1994. Their results show that cash holdings are negatively related to size, net working capital, leverage, dividend payment, and government regulation while they are positively related to the cash flow-to-assets ratio, the capital expenditures-to-assets ratio, industry volatility, and the R&D-to-sales ratio. They conclude that firms with better growth opportunities and riskier cash flows had higher levels of cash, while large firms having better access to capital markets hold less cash. Similar results are reported by Faulkender (2002) for a sample of small US firms, Ozkan and Ozkan (2002) for a sample of UK firms and Teruel and Solano (2008) for a sample of small and medium-sized Spanish firms.

Considering the agency costs that arise due to excessive cash levels, Harford (1999) empirically studies the notion that excessive cash leads the managers to make value decreasing investment decisions. He estimates a sample of all acquisition attempts by US firms during the period 1977-1993. The results support the hypothesis that acquisition by cash rich firms are

value decreasing. Moreover, they are more likely to make diverse acquisitions, and their targets firms are less attractive to other bidders. The similar phenomenon is observed in bidder firms in a merger depicted by sharp decline in operating performance.

Pinkowitz and Williamson (2001) examine the effect of bank power on cash holding patterns of industrial firms for a sample of Japanese firms for the period 1974-1995, German firms for the period 1984-1994 and US firms for 1971-1994. The cross country analysis show that Japanese firms tend to hold more cash than their American or German counterparts do. While cash holding pattern was similar across German and US firms, the OLS regression analysis reveal that Japanese cash balances are significantly influenced by the monopoly power of the banks. This is consistent with the fact that high cash holdings mean higher rents extracted by the banks during the periods when they enjoy certain power in the corporate lending system.

Dittmar et al. (2003) test the significance of corporate governance in determining the corporate cash holdings. They collect the data of more than 11,000 firms from 45 countries for the year 1998 and employed a shareholders' rights index developed by La Porta et al. (1998). The results reveal that the firms in countries with low shareholder protection hold up to twice as much cash as firms in countries with high shareholder protection. In case of poor shareholder protection, the factors determining corporate cash holding, such as investment opportunities and asymmetric information become less important. Furthermore, they find that with the easier access to funds, firms hold larger cash which supports the agency theory.

Ferreira and Vilela (2004) investigate the determinants of corporate cash holdings using a sample of 400 firms in 12 EMU countries including Germany, Austria, France, Greece, Italy, Netherlands, Portugal, Spain, Belgium, Ireland, Finland and Luxemburg for the period 1987-2000. The results show that cash holdings are positively influenced by investment opportunity set and firm cash flows, while assets' liquidity, leverage, firm size and bank debt negatively

affect the cash holdings. Low levels of cash are held by firms in countries with superior investor protection and concentrated ownership.

Guney et al (2006) examine the impact of leverage on cash balances of firms, which they argue may be non-monotonic. A negative (substitution effect) relation between leverage and cash holdings exists to the extent that leverage of firms acts as a proxy for their ability to issue debt. However, with the increase in leverage, firms may accumulate larger cash reserves so that the risk of financial distress and costly bankruptcy can be minimized. Therefore, at high levels of leverage, a positive (precautionary effect) relationship between cash holdings and leverage exists. Their results suggest a significant non-linear relationship between cash holding and leverage. Furthermore, country specific characteristics such as degree of creditor protection, shareholder protection and ownership concentration can influence the strength of the impact of leverage on cash holdings.

Drobetz and Grüninger (2006) investigate the determinants of Swiss non-financial firms' cash holdings over the 1995 to 2004 period. Their results show that the median Swiss firm holds almost twice as much cash and cash equivalents as the median UK or US firm. Moreover, they find a negative relationship between asset tangibility and cash holdings and a non-linear relationship between leverage and cash holdings. Dividend payments are positively related to cash reserves. However, they can't prove a significantly positive relationship between growth opportunities and cash holdings.

Hofmann (2006) examines the determinants of corporate cash holdings of nonfinancial firms in New Zealand. His findings suggest that the main determinants of corporate cash holdings in New Zealand are firms' growth opportunities, the variability of its cash flows, leverage, dividend payments, and the availability of liquid asset substitutes. While growth

opportunities and the variability of cash flows are positively related to cash holdings, large dividend payments and liquid asset substitutes indicate lower cash holdings.

More recently, Lins et al.(2010) analyse the structure of corporate liquidity and the motives that drive the companies from around the world to use cash or line of credits for their corporate liquidity. They find out that the firms have high level of credit lines and that also find that less than half of the total cash held by companies is held for non-operational purposes, amounting to only about 2% of assets. They conclude that non-operational cash is held to guard against future cash flow shocks in bad times, while credit lines are held to give firms the option to exploit future business opportunities available in good times.

The empirical researches reveal that that the firm specific factors affecting the corporate cash holdings have differing relationship across different countries and firm sizes. Moreover, the behaviour of these variables has been changing over time. In the summarizing table (Table 2) we can see that the results of these empirical studies described above are diverging, supporting all of the three theories: the Trade-off Model, the Pecking Order and the Free Cash Flow Theory.

Based on the past findings, the current research tries to analyse the behaviour of firm specific factors with respect to SMEs cash holdings in Portugal.

### 3. Research Design

For this research, it will be selected a sample of manufacturing companies<sup>2</sup> that during the period of analysis (2001-2007) complied with the SME condition, according to the requirements established by the European Commission recommendation 96/280/CE of 3 April, 1996, on the definition of small and medium-sized firms. Specifically, the sample firms met the following conditions:

- had less than 250 employees;
- turned over less than €50 million;
- possessed less than €43 million worth of total assets.

The information required for the sample was obtained from SABI (System of Analysis of Iberian Balance Sheet), developed by Bureau Van Dijk. This database includes accounting and financial information on Spanish and Portuguese firms, obtained from the annual financial statements deposited at the Registry of Companies of these two countries. For this study, we will be using only the data regarding the Portuguese companies, refined in order to eliminate cases with errors in the accounting data or lost values for some of the variables from the sample. Specifically, the variables such as assets, fixed assets, working capital and short-term and long-term debt were required to be positive. Also, the companies that didn't present information for all the required elements were eliminated from the sample. Our sample includes survivors and non-survivors that appeared on SABI at any time during the sample period. After applying the

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<sup>2</sup> Companies with CAE – Classificação Portuguesa das Actividades Económicas (Rev 2.1.) codes from 15000 to 37200

corresponding filters, we end up with a panel of 10.870 observations, corresponding to 1.553 Portuguese SMEs<sup>3</sup>.

The dependent variable cash holdings (CASH) used in this study will be measured similarly to the one used by Ozkan and Ozkan (2004), and it will be calculated as the ratio of cash and marketable securities to net total assets.

As for the independent variables, the model will use eight explanatory factors of cash holdings, similar to the ones used by Teruel and Solano (2008), which, according to the three theories mentioned above (the Trade-off Model, Pecking Order Theory and Free Cash Flow Theory) are the most relevant when determining the cash holdings:

- Growth Opportunities (GROWOP) – the proxy used is the ratio  $\text{sales}_t/\text{sales}_{t-1}$  used by Scherr e Hulburt (2001), assuming that the firms that grew most in the past are expected to have more growth opportunities in the future. According to the Free Cash Flow Theory, the relation with the dependent variable is expected to be a positive one.
- Size (SIZE) – calculated as the natural logarithm of sales, as used by Teruel and Solano (2008). According to the Trade-Off Model, it is expected a negative relation between this variable and the level of cash holdings. On the other hand, using the hypothesis of the Pecking Order Theory and the Free Cash Flow Theory, the relationship could be a positive one.
- Relationships with Financial Institutions (BANKR) – the proxy used to express this variable are the bank debt/total debt ratio (Ozkan and Ozkan, 2004) which, in the Trade-off Model's perspective is expected to have a negative relation with the dependent variable.

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<sup>3</sup> 1.483 SMEs in 2001, 1.582 in 2002, 1.611 in 2003, 1.601 in 2004, 1.351 in 2005, 1.382 in 2006 and 1.860 in 2007

- Financial Distress (FDISTRESS) – is calculated according to the re-estimation of Altman’s model carried out by Begley, Mings and Watts (1996), given by the following expression:

$$ZSCORE = 0,104 * X_1 + 0,010 * X_2 + 0,106 * X_3 + 0,003 * X_4 + 0,169 * X_5$$

where:  $X_1$  = working capital/total assets

$X_2$  = retained earnings/total assets

$X_3$  = net operating profits/total assets

$X_4$  = book value of capital/book value of debt

$X_5$  = sales/total assets

In the original model, the ratio  $X_4$  is calculated as market value of capital divided by the book value of debt, but because in the case of SMEs the market value is not available, here it was used the alternative proposed by Scherr and Hulburt (2001), which is the book value of the assets. A higher ZSCORE implies a lower default risk. However, the relation between this variable and the cash holding is still to be defined, as the previous researches have shown both positive and negative correlation.

- Leverage (LEV) – is measured by the ratio of total debt to shareholders’ equity (Teruel and Solano, 2008). In the framework of the three theories, the relationship between this variable and cash holdings could be positive or negative.
- Debt Maturity Structure (DEBTSTR) – the long-term debt/total debt ratio is used to proxy this variable (Opler et al. 1999), and the correlation between this variable and the cash holdings is expected to be negative.

- Cash-Flows (CFLOW) – the (pre-tax profits + depreciation)/total assets ratio will express this variable (Ozkan and Ozkan, 2004). According to the Pecking Order Theory, it is expected that firms with larger cash flows to hold more cash. On the other hand, in the framework of the Trade-off Model, a negative relation between cash flow and cash holdings is expected.
- Liquidity (LIQ) – in line with the previous work of Opler et al. (1999), Ferreira and Viela (2004) and Ozkan and Ozkan (2004), the existence of other liquid assets that may substitute cash will be measured by calculating the ratio of (working capital-cash)/total assets; a negative relationship is expected.

A briefly description of these variables is made in the Table 3. In order to characterize the companies from the sample, in Table 4 it is illustrated the descriptive statistics of the variables used.

We can see that the sample is made up of highly leveraged SMEs, with an average debt of 2,529 times their shareholders' equity. Bank debt represents, on average, 32.9% of these firms' total debt. In addition, most of their debt is short-term, with their long-term debt making up only 28,70% of their external financing. The average cash-holdings of Portuguese SMEs is 4,77% of total assets. These results are consistent with the findings of Teruel and Solano (2008) for the Spanish SMEs, although their results indicate that the Spanish SMEs prefer to hold on average less cash than the Portuguese ones (3,8%) and rely more on short-term debt (86,48% short-term debt in total debt).

Table 5 shows the correlation coefficients of the variables. In general, the correlation between the companies' cash holdings and the explanatory variables have the expected sign, except for the variable measuring the growth opportunities (GROWOP), although the proxy for

leverage (LEV) is not statistically significant and its correlation with the cash holdings is insignificant. Moreover, the correlation between the explanatory variables is also not very high.

After determining these values for each company from the sample, we first conducted an univariate analysis, in order to determine if there were significant differences for the variables studied between the firms in relation to their levels of cash holdings. Then we studied the determinants of cash holdings using a linear regression of cash holdings on the exogenous variables described above. The model is given by the following equation:

$$\text{CASH}_i = \alpha + \beta_1 \text{GROWOP}_i + \beta_2 \text{BANKR}_i + \beta_3 \text{SIZE}_i + \beta_4 \text{FDISTRESS}_i + \beta_5 \text{LEV}_i + \beta_6 \text{DEBTSTR}_i + \beta_7 \text{CFLOW}_i + \beta_8 \text{LIQ}_i + \varepsilon_i \quad (1)$$

where  $i$  represents the firm,  $\alpha$  is a constant,  $\beta_i$  ( $i=1, \dots, 8$ ) are the coefficients of the regression,  $\varepsilon$  represents the error, CASH is the ratio of cash plus marketable securities to total assets, GROWOP measures growth opportunities, SIZE expresses the size of the firm, BANKR measures the level of short-term bank debt, FDISTRESS the probability of financial distress, LEV the leverage, DEBTSTR expresses the debt maturity structure, CFLOW the capacity to generate cash flow and LIQ the investment in other liquid assets.

For testing the hypothesis concerning the determinants factors of firms' cash holdings, we pool the data for all companies at each year and estimate by OLS equation (1). Similar methodologies were also used in previous studies on cash-holdings. For example Teruel and Solano (2008) use a panel data methodology for their study of Spanish SMEs and Ferreira and Vilela (2004) use this methodology, but they also run a Fama and MacBeth regression and a cross-sectional regression, like Ozkan and Ozkan (2004) also do.

Pooled regressions are useful in that they allow us to test assumptions that are implicit in cross-sectional analyses. Using this, it is possible to control for unobservable heterogeneity, since the methodology provides us with more than one cross-section, which allows us to eliminate biases deriving from the existence of individual effects.

## **4. Empirical results**

### **4.1. Univariate tests**

Table 6 shows the mean values of the variables used in this study, for each quartile of the variable CASH. The quartiles have been constructed annually, following the methodology used by Opler et al. (1999), which explains why the ranges of the variable CASH overlap across quartiles. A difference of means test based on Student-t was carried out in order to determine if the mean values of the fourth quartile are significantly different from those of the first. The t-statistic is shown in the final column in Table 6.

In general, the characteristics of the firms holding more cash (fourth quartile) are significantly different from those with lower levels of cash holdings (first quartile), with the exception of growth opportunities and leverage. Therefore, we can observe that smaller firms with less liquidity and higher cash flows and more likelihood of insolvency tend to hold more cash, while bigger firms with more long-term debt and higher proportion of bank debt present lower levels of cash holdings, as predicted by the Trade-Off and Pecking Order theories. On the other hand, the relationship between firms' growth opportunities and their cash holdings is inconsistent with the Free Cash Flow Theory. However, some firm's characteristics do not change monotonically across cash-to-assets ratio quartile, as can be seen, for example, for the variable LEV. This indicates that comparing the first and fourth quartiles is not sufficient to describe the relation between cash holdings and firm's characteristics.

## 4.2. Regression tests

A pooled time series regression has been estimated to evaluate the factors influencing corporate cash holdings. The estimated results are reported in Table 7. As we can see from the values of the variance inflation factor ( $VIF < 10$ )<sup>4</sup>, the multicollinearity of the regression is low, meaning, on average, the standard error for the coefficient of each independent variable is 1,04 times as large as it would be if that independent variable were uncorrelated with the other independent variables from the regression.

Contrary to our expectation, the results of our regression suggest that the firms with better growth opportunities have smaller cash holdings. The negative coefficient for the GROWOP variable is inconsistent with the previous findings of Kim et al. (1998), Opler et al. (1999) and Ozkan and Ozkan (2004) for large firms in the United States and UK markets. The little statistical significance of this variable indicates that in the case of SMEs the level of cash holdings may not be influenced by their investment opportunities.

The negative coefficient of firm's size variable supports the Trade-off Theory, according to which larger firms should hold lower levels of cash due to the economies of scale associated with maintaining the cash level required for the normal transactions of the firm, but also because larger firms suffer less information asymmetry. On the other hand, these results contradict the Pecking Order and the Free Cash Flow theories, as reported by the earlier studies of Pinkowitz and Williamson (2001) and Ferreira and Vilela (2004).

The coefficient of the variable BANKR is negative which indicates that maintaining a banking relationship improves access to this type of external financing by reducing the

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<sup>4</sup> Kutner, Nachtsheim, Neter, *Applied Linear Regression Models*, 4th edition, McGraw-Hill Irwin, 2004.

information asymmetry between borrower and lender. This supports the Trade-off Theory and, as empirically confirmed by Pinkowitz and Williamson (2001) and Dittmar (2003), shows that firms that are more highly indebted to credit institutions can reduce their investments in liquid financial assets.

As shown in previous empirical evidence for large firms (Kim et al. 1998, Opler et al. 1999, Ozkan and Ozkan 2004, among others), the sign of the leverage (LEV) variable is negative which means that the most highly leveraged SMEs have less cash holdings, which is also consistent with Pecking Order and Free Cash Flow theories. According to the Pecking Order Theory high levels of debt and little cash holdings occur simultaneously when firms' investment exceeds retained earnings. The argument that high-leveraged firms have less cash holdings is also supported by the Free Cash Flow Theory, but the main reason is because high leveraged firms are more subject to monitoring, preventing managerial discretion. The Trade-Off Model is not clear about the predicted sign for this relationship, but the argument that firms with higher leverage need more cash holdings to prevent bankruptcy, as Ozkan and Ozkan (2004) also refer in their study, is not supported by this proxy. On the other hand, this explanation is consistent with our results on the financial distress variable, as the coefficient for FDISTRESS is positive and significant.

The relationship between the debt maturity structure of the SMEs and their level of cash holdings is consistent with the empirical findings of Ferreira and Vilela (2004) and the hypothesis of the Trade-off Theory, according to which the firms with a shorter debt maturity structure would keep higher cash levels in order to reduce the risk deriving from the non-renewal of their short-term debt and to reduce the costs associated with dependence on external financing, given the higher information asymmetry of SMEs with more short-term debt.

On the other hand, the sign of the cash flow to assets coefficient is positive, which contradicts the Trade-off Theory but supports the Pecking Order Theory. The effect of cash flow on cash holdings confirms the empirical results of Opler et al. (1999), Ferreira and Vilela (2004) and Teruel and Solano (2008) and supports the idea that in the presence of information asymmetries firms prefer to finance themselves from internally generated resources. This is even more relevant for our study, as the information asymmetry and agency conflicts associated with debt are greater for smaller firms.

Finally, the negative coefficient of liquidity (LIQ) variable supports the hypothesis that firms with more liquid assets will tend to reduce their cash levels, since these assets can be used as cash substitutes. This result is consistent with the arguments of the Trade-off Theory and with the precious findings of Drobetz and Grüninger (2006) and Hofmann (2006)

Using this model of linear regression, the equation of a SME's cash holdings can be written as follows:

$$\text{CASH}_i = 0,128 - 0,00003 * \text{GROWOP}_i - 0,011 * \text{SIZE}_i - 0,013 * \text{BANKR}_i + 0,131 * \text{FDISTRESS}_i - 0,000002 * \text{LEV}_i - 0,008 * \text{DEBTSTR}_i + 0,002 * \text{CFLOW}_i - 0,084 * \text{LIQ}_i + \varepsilon_t$$

Where the CASH variable is the ratio of cash plus marketable securities to total assets, GROWOP measures growth opportunities, SIZE expresses the size of the firm, BANKR measures the level of short-term bank debt, FDISTRESS stands for the probability of financial distress, LEV is the firm's leverage, DEBTSTR expresses the debt maturity structure, CFLOW the capacity to generate cash flow, LIQ the investment in other liquid assets and  $\varepsilon$  represents the error.

### 4.3. Robustness and additional tests

In order to evaluate the robustness of the regression results, we re-estimate equation (1) using alternative proxies for the independent variables, SIZE, FDISTRESS, and CFLOW, and including a yearly dummy for controlling unobserved macroeconomic effects.

To measure the firms' size we used two proxies, SIZE<sub>1</sub> and SIZE<sub>2</sub>. On the one hand, SIZE<sub>1</sub>, this, as we seen before, is calculated as the natural logarithm of sales, and on the other hand SIZE<sub>2</sub>, the natural logarithm of assets.

The likelihood of financial distress is also calculated using two proxies: FDISTRESS<sub>1</sub>, which was calculated above according to the re-estimation of Altman's model (ZSCORE), and FDISTRESS<sub>2</sub>, expressed by the research and development expenditures (R&D) standardized by year-end sales (Opler et al, 1999). Opler and Titman (1994) argue that R&D expenses are correlated with bankruptcy and distress costs, as R&D expenditures can proxy for the degree of product specialization and it is expected customers to be more reluctant to purchase products from a distressed firm with very specialized products that may require future servicing. Finally, the cash flow has been approximated by using the two proxies CFLOW<sub>1</sub> (the pre-tax profits plus depreciation divided by sales) and CFLOW<sub>2</sub> (the pre-tax profits plus depreciation divided by total assets).

Table 8 presents the results. In specification 1 we add to the base regression the yearly dummies. In specification 2 we use the alternative proxy for size. In specification 3, we use the alternative proxy for financial distress and in specification 4 we use the alternative proxy for cash flow.

The results obtained with all these estimations are generally consistent with the previous findings. The model constructed with the alternative SIZE proxy is almost identical with the

original regression found. On the other hand, when we chose a different measure for the likelihood of the financial distress, the regression obtained turn out to be less significant, and the coefficient of the FDISTRESS proxy changes its sign, becoming negative and confirming Ozkan and Ozkan's (2004) previous study. Nevertheless, it should be mentioned that this proxy is calculated as the ratio of R&D investment to total assets and as this study focuses on SMEs, the information regarding R&D investment was not available for all the firms from our sample (from the original 10.870 observations only 3.039 were valid for this proxy). Finally, the CFLOW<sub>2</sub> proxy proves to have less significance in the regression than the CFLOW<sub>1</sub> proxy used initially.

The results of the regression with the dummy variable are no different from the dummy-free regression, which means that either there are no macro economical factors that influenced the SMEs' decisions on cash holding in the period analysed, either a different variable, like Gross Domestic Product (GDP) should be used in order to measure the possible effects of the evolution of the economic cycle on cash levels.

Therefore, in Figure 3 we present the evolution over time of the cash holdings of the firms analysed, along with the evolution of the Portuguese's economy GDP growth in the period of time analysed<sup>5</sup>. We can see that the ratio of cash holdings to total assets (CASH) remains above 4% throughout the period, reaching its highest level in 2007. With regard to the GDP growth, we do not observe a clear direct relation between its evolution and that of the cash held by SMEs

In order to further study the effects of the macro economical environment changes over time on cash holdings. In specification 1 of Table 9 there are presented the results of the linear

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<sup>5</sup> GDP data from the National Bank of Portugal

regression with the GDP growth variable included. This confirms our expectations, that GDP growth does not explain the level of cash holdings of Portuguese SMEs.

Additionally, in order to test the robustness of our model, we tested the original hypothesis on two different samples. First, we limited our sample to profitable Portuguese SMEs. By introducing the limitation of positive EBIT (Earnings before Interest and Taxes) we end up with 8.771 observations for the period 2001-2007, which correspond to 1.253 firms. Our second sample was made by selecting only the survival firms, that is, the firms that presented activity during all the studied period. This second sample is made up of 5.600 observations, corresponding to 800 SMEs.

The results of the linear regression for these two samples are presented in specification 2 and 3, respectively, of Table 9. Once again, this confirms our initial conclusions, that the small and medium-sized-firms with better growth opportunities, better relation with banks, with higher level of leverage and liquid assets hold less cash, while the SMEs that are more likely to enter in financial distress and have a shorter debt maturity structure tend to have a higher level of cash holdings.

## 5. Conclusion

The aim of this paper was to analyse the determinants of cash holdings in small and medium-sized Portuguese companies. The study was conducted with a panel data of Portuguese SMEs, made up of 10.870 observations corresponding to 1.553 firms during the period 2001-2007.

The descriptive statistics shows that the Portuguese SMEs hold an average of 4.77% of their assets in form of cash for investment and financing purposes.

Using a pooled regression, this study models the cash-to-asset ratio as a function of firm specific factors including: growth opportunities, firm size, relationship with financial institutions, financial distress, leverage, debt maturity structure, cash flow and liquid assets substitutes. The behaviour of these variables was analysed under the framework of the main three theories of corporate cash holding: Trade-off Model, Pecking Order Theory and Free Cash Flow Theory.

The regression results indicate that all the variables in the model are significant in defining the cash levels of Portuguese small and medium-sized enterprises. Consistent with the empirical research, the amount of cash held by Portuguese SMEs is positively affected by their capacity to generate cash flow and the likelihood of a financial distress and negatively affected by the investment opportunities, the relationship with the banks, the leverage level, the amount of liquid assets substitutes, the debt maturity structure and the size of the firms. Moreover, the results obtained for profitable SMEs and for those that remained in our sample during the whole analysed period are also consistent with our hypothesis and with previous empirical research in this field.

Specifically, these findings are consistent with the Trade-off Theory that argues that firms identify their optimal level of cash holdings by weighting the marginal costs and marginal benefits of holding cash.

Regarding the effects of market imperfections on cash holdings, the results indicate that the SMEs with more information asymmetry hold more liquid assets, which confirms the hypothesis of the Pecking Order Theory. This supports the idea that relationship with credit institutions can reduce agency costs and information asymmetry between borrowers and lenders, cutting a firm's cost of external financing. Also, firms with a greater capacity to generate cash flow have higher levels of cash holdings.

The Free Cash Flow Theory could also be supported by the relationship between the leverage level and the cash holdings of Portuguese SMEs. However, all the other determinants considered seem to contradict this theory. Overall, we can conclude that the Trade-off Theory and the Pecking Order Theory are the ones that play the most important role in explaining the determinants of Portuguese SMEs' cash holdings.

Nevertheless, it is important to mention that the results obtained are limited by the methodology used, specifically the univariate test and multivariate pooled regressions. Previous empirical studies have also used cross-section regressions, Fama and MacBeth methodologies, GMM (Generalized Method of Moments) estimations and even qualitative methods like questionnaires for the sampled firms. Moreover, this study could be further developed by analyzing the determinants of cash flow for SMEs from specific industries or with different ownership structures, hence adding new variables that could explain the management cash level decisions.

On the other hand, the study of the macro economical environment changes didn't bring significant results and doesn't allow us to conclude if firm's external factors played a part in

SMEs decisions on cash holdings for the period considered. Given the present economical global situation, a future study that includes macro economical determinants of SMEs cash holdings, like interest rates and country regulation, should be interesting and would bring new valuable information on this area. The future researches should also explore the impact of corporate cash holdings on firms' profitability and performance.

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## Appendix

**Figure 1 - Optimal level of cash holdings in the Trade-Off Model**

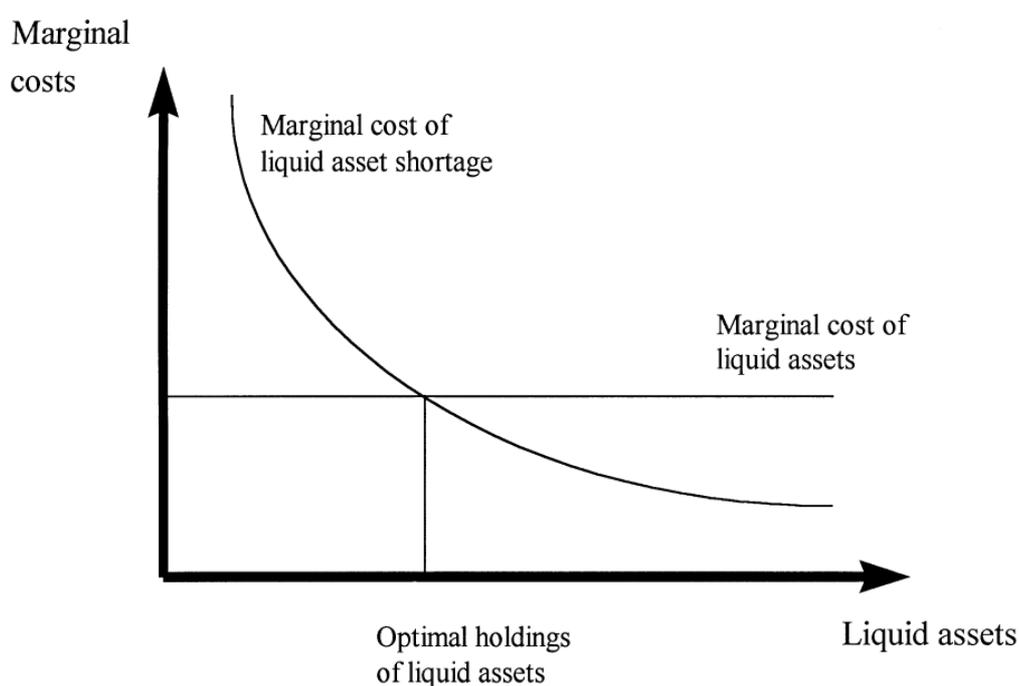


Figure 1 shows the marginal cost curve of being short of liquid assets and the marginal cost curve of holding cash. The marginal cost curve of being short of liquid assets is downward sloping and the marginal cost curve of holding liquid assets is assumed to be horizontal - if the cost is a liquidity premium, there is little reason to assume that the liquidity premium changes as the liquid asset holdings increase. If the firm has a shortage of liquid assets, it can cope with this by either decreasing investment or dividends or by raising outside funds through security sales or asset sales. A greater shortage has greater costs since it involves decreasing investment more or raising more outside funds. For a given amount of liquid assets, an increase in the cost of being short of liquid assets or an increase in the probability of being short of liquid assets will both shift the marginal cost curve to the right and increase the firm's holdings of liquid assets.

The optimal amount of liquid assets is given by the intersection of the marginal cost of liquid assets curve and the marginal cost of liquid asset shortage curve. The marginal cost of liquid assets curve is non-decreasing while the marginal cost of liquid asset shortage curve is decreasing.

**Figure 2 - The Pecking Order Model**

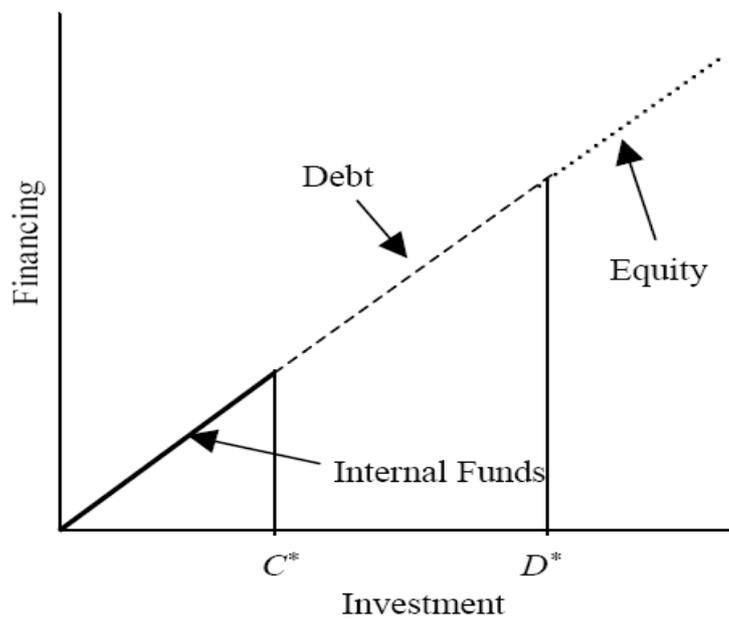


Figure 2 shows how the companies prioritize their sources of financing, from internal financing to equity. According to the Pecking Order Theory, internal funds are used first, and when that is depleted, debt is issued, and when it is not sensible to issue any more debt, equity is issued.

$C^*$  - the amount of internal funds that the firm has available for investment;  $(D^* - C^*)$  - the firm's debt capacity or the amount of debt it can undertake without jeopardizing its financial health or future investment opportunities.

**Figure 3 – Cash holdings and GDP growth over time**

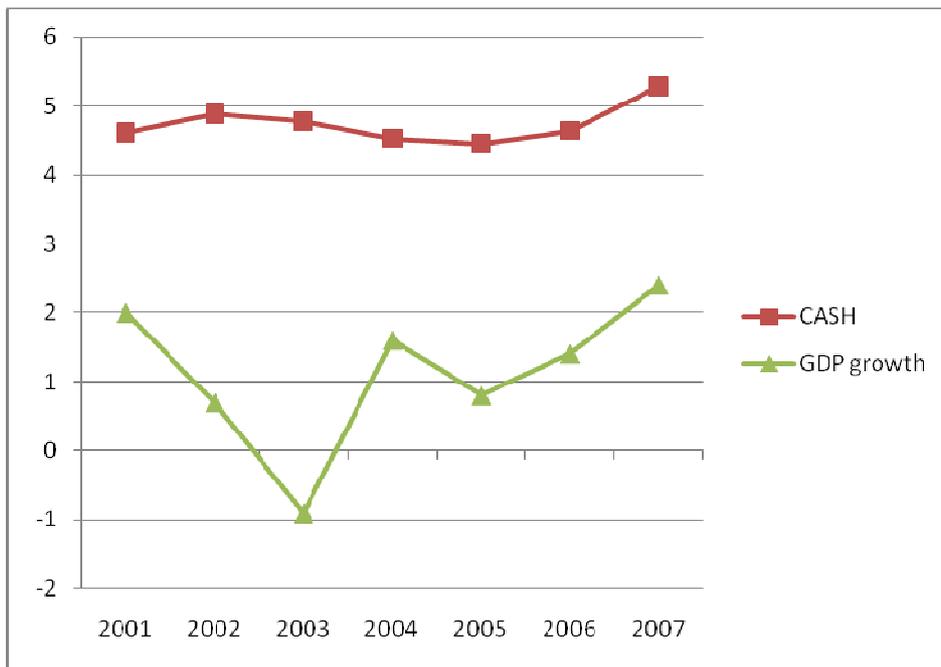


Figure 3 shows the annual evolution of GDP growth and the average annual level of cash holdings. CASH is the ratio of cash plus marketable securities to total assets, GDP is the Gross Domestic Product growth, calculated as the growth rate of GDP at market prices (2006) and expresses as percentage change on previous year.

**Table 1 – Cash holding determinants according to the three theories**

Variable	Trade-off Theory	Pecking Order Theory	Free Cash Flow Theory
Growth opportunities	*	*	Positive
Size	Negative	Positive	Positive
Relationship with banks	Negative	*	*
Financial distress	Positive/Negative	*	*
Leverage	Positive/Negative	Negative	Negative
Debt maturity structure	Negative	*	*
Cash flow	Negative	Positive	*
Liquidity	Negative	*	*

**Table 2 – Cash holding determinants in the previous empirical studies**

Author	Growth opportunities	Leverage	Debt maturity structure	Cash flow	Liquidity	Size	Relationship with banks	Financial distress
Kim et al. (1998)	+	-		-				
Opler et al. (1999)	+	-		+		+		
Faulkender (2002)	+	-		+		+		
Ozkan&Ozkan (2002)	+	-		+		+		+
Harford (1999)				-				
Pinkowitz &Williamson (2001)	+	-		-		-	-	
Dittmar (2003)							-	
Ferreira &Vilela (2004)	+	-	-	+	-	-		
Guney (2006)		+/-						
Drobetz &Grüninger (2006)		+/-			-			
Hofmann (2006)	+	-		+	-			
Teruel & Solano (2008)	+	+	-	+	-	-	-	+

**Table 3 - Description of Variables**

Name	Definition
Cash Holdings (CASH)	(Cash + Marketable securities)/Total assets
Growth Opportunities (GROWOP)	$Sales_t/Sales_{t-1}$
Size (SIZE)	$\ln(\text{Sales})$
Relationships with Financial Institutions (BANKR)	Bank debt/Total debt
Financial Distress (FDISTRESS)	$ZSCORE = 0,104*X_1+0,010*X_2+0,106*X_3+0,003*X_4+0,169*X_5$ $X_1 = \text{Working capital/Total assets}; X_2 = \text{Retained earnings/Total assets}; X_3 = \text{Net operating profits/Total assets}; X_4 = \text{Book value of capital/Book value of debt}; X_5 = \text{Sales/Total assets}$
Leverage (LEV)	Total debt/Shareholders equity
Debt Maturity Structure (DEBTSTR)	Long-term debt/Total debt
Cash-Flows (CFLOW)	(Pre-tax profits + Depreciation)/Total assets
Liquidity (LIQ)	(Working capital - Cash)/Total assets

**Table 4 - Descriptive Statistics**

<i>Variable</i>	<i>N</i>	<i>Median</i>	<i>Range</i>	<i>Mean</i>	<i>Std. Deviation</i>
CASH	10.870	0.02159	0.7982	0.047778	0.0714514
GROWOP	10.870	1.02982	1,209.22	1.193591	11.6563009
SIZE	10.870	7.999846	10.8011	7.853906	1.3946514
BANKR	10.870	0.31294	1.0000	0.329639	0.1997534
FDISTRESS	10.870	0.199204	1.8867	0.215134	0.1020290
LEV	10.870	1.981044	2,517.00	2.529491	73.8106595
DEBTSTR	10.870	0.249227	1.0000	0.287088	0.2162606
CFLOW	10.870	0.549902	14.5000	0.628094	0.5097253
LIQ	10.870	0.19196	0.9612	0.223620	0.1625808

CASH is the ratio of cash plus marketable securities to total assets, GROWOP measures growth opportunities, SIZE expresses the size of the firm, BANKR measures the level of short-term bank debt, FDISTRESS the probability of financial distress, LEV the leverage, DEBTSTR expresses the debt maturity structure, CFLOW the capacity to generate cash flow and LIQ the investment in other liquid assets.

**Table 5 - Correlation Matrix**

	CASH	GROWOP	SIZE	BANKR	FDISTRESS	LEV	DEBTSTR	CFLOW	LIQ
CASH	1								
GROWOP	-0.006	1							
SIZE	-0.161**	0.11	1						
BANKR	-0.124**	0.005	0.171**	1					
FDISTRESS	0.142**	-0.007	0.212**	-0.190**	1				
LEV	-0.00003	0.001	-0.009	0.002	0.018	1			
DEBTSTR	-0.064**	0.008	0.060**	0.151**	-0.252**	-0.007	1		
CFLOW	0.039**	-0.010	0.041**	-0.049**	0.076**	-0.001	0.097**	1	
LIQ	-0.160**	-0.011	-0.089**	0.068**	0.072**	0.018	-0.116**	-0.096**	1

CASH is the ratio of cash plus marketable securities to total assets, GROWOP measures growth opportunities, SIZE expresses the size of the firm, BANKR measures the level of short-term bank debt, FDISTRESS the probability of financial distress, LEV the leverage, DEBTSTR expresses the debt maturity structure, CFLOW the capacity to generate cash flow and LIQ the investment in other liquid assets.

\*\* Correlation is significant at the 0.01 level (2-tailed).

**Table 6 – Firms’ characteristics by CASH Quartiles**

<i>Variable</i>	<i>First Quartile</i>	<i>Second Quartile</i>	<i>Third Quartile</i>	<i>Fourth Quartile</i>	<i>t-statistic (p-value)</i>
Range CASH	0 to 0,007	0,006 to 0,022	0.018 to 0,061	0,052 to 0,798	
CASH	0.0032 (0.0030)	0.0137 (0.0134)	0.0361 (0.0347)	0.1378 (0.1043)	-80.074 (0.000)
GROWOP	1.5134 (1.0235)	1.0590 (1.0285)	1.1124 (1.0332)	1.0904 (1.0342)	0.947 (0.344)
SIZE	8.0678 (8.2189)	8.0202 (8.1639)	7.8321 (7.9484)	7.4966 (7.6468)	14.706 (0.000)
BANKR	0.3606 (0.3503)	0.3578 (0.3493)	0.3199 (0.3014)	0.2804 (0.2505)	14.993 (0.000)
FDISTRESS	0.1931 (0.1758)	0.2043 (0.1916)	0.2216 (0.2091)	0.2414 (0.2205)	-16.444 (0.000)
LEV	3.6673 (2.0497)	0.3296 (2.0280)	3.1539 (2.0037)	2.9679 (1.7995)	0.633 (0.527)
DEBTSTR	0.3059 (0.2783)	0.3020 (0.2718)	0.2754 (0.2320)	0.2652 (0.2109)	6.834 (0.000)
CFLOW	0.6168 (0.5301)	0.6182 (0.5452)	0.6250 (0.5568)	0.6523 (0.5666)	-2.432 (0.010)
LIQ	0.2426 (0.2087)	0.2371 (0.2044)	0.2249 (0.1933)	0.1899 (0.1571)	11.590 (0.000)

Comparison of mean values of characteristics of 1.553 SMEs for the period 2001-2007. Quartiles for variable CASH created annually. Each quartile contains approximately 2.718 observations. Median values in brackets. CASH is the ratio of cash plus marketable securities to total assets, GROWOP measures growth opportunities, SIZE expresses the size of the firm, BANKR measures the level of short-term bank debt, FDISTRESS the probability of financial distress, LEV the leverage, DEBTSTR expresses the debt maturity structure, CFLOW the capacity to generate cash flow and LIQ the investment in other liquid assets, t statistic tests differences of means between first and fourth quartile. P-value in brackets.

**Table 7 - Determinants of SMEs cash holdings**

	Unstandardized Coefficients		Standardized Coefficients	t	Collinearity Statistics
	B	Std. Error	Beta		VIF
(Constant)	0.128	0.004		30.954	
GROWOP	-0.00003	0.0001	-0.004	-0.448	1.000
SIZE	-0.011	0.000	-0.210	-21.732	1.128
BANKR	-0.013	0.003	-0.036	-3.696	1.116
FDISTRESS	0.131	0.007	0.186	18.657	1.201
LEV	-0.000002	0.00001	-0.002	-0.213	1.001
DEBTSTR	-0.008	0.003	-0.023	-2.373	1.117
CFLOW	0.002	0.001	0.016	1.708	1.031
LIQ	-0.084	0.004	-0.190	-20.403	1.047
Adjusted R Square	0.097				
N	10.870				

CASH is the ratio of cash plus marketable securities to total assets, GROWOP measures growth opportunities, SIZE expresses the size of the firm, BANKR measures the level of short-term bank debt, FDISTRESS the probability of financial distress, LEV the leverage, DEBTSTR expresses the debt maturity structure, CFLOW the capacity to generate cash flow and LIQ the investment in other liquid assets. All t-statistics (t) are heteroskedasticity robust using the White correction.

**Table 8 – Robustness of the exogenous variables on Corporate Cash Holdings**

	1		2		3		4	
	Beta	t	Beta	t	Beta	t	Beta	t
(Constant)	0.125	28.164	0.1407	30.6131	0.1405	33.9295	0.1289	31.3002
GROWOP	-0.000025	-0.441	-0.00002	-0.4463	-0.00003	-0.5577	-0.00003	-0.4702
SIZE1	-0.011	-21.262	-	-	-0.0080	-16.5360	-0.0107	-21.4780
SIZE2	-	-	-0.0112	-21.8563	-	-	-	-
BANKR	-0.013	-3.862	-0.0119	-3.4448	-0.0271	-7.9206	-0.0136	-3.9365
FDISTRESS1	0.132	18.776	0.0799	11.8651	-	-	0.1314	18.7893
FDISTRESS2	-	-	-	-	-0.1207	-2.6102	-	-
LEV	-0.000002	-0.193	-0.000003	-0.3797	0.000001	0.1449	-0.000002	-0.2164
DEBTSTR	-0.007	-2.307	-0.0061	-1.9237	-0.0215	-6.8322	-0.0066	-2.0779
CFLOW1	0.001	1.074	0.0019	1.4869	0.0045	3.4558	-	-
CFLOW2	-	-	-	-	-	-	0.0000	-1.4065
LIQ	-0.085	-0.744	-0.0785	-19.2724	-0.0767	-18.5010	-0.0846	-20.7001
Year Dummy	Yes		No		No		No	
Adjusted R Square	0.097		0.098		0.068		0.097	

CASH is the ratio of cash plus marketable securities to total assets, GROWOP measures growth opportunities, SIZE<sub>1</sub> and SIZE<sub>2</sub> express the size of the firm, BANKR measures the level of short-term bank debt, FDISTRESS<sub>1</sub> and FDISTRESS<sub>2</sub> the probability of financial distress, LEV the leverage, DEBTSTR expresses the debt maturity structure, CFLOW<sub>1</sub> and CFLOW<sub>2</sub> the capacity to generate cash flow and LIQ the investment in other liquid assets. Year dummy is a variable that changes in time but is equal for all firms in each time period considered. All t-statistics (t) are heteroskedasticity robust using the White correction.

**Table 9 – Determinants of corporate cash holdings for alternative samples**

	1		2		3	
	Beta	t	Beta	t	Beta	t
(Constant)	0.127	30.294	0.145	26.736	0.114	20.872
GROWOP	-0.00003	-0.448	-0.004	-1.935	-0.00002	-0.414
SIZE	-0.011	-21.695	-0.012	-19.801	-0.010	-15.318
BANKR	-0.013	-3.696	-0.015	-3.741	-0.009	-2.256
FDISTRESS	0.130	18.642	0.123	14.836	0.094	10.339
LEV	-0.000002	-0.216	0.000	-2.099	0.000003	0.422
DEBTSTR	-0.008	-2.394	-0.008	-2.105	-0.007	-1.914
CFLOW	0.002	1.647	0.004	2.515	0.004	2.567
LIQ	-0.084	-20.432	-0.090	-18.706	-0.058	-11.767
GDP	0.001	1.142	-	-	-	-
Adjusted R Square	0.097		0.097		0.073	
N	10,870		8,771		5,600	

CASH is the ratio of cash plus marketable securities to total assets, GROWOP measures growth opportunities, SIZE expresses the size of the firm, BANKR measures the level of short-term bank debt, FDISTRESS the probability of financial distress, LEV the leverage, DEBTSTR expresses the debt maturity structure, CFLOW the capacity to generate cash flow and LIQ the investment in other liquid assets. GDP is the Gross Domestic Product growth, calculated as the growth rate of GDP at market prices (2006) and expresses as percentage change on previous year. All t-statistics (t) are heteroskedasticity robust using the White correction.