ON THE DETERMINANTS OF SME CASH HOLDINGS: EVIDENCE FROM SPAIN

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Abstract: This work analyses the factors that might explain the level of cash holdings in a sample of 860 small and medium-sized firms from Spain during the period 1996-2001. The empirical results show that firms have a target cash level to which they attempt to converge. The level of this target is higher for firms with more growth opportunities and larger cash flows. In contrast, the target level for cash holdings falls when the use of bank debt and the presence of substitutes for cash increase. Moreover, when the interest rates in the economy increase firms reduces their cash holding.

Keywords: Cash, Liquidity, SMEs

JEL Classification: G31, G32

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1. INTRODUCTION

Firms have important cash holdings on their balance sheets, as has been demonstrated in recent studies. For example, in late 2000 the amount of cash and marketable securities held by firms in the European Monetary Union amounted to 14.8% of their total assets (Ferreira and Vilela, 2004). 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 (Baumol, 1952; Miller and Orr, 1966; Meltzer, 1993; Mulligan, 1997).

In recent years other explanations have been advanced in an attempt to develop a complete picture of the transaction approach. In this framework, cash decisions may be affected by the existence of market imperfections such as information asymmetry, agency conflicts or financial distress. On the one hand, information asymmetry and agency conflicts between shareholders and creditors make it difficult and expensive for firms to obtain funds. In these circumstances, firms may build up their liquid monetary assets in order to reduce the costs associated with dependence on external financing. On the other hand, managers have an incentive to accumulate cash balances to increase the amount of assets under their control, which may induce discretional behaviours in the management that are detrimental to the shareholders (Jensen, 1986). Finally, accumulating cash may reduce the firms' likelihood of entering financial distress.

Thus, numerous recent empirical studies have aimed to test the determinant factors of firms' cash levels. Kim, Mauer and Sherman (1998) demonstrated that US firms with higher cash levels show more growth opportunities, more volatility in their cash flows and less profitability in their productive assets. Opler, Pinkowitz, Stulz and Williamson (1999) obtained similar results for the same market, finding that smaller firms with more investment opportunities and risky activities possess a larger proportion of liquid financial assets.

More recently, Ozkan and Ozkan (2004) studied a sample of British firms and provided evidence on the same lines. In addition, and unlike the previous work, they tested the importance of the ownership structure in determining the British firms' cash levels. Similarly, various international studies (Dittmar, Marth-Smith and Servaes, 2003; Guney, Ozkan and Ozkan, 2003; Pinkowitz, Stulz and Williamson, 2003; Ferreira and Vilela, 2004) demonstrated that firms' cash holdings are conditioned by the legal structure of the country concerned, with lower levels found in countries where investors are more protected.

All these previous studies focussed their analysis on the determinants of cash holdings in large firms listed on the financial markets. But the imperfections mentioned above are more serious in the case of small and medium-sized enterprises (SMEs). Indeed, as Berger and Udell (1998) point out, the main characteristic of SMEs, which distinguishes them to a large extent from larger firms, is their greater informational opacity, which worsens information asymmetry problems. Along with this, the coincidence of ownership and control and the greater flexibility in operations in this type of firm makes the agency problems associated with debt more serious (Petit and Singer, 1985). In turn, this type of firm is more likely to suffer financial difficulties (Titman and Wessels, 1988), as well as financial constraints (Whited, 1992; Fazzari and

Petersen, 1993). Finally, their transaction costs will be relatively higher, given the economies of scale associated with these costs (Mulligan, 1997).

In this context, and since to our knowledge there has been only one previous working paper on American SMEs (Faulkender, 2004), the objective of this current research is to provide empirical evidence on the determinants of cash holdings in small and medium-sized firms. The study also contributes to the literature for a number of other reasons. First, we present empirical evidence for a sample of Spanish SMEs in the context of the continental model (civil law), which is characterised by less-developed capital markets (La Porta, López-de-Silanes, Shleifer and Vishny, 1997). Second, and in contrast to Faulkender's (2004) work, we use a dynamic panel. This offers various advantages. On the one hand, it allows us to control for the existence of unobservable heterogeneity, as there is more than one cross section. On the other, and in common with the work of Guney et al. (2003) and Ozkan and Ozkan (2004), we can examine a partial adjustment model that allows us to confirm whether the SMEs possess an optimal cash holding level. Finally, the estimation carried out using General Method of Moment (GMM) allows us to control for possible endogeneity problems that may arise, since, as Guney et al. (2003) point out, the random disturbances that affect decisions about the cash level may also affect firm characteristics such as leverage and growth opportunities.

The results obtained show that the sample SMEs have a target level of cash holdings to which they attempt to converge. This target level is higher for firms with greater growth opportunities and cash flows. In contrast, the cash level falls when the use of bank debt rises and with increased firm liquidity. Moreover, when the interest rates in the economy increase firms reduces their cash holding.

The rest of this work is structured as follows: in Section 2, we review the literature examining the main determinants of investment in liquid financial assets. In the third section, we describe the sample and variables used, while in the fourth we outline the methodology employed. In Section 5, we report the results of the research. Finally, we end with our main conclusions.

2. THEORETICAL FOUNDATIONS AND HYPOTHESES

If market imperfections did not exist, firms' financial decisions would not affect their value (Stiglitz, 1974). In this situation, keeping liquid financial assets would be irrelevant. Indeed, the volume of cash kept to deal 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 (Opler, Pinkowitz, Stulz and Williamson, 2001).

However, the presence of market imperfections implies that there is an optimal cash level that balances costs and benefits and maximises 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 (Myers, 1977). 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.

However, investing in cash holdings also has costs. On the one hand, it has an opportunity cost for the firm, since it will generally provide a lower return than productive investments, assuming that the firm forgoes these investments to hold that level of cash. On the other hand, keeping a higher level of liquid financial resources in the firm can also generate agency conflicts between managers and shareholders. Thus, the existence of large free cash flows can generate discretional behaviours in the managers that are detrimental to shareholder interests (Jensen, 1986). In this context, in firms where ownership and control are firmly separated, as is the case for firms listed on organised markets, managers can use the funds on projects that do not clearly benefit the shareholders, or alternatively they may pursue personal objectives. 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. 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).

On the basis of these benefits and costs, we now describe the main characteristics of firms that are relevant when determining cash levels according to the theories discussed above.

Growth opportunities

The existence of growth opportunities in firms is an important factor that positively affects cash levels, as has been shown in various empirical studies (Kim et al., 1998; Opler et al., 1999; Ferreira and Vilela, 2004; Ozkan and Ozkan, 2004). 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 costs. They also suffer more serious agency conflicts associated with debt, which can lead to underinvestment insofar as it discourages shareholders from embarking on profitable projects (Myers, 1977).

Hence we might expect firms with more investment opportunities to keep higher liquidity levels, in order not to limit or cancel their profitable investment projects. The value of the firms is dependent upon them carrying out these projects, thus the cost of not having sufficient cash to make the investments is higher.

Size

Size is another significant variable that affects cash holdings. The traditional models to determine the optimal cash levels (Baumol, 1952; Miller and Orr, 1966), or more recent models such as that of Mulligan (1997), 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.

Moreover, we should also bear in mind that firm size is related to another set of factors that may influence liquidity levels. More specifically, smaller firms suffer more severe information asymmetries (Jordan, Lowe and Taylor, 1998; Berger, Klapper and Udell, 2001), more financial constraints (Whited, 1992; Fazzari and Petersen, 1993) and they are more likely to suffer financial distress (Rajan and Zingales, 1995; Titman and Wessel, 1988). Also, financial distress is associated with high fixed costs and these costs are proportionately greater for smaller firms (Warner, 1977). Thus, we would expect a negative relation between firm size and cash holdings.

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. Thus, according to various theoretical contributions (Leland and Pyle, 1977; Diamond, 1984; Boyd and Prescott, 1986), establishing stable links with financial institutions can improve both the availability and the conditions of financing. Various works have demonstrated empirically that keeping banking relationships can be beneficial to firms, insofar as contact between the firm and financial intermediary can improve the availability of funds and lower their costs (Petersen and Rajan, 1994).

On the basis of these arguments, Ozkan and Ozkan (2004) maintain that building relationships with financial institutions will improve a firms' ability to access external financing. This suggests that firms with a higher proportion of bank debt will be able to access external financing more easily. However, SMEs find it very difficult to obtain external finance. In this case, 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 Körting, 1998; Bodt et al., 2001), and are more likely to be granted loans (Cole, 1998).

Probability of financial distress

The costs of financial distress arise when the firm cannot meet its payment obligations contracted with third parties, either in the short or the long term. This factor could affect a firms' cash holding decisions, although there is some controversy about the direction. 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. However, Kim et al. (1998) expect firms with a greater likelihood of financial distress to have lower levels of liquidity. This latter relation can be explained by the fact that firms that are having difficulties in meeting their payment commitments cannot accumulate cash, since they will use any liquid resources available to pay what they owe.

Furthermore firms with more growth opportunities may also incur greater costs in financial distress (Harris and Raviv, 1990; Shleifer and Vishny, 1992). This is because their value depends on their growth opportunities rather than on tangible assets or specific cash flows. Consequently, this type of firm will keep higher cash levels to avoid costs of financial distress.

Leverage

The leverage ratio will also affect a firm's cash holdings. The empirical evidence (Kim et al., 1998; Opler et al., 1999; Ferreira and Vilela, 2004; 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 rises (Baskin, 1987). In addition, as John (1993) maintains, firms that can access the debt market can resort to borrowing as a substitute for liquid assets.

Debt maturity structure

The distribution of debt maturities between short and long term can also affect decisions concerning liquid financial assets, as Guney et al. (2003) and Ferreira and Vilela (2004) maintain. The use of short-term debt obliges firms to negotiate the renewal of their credits periodically, with the consequent risk of refinancing. Thus, firms with a larger proportion of short-term debt will keep higher cash levels in order to avoid the financial distress that they would incur if their loans failed to be renewed.

Furthermore, on the basis of debt maturity structure models (for example Flannery, 1986, and Kale and Noe, 1990), firms with greater information asymmetry will keep more short-term debt. This relation is confirmed in various empirical studies[i], so that debt maturity can also be regarded as a proxy for information asymmetry. From this perspective, therefore, we would expect firms with a higher proportion of short-term debt to keep higher cash holdings.

Cash flows generated by the firm

Myers and Majluf (1984) argue that in the presence of information asymmetry firms will establish a hierarchy in their use of funding sources. According to hierarchy 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 Monetary Union (EMU) countries. However, Kim et al. (1998) claim that the relation is in fact negative, as they consider that cash flows represent an additional source of liquidity for the firm and can therefore substitute cash.

Liquidity

The presence of liquid assets apart from cash and marketable securities (for example debtors or stocks) can also affect a firm's optimal cash holdings, since they can be considered substitutes for cash. We would therefore expect firms with more non-cash liquid assets to reduce their cash levels.

In Chart 1, we summarise the main explanatory factors of firms' levels of cash holdings.

CHART 1

3. DATA AND VARIABLES

3.1 Sample and data

The information required for the sample was taken from the SABE (System of Analysis of Spanish Balance Sheets) database, developed by Bureau Van Dijk. This database includes accounting and financial information on Spanish firms, obtained from the annual financial statements deposited at the Registry of Companies.

We selected firms from the manufacturing sector that during the period of analysis (1996-2001) complied with the SME condition, according to the requirements established by the European Commission recommendation 96/280/CE of 3rd April, 1996 on the definition of small and medium-sized firms. Specifically, the sample firms met

[i] Stohs and Mauer (1996) and Guedes and Opler (1996), among others.

the following conditions: a) had less than 250 employees; b) turned over less than €40 million; and c) possessed less than €27 million worth of total assets.

The information obtained was refined, eliminating cases with errors in the accounting data or lost values for some of the variables from the sample. Specifically, we required that variables such as assets, fixed assets, working capital and short-term and long-term debt be positive, as well as any other variable defined as positive. After applying the corresponding filters, we built a panel comprising 5160 observations corresponding to 860 firms.

In addition, we required interest rate data, which we obtained from publications of the Information Bureau of the Spanish Annotated Public Debt Market. Gross Domestic Product (GDP) data were obtained from Eurostat.

3.2 Variables

The dependent variable used in this study has been measured in two ways. First, and similarly to Ozkan and Ozkan (2004), we used the variable $CASH_1$, calculated as the ratio of cash and marketable securities to total assets. Second, we used the variable $CASH_2$, which is identical to $CASH_1$ except that in the denominator cash and marketable securities are subtracted from the total assets (Opler et al., 1999). The higher the values of both these measures, the higher the firm's cash level.

With regard to the explanatory factors of cash holdings[ii], we used, in the first place, a firm's *growth opportunities*. In this case, given that the sample comprises small and medium-sized firms for which no information about their market value is available, we could not use the book-to-market ratio, as is common practice when dealing with larger firms. Instead, this variable is measured by the ratio $sales_0/sales_{-1}$ (GROWP) used

by Scherr and Hulburt (2001). Firms that grew most in the past are assumed to have more growth opportunities in the future. Thus, we would expect the dependent variable to be positively related to this variable.

To measure *size* we also used two proxies. On the one hand $SIZE_1$, which is calculated as the natural logarithm of sales, and on the other $SIZE_2$, the natural logarithm of assets. A negative relation is expected between both variables and the amount of liquid financial assets held, since information asymmetry and the probability of default are greater in smaller firms. In addition, as we said in Section 2, larger firms keep lower cash holdings. This is because there may be economies of scale associated with the cash holdings firms keep for their day-to-day transactions.

The *relationships with financial institutions (BANKD)* has been approximated by considering the debt levels that the firms maintain with their banks. Specifically, *BANKD* is calculated as the ratio of short-term bank debt to total debt[iii]. The expected relation between this variable and a firm's cash holdings is negative.

The likelihood of financial distress is calculated according to the re-estimation of Altman's (1968) model carried out by Begley, Mings and Watts (1996), given by the following expression:

$$ZSCORE=0.104*X_1 + 1.010*X_2 + 0.106*X_3 + 0.003*X_4 + 0.169*X_5$$

[ii] In Appendix 1 we briefly describe these variables.

[iii] We do not use total bank debt (both short-term and long-term), because the database does not disaggregate long-term bank debt. In any case, long-term debt represents only 16% of the sample firms' liabilities (see Table I).

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

Although the ratio X_4 is calculated as market value of capital over book value of debt in the original model, here we have used the alternative proposed by Scherr and Hulburt (2001): the book value (and not the market value) of the assets. This is because the market value is not available in the case of SMEs.

A higher ZSCORE implies a lower default risk. Its effect on cash holdings is not at all clear, as we have said in Section 2.

The *leverage (LEV)* has been measured by the ratio of debt to shareholders' equity. Previous empirical evidence has found a negative relationship between this variable and cash holdings.

The *debt maturity structure* is measured by the variable *LDEBT*, defined as long-term debt divided by total debt. We would expect a negative relationship between this variable and the dependent variable. Indeed, firms that use more long-term debt have less risk of refinancing and less information asymmetry.

The *cash flow* has been approximated by dividing pre-tax profits plus depreciation over sales *($CFLOW_1$)* or total assets *($CFLOW_2$)*. We would expect firms with larger cash flows to hold more cash.

On the other hand, in line with the previous work of Opler et al. (1999), Ferreira and Vilela (2004) and Ozkan and Ozkan (2004), we calculated the ratio of working capital less cash to total assets (LIQ) to measure the existence of other liquid assets that may substitute for cash. In this case we would expect a negative relation.

The opportunity cost of the capital invested in liquid assets (*RSPREAD*) has been measured, following Kim et al. (1998), as the difference between the return on the

firm's assets (gross operating profits/assets) and the return on Treasury bills. According to these authors this variable should be negatively related to cash holdings, since it measures how attractive investment in the firm's activities is compared to investing in liquid assets. Moreover, we have also used the short-term interest rate, measured as 1-year Treasury bills (INT), to capture the time-series variation in interest rates.

Finally, we introduced the gross domestic product growth (GDP) to measure the possible effects of the evolution of the economic cycle on cash levels.

In order to characterise the firms of the sample, in Table I we report the descriptive statistics of the variables used. We can see that the sample is made up of small firms, with average assets of €8.6 million and average sales of €10.73 million. They are highly leveraged, with debt of 2.63 times their shareholders' equity. Bank debt represents almost 30% of these firms' debt. In addition, most of their debt is short-term, with their long-term debt making up only 16.8% of their external financing. The average cash holdings of the Spanish SMEs is 6.57% of total assets ($CASH_1$), and 8% if cash and marketable securities are subtracted from total assets ($CASH_2$).

TABLE I

On the other hand, Figure 1 presents the evolution over time of the cash holdings of the firms analysed, along with the evolution in the interest rates and the Spanish economy's GDP growth in the period of time analysed. We see that the ratio of cash holdings to total assets ($CASH_1$) remains above 6% throughout the period. The highest level (7.05%) is reached in 1999, the year in which the interest rates were at their lowest level. Conversely, in 1996, when the interest rates are higher, firms' investment in cash is at its lowest (6.10%). Thus, cash levels climb (fall) when interest rates decrease (increase). The effect is not very strong. For instance, given a fall in interest rates from 3.8% to 2.9% (a drop of 23.68% between 1998 and 1999), the cash holdings over assets

changed from 6.7% to 7.1% (an increase of only 5.97% over the same period). However, this effect is not necessarily direct, since changes in the interest rate may affect other variables that determine cash levels. With regard to the GDP growth, we do not observe a clear relation between its evolution and that of the levels of cash held by firms.

FIGURE 1

In Table II we report the correlation coefficients of the variables. In general, we can say that the correlations between the firms' cash holdings and the explanatory variables have the expected sign, except for the variable measuring the opportunity cost (RSPREAD), although the proxies for growth opportunities (GROWP), size ($SIZE_1$, $SIZE_2$) and liquidity (LIQ) are not statistically significant. On the other hand, the correlation between the explanatory variables is not high, except for the case of $CFLOW_2$ and RSPREAD, with a correlation coefficient of 0.7536.

TABLE II

4. METHODOLOGY

We tested the hypotheses concerning the determining factors of firms' cash holdings using the panel data methodology.

Panel data are useful in that they allow us to relax and test assumptions that are implicit in cross-sectional analyses. In particular, we might mention two relevant aspects. Firstly, it is possible to control for unobservable heterogeneity, since the methodology provides us with more than one cross section. This allows us to eliminate biases deriving from the existence of individual effects (Hsiao, 1985). Secondly, the

panel data methodology also makes it possible to model dynamic responses with micro data.

In addition, we aim to determine whether changes in the firms' cash ratios follow a partial adjustment model. We develop a model that assumes that the firms pursue a target level when making their cash decisions. In this way, the levels achieved at any time will also be explained by the decisions taken in previous periods. To test the assumption, and following Ozkan and Ozkan (2004), we consider that the optimal cash level is given by the particular characteristics of the firm explained above plus a random disturbance, such that:

$$CASH^{*}_{it} = \rho + \sum_{k} \beta_{k} x_{kit} + \upsilon_{it} \qquad (1)$$

Firms will adjust their cash levels to achieve this level, such that any changes occurring will be determined by:

$$CASH_{it} - CASH_{it-1} = \gamma\,(CASH^{*}_{it} - CASH_{it-1}) \qquad (2)$$

where $(CASH^{*}_{it} - CASH_{it-1})$ indicates the adjustment required to reach the optimal level. A firm's capacity to achieve the desired level will be given by the coefficient γ, which takes values between 0 and 1. If γ is 1, the firms will adjust their cash levels to the optimal level immediately; if it is 0, this indicates that the costs of adjustment are so high that the firms cannot modify their existing cash structures.

Thus, substituting (1) into (2), the equation that explains the cash levels kept by firms is as follows:

$$CASH_{it} = \alpha + \delta_0 \ CASH_{it-1} + \sum_{k=1} \delta_k x_{kit} + \varepsilon_{it} \qquad (3)$$

where $\alpha = \rho\gamma$; $\delta_0 = (1-\gamma)$; $\delta_k = \gamma\beta_k$; and $\varepsilon_{it} = \gamma\upsilon_{it}$.

In addition, if we introduce the firm's unobservable individual effects and the time dummy variables into the model, the model to be estimated becomes:

$$CASH_{it} = \alpha + \delta_0 CASH_{it-1} + \delta_1 GROWP_{it} + \delta_2 SIZE_{it} + \delta_3 BANKD_{it} + \delta_4 ZSCORE_{it} + \delta_5 LEV_{it} + \delta_6 LDEBT_{it} + \delta_7 CFLOW_{it} + \delta_8 LIQ_{it} + \delta_9 RSPREAD_{it} + \eta_i + \lambda_t + \varepsilon_{it} \qquad (4)$$

The variable η_i (unobservable heterogeneity) is designed to measure the particular characteristics of each firm as well as the characteristics of the sector in which it operates. The parameters λ_t are time dummy variables that change in time but are equal for all firms in each of the time periods considered. In this way, we attempt to capture the economic variables that firms cannot control and which may affect their cash decisions. We should bear in mind that the parameter δ_0 is 1 minus the adjustment coefficient (the adjustment costs).

Regressions of dynamic panels are characterised by the existence of autocorrelation, as a consequence of considering the lagged dependent variable as an explanatory variable. In this way, estimations used in static frameworks lose their consistency[iv]. Indeed, the estimation by OLS of Equation (4) is inconsistent even if the ε_{it} are not serially correlated, since $CASH_{it-1}$ is correlated with η_i. Likewise, the intragroup estimator, which estimates Equation (1) with the variables transformed into deviations from the mean, is also inconsistent, as a consequence of the correlation that arises between $(CASH_{it-1} - \overline{CASH}_{it-1})$ and $(\varepsilon_{it} - \overline{\varepsilon_{it}})$. Finally, the OLS estimation of first

differences is equally inconsistent, since $\Delta CASH_{it-1}$ and $\Delta\varepsilon_{it}$ are correlated, given that $CASH_{it-1}$ and ε_{it-1} are.

Considering the previous limitations, the parameters of Equation (4) will be estimated using instrumental variable estimators and specifically applying the General Method of Moment (GMM) on the equation in first differences. This procedure, developed by Arellano and Bond (1991)[v], presents two levels of application dependent upon the nature of the ε_{it}. If the residuals are homoskedastic, the 1-stage GMM turns out to be optimal. If in contrast there is heteroskedasticity, the estimator of instrumental variables in one stage continues to be consistent, but conducting the estimation in two stages increases efficiency. This procedure makes use of the residuals of the 1-stage estimation.

The GMM estimations that use lagged variables as instruments under the assumption of "white noise" disturbances are inconsistent if the errors are autocorrelated (Arellano and Bover, 1990). In this way, this methodology assumes that there is no second-order serial correlation in the errors in first differences. For this reason, in order to test the consistency of the estimations, we used the test for the absence of second-order serial correlation proposed by Arellano and Bond (1991). Likewise, we employed the Sargan (1958) test of over-identifying restrictions, which tests for the absence of correlation between the instruments and the error term.

5. RESULTS

5.1 Univariate analysis

[iv] See Baltagi (2001).
[v] Arellano and Bond's (1991) GMM estimators use more instruments and are more efficient than the estimator proposed by Anderson and Hsiao (1982).

We first conducted a 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. For this, in Table III we present the mean values of the variables used in this study for each quartile of the variable $CASH_1$. Following Opler et al. (1999) the quartiles have been constructed annually, which explains why the ranges of the variable $CASH_1$ overlap across quartiles. We then carried out a difference of means tests based on Student's t 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 III.

TABLE III

In general, the characteristics of the firms holding most cash (fourth quartile) are significantly different from those with lower cash holdings (first quartile). Thus, firms with higher opportunity cost, higher cash flows and more liquidity present higher levels of cash. In contrast, the cash holding is lower in smaller firms, in those with more likelihood of insolvency, more leverage, more long-term debt and higher proportion of bank debt. However, we should mention that the relationship found for opportunity cost or liquidity is in the opposite direction to that which we expected. In addition, whether size is judged to have a significant effect on the levels of cash held depends on the measure of size used. It can also be seen that several variables do not change monotonically with cash levels, as can be seen for example for the variable LIQ. This indicates that comparing the first and fourth quartiles is not sufficient to describe the relation between cash holdings and firm characteristics.

5.2 Multivariate analysis

In Tables IV and V we report the results obtained for the estimation of the dynamic model described in Section 4. The explanatory variables have been assumed to be endogenous[vi]. This is justified since many of the variables are built from financial figures presented by the firms, so it is difficult to regard them as exogenous (Kremp, Stohs and Gerdesmeier, 1999). Moreover, as Guney et al. (2003) point out, the random disturbances that affect decisions about cash holdings can also influence firm characteristics such as leverage and growth opportunities.

All the estimations have been carried out using the 2-stage GMM estimator, since the 1-stage estimation can present problems of heteroskedasticity, as is shown by the rejection of the null hypothesis of the Sargan (1958) test in these estimations. Furthermore, we do not detect any second-order serial correlation, which confirms the consistency of the estimations.

Tables IV and V present results for two specifications of the dependent variable: $CASH_1$, measured as the ratio of cash and marketable securities to total assets, and $CASH_2$, where we subtract cash and marketable securities from assets. To confirm the robustness of the results, in Tables IV and V we present the estimation of Equation (4) using alternative proxies for some independent variables. Thus, in columns 1 and 2 we show the results using two size proxies ($SIZE_1$ and $SIZE_2$ respectively), in column 3 and 4 we use two cash flow measures ($CFLOW_1$ and $CFLOW_2$ respectively). In addition, we include short-term interest rates and economic cycle with GDP growth in column 3 and 4. The time dummies have been dropped in the regressions reported in columns 3 and 4, to avoid the multicollinearity problem since the time dummies should span the variation

[vi] $E(x_{it}\ \varepsilon_{is}) \neq 0$ for $s \leq t$ and $E(x_{it}\ \varepsilon_{is})=0$ for all $s>t$.

in the interest rate and the GDP growth. The results obtained with all these estimations are generally consistent.

TABLE IV

TABLE V

Specifically, the lagged dependent variable $CASH_{1t-1}$ coefficient, 0.2382 for the first regression in Table IV, is significant and positive, which confirms the dynamic behaviour of cash holding decisions (The corresponding figure is 0.1644 for $CASH_{2t-1}$ for the first regression in Table V). Hence it is clear that firms pursue a target cash holding level that balances the costs and benefits of keeping cash. This is consistent with the results found by Guney et al. (2003) and Ozkan and Ozkan (2004) for large firms. In addition, we find that the Spanish SMEs try to adjust their cash levels to the optimal level more quickly than the firms studied by Guney et al. (2003). Indeed, our adjustment coefficient (1- δ_0) in Table IV is roughly 0.76, compared to 0.6025 obtained for large British firms and roughly 0.56 for French, German and Japanese firms. This higher speed of adjustment for SME could be motivated by the relatively higher cost for small firms of being off target, since SMEs suffer more severe information asymmetries than larger firms and, along with agency conflicts between shareholders and creditors, more financial constraints and a greater likelihood of suffering financial distress. In contrast with SMEs, larger companies can adjust slowly to their target level without incurring a high level of agency costs.

Along with the search for an optimal cash level, decisions about liquid assets are also affected by the explanatory factors considered in Section 2 of this work. First, firms with better growth opportunities should have larger cash holdings. The results show that the variable GROWP is significant and positive in most of the estimations carried out. Of the four regressions shown in Table IV, three have the expected sign and are

significant at the 5% level or better; the same holds for the regressions reported in Table V. This result is similar to that found by Kim et al. (1998), Opler et al. (1999) and Ozkan and Ozkan (2004) for large firms in the US and UK markets. Hence the results appear to indicate that the SMEs with the best investment opportunities increase their levels of cash to ensure they will be able to undertake potentially profitable investment projects in the future, although the economic impact of this effect is small[vii]. An increase of one standard deviation in the variable GROWP produces an increase in the cash held by firms by between 2.36% and 2.82% as shown in Table IV. Similarly, in Table V the same change in GROWP produces a change in cash levels by between 2.31% and 3.07%.

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 and probability of default. However, size does not appear to affect cash levels, since most of the coefficients estimated for the variables $SIZE_1$ and $SIZE_2$ are not significant. SIZE in Table IV is statistically significant at the 5% level in only one of the four regressions, and in Table V SIZE is only significant at the 10% level in only one of four regressions[viii]. Previous studies by Kim et al. (1998), Guney et al. (2003) and Ozkan and Ozkan (2004) have not confirmed the idea that smaller firms maintain higher cash levels either, in spite of the intuitive attraction of the argument that small firms have greater information asymmetry problems, financial difficulties or financial constraints that

[vii] Following Kim et al. (1998) economic impact of statistical significance explanatory variables is measured as the percentage of change (over the mean value) in the dependent variable due to a one standard deviation change in the explanatory variable, all other things being equal. In addition, recall that in this partial adjustment model, the estimated coefficient (δ_k) is equal to $\gamma \beta_k$. So, the interpretation of how that characteristic impacts target cash levels (β_k) should be divided by γ.

make it more difficult and more expensive for them to obtain external financing. This may be because, as Ozkan and Ozkan (2004) point out, other factors may affect the way in which a company's size affects its cash holding decisions. Another possibility is that in the present study the finding may be explained by the greater homogeneity of the sample, which is made up of small firms that do not differ very much in size.

On the other hand, and as predicted, we observe that the coefficient of the variable BANKD is significant and negative in all regressions in both Tables IV and V. Moreover, this relationship has considerable economic impact. Depending on the regression specification, an increase in BANKD of one standard deviation reduces cash holdings by between 21.24% and 41.09%. This appears to indicate that maintaining a banking relationship improves access to this type of external financing by reducing the information asymmetry between borrower and lender. In this way, and as is confirmed empirically by Ferreria and Vilela (2004) and Ozkan and Ozkan (2004), firms that are more highly indebted to credit institutions can reduce their investments in liquid financial assets.

With regard to the effects of leverage (LEV), empirical evidence for large firms (Kim et al., 1998; Opler et al., 1999; Ferreira and Vilela, 2004; Ozkan and Ozkan 2004) shows that more highly leveraged firms should maintain lower cash holdings because they incur higher interest rates (Baskin, 1987) and have easier access to the capital markets (John, 1993). However, the positive sign in the coefficient estimates on LEV in Tables IV and V (between 0.0004 and 0.0006) indicate the opposite (the most highly leveraged SMEs have higher cash holdings). On the one hand, this result is consistent with the evidence from American SMEs found by Faulkender (2004), and it appears to

[viii] The alternative specifications with variable $SIZE_2$ in regressions (3) and (4) in Tables IV and V are not significant either.

indicate that SMEs prefer to keep high cash levels rather than use the cash to reduce their debt, given their greater difficulty in gaining access to the capital markets. On the other hand, Ozkan and Ozkan (2004) also consider that more highly leveraged firms may keep more cash in order to lower their default risk. But this explanation loses force, since the coefficient of the variable measuring financial distress (ZSCORE) is not significant[ix]. Hence, there does not appear to be a relationship between the likelihood of default and cash holdings. Notwithstanding these theoretical considerations, in the present study the positive relationship between leverage and cash holdings is given limited support, since the coefficients for LEV are significant in three of the four regressions for the specification of the dependent variable in Table IV (one at the 10% level and two at the 5% level) but the coefficients in Table V were mainly insignificant, where only one of four regressions is significant at the 10% level. Moreover, the economic significance of these coefficients is relatively small because an increase in LEV of one standard deviation increases the cash holding by an average of 4.73% for the regressions where the relationship was statistically significant.

We expected that firms with a shorter debt maturity structure would keep higher cash levels in order to reduce their dependence on external financing and refinancing risk. Results reported in Tables IV and V show partial support for this hypothesis. The coefficient of the variable LDEBT is significant with a negative sign in one regression in Table IV, and it is close to being significant in another two. In fact, with a one-tailed test, we could accept either a negative or zero value, but not a positive one. In addition, all regressions in Table V are negative and significant. Significant coefficients have an important economic impact given that a one standard deviation increase on the

[ix]The lack of significance of ZSCORE holds even when leverage (LEV) is omitted from the specification.

proportion on long-term debt over total debt is associated with a reduction in cash holdings of 18.27% for dependent variable $CASH_1$ in Table IV, and between 14.72% and 21.76% for dependent variable $CASH_2$ in Table V. Thus, the evidence partially supports the hypothesis that firms with a higher proportion of short-term debt will keep higher levels of cash in order to reduce the risk deriving from the non-renewal of their short-term debt. Moreover, they also reduce the costs associated with dependence on external financing, given the higher information asymmetry of firms with more short-term debt.

The effect of cash flow on cash holding supports the idea that in the presence of information asymmetries firms prefer to finance themselves from internally generated resources. Moreover, information asymmetry and agency conflicts associated with debt are greater for smaller firms. This result is in line with the presence of a financial hierarchy as established by the Pecking Order Theory, which is particularly relevant for SMEs (Jordan et al., 1998; Watson and Wilson, 2002). Furthermore, this is also consistent with the research of Almeida, Campello and Weisbach (2004) who found that the holdings of liquid assets in financially constrained firms increase when cash flows are higher, and SMEs are most likely to be subject to financial restrictions (Whited, 1992; Fazzari and Petersen, 1993). Specifically, the coefficient estimates on $CFLOW_1$ and $CFLOW_2$ (pre-tax profits plus depreciation over sales and total assets respectively) are positive and statistically significant in all the regressions reported in Tables IV and V, six of them significant at the 1% level and two at the 5% level. Moreover, the economic significance of the influence of cash flows on cash holding show that, all other things being equal, an increase in $CFLOW_1$ of one standard deviation produces in increase in cash and marketable securities held of around 11.23% on average (17.78%

for $CFLOW_2$). Thus, we find that firms generating larger cash flows possess greater cash holdings, as we expected.

On the other hand, the most important economic significance is for the presence of other liquid assets that may substitute for cash. The relationship between cash holdings and asset liquidity (LIQ) is negative and significant in all the regressions in Tables IV and V. A reduction in cash holdings ranging between 30.78% and 48.21% depending on the regression in Table IV (between 31.71% and 52.93% in Table V) comes about as a consequence of an increase in LIQ of one standard deviation. This 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.

The opportunity cost of capital invested in liquid assets, measured as the difference between the return on the firm's assets and the return on Treasury bill assets (RSPREAD), are not significant (regressions 1 and 2 in Tables IV and V). Thus, in contrast with the results of Kim et al. (1998), we find that the lower return that may be the consequence of holding cash does not affect decisions about cash holdings.

Finally, in order to evaluate the effect of changes in the macroeconomic environment over time on cash holdings, we studied the interest rates (INT) and gross domestic product (GDP). On the one hand, we find that an interest rate drop (rise) is related with an increase (decrease) in cash levels of the firms. Specifically, the coefficient estimates for the interest rate of 1-year Treasury bills (INT) for regressions 3 and 4 in Tables IV and V are negative and statistically significant[x]. These results show that for the time period of the analysis, SMEs increase their level of cash when the interest rates decrease, since keeping cash become cheaper. However the average

[x] This result does not change if we introduce interest rates in increments rather than levels.

economic impact is only 4.25% in Table IV (5.22% in Table V). On the other hand, in order to test for the possible effects of the evolution of the economic cycle on cash levels, we introduced the growth in the economy in the period studied by means of the GDP (column 3 and 4 of Tables IV and V). This variable is not significant, which may be explained by the fact that the period studied belongs to a single economic cycle.

6. CONCLUSIONS

The aim of this work was to examine the determinants of the cash holdings in small and medium-sized firms. With this in mind, we used a sample of Spanish firms to conduct a study with panel data for SMEs. This panel is made up of 5160 observations corresponding to 860 firms during the period 1996-2001.

First, we used a dynamic panel to test for the existence of an optimal cash holding. Our findings demonstrate that decisions about cash holdings follow a partial adjustment model. Thus, we find that firms pursue a target level for their cash holdings and their decisions are taken with the aim of achieving this. In addition, it is important to note that the speed with which Spanish SMEs attempt to adjust their levels to the optimal level is higher than that found in previous studies for large firms. This can be explained because small and medium sized enterprises suffer more information asymmetries and more agency conflict arising from debt than larger companies, and therefore may indicate that the cost of being far from the optimal level is higher for them.

With regard to the effects deriving from the existence of market imperfections, the results appear to indicate that firms with more information asymmetry hold more liquid assets. Indeed, bank debt is associated with lower levels of cash, which supports the idea that relationships with credit institutions can reduce agency costs and

information asymmetry between borrowers and lenders, thereby cutting a firm's cost of external financing. Equally, firms with a greater capacity to generate cash flows possess higher cash holdings. In addition, the existence of growth opportunities appears to affect the decision to hold liquid assets, although with small economic impact. Moreover, the results partially support the hypothesis that firms with more short-term debt, which are therefore likely to have greater information asymmetry, also hold more cash.

The most important economic impact is for the existence of substitutes for cash. This exerts a negative effect on firm's cash holdings, since possessing liquid assets reduces cash levels. On the other hand, we found little empirical support for the influence of leverage on an SME's levels of cash.

Finally, the effects of the macroeconomic environment changes over time on cash holdings have been studied. Our results appear to indicate that the cash holdings of SMEs are negatively related with the interest rates in the general economy, since cash levels increase (decrease) when interest rates fall (climb). In fact, a reduction in interest rates in the Spanish economy in the period of analysis period is associated with a rise in the cash kept by SMEs, though with a limited economic impact. However, we do not observe any relationship between GDP growth and cash levels, but this might be explained because the period analysed belonged to a single cycle.

Appendix 1. Description of variables	
Name	**Definition**
Cash holdings *($CASH_1$)*	Cash + Marketable securities / Total assets
Cash holdings *($CASH_2$)*	Cash + Marketable securities / Total assets – (Cash + Marketable securities)
Growth opportunities *(GROWP)*	$Sales_0$ / $Sales_{-1}$
Size *($SIZE_1$)*	ln (Sales)
Size *($SIZE_2$)*	ln (Assets)
Bank debt *(BANKD)*	S-T Bank debt / Total debt
Probability of financial distress *(ZSCORE)*	ZSCORE= $0{,}104*X_1 + 1{,}010*X_2 + 0{,}106*X_3 + 0{,}003*X_4 + 0{,}169*X_5$ 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
Leverage (*LEV)*	Total debt / Shareholders equity
Debt maturity structure *(LDEBT)*	L-T debt / Total debt
Cash flow *($CFLOW_1$)*	Pre-tax profits + Depreciation / Sales
Cash flow *($CFLOW_2$)*	Pre-tax profits + Depreciation / Total Assets
Other liquid assets *(LIQ)*	Working capital – (Cash + Marketable securities) / Total assets
Opportunity cost *(RSPREAD)*	Gross operating profit / Assets – interest rate 1-yr T-bills
Interest rate (*INT*)	Interest rate 1-yr T-bills
Gross Domestic Product growth (GPD)	Growth rate of GPD at constant prices (1995). Percentage change on previous year.

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Chart 1: Determinants of cash holdings in SMEs

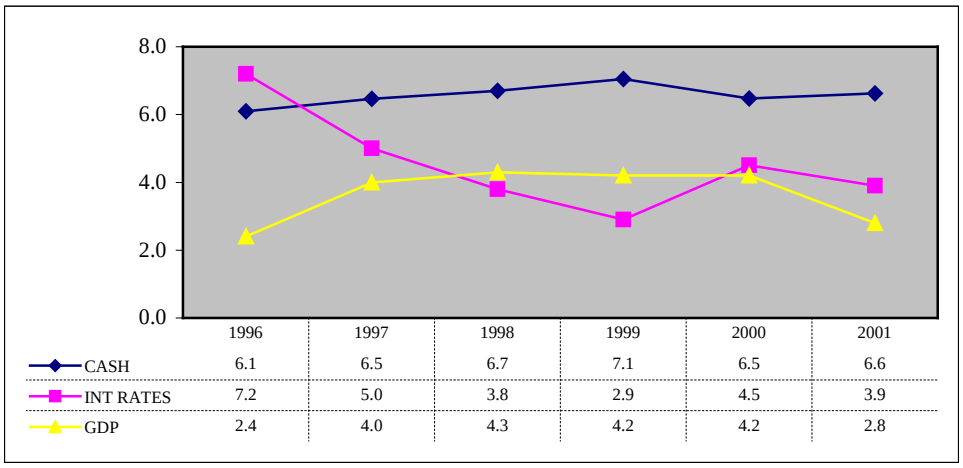
Factor	**Relation with cash holdings**	**Explanation**
Growth opportunities	Positive	-External finance more expensive due to information asymmetries and agency problems.
Size	Negative	-Economies of scale, information asymmetry, financial constraints, financial distress.
Relationships with banks	Negative	-Ease of access to external financing.
Probability of financial distress	Positive/Negative	-Raise cash level to reduce financial distress. -Worsening financial distress reduces liquid assets.
Leverage	Positive/Negative	-More severe financial distress. -Raised cost of resources to keep liquid assets.
Debt maturity structure	Negative	-Increased risk of refinancing of short-term debt. -More information asymmetry.
Capacity of cash flow generation	Positive/Negative	-Preference for internal financing. -Source of additional liquidity.
Liquidity	Negative	-Possibility of alternative financing.
Opportunity cost of holding cash	Negative	-Alternative return to keeping cash.

Table I. Descriptive statistics

$CASH_1$ is the ratio of cash plus marketable securities to total assets; *$CASH_2$* the ratio of cash plus marketable securities to total assets less cash and marketable securities; *GROWP* measures growth opportunities; *SALES and ASSETS* the size; *BANKD* level of short-term bank debt; *ZSCORE* probability of financial distress; *LEV* the leverage; *LDEBT* debt maturity structure; *$CFLOW_1$* and *$CFLOW_2$* capacity to generate cash flow; *LIQ* investment in other liquid assets; *RSPREAD* opportunity cost of keeping cash.

Variable	Obs	Mean	Std. Dev.	Median	Perc 10	Perc 90
$CASH_1$	5160	0.0657	0.0787	0.0380	0.0038	0.1665
$CASH_2$	5160	0.0800	0.1167	0.0395	0.0038	0.1997
GROWP	4300	1.1023	0.2720	1.0808	0.9135	1.2860
SALES	5160	10733830	6260136	8884473	4683231	19475743
ASSETS	5160	8600183	4956745	7311955	3488190	15954179
BANKD	5160	0.2898	0.1733	0.2855	0.0583	0.5201
ZSCORE	5160	0.4812	0.2035	0.4653	0.2370	0.7477
LEV	5160	2.6320	5.2280	1.8071	0.5756	4.8151
LDEBT	5160	0.1680	0.1441	0.1352	0.0125	0.3768
$CFLOW_1$	5160	0.0881	0.0933	0.0728	0.0223	0.1757
$CFLOW_2$	5160	0.1064	0.0800	0.0945	0.0300	0.2055
LIQ	5160	0.0885	0.1612	0.0776	-0.1033	0.3011
RSPREAD	5160	0.0305	0.0750	0.0221	-0.0359	0.1164

Figure 1



	1996	1997	1998	1999	2000	2001
CASH	6.1	6.5	6.7	7.1	6.5	6.6
INT RATES	7.2	5.0	3.8	2.9	4.5	3.9
GDP	2.4	4.0	4.3	4.2	4.2	2.8

Values in percents

Table II: Correlation Matrix

$CASH_1$ is the ratio of cash plus marketable securities to total assets; *$CASH_2$* the ratio of cash plus marketable securities to total assets less cash and marketable securities; *GROWP* measures growth opportunities; *$SIZE_1$ and $SIZE_2$* the size; *BANKD* level of short-term bank debt; *ZSCORE* probability of financial distress; *LEV* the leverage; *LDEBT* debt maturity structure; *$CFLOW_1$* and *$CFLOW_2$* capacity to generate cash flow; *LIQ* investment in other liquid assets; *RSPREAD* opportunity cost of keeping cash.

	$CASH_1$	**$CASH_2$**	**GROWP**	**$SIZE_1$**	**$SIZE_2$**	**BANKD**	**ZSCORE**	**LEV**	**LDEBT**	**$CFLOW_1$**	**$CFLOW_2$**	**LIQ**	**RSPREAD**
$CASH_1$	1												
$CASH_2$	0.9832***	1											
GROWP	-0.0104	-0.0143	1										
$SIZE_1$	-0.0156	-0.0218	0.1449***	1									
$SIZE_2$	-0.0021	0.0086	0.0610***	0.7525***	1								
BANKD	-0.3399***	-0.3181***	-0.0493***	-0.0217	0.0041	1							
ZSCORE	0.3515***	0.3315***	-0.0403***	0.1220***	-0.1280***	-0.2320***	1						
LEV	-0.0991***	-0.0946***	0.0089	-0.0305**	-0.0359***	0.0649***	-0.2749***	1					
LDEBT	-0.0294**	-0.0248*	-0.0349**	-0.0852***	0.1156***	-0.2521***	-0.2447***	0.0986***	1				
$CFLOW_1$	0.2367***	0.2355***	0.0204	-0.0591***	0.1586***	-0.2092***	0.1294***	-0.1967***	0.0976***	1			
$CFLOW_2$	0.2731***	0.2540***	0.1416***	0.1110***	0.0116	-0.3029***	0.3275***	-0.2473***	-0.0611***	0.7216***	1		
LIQ	-0.0022	-0.0096	-0.0245	0.0642***	0.0228	-0.1378***	0.4544***	-0.2019***	-0.0184	0.0203	0.0955***	1	
RSPREAD	0.2449***	0.2254***	0.2102***	0.1538***	0.0019	-0.1923***	0.2661***	-0.1520***	-0.1188***	0.4473***	0.7536***	0.1312***	1

* Significant at 10%.** Significant at 5%.*** Significant at 1%.

Table III: Firms characteristics by $CASH_1$ quartiles

Comparison of mean values of characteristics of 860 firms for period 1996-2001. Quartiles for variable $CASH_1$ created annually. Median values in brackets. *$CASH_1$* is the ratio of cash plus marketable securities to total assets; *$CASH_2$* the ratio of cash plus marketable securities to total assets less cash and marketable securities; *GROWP* measures growth opportunities; *$SIZE_1$* and *$SIZE_2$* the size; *BANKD* level of short-term bank debt; *ZSCORE* probability of financial distress; *LEV* the leverage; *LDEBT* debt maturity structure; *$CFLOW_1$* and *$CFLOW_2$* capacity to generate cash flow; *LIQ* investment in other liquid assets; *RSPREAD* opportunity cost of keeping cash. t statistic tests difference of means between first and fourth quartile. P-value in brackets

	First quartile	**Second quartile**	**Third quartile**	**Forth quartile**	**T**
Range $CASH_1$	0 to 0.0141	0.0117 to 0.0420	0.0337 to 0.0919	0.0839 to 0.4986	
$CASH_1$	0.0056	0.0243	0.0584	0.1745	70.98
	(0.0050)	(0.0230)	(0.0564)	(0.1460)	(0.00)
$CASH_2$	0.0051	0.0204	0.0469	0.1602	34.75
	(0.0042)	(0.0182)	(0.0426)	(0.1145)	(0.00)
GROWP	1.0995	1.0923	1.1157	1.1018	0.16
	(1.0823)	(1.0805)	(1.0922)	(1.0701)	(0.87)
$SIZE_1$	14.2744	14.2133	14.2262	14.2614	-0.60
	(14.2535)	(14.1632)	(14.1863)	(14.2190)	(0.61)
$SIZE_2$	14.1326	13.9657	13.9451	14.0237	-5.06
	(14.1280)	(13.9515)	(13.9159)	(14.0006)	(0.00)
BANKD	0.3434	0.3278	0.2887	0.1995	-22.03
	(0.3419)	(0.3337)	(0.2837)	(0.1548)	(0.00)
ZSCORE	0.3986	0.4542	0.4860	0.5858	24.46
	(0.3923)	(0.4420)	(0.4681)	(0.5907)	(0.00)
LEV	3.0054	3.0793	2.5969	1.8462	-6.99
	(2.1885)	(2.0411)	(1.9377)	(1.1146)	(0.00)
LDEBT	0.1816	0.1646	0.1666	0.1593	-3.88
	(0.1569)	(0.1299)	(0.1317)	(0.1153)	(0.00)
$CFLOW_1$	0.0762	0.0748	0.0842	0.1172	10.00
	(0.0640)	(0.0615)	(0.0733)	(0.0979)	(0.00)
$CFLOW_2$	0.0850	0.0930	0.1076	0.1402	17.53
	(0.0770)	(0.0824)	(0.0992)	(0.1284)	(0.00)
LIQ	0.0800	0.0953	0.0849	0.0936	2.10
	(0.0648)	(0.0801)	(0.0689)	(0.1000)	(0.03)
RSPREAD	0.0105	0.0202	0.0326	0.0587	15.79
	(0.0079)	(0.0152)	(0.0264)	(0.0479)	(0.00)

Table IV: Determinants of cash holding in SMEs (I)

Dependent variable $CASH_1$ is the ratio of cash plus marketable securities to total assets. *GROWP* measures growth opportunities; $SIZE_1$ and $SIZE_2$ the size; *BANKD* level of short-term bank debt; *ZSCORE* probability of financial distress; *LEV* the leverage; *LDEBT* debt maturity structure; $CFLOW_1$ and $CFLOW_2$ capacity to generate cash flow; *LIQ* investment in other liquid assets; *RSPREAD* opportunity cost of keeping cash, *INT* interest rates and *GDP* the Gross Domestic Product growth. All the estimations have been carried out using the 2-stage GMM estimator.

	1	2	3	4
$CASH_{1t-1}$	0.2382***	0.2347***	0.2374***	0.2492***
	(6.46)	(6.28)	(6.10)	(6.57)
GROWP	0.0043**	-0.0103	0.0038**	0.0051***
	(2.31)	(-1.43)	(1.95)	(2.58)
$SIZE_1$	-0.0208	-	-0.0215	-0.0317**
	(-1.36)	-	(-1.62)	(-2.34)
$SIZE_2$	-	0.0001	-	-
	-	(0.01)	-	-
BANKD	-0.0773***	-0.1139***	-0.0620**	-0.0605**
	(-3.34)	(-4.40)	(-2.41)	(-2.30)
ZSCORE	0.0467	-0.0118	0.0392	0.0387
	(1.41)	(-0.38)	(1.15)	(1.21)
LEV	0.0004	0.0004*	0.0005**	0.0006**
	(1.57)	(1.79)	(1.98)	(2.23)
LDEBT	-0.0318	-0.0638***	-0.0350	-0.0277
	(-1.49)	(-2.81)	(-1.57)	(-1.19)
$CFLOW_1$	0.0720***	0.0446**	0.0646***	-
	(4.10)	(2.24)	(3.50)	-
$CFLOW_2$	-	-	-	0.1096***
	-	-	-	(3.12)
LIQ	-0.1497***	-0.0960**	-0.1570***	-0.1458***
	(-4.33)	(-2.48)	(-4.66)	(-4.10)
RSPREAD	0.0094	0.0024	-	-
	(0.24)	(0.07)	-	-
INT	-	-	-0.1785***	-0.1394**
	-	-	(-2.58)	(-1.97)
GDP	-	-	-0.0004	0.0003
	-	-	(-0.02)	(0.17)
C	0.0016	0.0003	0.0016	0.0023**
	(1.44)	(0.24)	(1.44)	(2.05)
m_2	-0.18	0.00	-0.16	-0.18
Sargan Test	95.05 (86)	87.66 (86)	73.31 (77)	81.74 (77)
Observations	3440	3440	3440	3440

z statistic in brackets.

* Significant at 10%. ** Significant at 5%. *** Significant at 1%.

m_2 is test for second-order serial autocorrelation in residuals in first differences, distributed asymptotically as N(0,1) under null hypothesis of no serial correlation.

Sargan Test is test of over-identifying restrictions distributed asymptotically under null hypothesis of validity of instruments as Chi-squared. Degrees of freedom in brackets.

Table V: Determinants of cash holding in SMEs (II)

Dependent variable $CASH_2$ is the ratio of cash plus marketable securities to total assets minus cash and marketable securities. *GROWP* measures growth opportunities; $SIZE_1$ and $SIZE_2$ the size; *BANKD* level of short-term bank debt; *ZSCORE* probability of financial distress; *LEV* the leverage; *LDEBT* debt maturity structure; $CFLOW_1$ and $CFLOW_2$ capacity to generate cash flow; *LIQ* investment in other liquid assets; *RSPREAD* opportunity cost of keeping cash, *INT* interest rates and *GDP* the Gross Domestic Product growth. All the estimations have been carried out using the 2-stage GMM estimator.

	1	**2**	**3**	**4**
$CASH_{2t-1}$	0.1644***	0.1574***	0.1645***	0.1801***
	(4.50)	(4.32)	(4.25)	(4.80)
GROWP	0.0057**	-0.0013	0.0056**	0.0074***
	(2.10)	(-0.13)	(1.97)	(2.58)
$SIZE_1$	-0.0176	-	-0.0236	-0.0361*
	(-0.79)	-	(-1.28)	(-1.93)
$SIZE_2$	-	0.0093	-	-
	-	(0.49)	-	-
BANKD	-0.1135***	-0.1596***	-0.0886**	-0.0887**
	(-3.47)	(-4.50)	(-2.44)	(-2.42)
ZSCORE	0.0156	-0.0317	0.0026	0.0091
	(0.34)	(-0.73)	(0.06)	(0.22)
LEV	0.0004	0.0005	0.0006	0.0005*
	(1.14)	(1.60)	(1.64)	(1.65)
LDEBT	-0.0682**	-0.1016***	-0.0718**	-0.0653**
	(-2.46)	(-3.58)	(-2.45)	(-2.20)
$CFLOW_1$	0.0952***	0.0608**	0.0860***	-
	(3.80)	(2.18)	(3.31)	-
$CFLOW_2$	-	-	-	0.1347***
	-	-	-	(2.79)
LIQ	-0.1999***	-0.1324**	-0.2192***	-0.2010***
	(-4.14)	(-2.42)	(-4.68)	(-4.07)
RSPREAD	-0.0395	-0.0194	-	-
	(-0.71)	(-0.36)	-	-
INT	-	-	-0.2841***	-0.2349**
	-	-	(-3.13)	(-2.54)
GDP	-	-	-0.0011	-0.0010
	-	-	(-0.56)	(-0.49)
C	0.0024	0.0005	0.0030**	0.0039***
	(1.45)	(0.32)	(2.04)	(2.58)
m_2	-0.92	-0.94	-0.92	-0.89
Sargan Test	91.65 (86)	82.38 (86)	67.50 (77)	75.09 (77)
Observations	3440	3440	3440	3440

z statistic in brackets.

* Significant at 10%. ** Significant at 5%. *** Significant at 1%.

m_2 is test for second-order serial autocorrelation in residuals in first differences, distributed asymptotically as N(0,1) under null hypothesis of no serial correlation.

Sargan Test is test of over-identifying restrictions distributed asymptotically under null hypothesis of validity of instruments as Chi-squared. Degrees of freedom in brackets.