The Determinants and the Value of Cash Holdings: Evidence from French firms

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Abstract:

This paper investigates the determinants of the cash holdings of French firms over the period 1998- 2002, using the trade-off theory and the pecking order theory. We show that French firms increase their cash level when their activities are risky and the levels of their cash flow are high, and reduce it when they are highly leveraged. Growth companies hold higher cash levels than mature companies. For growth companies, there is a negative relation between cash and the following firm's characteristics: size, level of liquid assets and short-term debt. The cash level of mature companies increases with their size, their investment level, and the payout to their shareholders in the form of dividends or stock repurchases, and decreases with their trade credit and their expenses on research and development. Further results indicate that the firm's market value as measured by Tobin's Q increases with its cash level. This positive relation is stronger for growth companies than for mature companies.

Key words: Cash holdings, growth opportunities, firm market value.

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1.   Introduction:

In a perfect Modigliani-Miller world, holding large amounts of cash is irrelevant because companies can easily go to capital markets to finance their profitable investment projects at negligible transaction costs. However, many international studies show that companies maintain important cash holdings. For example, Kalcheva and Lins (2003), find that companies hold on average 16% of their total assets in cash or cash equivalents, Ferreira and Vilela (2004) find an average cash ratio of 15%, and Guney et al., (2003) observe an average cash ratio of 14%. Why do companies hold cash? Several studies, undertaken on the U.S. market and, recently, on international samples, tried to answer this question using two theoretical models: the trade-off model (Myers 1977) and the pecking order model (Myers et Majluf 1984). By utilizing trade-off theory on the case of detention of cash, we are able to conclude that there is an optimal cash level which results from weighting its marginal benefits and costs. However, extending pecking order theory in an effort to explain the determinants of cash, leads to a contradictory conclusion of no optimal cash level. It is used as a buffer between retained earnings and investment needs.

Previous U.S. studies (e.g. Opler et al., (1999) and Kim et al., (1998)) validate the trade-off theory. The cash level increases with the growth opportunities of the company, its business risk, its capital expenditures and its difficulty of access to the capital markets. It decreases with its size, its leverage and its dividend payments.

Other recent studies were undertaken on international samples. In addition to the capital structure theories, these studies examine the relations between cash holdings and the shareholders' and creditors' protection, the ownership structure and the financial markets' development. The majority of these studies also validate the trade-off theory and find evidence that firms in countries with superior investor protection and where capital markets are better developed hold less cash. Examples of this include Dittmar et al., (2002), Ferreira and Vilela (2004), and Guney et al., (2003). One of the rare studies which find support of the pecking order theory is that of Kalcheva and Lins (2003). In this study the authors provide evidence that cash is positively related to the growth opportunities of the company, to its size and to its cash flow. It is negatively related to the level of its debt and capital expenditures.

However, until now, and to our knowledge, no recent study[1] was undertaken on the French market. The only results concerning cash holdings of French companies come from the studies undertaken on international samples. These studies show that French companies

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[1] A study of reference on the cash holdings of French firms over one older period can be found in Levasseur (1979).

hold larger fractions of their total assets in cash, exceeding the corresponding levels of cash of American and British companies. Guney et al., (2003) found that French firms hold on average 12,3% of their total assets in cash against 10,3% for British companies. Dittmar et al., (2002) found that the median of the cash ratio for French firms is 11,1% against 8,1% for British firms and 6,4% for U.S. firms.

The French market is characterized by high levels of trade credit. Indeed, the companies in our sample, over the period 1998- 2002, have on average a trade credit which represent 48 days of their sales turnovers. In addition, French companies hold high levels of cash. Indeed, the companies in our sample hold on average 13% of their total assets in cash. A thorough study on the French market would make it possible to reach additional results concerning cash holding using particularly the two capital structure theories and trying to find which of these two theories would better explain cash holdings of the French companies.

Previous studies show that investment opportunities are very important in explaining cash holdings. Thus, accumulating cash would be more beneficial and more important for the growth companies. To test this assumption, we examine the determinants of cash levels by dividing our sample into two sub samples: growth companies and mature companies.

Examining determinants of cash holdings of French firms and doing this for two sub samples of firms: firms with higher growth potential and those with lower growth potential is one of the principal contributions of this paper.

Existing literature highlights the benefits of cash holdings. It enables firms to undertake their projects without raising outside funds at high transaction costs. Holding cash should also make it possible for firms to reduce their cash flow uncertainty. In addition, firms which pay dividends may have to reduce or cut their dividends when they face cash shortage. Thus, holding large amount of cash enables firms to avoid these situations. The existence of such benefits should make cash holdings valuable to shareholders.

In our study, we use a sample of 297 French companies, considered over the period 1998- 2002. We examine the determinants of cash holdings and test the hypothesis that firm's cash holdings is positively related to its market value.

Contrary to the majority of previous studies which validate the trade-off theory, we find that both trade-off and pecking order theories play an important role in explaining the determinants of French firms' cash holdings. However, some of our results are in line with the findings of the previous studies (e.g. Opler et al., (1999), Ferreira and Vilela (2004), Kalcheva and Lins (2003)). In particular, we find that French firms increase their cash level when their

activities are risky and the levels of their cash flow are high, and reduce it in the presence of high leverage.

Our results validate our principal hypothesis: cash holdings enable firms to undertake their profitable projects; this leads growth firms to hold higher cash levels than mature firms. We also find that growth and mature firms have different determinants of cash holdings. For growth companies, we find a negative relation between cash and the following firm's characteristics: size, level of liquid assets and short-term debt. These results are consistent with previous empirical evidence (e.g. Opler et al., (1999)). For mature firms, our results show that their cash level increases with their size and their payout to shareholders in the form of dividends or stock repurchases, and decreases with their research and development expenses. These results do not confirm previous empirical findings which show that firms decrease their cash level with their size and their dividend payments and increase it with their R&D expenses (e.g. Opler et al., (1999), Guney et al., (2003)).

Similar to the findings of previous studies, we find that the cash level of mature companies increases with their investment's level. However, we find a negative relation between the cash level of mature companies and their trade credit. This relation confirms the findings of the few studies which examine it (e.g. Kim et al., (1998) and Deloof (2001)).

In addition, we find that the firm's market value as measured by Tobin's Q increases with its cash level. This positive relation is stronger for growth firms than for mature firms. Thus, accumulating cash is more beneficial for growth firms because of the role of cash in financing the profitable projects of such firms.

The remainder of this paper is organized as follows. In section 2, we develop our empirical hypotheses. We present our data and the methodology we adopted in section 3. In section 4, we present the results of our regressions. Finally, we conclude in section 5.

2.   Why do firms hold cash? Theories and empirical hypotheses:

In this section, we discuss two theoretical models that can explain the determination of the cash level: the trade-off theory and the pecking order theory. We also develop the empirical predictions of these two theories. Table 1 summarizes the empirical predictions of these two models of cash holdings.

2.1.   The trade-off theory:

Like debt, cash holding generates costs and benefits; and is very important in financing the growth opportunities of the firm. The principal benefit of holding cash is that it constitutes a safety buffer (Levasseur 1979) which allows firms to avoid the costs of raising

external funds or liquidating existing assets and which allows firms to finance their growth opportunities. In fact, since companies operate in an imperfect market, they either have difficulty accessing the capital markets or bear a very important external financing cost. Moreover, the principal characteristic of their environment is uncertainty. Thus, insufficient amount of cash forces firms to forgo profitable investment projects or to support abnormally high costs of financing.

Two principal costs are associated to cash holdings. These costs depend on whether managers maximize shareholders wealth or not. If managers' decisions are in line with shareholders' interests, the only cost of cash holdings is its lower return relative to other investments of the same risk. If managers don't maximize shareholders' wealth, they increase their cash holdings to increase assets under their control and so to be able to increase their managerial discretion. In this case, the cost of cash holdings will increase and include the agency cost of managerial discretion.

Thus, we can apply the idea of trade-off theory to determine the optimal level of cash.

In this section, we examine in more details the benefits of cash holdings as well as the principal predictions of the trade-off theory. First, we discuss the transaction costs motive; then we examine the principal firm characteristics which determine cash holdings decisions.

2.1.1. The transaction costs motive:

According to Keynes (1936), firms need liquidity to face their current expenses. Thus they have to raise funds in capital markets or liquidate existing assets. However, capital markets are imperfect and there are transaction costs which can be avoided by holding a sufficient cash level. Thus, the firm can avoid the situations where it is forced to forgo its profitable investments, to cut its dividend payments or to liquidate its assets. And this is one of the principal benefits of holding a sufficient cash level.

One could expect firms to increase their cash holding as outside funds are expensive and the access to capital markets is difficult.

2.1.2. The determinants of cash holdings:

Growth opportunities:

One of the concerns of firms with strong growth opportunities is to guarantee their financing. Indeed, these firms can face two situations: either outside funds are inexistent or they are expensive when accessible. In such situations, these firms will be forced to forgo these projects. However, if firms hold sufficient cash levels, they can use it to seize all their profitable investment opportunities. This would lead firms to accumulate cash.

Moreover, firms with strong growth opportunities have greater financial distress costs. In fact, positive NPV of intangible growth opportunities, which is part of the firm value, disappears in case of bankruptcy. These firms should then hold large amounts of cash to avoid this high financial distress costs

Therefore, one could expect a positive relation between a firm's cash level and its set of growth opportunities.

The ease of selling firm assets:

Firms can raise funds by selling their assets. Hence, firms with mostly firm-specific assets can raise funds at very high cost by selling these assets. Thus, holding large amounts of cash enables these firms to avoid such liquidation costs (John 1993). One could expect a positive relation between firm's cash level and its assets' specificity.

Payout to shareholders: dividends and stock repurchase:

Companies which currently pay dividends can raise funds easily and at a low cost since they can reduce their dividend payments (Opler et al., 1999). Therefore they don't need to hold high amounts of cash and the relation between dividend payments and cash holdings would be negative.

However, cash holdings can also increase with dividend payments. Indeed, firms which pay dividends may have to reduce or cut their dividends when having a cash shortage. Thus, holding large amount of cash enables firms to avoid these situations. In this case, the relation between dividend payments and cash holdings would be positive.

The predicted relationship between cash holdings and dividend payments is not clearly determined under the trade-off model.

We could expect a negative relationship between cash holdings and stock repurchase. Indeed, when the firm repurchases its stocks, it uses its accumulated cash to finance this repurchase.

Cash flow volatility:

Companies with more volatile cash flow face liquidity constraints and experience cash shortage which leads them to forgo some profitable investment projects. Therefore, one would expect firms with greater cash flow volatility to hold more cash. This enables them to avoid liquidity constraints costs.

Cash flow:

Firms can use their cash flow as a source of liquidity to finance their investments. Thus cash flow can be seen as a cash substitute and would be negatively correlated to cash level.

Liquid assets substitutes:

Liquid assets other than cash (and nets of current liabilities) can be converted easily into cash and represent consequently substitutes for cash holdings. Therefore, there would be a negative relationship between cash holdings and these assets.

Investment:

We could expect a positive relationship between cash holdings and the investments level. Indeed, cash holdings are supposed, under this theory, to enable firms to avoid costly external funds and thus to undertake their profitable investment projects.

The trade credit:

The trade credit is the funds transferred between companies. Giving the right to customers to defer payment is equivalent of lending them money. The argument works in the inverse order as well. Therefore, trade credit is an important source of short-term external finance. The French market is characterized by high levels of trade credit (Dietsch and Kremp 1998).

Trade credit is measured as the difference between the receivables collection period and the payment period for accounts payable. One could expect a negative relationship between trade credit and cash holdings. Indeed, if trade credit is positive, the firm's commercial policy consists of selling on credit and paying its suppliers cash. Thus, the company has an immediate financing need and it uses its cash holdings to pay its suppliers. Consequently, its cash level decreases. On the other hand, when the trade credit is negative, the company requires short term payments from its customers and obtains long term payments from its suppliers. Therefore, it doesn't have immediate financing needs, and it will consequently accumulate cash to be able to pay its suppliers in the following period.

An alternative way to examine the relationship between the trade credit and the cash holdings would be to consider only the accounts payable. In fact, the terms of payments (imposed by the suppliers or decided by the firm) determine if the company is a lender or a borrower.

One could expect a positive relationship between the cash level and the accounts payable. Indeed, if the firm obtains long payment time from its suppliers, it doesn't have

immediate financing needs, and it will consequently accumulate cash to be able to pay its suppliers in the following period. However, if the company obtains short term payments from its suppliers or if it pays them cash, it uses its accumulated cash to pay them.

Leverage:

Leverage increases the discipline of capital markets. Thus, less leveraged firms can accumulate large amounts of cash without being subject to monitoring by capital markets. In addition, debt can be used to finance firm's investment opportunities and can be seen as a cash substitute. Therefore, we could expect a negative relationship between cash holdings and leverage. Moreover, the leverage ratio acts as a proxy for the ability of firms to issue new debt. Thus highly leveraged firms have an easier access to capital markets and hold less cash.

However, debt increases the probability of financial distress and bankruptcy. To reduce this probability, firms with higher leverage are expected to hold more cash.

Thus, the predicted relationship between cash holdings and leverage is not clearly determined under the trade-off model.

Debt structure:

The debt structure (i.e. the ratio of short- term debt or long-term debt to total debt) can influence the firm's cash holdings. Firms with more short-term debt in their capital structure are expected to hold more cash. This is because they can meet constraints of renewal of their credit lines and are subject to the risk of experiencing financial distress. These firms can avoid such financial distress by holding large amounts of cash.

However, one could expect a negative relationship between cash level and short-term debt. In fact, Barclay and Smith (1995) show that firms with the highest credit rating issue more short-term debt. These firms have better access to capital markets and hold consequently less cash. In addition, short-term debt can be used to face the current expenses and thus can be seen as a cash substitute.

Thus, the relationship between debt structure and cash level is not clear.

2.2. Pecking order theory:

Extending pecking order theory (Myers and Majluf 1984) to the explanation of the determinants of cash, leads to the conclusion that there is no optimal cash level. It is used as a buffer between retained earnings and investment needs. Under this theory, the cash level would just be the result of the financing and investment decisions.

According to this theory, issuing new equities is very costly for firms because of information asymmetries. Thus, firms finance their investments primarily with internal funds, then with debt and finally with equities.

When operational cash flow are high, firms use them to finance new profitable projects, to repay debts, to pay dividends and finally to accumulate cash. When retained earnings are insufficient to finance new investments, firms use their cash holdings, and then issue new debt.

Growth opportunities:

In the presence of information asymmetries between managers and investors, outside funds are more expensive. Thus, firms must use accumulated cash to finance profitable projects and the relationship between cash holdings and the investment opportunity set should be positive.

Cash flow:

When operational cash flow are high, firms use them to finance new profitable projects, to repay debts, to pay dividends and finally to accumulate cash. Thus, one could expect cash holdings to increase with cash flow level.

Leverage:

Cash holdings should decrease with leverage. Indeed, when investment needs are high and exceed retained earnings, firms issue new debt. Thus, leverage increases whereas cash holdings fall. However, when investment needs are less than retained earnings, firms repay their debt and accumulate cash.

Investment:

To finance their investment projects, firms use primarily accumulated cash. Thus, it is expected that cash holdings will decrease with investments level.

The trade credit:

We can expect a positive relation between cash and trade credit. Indeed, when trade credit is negative, the company requires short term payments from its customers and obtains long term payments from its suppliers. Therefore, it doesn't have immediate financing needs, and can consequently use its cash holdings to finance its new investments projects. Thus, its cash level will decrease. On the other hand, if trade credit is positive, the company has immediate financing needs. Thus, the firm will increase its cash level to be able to pay its suppliers.

Instead of examining the relationship between cash and trade credit, we can consider the relationship between cash and accounts payable (for the reasons explained under the trade-off theory) and we can expect it to be negative. Indeed, if the firm obtains long term payments from its suppliers, it doesn't have immediate financing needs and can consequently use its cash holdings to finance its new investments projects instead of accumulating cash. However, if the company obtains short term payments from its suppliers or if it pays them cash, it will increase its cash level to be able to pay them.

Real size:

Larger firms have high level of operational cash flow. Therefore they increase their cash holdings and the relationship between cash holdings and size is expected to be positive.

Although pecking order theory stipulates that there is no optimal cash level, some of its empirical predictions are similar to those of the trade-off theory. So, it is difficult to distinguish empirically between these two theories.

3.   Methodology and data description:

3.1.   Methodology:

The principle benefit of cash holdings is the following: it enables firms to undertake their profitable investments projects without raising outside funds at high transaction costs. Thus, accumulating cash would be more beneficial and more important for growth companies than for mature companies. In addition, these two categories of firms could be expected to behave differently when deciding how much cash to accumulate. Therefore, we examine, in particular, the determinants of cash levels by dividing our sample into two sub samples: growth firms and mature firms. We use Tobin's Q as a proxy for growth opportunities. Tobin's Q is given by the market value of assets (the market value of equity plus the book value of debt) divided by the book value of assets. For a given year, growth companies are firms with Tobin's Q greater than the median for this year. Mature companies are those with Tobin's Q lower than this median.[2]

We study the determinants of cash holdings using two different regression methodologies: OLS model with year and industry dummies and panel data model. OLS model uses firms for which we have data for at least one year and includes year and industry

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[2] We also use the mean of Tobin's Q to construct the two sub samples and our results (unreported here for brevity) remain the same.

dummies. Panel data model is the same for all firms and includes industry dummies (industry classification affects cash holdings).[3]

3.2. Sample selection and variable construction:

For our analysis of the determinants of cash holdings, we use a sample of publicly traded French firms over the period 1998- 2002 obtained from Compustat and Datastream. To build our final sample, we exclude financial firms since their cash policy differs from that of industrial firms. We also exclude missing firm-year observations for any variable in the model.

In addition, we noticed the presence of outliers. To avoid problems with these outliers, we detected them and removed them from our sample. To detect these outliers, we compute the Mahalnobis distance using all variables. Indeed, all variables define a k-dimensional space (k is the number of explanatory variables) and the observed variables for each firm define its coordinates in this space. The Mahalnobis distance for a firm is the difference between its observed variables and the means of all observed explanatory variables. A firm has a significant Mahalnobis distance, and thus represents an outlier when this distance is higher than the χ^2 (k) statistics. We compute the Mahalnobis distance for all the firms of our initial sample, detected outliers, eliminate them and our remaining sample consists of 297 firms and a total 1115 firm-year observations (557 for the growth companies and 558 for the mature companies).

Consistent with the majority of previous studies (e.g. Opler et al., (1999), Dittmar et al., (2002), Kalcheva and Lins (2003), Ferreira and Vilela (2004)), our variables are defined as follows.

The explained variable in our study is the cash holdings (CASH) defined as the ratio of total cash and equivalents to net assets, where net assets are computed as assets less total cash and equivalents.

We use firm size (SIZE) as a proxy for its ability to access capital markets. We compute it as the natural logarithm of total assets. Indeed, a small firm faces difficulties of accessing capital markets since it is typically young, less known and thus more vulnerable to capital markets imperfections (Almeida, Campello and Weisbach, 2002).

We use the R&D expenses to sales ratio as a measure of assets' specificity of the firm (R&D/Sales). Firms that do not report R&D expenses are considered to be firms with no R&D expenses.

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[3] We also estimate the fixed-effects model (unreported for brevity) and our results continue to hold.

We use firm's dividend yield (DIVY) to measure the effects of dividend's payment. It is defined as the ratio of dividend to the stock price.[4]

We measured the stock repurchase by the natural logarithm of its amount (STREP).[5]

Leverage is measured as the ratio of total debt (long and short-term debt) to the book value of total assets (DEBT). To test the relation between cash holdings and debt structure, we use the ratio of short- term debt to total debt (STDEBT).

We use the ratio of cash flow to net assets (CF/Net Assets) to test the relationship between cash flow and cash holdings. Cash flow is defined as net operational income plus depreciation. We measure cash flow volatility as a firm's cash flow standard deviation over the period of the study (VOLAT).

We use net working capital to net assets ratio as a proxy for liquid asset substitutes (NWC). Net working capital is defined as the difference between current assets (minus total cash and equivalent) and current liabilities.

We use the ratio of capital expenditures to net assets to test the relationship between cash level and investments (CAPEX/Net Assets).

Trade credit (TRCREDIT) is measured as the difference between receivables collection period and the payment period for accounts payable.[6]

3.3. Descriptive statistics:

Table 2 describes our main variables and tests the equality of means and medians between our two sub samples.

Over the period 1998-2002, French firms hold, on average, 14,7% of their net assets in cash, with a leverage of 24%, a dividend yield of 3% and invest approximately 7% of their net assets. The mean book value of total assets for our sample is about 2375 million euros (the median is about 194 million euros).

Growth companies hold on average 16,5% of their net assets in cash, the mean of their total book assets is about 1957 million euros (the median is about 191 million euros); the mean of their leverage is about 23%. They have on average a dividend yield of 2,4% and spend about 7% of their net assets on capital expenditures.

French mature firm holds on average 13% of its net assets in cash, with a leverage of 24%, a dividend yield of 3,5% and invest approximately 6% of its net assets. The mean book

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[4] We also use a dummy dividend that is set to one if the firm pays dividends and set to 0 if it did not. The results (unreported here for brevity) remain the same.
[5] We also use a dummy stock repurchase that is set to one if the firm repurchases its stocks and 0 if it did not. The results (unreported here for brevity) remain the same.
[6] We also consider the relation between cash holdings and only the accounts payable (instead of the trade credit) and we obtain the same results.

value of total assets for our sub sample of mature companies is about 2793 million euros (the median is about 204 million euros).

We observe that, on average, growth companies hold higher cash levels (16,5%) than mature companies(13%); this observation confirms our hypothesis. In addition, growth companies are smaller, pay less dividends, invest more, have more cash flow and trade credit and less short term debt than mature companies.

When we compare the mean of the cash ratio of our sample of French firms (14,7%) to the average of cash holdings of the French firms in international studies, we find that our average cash ratio is lower than that found by Ferreira and Vilela (2004) over the period 1987-2000 (15,9%). It is also lower than the average cash ratio found by Kalcheva and Lins (2003) over the year 1996 (18%). However, the mean of our cash ratio is higher than that found by Guney et al., (2003) over the period 1983-2000 (12,3%); this is most probably due to their definition of cash ratio which consists in normalizing cash to total assets rather than total net assets.

We observe that the median value of cash ratio is 9,8% for our whole sample (it is equal to 10,6% for growth companies and 9,2% for mature companies). This median value of whole sample's cash ratio is lower than that of the French firms found by Dittmar et al., (2002) (11,1%) and by Ferreira and Vilela (2004) (10,7%). Our median firm holds higher amounts of cash than the median French firm from the sample of Guney et al., (2003) (8,4%). However, these differences between the mean and median values of the cash ratio of our sample and the values found in international studies are not very important. They are most probably due to the differences of the studies' periods and samples' sizes.

We also compute the descriptive statistics per year[7] and observe that the mean cash ratio for our whole sample is stable between 1998 and 1999; it represents about 16% of the net assets. It declines from 15% in 2000 to about 13% in 2002. The average cash ratio for the two sub samples follows the same evolution as the whole sample. For mature companies, it declines from 15% in 1998 to about 12% of the net assets in 2002. For growth companies, it is stable between 1998 and 1999; it represents about 19% of the net assets. It declines from 17% in 2000 to 14% in 2002.

When we compute the descriptive statistics by industries[8], we find that on average, there is a strong variation of the cash levels among industries. This applies for the whole sample as well as for the two sub samples of growth and mature companies. Indeed, for the

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[7] That we did not report here for brevity.
[8] That we did not report here for brevity.

whole sample and the sub sample of growth companies, the sector of basic industries holds the lowest cash levels (10% of the net assets for the whole sample and 12% for the growth companies). For the mature companies, the sector of non cyclic services holds the lowest cash level (9% of their net assets). The sector of informational technologies is the sector where firms hold the highest levels of cash holdings (21% for our whole sample, 16,5% for mature companies and 24% for growth companies).

Table 3 reports the correlations coefficients for the pooled data. There are no problems of correlation between the explanatory variables which could bias our results.

4.   Empirical tests and results:

4.1.   Determinants of cash level:

Table 4 presents OLS and panel regressions of CASH on the independent variables described earlier for our whole sample and two sub samples of growth and mature firms.

To highlight the importance of the growth opportunities in explaining the French firms' cash level, we initially estimate the regressions of CASH for our whole sample using Tobin's Q as one of the explanatory variables. We find evidence that supports our principal hypothesis: French firms increase their cash holdings when they have important growth opportunities.

Then, we exclude Tobin's Q from the explanatory variables and we estimated our two regression models for the whole sample and the two sub samples of growth and mature companies.

The OLS and panel regressions using the whole sample lead us to the following results. The coefficients of the cash flow to net assets ratio and the volatility (which measures firms' business risk) are significantly positives. Cash holdings decrease significantly with leverage, short term debt, trade credit and liquid assets substitutes of cash measured by net working capital. However, the coefficient of stock repurchase is significantly positive only with the OLS regression. All these results hold when we include or exclude Tobin's Q from the explanatory variables. We also find that cash holdings increase significantly with dividend's payment but only when we include Tobin's Q in the explanatory variables.

When we estimate our regression models for the two sub samples, we find that some results are similar for the two categories of firms and some of them are specific to each one.

According to the OLS and panel regressions, growth and mature firms increase significantly their cash level with the cash flow to net assets ratio and the volatility (the coefficient of the cash flow ratio is significantly positive for the mature firms only with the

panel model). The coefficient of leverage is significantly negative for our two sub samples of French firms.

For the sub sample of growth companies, our two regression models show that cash holdings decreases significantly with size (SIZE), short-term debt (STDEBT) and level of liquid assets substitutes of cash (NWC).

For the sub sample of mature firms, our results show that cash level increases significantly with size (SIZE), stock repurchase (STREP), investment's level (CAPEX/Net Assets) and dividend's payment (DIVY) (the coefficients of capital expenditures and dividend yield are significant only with the panel regression). The coefficients of trade credit (TRCREDIT) and R&D expenses (R&D/Sales) are significantly negative with the two regression models.

We also test the explanatory power of industry classification with a null hypothesis that all industry dummies coefficients are equal to zero. The F- statistic for this test show that the null hypothesis is rejected and that industry classification play an important role in explaining French firms' cash holdings.

Growth companies decrease their cash holdings when they have substitutes such as liquid assets and debt and in particular short-term debt; and when they have large assets. They increase their cash holdings when their activities are risky and when they have high level of operational cash flow. However, the payout to shareholders (in the form of dividends or stock repurchases) doesn't have an effect on cash holdings and this could be due to the fact that these firms with high growth potential pay low dividends.

Mature companies increase their cash level when their operational cash flow are important and volatile, when they have large assets and high investment level and when they pay dividends or repurchase their stocks. Indeed, these firms with low growth potential pay high dividends and repurchase their stocks, thus accumulating high amounts of cash avoid them situations where they must reduce or cut their dividends in case of cash shortage. Mature companies are large companies where managers have high managerial discretion which enables them to hold high amounts of cash. These firms increase their cash level to finance their capital expenditures. They decrease it when they have substitutes such as debt or when they have high trade credit (they use their accumulated cash to pay their suppliers). They also decrease their cash level when they have important R&D expenses.

The principal difference between growth and mature companies is their growth potential. Therefore, the benefits of cash holdings are not the same for these two categories of firms: accumulating high amounts of cash is more beneficial for growth firms. This leads

them to hold higher cash levels than mature companies; and to have different determinants of cash holdings: growth firms hold cash to be able to undertake their profitable investments projects without raising outside funds at high transaction costs; whereas mature firms accumulate cash to be able to pay dividend to their shareholders and may be to enable managers to increase the resources under their control (and thus to enable them to consume private benefits). This finding confirms our hypotheses announced previously.

Some of our results are consistent with previous empirical evidence and some of them do not confirm the findings of previous studies. Indeed, we find that cash holdings increases with cash flow level and its volatility and decreases with leverage and this applies for our two sub samples. These results are similar to those of the majority of the previous empirical studies (e.g. Opler et al., (1999), Ferreira and Vilela (2004), Kalcheva and Lins (2003)).

Consistent with the findings of previous studies, our results show that for growth companies, cash holdings decrease with their level of liquid assets substitutes of cash and their size (e.g. Opler et al., (1999)). We also find a negative relationship between growth firms' cash holdings and short-term debt and this result is in line with the finding of Guney et al., (2003) (who find a positive relationship between cash and long-term debt for French firms).

Contrary to the majority of previous studies, which show that firms decrease their cash level with their dividend payments and increase it with their R&D expenses (e.g. Opler et al., (1999), Guney et al., (2003)), we find that cash level of mature firms increases with their payout to shareholders and decreases with their R&D expenses. However, our results confirm those of previous empirical studies concerning the positive relation between cash and investment level. Similar to the fewest studies which find a positive relationship between cash and size (e.g. Ozkan and Ozkan (2004) and Kalcheva and Lins (2003)), we find that mature firms increase their cash holdings with size. Very few studies examine the relationship between cash and trade credit. Consistent with Kim et al., (1998) and Deloof (2001), we find that mature firms decrease their cash level with their trade credit.

To find which of the two theories of capital structure (trade-off and pecking order theories) would better explain cash holdings of French firms; we examine the sign of the relationship between cash and the following firm characteristics: size, cash flow level, trade credit and capital expenditures.

Some results obtained for mature firms are consistent with the trade-off theory (the positive relationship between cash and investment level and the negative relationship between cash and trade credit) and others are consistent with the pecking order theory (the positive

impact of size and cash flow on cash holdings). The positive relation between cash holdings of growth companies and their cash flow level confirms the prediction of pecking order theory. However, the negative relation between their cash holdings and their size coincides with the prediction of the trade-off theory.

According to the trade-off theory, leverage can have a positive or a negative effect on the cash level; however pecking order theory stipulates a negative one. Our results for the two sub samples show a negative relation between cash and leverage. This provides evidence for the two theories.

We also use explanatory variables of cash level and for which we have only predictions of the trade-off theory. It is the case for business risk measured by cash flow volatility, debt structure measured by the ratio of short- term debt to total debt, dividend's payment, stock repurchases, assets' specificity measured by R&D expenses and level of liquid assets substitutes of cash. Coefficients of these variables, except stock repurchases and assets' specificity, coincide with the predictions of trade-off theory.

Thus both trade-off and pecking order theories play an important role in explaining the determinants of cash holdings of growth and mature French firms.

4.2.   Firm market value and cash holdings:

The principle benefit of holding cash is the following: it enables firms to undertake their profitable investments projects without raising outside funds at high transaction costs. It also makes it possible for firms to reduce their cash flow uncertainty. In addition, firms which pay dividends may have to reduce or cut their dividends when having a cash shortage. Thus, holding large amount of cash enables them to avoid such situations. The existence of such benefits should make cash holdings valuable to shareholders. Thus, one could expect a positive relationship between cash holdings and firm market value measured by its Tobin's Q. This positive relationship should be stronger for growth firms than for mature firms.

The majority of previous studies dealing with cash examined only its determinants. Very few studies tested the existence of a relationship between cash level and firm market value. Examples of this include Kalcheva and Lins (2003) and Pinkowitz and Williamson (2002). In these studies, the principal explanatory variable of firm market value is cash holdings. However, the value shareholders place on cash depends on other firm characteristics: leverage, investment and cash flow levels, dividend's payment and R&D expenses.

The impact of such variables on firm market value can be explained as follows. A firm with high growth potential has a high market value. Such firm spends more on Research &

Development or capital expenditures, don't pay dividends neither repurchases its stocks. Thus, one could expect the firm market value to increase with R&D expenses and capital expenditures and to decrease with the payout to shareholders. Leverage is expected to have a negative impact on firm market value. In fact, debt increases the probability of financial distress and holding high cash level will reduce this probability and this will be consequently more beneficial for creditors than for shareholders. Thus shareholders value high leveraged firm at a discount. Cash flow level is expected to have a positive impact on firm market value since cash flow is a proxy for firm's profitability.

In this section, we examine the relation between firm market value and cash holdings while including the control variables described above. To do this, we estimate the two regression models used in analysing the determinants of cash level. We also include industry dummies.

Table 5 presents regressions of Tobin's Q on the independent variables described earlier for our whole sample and our two sub samples of growth and mature firms.

The results of our regressions using firms in our whole sample show that the coefficients of cash and cash flow are significantly positive. The coefficient of dividend's payment is significantly negative. The other coefficients are not significant. These results are in line with our predictions.

Our two regression models for the two sub samples of firms show a positive impact of cash on firm market value for growth firms as well as for mature firms (the coefficient of cash is significantly positive for mature firms only in the panel regression). However, this positive impact is stronger for growth companies than for mature companies (the coefficient of cash for growth companies is about 11 times that obtained for mature companies). This result confirms the hypothesis announced earlier: the impact of cash on firm market value is stronger for growth firms than for mature firms. We also find that firm market value increases significantly with cash flow for growth firms as well as for mature firms. This positive relation is also stronger for growth companies than for mature companies.

We find that for growth companies, Tobin's Q decreases significantly with payout to shareholders (in the form of dividends or stock repurchases) and leverage; these results confirm our hypotheses. However, contrary to our expectation, we find that the coefficient of R&D expenses is significantly negative.

Contrary to growth firms, market value of mature firms increases with their R&D expenses, their capital expenditures and their leverage. These results, except the impact of leverage, confirm our hypotheses.

Our results concerning the effect of debt on firm value are consisting with those of McConnell and Servaes (1995): debt might prevent managers of mature firms from taking on negative net present value projects and thus it is beneficial for shareholders. However, debt might force managers of growth firms to pass up profitable projects and thus shareholders should value high leveraged growth firm at a discount.

We also test the explanatory power of industry classification and find that it plays an important role in explaining French firms' market value.

The main result of these regressions shows that cash holding is beneficial for all French firms and in particular for growth firms: it increases their market value. This result is in line with that of Kalcheva and Lins (2003) and Pinkowitz and Williamson (2002).

4.3.   Robustness checks:

One concern about our results is that they may be caused by our classification of firms into growth or mature ones. To distinguish between these two categories of firms, we use the Tobin's Q. However the concern here is whether the Tobin's Q is a reasonable proxy for the firm's growth opportunities. To reduce the possibility that our results depend on our classification scheme, we have performed a battery of robustness checks using alternative measures of growth opportunities. First we use the firm's price-to-earnings ratio (PER) calculated by dividing the stock price by the earnings per share at the end of each year. For each year, growth companies are firms with PER greater than the median for this year. Mature companies are those with PER lower than this median. Second we use the annual growth rate of sales turnover. Again, for each year, we divide our sample to one half with higher growth rate of sales turnover and the other half with lower growth rate of sales turnover using the median of the growth rate of sales turnover as the cut point. We also use the firm's three-year historical growth rate of sales turnover and the firm's five-year historical growth rate of sales turnover as a proxy for growth opportunities. We collected these variables from Thomson Financial Database. These variables are not available for all firms in our whole sample. As a result, the size of our sample declines.

Table 6 describes our main variables and tests the equality of means and medians between our two sub samples of firms defined using the price-to-earnings ratio (PER) and the annual growth rate of sales turnover (Sales 1year growth). This table confirms our previous results: on average, growth firms hold higher cash levels, pay less dividends, invest more, have more cash flow and trade credit and less short term debt than mature companies.

Table 7 presents OLS and panel regressions of CASH for our two sub samples of growth and mature firms defined according to the price-to-earnings ratio and the annual

growth rate of sales turnover. The results displayed in this table confirm our previous findings. Further, the magnitudes of the coefficients of all variables are comparable to those in Table 4 for both growth and mature firms. To highlight the importance of the growth opportunities in explaining the French firms' cash level, we estimate our regressions using Tobin's Q as one of the explanatory variables. We find evidence that supports our principal hypothesis: growth French firms increase their cash holdings when they have important growth opportunities (the coefficient of the Tobin's Q is significantly positive for growth firms when the annual growth rate of sales turnover is used to construct our two sub samples).

We also examine the relation between firm market value and cash holdings for our two sub samples defined according to the price-to-earnings ratio and the annual growth rate of sales turnover. The results based on these classification procedures are displayed in Table 8. They are consistent with our previous findings.[9]

Thus, our results appear to be robust to the choice of the growth measure.

5.   Conclusion:

In this paper, we investigate the determinants of the cash holdings of French firms over the period 1998- 2002, as well as the impact of cash holdings on firm market value. We build our study by dividing our sample into two sub samples: growth and mature firms. In fact, the principle benefit of cash holdings is that it enables firms to undertake their profitable investments projects without raising external funds at high transaction costs. Thus growth and mature firms would behave differently when deciding how much cash to hold and their market value would be differently related to their cash holdings.

Our results show that growth companies hold higher levels of cash than mature companies. We find that both trade-off and pecking order theories play an important role in explaining the determinants of cash holdings of growth and mature French firms. From a valuation perspective, we find that firm market value measured by Tobin's Q is positively related to cash holdings. This positive impact is stronger for growth firms than for mature firms.

Our findings show that all the French firms (growth and mature firms) increase their cash level when their activities are risky and the levels of their cash flow are high and reduce it when they are highly leveraged.

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[9] We also do all these robustness checks using the firm's three-year historical growth rate of sales turnover and to the firm's five-year historical growth rate of sales turnover as alternative measures of growth opportunities. Our results (unreported here for brevity) remain the same.

For growth companies, there is a negative relation between cash and the following firm characteristics: size, level of liquid assets substitutes of cash and short-term debt. The cash level of mature companies increases with their size, their investment's level, and the payout to their shareholders in the form of dividends or stock repurchases and decreases with their trade credit and their research and development expenses.

Our results, except the negative effect of the R&D expenses and the positive effect of the payout to shareholders and the size (found for mature firms), are consistent with findings of previous empirical studies.

To reduce the possibility that our results depend on our classification of firms into growth or mature ones using the Tobin's Q, we have performed a battery of robustness checks using alternative measures of growth opportunities. We find that our results are robust to the choice of the growth measure.

The behaviour of managers of large mature firms which hold high cash level can lead us to think that they act according to free cash flow theory predictions. These managers would have high managerial discretion which enables them to hold high amounts of cash. Thus, it is important, in future work to examine how free cash flow theory would explain determinants of the cash holdings of French firms.

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Table 1

Summary of model predictions

Variables	Definitions	Trade-off theory	Pecking order theory
Firm's assets specificity	R&D/Sales	Positive	
Dividend's payment	DIVY = dividend/stock price	Positive **Or** Negative	
Stock repurchase	STREP = natural logarithm of stock repurchase	Negative	
Growth opportunities	Tobin' Q	Positive	Positive
Cash flow volatility	VOLAT = cash flow standard deviation	Positive	
Cash flow	CF = net operational income + depreciation	Negative	Positive
Liquid assets substitutes of cash	NWC = working capital net of cash	Negative	
Trade credit	TRCREDIT = receivables collection period - payment period for accounts payable	Negative	Positive
Accounts payable	Payment period for accounts payable	Positive	Negative
Leverage	DEBT = total debt/total assets	Positive **Or** Negative	Negative
Debt structure	STDEBT = short-term debt/total debt	Positive **Or** Negative	
Capital expenditures	CAPEX = capital expenditures	Positive	Negative
Size	SIZE = natural logarithm of total assets	Negative	Positive

Table 2
Descriptive statistics of variables over the period 1998-2002

This table provides summary statistics for our sample over the period 1998-2002. Firms are classified into growth and mature firms according to their Tobin's Q. Net assets in the denominators are calculated as total assets less total cash and equivalents. CASH is the ratio of cash and equivalents to net assets. SIZE is defined as the natural logarithm of total assets. CF/Net Assets is the ratio of cash flow to net assets, where cash flow is net operational income plus depreciation. VOLAT is cash flow standard deviation over the period 1998-2002. DEBT is total debt over total assets. STDEBT is the ratio of short-term debt to total debt. TRCREDIT is the trade credit measured as the difference between receivables collection period and the payment period for accounts payable. DIVY is the ratio of dividend to the stock price. STREP is the natural logarithm of stock repurchase. NWC is the working capital net of cash. CAPEX is the firm's capital expenditures. R&D/Sales is the R&D expenses to sales ratio. N is the number of non-missing observations in our sample of panel data. P-values are reported for the test for equality of means (Student test), and the test for equality of medians (Wilcoxon test). ***, **, * indicate coefficients significance level: 1%, 5% and 10% respectively.

Variable	Whole sample		Mature firms		Growth firms		Test for Equality	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
CASH	0,147	0,098	0,130	0,092	0,165	0,106	0,0002***	0,0001***
SIZE	5,619	5,266	5,747	5,320	5,492	5,252	0,0307**	0,1181
CF/Net Assets	0,087	0,085	0,062	0,073	0,111	0,107	0,0000***	0,0000***
VOLAT	0,048	0,027	0,045	0,0274	0,051	0,0273	0,1075	0,0441**
DEBT	0,236	0,227	0,242	0,246	0,230	0,209	0,1578	0,0222**
STDEBT	0,458	0,424	0,480	0,454	0,435	0,382	0,0043***	0,0002***
TRCREDIT	48	46	44	39	52	51	0,0057***	0,0000***
DIVY	2,974	2,510	3,500	3,175	2,446	1,970	0,0000***	0,0000***
STREP	4,602	0	4,423	0,000	4,784	0,000	0,3759	0,3980
NWC/Net Assets	0,074	0,076	0,070	0,065	0,079	0,084	0,4153	0,2270
CAPEX/Net Assets	0,067	0,054	0,064	0,054	0,070	0,053	0,0789*	0,8623
R&D/Sales	0,006	0	0,006	0	0,006	0	0,7151	0,3130
N	1115	1115	558	558	557	557		

Table 3
Correlation matrix

This table reports Pearson correlation coefficients for the pooled data.
CASH is the ratio of cash and equivalents to net assets. NA are Net assets and are calculated as total assets less total cash and equivalents. CF/NA is the ratio of cash flow to net assets, where cash flow is net operational income plus depreciation. TRCREDIT is the trade credit measured as the difference between receivables collection period and the payment period for accounts payable. STDEBT is the ratio of short- term debt to total debt. DIVY is the ratio of dividend to the stock price. DEBT is total debt over total assets. NWC is the working capital net of cash. CAPEX is the firm's capital expenditures. STREP is the natural logarithm of stock repurchase. Tobin's Q is measured as the market value of equity plus the book value of debt, divided by the book value of assets. R&D/Sales is the R&D expenses to sales ratio. SIZE is defined as the natural logarithm of total assets. VOLAT is cash flow standard deviation over the period 1998-2002. S20, S30, S40, S50, S60 and S90 are industry dummies for the following sectors: generalist industries, cyclic consumer goods, non cyclic consumer goods, cyclic services, non cyclic services and informational technologies.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1-CASH	1	0,27	-0,01	-0,03	-0,02	-0,34	0,01	0,06	0,01	0,29	0,07	0,02	-0,04	0,00	-0,06	-0,01	0,17	-0,13	0,20
2-CF/NA		1	-0,06	-0,13	0,08	-0,22	0,13	0,27	0,08	0,31	-0,02	0,04	0,01	-0,03	0,06	0,02	-0,12	-0,02	-0,25
3-TRCREDIT			1	0,06	-0,02	-0,12	0,20	-0,09	-0,01	0,15	0,12	0,10	-0,01	-0,10	-0,09	-0,21	0,29	-0,08	0,15
4-STDEBT				1	0,01	-0,21	-0,05	-0,11	-0,05	0,00	0,02	-0,04	0,13	0,01	-0,07	-0,06	0,04	-0,15	0,13
5-DIVY					1	0,02	0,13	0,02	0,15	-0,24	-0,06	0,08	0,13	-0,04	-0,11	-0,04	-0,19	0,01	-0,18
6-DEBT						1	-0,25	0,04	0,06	-0,18	-0,04	-0,11	0,14	0,07	0,05	0,05	-0,22	0,24	-0,15
7-NWC/NA							1	-0,21	-0,04	-0,02	0,01	0,29	0,06	0,06	-0,32	-0,21	0,03	-0,30	0,01
8-CAPEX/NA								1	-0,02	0,08	-0,05	-0,08	0,03	-0,03	0,11	0,15	-0,10	-0,03	-0,06
9-STREP									1	-0,05	0,10	-0,06	0,09	-0,02	-0,05	0,02	-0,09	0,30	-0,12
10-TOBIN'Q										1	0,02	-0,09	-0,10	-0,01	0,08	-0,01	0,24	-0,09	0,14
11-RD/Sales											1	0,05	0,07	-0,09	-0,14	-0,02	0,21	0,09	0,26
12-S20												1	-0,18	-0,19	-0,22	-0,05	-0,16	-0,08	-0,04
13-S30													1	-0,22	-0,25	-0,06	-0,18	0,07	-0,11
14-S40														1	-0,27	-0,07	-0,20	-0,14	-0,03
15-S50															1	-0,08	-0,22	0,10	-0,07
16-S60																1	-0,06	0,15	-0,06
17-S90																	1	-0,17	0,45
18-SIZE																		1	-0,33
19-VOLAT																			1

Table 4
Regression of cash holdings on firm characteristics
This table shows the regression results for cash holdings for the whole sample (with and without Tobin' Q) and the two sub samples of growth and mature firms. For a given year, growth companies are firms with Tobin's Q greater than the median for this year. The mature companies are those with Tobin's Q lower than this median. The dependent variable in all models is the ratio of cash and equivalents to net assets. Net assets in the denominators are calculated as total assets less total cash and equivalents. SIZE is defined as the natural logarithm of the total assets. Tobin's Q is measured as the market value of equity plus the book value of debt, divided by the book value of assets. CF/Net Assets is the ratio of cash flow to net assets, where cash flow is net operational income plus depreciation. VOLAT is cash flow standard deviation over the period 1998-2002. DEBT is total debt over total assets. STDEBT is the ratio of short- term debt to total debt TRCREDIT is the trade credit measured as the difference between receivables collection period and the payment period for accounts payable. DIVY is the ratio of dividend to the stock price. STREP is the natural logarithm of stock repurchase. NWC is the working capital net of cash. CAPEX is the firm's capital expenditures. R&D/Sales is the R&D expenses to sales ratio. Industry dummy variable are constructed for each industry, defined by industry classification of Euronext. Panel data model is the same for all firms and includes industry dummies. OLS model uses firms for which we have data for at least one year and includes year and industry dummies. N is the number of non-missing observations in our sample of panel data. All t-statistics are corrected for heteroskedasticity using White's (1980) correction and are in parentheses. The industry F statistics tests the null hypothesis that all industry dummies coefficients are equal to zero. ***, **, * indicate coefficients significance level: 1%, 5% and 10% respectively.

Table 4 (Continued)

Independent variable	Whole sample		Whole sample		Mature firms		Growth firms	
	OLS	Panel	OLS	Panel	OLS	Panel	OLS	Panel
Intercept	0,1867***	0,1589***	0,1990***	0,1782 ***	0,1141**	0,0834 **	0,2336***	0,2144 ***
	(5,735)	(5,387)	(5,969)	(6,675)	(2,463)	(2,135)	(4,309)	(4,044)
SIZE	-0,0023	-0,0011	-0,0025	-0,0016	0,0100***	0,0112 ***	-0,0080**	-0,0070 **
	(-0,967)	(- 0,463)	(-1,034)	(- 0,721)	(3,044)	(3,674)	(-2,283)	(- 1,995)
TOBIN' Q	0,0223***	0,0225 ***						
	(3,382)	(3,475)						
CF/Net Assets	0,3680***	0,3811 ***	0,4802***	0,4029 ***	0,2408	0,2578*	0,6551***	0,6793 ***
	(3,577)	(3,719)	(4,692)	(4,901)	(1,512)	(1,640)	(4,334)	(4,533)
VOLAT	0,5278***	0,5283 ***	0,5676***	0,4695 ***	0,7596***	0,7771 ***	0,4643**	0,4617 **
	(3,610)	(3,621)	(3,722)	(3,877)	(3,325)	(3,458)	(2,310)	(2,293)
DEBT	-0,3147***	-0,3182 ***	-0,3234***	-0,3335 ***	-0,3975***	-0,3956 ***	-0,2547***	-0,2624 ***
	(-8,407)	(- 8,560)	(-8,538)	(- 9,843)	(-6,375)	(- 6,421)	(-5,536)	(- 5,689)
STDEBT	-0,0639***	-0,0635 ***	-0,0636***	-0,0557 ***	-0,0308	-0,0301	-0,0688***	-0,0662 ***
	(-3,454)	(- 3,446)	(-3,391)	(- 3,137)	(-1,044)	(- 1,035)	(-3,043)	(- 2,914)
TRCREDIT	-0,0003***	-0,0003 ***	-0,0002**	-0,0002 **	-0,0004***	-0,0004 ***	-0,0000	-0,0004
	(-3,339)	(- 3,430)	(-2,519)	(- 2,164)	(-4,404)	(- 4,443)	(-0,144)	(- 0,257)
DIVY	0,0029*	0,0031 **	0,0014	0,0012	0,0027	0,0031*	-0,0025	-0,0032
	(1,867)	(2,021)	(0,871)	(0,750)	(1,530)	(1,748)	(-0,804)	(- 1,044)
STREP	0,0014**	0,0008	0,0014**	0,0009	0,0025***	0,0020 **	0,0004	-0,0002
	(2,114)	(1,346)	(2,121)	(1,484)	(2,733)	(2,353)	(0,420)	(- 0,221)
NWC/Net Assets	-0,1120***	-0,1125 ***	-0,1204***	-0,1033 ***	-0,0194	-0,0162	-0,1527***	-0,1551 ***
	(-3,290)	(- 3,283)	(-3,427)	(- 2,669)	(-0,435)	(- 0,366)	(-3,008)	(- 3,068)
CAPEX/Net Assets	-0,0112	-0,0177	-0,0213	0,0942	0,1851	0,1916*	-0,1388	-0,1464
	(-0,147)	(- 0,232)	(-0,272)	(1,113)	(1,625)	(1,665)	(-1,279)	(- 1,338)
R&D/Sales	0,0001	0,0009	-0,0597	-0,0818	-1,4352***	-1,4202 ***	0,6605	0,5866
	(0,000)	(0,002)	(-0,150)	(- 0,248)	(-5,377)	(- 5,466)	(1,226)	(1,078)
Industry F	3,9532***	4,0428 ***	4,1906***	3,8899 ***	2,9751***	2,997 ***	1,7880*	1,9002*
Adjusted R ²	0,2486	0,2478	0,2286	0,2268	0,1899	0,1915	0,2855	0,2827
N	1115	1115	1115	1115	558	558	557	557

Table 5

Regression of firm market value

This table shows the regression results for firm market value for the whole sample (with and without Tobin' Q) and the two sub samples of growth and mature firms. For a given year, growth companies are firms with Tobin's Q greater than the median for this year. The mature companies are those with Tobin's Q lower than this median. The dependent variable in all models is TOBIN'Q measured as the market value of equity plus the book value of debt, divided by the book value of assets. Net assets in the denominators are calculated as total assets less total cash and equivalents. CASH is the ratio of cash and equivalents to net assets. CF/Net Assets is the ratio of cash flow to net assets, where cash flow is net operational income plus depreciation. DEBT is total debt over total assets. DIVY is the ratio of dividend to the stock price. STREP is the natural logarithm of stock repurchase. CAPEX is the firm's capital expenditures. R&D/Sales is the R&D expenses to sales ratio. Industry dummy variable are constructed for each industry, defined by industry classification of Euronext. Panel data model is the same for all firms and includes industry dummies. OLS model uses firms for which we have data for at least one year and includes year and industry dummies. N is the number of non-missing observations in our sample of panel data. All t-statistics are corrected for heteroskedasticity using White's (1980) correction and are in parentheses. The industry F statistics tests the null hypothesis that all industry dummies coefficients are equal to zero. ***, **, * indicate coefficients significance level: 1%, 5% and 10% respectively.

	Whole sample		Mature firms		Growth firms	
Independent variable	OLS	Panel	OLS	Panel	OLS	Panel
Intercept	0,4666***	0,8720 ***	0,4441***	0,4424 ***	1,2976***	1,8804 ***
	(3,764)	(4,926)	(14,225)	(17,514)	(5,855)	(5,687)
CASH	**1,1971*****	**0,7983 ****	**-0,0166**	**0,0795 ****	**2,0232*****	**0,9023***
	(2,941)	**(2,370)**	**(-0,359)**	**(3,162)**	**(3,453)**	**(1,682)**
CF/Net Assets	4,1091***	1,6330*	0,4923***	0,1709 ***	2,3811***	0,8345
	(8,395)	(1,666)	(5,290)	(2,882)	(3,144)	(0,891)
DIVY	-0,0701***	-0,0497 **	-0,0028	-0,0027	-0,1331***	-0,0689
	(-7,781)	(- 2,494)	(-1,457)	(- 1,587)	(-6,122)	(- 1,581)
DEBT	-0,1195	-0,4960	0,4733***	0,5153 ***	-0,9463***	-1,5396 ***
	(-0,501)	(- 1,522)	(8,970)	(9,806)	(-2,797)	(- 3,193)
CAPEX/Net Assets	-0,2967	-0,3896	0,2701**	0,0377	-0,4808	-0,6482
	(-0,487)	(- 0,739)	(2,395)	(0,459)	(-0,536)	(- 0,661)
STREP	-0,0024	-0,0062	0,0008	0,0008	-0,0131**	-0,0164*
	(-0,577)	(- 1,108)	(0,866)	(0,935)	(-2,028)	(- 1,647)
R&D/Sales	-1,6719	2,0081	0,7388**	0,2355 **	-3,7405*	3,4251
	(-1,056)	(1,216)	(2,200)	(1,960)	(-1,764)	(1,118)
Industry F	16,4110***	17,4324 ***	5,8973***	4,3456 ***	2,3339**	4,1077 ***
Adjusted R ²	0,2841	0,1547	0,3174	0,1993	0,3136	0,1492
N	1115	1394	558	672	557	723

Table 6
Robustness checks of Descriptive statistics of variables over the period 1998-2002

This table provides summary statistics for our sample over the period 1998-2002. First, firms are classified into growth and mature firms according to their price-to-earnings ratio (PER). Second, firms are classified into growth and mature firms according to their annual growth rate of sales turnover (Sales 1year growth). Net assets in the denominators are calculated as total assets less total cash and equivalents. CASH is the ratio of cash and equivalents to net assets. SIZE is defined as the natural logarithm of total assets. CF/Net Assets is the ratio of cash flow to net assets, where cash flow is net operational income plus depreciation. VOLAT is cash flow standard deviation over the period 1998-2002. DEBT is total debt over total assets. STDEBT is the ratio of short- term debt to total debt. TRCREDIT is the trade credit measured as the difference between receivables collection period and the payment period for accounts payable. DIVY is the ratio of dividend to the stock price. STREP is the natural logarithm of stock repurchase. NWC is the working capital net of cash. CAPEX is the firm's capital expenditures. R&D/Sales is the R&D expenses to sales ratio. N is the number of non-missing observations in our sample of panel data. P-values are reported for the test for equality of means (Student test), and the test for equality of medians (Wilcoxon test). ***, **, * indicate coefficients significance level: 1%, 5% and 10% respectively.

| | PER | | | | | | Sales 1year growth | | | | | |
| | Mature firms | | Growth firms | | Test for Equality | | Mature firms | | Growth firms | | Test for Equality | |
Variable	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
CASH	0,139	0,094	0,145	0,103	0,6230	0,2812	0,137	0,091	0,154	0,105	0,0833*	0,0160**
SIZE	5,754	5,395	6,217	5,715	0,0017***	0,0013***	5,670	5,245	5,636	5,350	0,7889	0,9235
CF/Net Assets	0,072	0,082	0,098	0,098	0,0000***	0,0013***	0,075	0,082	0,100	0,093	0,0000***	0,0001***
VOLAT	0,048	0,029	0,040	0,021	0,0524*	0,0271**	0,047	0,030	0,046	0,025	0,6758	0,0846*
DEBT	0,245	0,246	0,231	0,220	0,1814	0,2845	0,238	0,234	0,234	0,219	0,6719	0,7215
STDEBT	0,451	0,420	0,447	0,413	0,8383	0,5453	0,471	0,429	0,440	0,403	0,0755*	0,0422**
TRCREDIT	43,306	38,249	52,428	49,856	0,0089***	0,0008***	45,412	43,315	51,874	49,106	0,0134**	0,0134**
DIVY	3,726	3,510	2,461	1,925	0,0000***	0,0000***	3,505	3,140	2,492	1,965	0,0000***	0,0000***
STREP	5,360	0,000	5,324	0,000	0,9442	0,9921	4,639	0,000	4,821	0,000	0,6738	0,8006
NWC/Net Assets	0,088	0,069	0,050	0,048	0,0055***	0,0063***	0,095	0,103	0,054	0,054	0,0004***	0,0001***
CAPEX/Net Assets	0,063	0,053	0,066	0,051	0,4346	0,7928	0,060	0,049	0,072	0,059	0,0003***	0,0008***
R&D/Sales	0,006	0,000	0,008	0,000	0,4167	0,9266	0,006	0,000	0,007	0,000	0,5763	0,9383
N	383	383	384	384			502	502	504	504		

Table 7

Robustness checks of Regression of cash holdings on firm characteristics

This table shows the regression results for cash holdings for the two sub samples of growth and mature firms. First, firms are classified into growth and mature firms according to their price-to-earnings ratio (PER). Second, firms are classified into growth and mature firms according to their annual growth rate of sales turnover (Sales 1year growth). The dependent variable in all models is the ratio of cash and equivalents to net assets. Net assets in the denominators are calculated as total assets less total cash and equivalents. SIZE is defined as the natural logarithm of the total assets. Tobin's Q is measured as the market value of equity plus the book value of debt, divided by the book value of assets. CF/Net Assets is the ratio of cash flow to net assets, where cash flow is net operational income plus depreciation. VOLAT is cash flow standard deviation over the period 1998-2002. DEBT is total debt over total assets. STDEBT is the ratio of short- term debt to total debt TRCREDIT is the trade credit measured as the difference between receivables collection period and the payment period for accounts payable. DIVY is the ratio of dividend to the stock price. STREP is the natural logarithm of stock repurchase. NWC is the working capital net of cash. CAPEX is the firm's capital expenditures. R&D/Sales is the R&D expenses to sales ratio. Industry dummy variable are constructed for each industry, defined by industry classification of Euronext. Panel data model is the same for all firms and includes industry dummies. OLS model uses firms for which we have data for at least one year and includes year and industry dummies. N is the number of non-missing observations in our sample of panel data. All t-statistics are corrected for heteroskedasticity using White's (1980) correction and are in parentheses. The industry F statistics tests the null hypothesis that all industry dummies coefficients are equal to zero. ***, **, * indicate coefficients significance level: 1%, 5% and 10% respectively.

Table 7 (Continued)

Independent variable	PER				Sales 1 year growth			
	Growth firms		Mature firms		Growth firms		Mature firms	
	OLS	Panel	OLS	Panel	OLS	Panel	OLS	Panel
Intercept	0,0532	0,0376	0,1641***	0,1189**	0,0964**	0,0728*	0,2628***	0,2325***
	(0,953)	(0,689)	(2,861)	(2,099)	(2,087)	(1,704)	(5,374)	(5,262)
SIZE	0,0008	0,0024	-0,0002	0,0027	-0,0005	0,0003	-0,0044	-0,0031
	(0,206)	(0,620)	(-0,051)	(0,557)	(-0,143)	(0,084)	(-1,329)	(-0,947)
TOBIN' Q	0,0212	0,0216	0,0372	0,0400	0,0254***	0,0250***	-0,0001	0,0017
	(1,480)	(1,523)	(1,274)	(1,444)	(3,173)	(3,197)	(-0,005)	(0,151)
CF/Net Assets	0,9232***	0,9298***	0,1547	0,1571	0,7240***	0,7375***	0,2156	0,2230
	(3,491)	(3,541)	(0,877)	(0,884)	(4,250)	(4,356)	(1,520)	(1,559)
VOLAT	0,6054***	0,5915***	0,6258**	0,6106**	0,4618**	0,4524**	0,4658**	0,4771**
	(2,735)	(2,666)	(2,107)	(2,060)	(2,404)	(2,388)	(2,021)	(2,099)
DEBT	-0,1212**	-0,1333**	-0,3579***	-0,3677***	-0,1729***	-0,1769***	-0,3571***	-0,3594***
	(-2,030)	(-2,269)	(-5,059)	(-5,378)	(-4,286)	(-4,303)	(-5,740)	(-5,967)
STDEBT	-0,0408	-0,0405	-0,0042	-0,0044	-0,0382*	-0,0377*	-0,0834***	-0,0832***
	(-1,539)	(-1,519)	(-0,094)	(-0,101)	(-1,784)	(-1,766)	(-2,546)	(-2,578)
TRCREDIT	0,0001	0,0001	-0,0007***	-0,0007***	-0,0001	-0,0001	-0,0005***	-0,0005***
	(0,656)	(0,597)	(-4,585)	(-4,692)	(-0,899)	(-1,021)	(-3,428)	(-3,410)
DIVY	-0,0008	-0,0001	0,0050**	0,0051**	-0,0006	-0,0005	0,0028	0,0032
	(-0,265)	(-0,047)	(2,241)	(2,265)	(-0,225)	(-0,224)	(1,386)	(1,571)
STREP	-0,0010	-0,0012	0,0024**	0,0016*	0,0007	0,0002	0,0010	0,0004
	(-1,167)	(-1,488)	(2,261)	(1,697)	(0,810)	(0,258)	(1,096)	(0,473)
NWC/Net Assets	-0,0867	-0,0865	0,0102	0,0181	-0,1513***	-0,1516***	-0,0487	-0,0511
	(-1,534)	(-1,503)	(0,211)	(0,364)	(-3,057)	(-3,014)	(-1,190)	(-1,242)
CAPEX/Net Assets	-0,2209*	-0,2262*	0,1434	0,1282	0,0082	0,0018	0,0310	0,0303
	(-1,895)	(-1,909)	(0,869)	(0,776)	(0,088)	(0,019)	(0,245)	(0,240)
R&D/Sales	-0,1499	-0,1377	-0,4685	-0,4200	0,4536	0,4672	-0,1520	-0,1412
	(-0,348)	(-0,321)	(-0,859)	(-0,786)	(0,713)	(0,732)	(-0,399)	(-0,380)
Industry F	0,5018	0,5102	1,5442	1,4736	0,8476	0,9183	2,3178**	2,2557**
Adjusted R ²	0,2982	0,2993	0,1953	0,1970	0,3678	0,3700	0,1649	0,1678
N	384	384	383	383	504	504	502	502

Table 8

Robustness checks of Regression of firm market value

This table shows the regression results for firm market value for the two sub samples of growth and mature firms. First, firms are classified into growth and mature firms according to their price-to-earnings ratio (PER). Second, firms are classified into growth and mature firms according to their annual growth rate of sales turnover (Sales 1year growth). The dependent variable in all models is TOBIN'Q measured as the market value of equity plus the book value of debt, divided by the book value of assets. Net assets in the denominators are calculated as total assets less total cash and equivalents. CASH is the ratio of cash and equivalents to net assets. CF/Net Assets is the ratio of cash flow to net assets, where cash flow is net operational income plus depreciation. DEBT is total debt over total assets. DIVY is the ratio of dividend to the stock price. STREP is the natural logarithm of stock repurchase. CAPEX is the firm's capital expenditures. R&D/Sales is the R&D expenses to sales ratio. Industry dummy variable are constructed for each industry, defined by industry classification of Euronext. Panel data model is the same for all firms and includes industry dummies. OLS model uses firms for which we have data for at least one year and includes year and industry dummies. N is the number of non-missing observations in our sample of panel data. All t-statistics are corrected for heteroskedasticity using White's (1980) correction and are in parentheses. The industry F statistics tests the null hypothesis that all industry dummies coefficients are equal to zero. ***, **, * indicate coefficients significance level: 1%, 5% and 10% respectively.

	PER				Sales 1 year growth			
	Growth firms		Mature firms		Growth firms		Mature firms	
Independent variable	OLS	Panel	OLS	Panel	OLS	Panel	OLS	Panel
Intercept	0,3983*	0,6681***	0,4184***	0,3693***	0,2612	0,6176***	0,7018***	0,5519***
	(1,870)	(3,324)	(5,237)	(5,210)	(1,301)	(3,155)	(7,222)	(6,493)
CASH	**1,4925**	**1,6236**	**0,3060**	**0,3390**	**2,4499***	**2,5127***	**-0,1155**	**-0,0937**
	(1,510)	**(1,543)**	**(1,052)**	**(1,146)**	**(3,355)**	**(3,258)**	**(-0,761)**	**(-0,571)**
CF/Net Assets	8,0057***	7,6651***	1,5161***	1,5478***	5,1726***	5,4748***	2,0411***	2,1566***
	(4,754)	(4,490)	(5,127)	(4,915)	(4,856)	(4,949)	(5,264)	(5,078)
DIVY	-0,0720***	-0,1115***	-0,0188***	-0,0207***	-0,1019***	-0,1316***	-0,0281***	-0,0303***
	(-3,682)	(-4,808)	(-3,200)	(-3,393)	(-5,183)	(-6,007)	(-4,174)	(-4,388)
DEBT	0,0235	-0,0682	0,3869***	0,3909***	-0,1209	-0,1259	-0,2628	-0,2270
	(0,051)	(-0,143)	(2,678)	(2,595)	(-0,282)	(-0,291)	(-1,353)	(-1,137)
CAPEX/Net Assets	-1,0545	-0,6624	1,2554*	1,4808**	-0,7300	-0,2323	0,4349	0,7169
	(-1,156)	(-0,661)	(1,872)	(2,153)	(-0,753)	(-0,233)	(0,745)	(1,180)
STREP	-0,0013	-0,0001	0,0015	0,0004	-0,0114*	-0,0131**	0,0139***	0,0119***
	(-0,194)	(-0,019)	(0,514)	(0,155)	(-1,635)	(-1,967)	(3,366)	(3,023)
R&D/Sales	-2,5708	-2,8413	-0,0821	0,2272	-2,7735	-2,8030	-0,2824	-0,0569
	(-0,992)	(-0,991)	(-0,072)	(0,203)	(-1,165)	(-1,094)	(-0,255)	(-0,049)
Industry F	2,6775**	1,9446*	5,6691***	4,3461***	6,6876***	6,7037***	8,1603***	7,1470***
Adjusted R ²	0,4033	0,3459	0,1867	0,1610	0,3710	0,3367	0,2104	0,1723
N	384	384	383	383	504	504	502	502