

## Box 6

### THE DETERMINANTS OF NON-FINANCIAL CORPORATIONS' CASH HOLDINGS: A MICROECONOMIC ANALYSIS

In the last few years non-financial corporations in the euro area have considerably increased their liquidity ratios (i.e. cash and cash equivalents<sup>1</sup> as a percentage of total assets). In order to properly assess this development, which has been relatively widespread across sectors, the underlying forces explaining this increase need to be examined. To this end, this box analyses the relationship between cash holdings and some of their potential determinants, using a large micro dataset for the period 1998-2005.<sup>2</sup>

#### Why do non-financial corporations hold liquid assets? The benefits and costs of holding cash

Cash holdings are affected by the costs and benefits of holding liquid assets. The costs are associated with the lower returns offered by funds invested in this type of asset by comparison with alternative ways of using such funds. Assuming that the question of whether to repay loans or hold money is the main financial investment decision facing non-financial corporations, the spread between bank lending rates and a corporation's own rate of return on M3 (which comprises a somewhat narrower range of assets than the cash and cash equivalents considered here) can be used as a rough proxy for this opportunity cost. The opportunity cost of holding cash is likely to be higher for more highly leveraged firms, and a negative relationship between firms' liquidity ratios and their indebtedness is therefore to be expected.

As for the benefits of holding cash, the literature on corporate cash holdings emphasises two main elements: the transaction cost motive (i.e. firms' ability to save on transaction costs by using cash to make payments without having to liquidate assets) and the precautionary motive (i.e. firms' desire to accumulate cash in order to hedge against the risk of being short of cash in the future). The first implies a positive relationship between cash holdings and firms' transactions (or their level of activity, proxied here by cash flow) and a negative relationship between cash holdings and non-cash short-term assets (such as trade credit), which are easier to convert into

1 Cash and cash equivalents include all liquid funds (and thus constitute a broader range of assets than the M3 monetary aggregate).

2 These data comprise more than 600,000 observations for around 100,000 non-financial (quoted and unquoted) corporations in the euro area. They are derived from the AMADEUS database of Bureau van Dijk.

cash than other assets. The precautionary motive would imply a positive relationship between liquidity ratios and cash flow volatility, as well as a negative relationship between liquidity ratios and (less volatile) tangible assets. Finally, the incentives to hold cash can vary across firms of different sizes, owing, for instance, to differences in the financing constraints they face. For example, if small firms have more limited access to external finance, they could decide to hold more cash in anticipation of a need for funds in the future in order to finance new projects. Differences in financing constraints can also result in differences in the extent to which cash holdings are sensitive to cash flows.

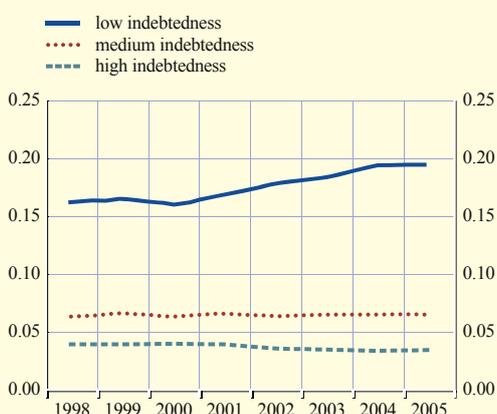
### The relationship between cash holdings and their determinants: descriptive analysis

Charts A to F present the relationship between levels of cash holdings and a number of variables that, given the costs and benefits of holding cash, might affect firms' liquidity ratios. The charts present the median liquidity ratio (defined as cash and cash equivalents as a percentage of total assets) for firms exhibiting high (i.e. above the 90th percentile), medium (i.e. between the 45th and 55th percentiles) and low (i.e. below the 10th percentile) levels of a given variable.

As can be seen in Chart A, it seems that there is a clear relationship between firms' cash holdings (expressed as their liquidity ratios) and their indebtedness levels. Highly leveraged firms exhibit lower cash holdings in line with the higher opportunity cost of holding liquid assets. A clear pattern emerges also when comparing the cash holdings of firms with different cash flow-to-asset ratios, with firms with larger cash flows relative to their assets also exhibiting higher liquidity ratios (see Chart B). The difference is especially large for those firms with the highest levels of internally generated funds. This difference has, moreover, increased over time, since it is the firms with the largest cash flows that have been exhibiting the largest increases in cash holdings in recent years. Likewise, it is observed that firms with high levels of tangible assets on their balance sheets exhibit – in line with the more limited volatility of this type of asset – substantially lower levels of cash holdings than firms holding medium and low levels of such assets, which have similar liquidity ratios (see Chart C). In line with their substitutive role, a negative relationship is observed

**Chart A Liquidity ratios for firms with different indebtedness levels**

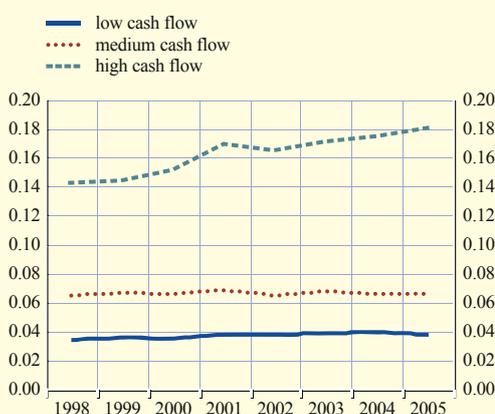
(ratio of cash and cash equivalents to total assets)



Sources: AMADEUS (Bureau van Dijk) and ECB calculations.  
Note: Indebtedness is defined as the ratio of debt to total assets.

**Chart B Liquidity ratios for firms with different cash flow levels**

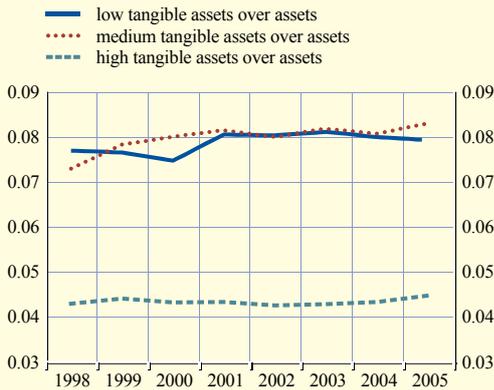
(ratio of cash and cash equivalents to total assets)



Sources: AMADEUS (Bureau van Dijk) and ECB calculations.  
Note: Cash flow is defined as the ratio of cash flow to assets.

**Chart C Liquidity ratios for firms with different levels of tangible assets**

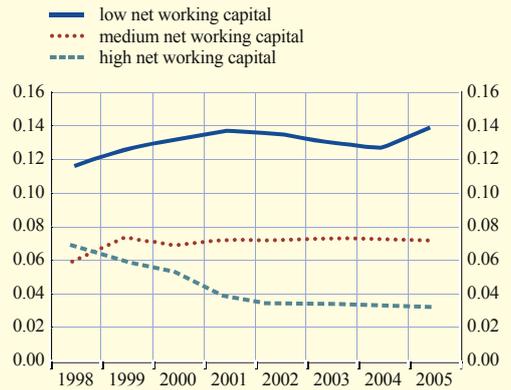
(ratio of cash and cash equivalents to total assets)



Sources: AMADEUS (Bureau van Dijk) and ECB calculations.

**Chart D Liquidity ratios for firms with different levels of net working capital**

(ratio of cash and cash equivalents to total assets)

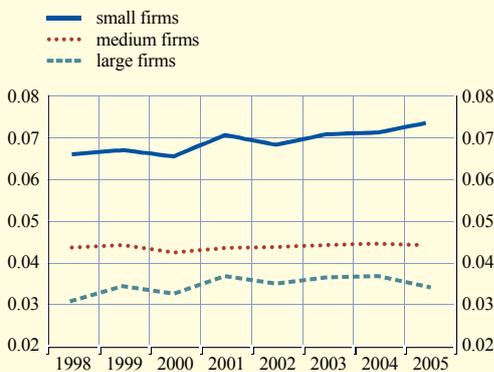


Sources: AMADEUS (Bureau van Dijk) and ECB calculations. Note: Net working capital is defined as short-term assets other than cash and cash equivalents.

between cash holdings and net working capital (see Chart D). Likewise, Chart E shows that firms of different sizes differ substantially in their liquidity ratios, with the smallest companies in particular holding significantly more cash than larger companies. Finally, contrary to what would be expected, the relationship between cash flow volatility and liquidity holdings does not appear to be positive according to this simple bivariate descriptive analysis, since firms with more volatile cash flows seem to hold less cash (see Chart F). However, when an equation is estimated relating cash holdings to all of the above-mentioned potential determinants, as well as to the opportunity cost of holding cash, a positive relationship between cash holdings and cash flow volatility emerges (see the table next to Chart G). In addition, as expected, a negative coefficient is estimated for the spread between bank lending rates and non-financial corporations' own rate of return on M3,

**Chart E Liquidity ratios for firms of different sizes**

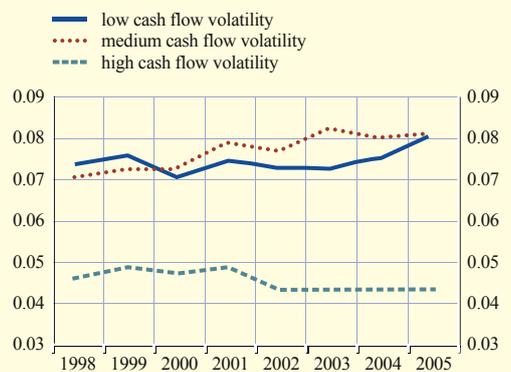
(ratio of cash and cash equivalents to total assets)



Sources: AMADEUS (Bureau van Dijk) and ECB calculations. Note: Firm size is defined as a function of assets, employees and turnover.

**Chart F Liquidity ratios for firms with different degrees of cash flow volatility**

(ratio of cash and cash equivalents to total assets)



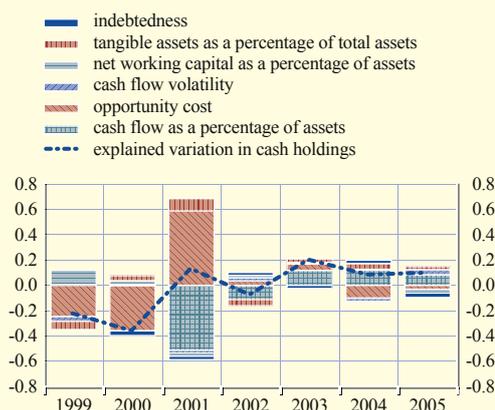
Sources: AMADEUS (Bureau van Dijk) and ECB calculations. Note: Cash flow volatility is measured as the coefficient of variation for this variable.

Relationship between liquidity ratios and selected variables

Variable	Coefficient in a liquidity ratio equation
Cash flow as a percentage of assets	0.17
Cash flow volatility	0.003
Tangible assets as a percentage of total assets	-0.04
Indebtedness as a percentage of assets	-0.02
Net working capital as a percentage of assets	-0.03
Spread between the bank lending rate and the rate of return on M3	-0.39
Relationship between cash holdings and size: dummy (size = medium)	-1.6
dummy (size = large)	-2.1

Chart G Contributions to developments in liquidity holdings

(percentage points)



Sources: AMADEUS (Bureau van Dijk) and ECB calculations.

Notes: a) The table reports the estimated coefficients when liquidity ratios are related to the variables presented in the table. All are significant at conventional (95%) confidence levels.

b) Chart G shows the contributions to developments in cash holdings of the variables presented in the charts above. All variables are significant at the 5% significance level.

with an increase of 100 basis points in this spread leading firms to reduce their cash holdings by 0.4 percentage point (6% of the median liquidity ratio).

Chart G illustrates the role played by each of the above-mentioned variables in explaining developments in liquidity holdings in recent years according to the estimated coefficients when these variables are included in a liquidity ratio equation.<sup>3</sup> As can be seen, developments in cash holdings were driven largely by changes in opportunity costs (proxied by the spread between the bank lending rate and the rate of return on M3) in the late 1990s and early 2000s, while more recently (in the period 2002-05) interest rates have played a more limited role. Thus, in recent years increases in the cash flow-to-asset ratio have replaced variations in opportunity costs as the main factor contributing to the accumulation of cash holdings. Furthermore, for the period 2003-05 estimated time dummies are increasingly positive, suggesting that other macroeconomic factors might also have contributed to the accumulation of cash in recent years. For example, firms might have accumulated cash in order to carry out merger and acquisition activities, which have surged over the last few years.<sup>4</sup>

To sum up, the evidence presented in this box indicates that cash holdings are related to balance sheet variables such as indebtedness, net working capital and tangible assets, as well as other variables such as firm size and cash flow. Of those factors, cash flows seem to have played the most important role in explaining the increases observed over the last few years in non-financial corporations' liquidity ratios. The accumulation of corporate cash holdings is thus broadly consistent with a pick-up in real economic activity in recent years. Variations in the opportunity cost of holding money have also driven recent developments in cash holdings, although to a lesser extent than at the end of the 1990s, when increases in such costs contributed to reductions in liquidity ratios.

<sup>3</sup> Chart G does not show the contribution associated with lagged levels of cash holdings, which would, given the high levels of persistence exhibited by this variable, appear as the main explanatory factor in this contribution analysis.

<sup>4</sup> See also the box entitled "Recent trends in merger and acquisition activity in the euro area" in the July 2006 issue of the Monthly Bulletin.