THE DETERMINANTS AND IMPLICATIONS OF CORPORATE CASH HOLDINGS

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ABSTRACT

We examine the determinants and implications of holdings of cash and marketable securities by publicly traded U.S. firms in the 1971-1994 period. Firms with strong growth opportunities and riskier cash flows hold relatively high ratios of cash to total assets. Firms that have the greatest access to the capital markets (e.g. large firms and those with credit ratings) tend to hold lower ratios of cash to total assets. These results are consistent with the view that firms hold liquid assets to ensure that they will be able to keep investing when cash flow is too low relative to planned investment and when outside funds are expensive. The short run impact of excess cash on capital expenditures, acquisition spending and payouts to shareholders is small. The main reason that firms experience large changes in excess cash is the occurrence of operating losses. There is no evidence that risk management and cash holdings are substitutes.

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"[T]here is no necessity to hold idle cash to bridge over intervals if it can be obtained without difficulty at the moment when it is actually required."

John Maynard Keynes, *The General Theory of Employment, Interest and Money*, 1934.

1. Introduction

On February 8, 1996, Chrysler Corporation's Chairman Robert J. Eaton and investor Kirk Kerkorian agreed to a 5-year standstill agreement in which Kerkorian would cease attempts to take over Chrysler. An important element of the agreement was a commitment from Chrysler that liquid assets (defined as cash and marketable securities) in excess of a $7.5 billion target be returned to shareholders in the form of share repurchases or dividends.

The Chrysler/Kerkorian story raises questions that have gone largely unexamined in the finance literature. Is there an optimal level of liquid asset holdings on a corporate balance sheet? And, if so, is the relatively large amount of liquid assets held by firms like Chrysler justified? This question is particularly relevant today. The S&P 500 corporations reported a total of $716 billion in cash and marketable securities on their balance sheets as of fiscal year 1994. The largest non-financial holders of liquid assets were Ford ($13.8 billion), General Motors ($10.7 billion) and IBM ($10.5 billion).

A corporation may carry significant liquid assets for a variety of reasons. Perhaps the best recognized motive is to minimize transactions costs. A well-developed stochastic programming literature identifies optimal cash balances in a world where selling securities to obtain cash is costly.[1] This literature specifies how much cash a firm will hold on average and its key result is that there are economies of scale in cash management.

Another motive for holding liquid assets is to enable the firm to keep investing when cash flow is too low to fund positive net present value projects and when outside funds are expensive. Outside funds are likely to be expensive for firms with significant information asymmetries and

agency costs. For instance, in a downturn investors may have a hard time discerning whether a firm's poor performance is due to general economic conditions or to the fact that the firm has exhausted its growth opportunities. In such a situation, outside funds are expensive and a reserve of liquid assets is valuable if the firm has good investment opportunities but current cash flow is low because of the business cycle. If, in contrast, the firm no longer has growth opportunities, then liquid assets may enable management to postpone necessary changes in the firm's strategy and would make shareholders worse off. Therefore, holdings of liquid assets can make shareholders worse off in some circumstances.

This paper proceeds in three steps. We first examine the basic question of whether firms act as if they have a target level of cash balances. This will shed light on whether firms behave as if the amount of cash on the balance sheet is a policy variable that is to be controlled for the reasons indicated above. We find that cash balances exhibit a high degree of mean-reversion, consistent with the targeting hypothesis. This raises the natural question of how target levels are set. In our second step, we investigate the cross-sectional determinants of corporate cash employing Compustat data for U.S. firms in the 1971-1994 period. Our cross-sectional regressions point to several influential factors that determine cash balances including corporate growth prospects, short-term working capital imbalances, leverage, industry volatility, and firm size. We argue that these results are consistent with a precautionary demand for liquid assets induced by the existence of information asymmetries and agency costs of debt. Strikingly, use of derivatives does not appear to decrease cash holdings. At the same time, we find that many firms have liquid asset positions that far exceed those predicted by our cross-sectional regressions. We define excess cash as the amount of cash held by a firm in excess of the amount predicted by our model.

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[1] See Baumol (1952), Miller and Orr (1966), Penttinen (1991), Vickson (1985), Chand (1982), Constantinides (1976) and Elton and Gruber (1974).

The existence of firms with large amounts of positive excess cash raises three important related questions that we address in our third step. First, why is it that firms have excess cash? Second, does the excess cash lead firms to make expenditure decisions that they would not otherwise make? Third, what is the main reason that firms experience large changes in excess cash? Firms could choose to have positive excess cash because management is more risk-averse than it should be to maximize shareholder wealth. The cost of the positive excess cash resulting from this excessive risk aversion is the liquidity premium. Firms could also have excess cash because they do not want to pay out funds to shareholders and lack good projects; in this case, management would want to find ways to spend the excess cash, so that it would accept projects that are not in the interest of shareholders. We find evidence that firms with abnormally high cash invest more, after controlling for investment opportunities. However, at the same time, the propensity to spend excess cash on investment and acquisitions is sufficiently small that, on average, little is spent out of excess cash in the short run. In other words, if excess cash burns a hole through management's pockets, it does so very slowly. This result is verified when we look at the persistence of excess cash. Firms that have large amounts of excess cash for more than one year tend to keep their excess cash for a long period. Finally, we find that firms that experience large changes in excess cash mainly do so because of operating losses. This result implies that the lumpiness of capital expenditures and acquisitions is not as important as one might have thought as a motivation to hold cash.

Our results build on an extensive but generally older literature on corporate liquidity. Chudson (1945), for example, finds that cash/assets ratios tend to vary systematically by industry and tend to be higher among profitable companies. Vogel and Maddala (1967) find that cash balances have been declining over time and that larger firms tend to have lower cash/assets and cash/sales ratios. This suggests that there are economies of scale in the transaction motive for

cash.[2] Baskin (1987) argues that firms may use cash holdings for competitive purposes. He concludes that "[t]he empirical evidence is consistent with an oligopolistic model in which liquid assets are used both to signal a commitment to retaliation against market encroachment and to enable firms to preempt new opportunities quickly." Another paper by John (1993) argues that firms wish to hold greater amounts of cash when they are subject to higher financial distress costs. Using a sample of 223 large firms in 1980, John finds that firms with high Tobin's Q ratios and low tangible asset ratios tend to hold more cash. This is consistent with the financial distress theory if one agrees that a low Tobin's Q is a proxy for financial distress. Finally, in a contemporaneous and closely related paper, Harford (1997) explores the relation between a firm's acquisition policy and its liquid asset holdings. He finds that cash rich firms are more likely to make acquisitions, that these acquisitions are more likely to be diversifying acquisitions, and that they are more likely to decrease shareholder wealth. He views his evidence as strongly supportive of free cash flow theory.

The next section of this paper motivates our empirical hypotheses. We present our data in Section 3. In Section 4, we present time-series results. In Section 5, we report cross-sectional regressions. In Section 6, we investigate whether the investment and payout policies of firms with given investment opportunities are related to their liquid asset holdings in the short run. Section 7 examines how likely firms are to keep excess cash over a number of years and examines the characteristics of firms that experience large changes in excess cash. Section 8 summarizes the findings and suggests future directions for empirical research in this area.

2. *Theory and Empirical Hypotheses*

In a world of perfect capital markets, holdings of liquid assets are irrelevant. If cash flow turns out to be unexpectedly low so that a firm has to raise funds to keep operating and to invest, it can do so at zero cost. Since there is no liquidity premium in such a world, holdings of liquid assets have no

[2] A number of early studies considered the question of whether there are economies of scale in holding cash including Frazer (1964) and Meltzer (1963).

opportunity cost. Hence, if a firm borrows money and invests it in liquid assets, shareholder wealth is unchanged.

If it is costly for the firm to be short of liquid assets, the firm equates the marginal cost of holding liquid assets to the marginal benefit. Holding an additional dollar of liquid assets reduces the probability of being short of liquid assets and decreases the cost of being short of cash under the reasonable assumption that the marginal benefit of liquid assets in a state of the world decreases as the amount of liquid assets increases. We define a firm to be short of liquid assets if it has to cut back investment, cut back dividends, or raise funds by selling securities or selling assets. Specifically, consider investment at date t in state of the world s(t), I(s(t)). In state s(t), the firm has cash on hand equal to liquid assets at time t-1, L(t-1), plus the return on these liquid assets, r(s(t))L(t-1), and the cash flow from operations, C(s(t)). Out of the cash on hand, the firm must pay taxes, T(s(t)), make required payments on existing financial contracts, P(s(t)), and dividend payments, d(s(t)). Required payments on existing financial contracts include not only contractual payments on debt contracts and bond issues, but also required payments on derivatives. In this setting, a firm is short of cash if:

$$I(s(t)) > L(t-1)(1+r(s(t))) + C(s(t)) - T(s(t)) - P(s(t)) - d(s(t)),$$

and

$$\frac{\partial I(s(t))}{\partial L(t-1)} = (1 + r(s(t))).$$

The first equation indicates that the firm uses up all of the liquid assets available before financing and the second indicates that if it had more liquid assets available it would invest them. Models of optimal holdings of liquid assets can differ in terms of the costs of being short of cash in each state of the world and in terms of the marginal cost of holding cash.

The above framework has important implications. The firm can avoid being short of liquid assets in a particular state of the world by holding more liquid assets or by engaging in financing activities that reduce P(s(t)) in that state of the world. For instance, the firm could hedge so that in some states of the world P(s(t)) might be negative. Alternatively, the firm could have more equity so that it would have to make fewer payments to bondholders, in which case P(s(t)) would be lower. Therefore, an optimal theory of liquid asset holdings has to address the issue of why it is more efficient for the firm to hold an additional dollar of liquid assets instead of decreasing leverage by some amount or by hedging.

In the remainder of the section, we first address the role of transaction costs as a determinant of cash holdings and then turn to the impact of information asymmetries and agency costs on cash holdings.

2. A. The transaction costs model.

Consider the effect of transaction costs on the irrelevance result within the framework we just discussed. We now assume that there are costs to buying and selling financial and real assets. In particular, let's assume that there is a cost to raising outside funds that takes the form of a fixed cost plus a variable cost which is proportional to the amount raised. In this case, a firm short of liquid assets has to raise funds in the capital markets, liquidate existing assets, reduce dividends, and/or renegotiate existing financial contracts. Unless the firm has assets that can be liquidated at low cost, it prefers using the capital markets. However, it is costly to raise funds irrespective of whether the firm does so by selling assets or using the capital markets. The fixed costs of accessing outside markets induce the firm to raise funds infrequently and to use cash and liquid asset holdings as a buffer.

Figure 1 shows the marginal cost curve of being short of liquid assets and the marginal cost curve of holding cash. The marginal cost curve of being short of liquid assets is downward

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

With the assumptions that lead to Figure 1, one would expect the marginal cost of being short of funds and hence holdings of liquid assets to increase with the following variables:

1. **Size of transaction costs of raising outside funds.** One would expect transaction costs to be lower for firms that have accessed public markets already. This means that firms with a debt rating have less liquid assets.
2. **Cost of raising funds through asset sales, dividend cuts, and renegotiation.** A firm that has assets on its balance sheet that can be cheaply converted into cash can raise funds at low cost by selling these assets. Hence, firms with mostly firm-specific assets have more liquid assets and diversified firms have less liquid assets. Also, a firm that currently pays dividends can raise funds at low cost by reducing its dividend payments.
3. **Investment opportunities.** An increase in the number of profitable investment opportunities means that the firm has to give up better projects with a cash shortage.
4. **Cost of hedging instruments.** By hedging with financial instruments, a firm can avoid situations where it has to seek funds in the capital markets because of random variation in cash flow. Hence, firms for which hedging is expensive are expected to hold more liquid assets.

5. **Length of the cash conversion cycle.** Firms in multiple product lines and firms with low inventory relative to sales are firms where one would expect the cash conversion cycle to be short, hence they should have less liquid assets.
6. **Cash flow uncertainty.** Uncertainty leads to situations where the firm has more outlays than expected at times. Therefore, one would expect firms with greater cash flow uncertainty to hold more cash.
7. **Absence of economies of scale.** Simple transaction costs models suggest that there are economies of scale in cash management.

In a world with significant transaction costs, one would expect assets that can be exchanged for cash with lower transaction costs to have a lower return to reflect this benefit.[3] This means that there is now a cost to holding liquid assets. One would expect this cost to be highest for cash and to decrease for assets that are poor substitutes for cash. Consequently, a firm's liquid assets have an opportunity cost. For liquid assets held in the form of demand deposits, the opportunity cost increases with interest rates. To the extent that cash substitutes are deposited in short-maturity instruments, holding these cash substitutes become more expensive when the liquidity premium component of the term structure rises.

In summary, the transaction cost model implies that liquid assets divided by total assets increase with (1) the volatility of cash flow divided by total assets and (2) the length of the cash conversion cycle. The model also implies that liquid asset holdings decrease (1) with interest rates and the slope of the term structure, (2) with the cost of raising debt, (3) with the ease of selling of assets, (4) the cost of hedging risk and (5) with the size of a firm's dividend.

[3] See Amihud and Mendelson (1986) for a paper that provides such a result.

2.B. Information asymmetries, agency costs of debt, and liquid asset holdings.

We now extend the analysis to allow for information asymmetries and agency costs of debt. For now, however, we assume that management maximizes shareholder wealth, so that investors are not worried that management could use the liquid assets to pursue its own objectives.

First, consider the role of information asymmetries. Information asymmetries make it harder to raise outside funds. Outsiders want to make sure that the securities they purchase are not overpriced and consequently discount them appropriately. Since outsiders know less than management, their discounting may underprice the securities given management's information.[4] In fact, outsiders may require a discount that is large enough that management may find it more profitable not to sell the securities and reduce investment instead. Since information asymmetries make outside funds more expensive, the model with information asymmetries makes many predictions that are similar to the model with transaction costs discussed earlier. However, the model provides an explicit reason for why outside funds would be expensive and predicts that the cost of raising outside funds increases as these securities are more informationally sensitive and as information asymmetries are more important. This would suggest that firms with no debt capacity left would hold more liquid assets since their only alternative is to raise capital through relatively informationally sensitive securities such as equity. However, if firms with little debt capacity are firms that have poor investment opportunities, then these firms have little need for liquid assets except to prevent default.

Let's now consider the role of agency costs of debt. These agency costs arise when the interests of the shareholders differ from the interests of the debtholders and, possibly, when interests differ among various classes of debtholders. Because of these costs, highly levered firms

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[4] See Myers and Majluf (1984) for this argument.

find it difficult and expensive to raise additional funds; they also sometimes find it impossible to renegotiate existing debt agreements to prevent default and bankruptcy. Such firms have high incentives to engage in asset substitution as argued by Jensen and Meckling (1976), so that debt will be expensive both in terms of the required promised yield and in terms of the covenants attached to the debt. They are also likely to face the underinvestment problem emphasized by Myers (1977), namely that raising funds to invest may benefit debtholders but not shareholders, so that shareholders prefer not to invest even though the firm has valuable projects.

Firms want to avoid situations where the agency costs of debt are so high that they cannot raise funds to invest in valuable projects. Obviously, one way to do so is to choose a low level of leverage. However, one would expect firms with valuable investment opportunities for which the cost of raising additional outside funds, in the form of debt, is high to hold more liquid assets since the cost of being short of funds is higher for such firms. The market-to-book ratio is generally used as a proxy for investment opportunities.[5] This means that, holding the degree of information asymmetry between managers and investors constant, one would expect firms with a high market-to-book ratio to hold more cash. The problem is that such firms invest a lot, so that if investment expenditures occur discretely, they hold more cash, on average, to pay for investment expenditures. Hence, one would expect liquid assets to increase with the market-to-book ratio controlling for the level of investment expenditures.[6]

In general, one would expect that issuing a large amount of debt would be most costly for firms with high bankruptcy and distress costs. R&D expenditures are a proxy for distress costs. As discussed in Titman and Wessels (1988), R&D expenditures can proxy for the degree of product specialization. We expect customers to be more reluctant to purchase products from a distressed firm with very specialized products that may require future servicing [Titman (1984) and Maksimovic and

[5] See Smith and Watts (1992) and Jung, Kim and Stulz (1996).

Titman (1991)]. Opler and Titman (1994) provide evidence that firms with high R&D/sales are more vulnerable to financial distress. Opler and Titman argue that R&D expenses are correlated with bankruptcy and distress costs. We would also expect that regulated firms will tend to have lower costs of raising capital since diverting funds to alternative, risky investments is difficult if not impossible.

2.C. Agency costs of managerial discretion.

In the presence of agency costs of managerial discretion, management can hold cash to pursue its own objectives. First, management may hold excess cash simply because it is risk averse. More entrenched management would therefore be more likely to hold excess cash. Hence, one would expect firms with anti-takeover amendments to be more likely to hold excess cash. Second, management may accumulate cash to have more flexibility to pursue its own objectives. Cash is like free cash flow: It allows management to make investments that the capital markets would not be willing to finance. By enabling management to avoid the discipline of capital markets, investing in cash can therefore have an adverse effect on firm value. To put it another way, increasing a firm's holdings of liquid assets by one dollar may increase firm value by less than one dollar. The possibility that management could be using cash for its own objectives raises the costs of outside funds because outsiders do not know whether management is raising cash to increase firm value or to pursue its own objectives. Third, management may accumulate cash because it does not want to make payouts to shareholders and wants to keep funds within the firm. Having the cash, however, management must find ways to spend it and hence chooses poor projects when good projects are not available. In general, the agency costs of managerial discretion are less important and may be

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[6] Antunovitch (1996) further argues that firms with higher information asymmetries will have a greater dispersion of slack since these firms find it harder to access capital markets.

trivial for firms with valuable investment opportunities because the objectives of management and shareholders are more likely to coincide.

When is it more likely that management will not be disciplined so that it can afford to hold excess cash to pursue its own objectives? One would expect the firms with excess cash to be low market-to-book firms where:

1. **Outside shareholders are highly dispersed.** As argued by Shleifer and Vishny (1986), the existence of large independent shareholders makes a takeover and/or a proxy contest easier.
2. **The firm is large.** Firm size is a takeover deterrent. It requires large resources to be husbanded by the bidder and makes it easier for the target to use the political arena to its advantage.
3. **The firm has low debt.** By having low debt, the firm is less subject to monitoring by the capital markets.
4. **The firm is protected from the market for corporate control through anti-takeover charter amendments.** These amendments make it less likely that the firm becomes a target.

For entrenched management, accumulating liquid assets can be a double-edged sword. Holding excess cash makes it easier for management to remain independent from the capital markets and to pursue its investment policies. At the same time, it increases the gain to a bidder from taking over the firm since the bidder gains control of liquid assets that can help it to finance the acquisition.

To the extent that agency costs of managerial discretion are higher for low market-to-book firms than for high market-to-book firms, one expects low market-to-book firms with entrenched management to have excess liquid assets. To the extent that low market-to-book firms have poor investment opportunities and management holds liquid assets to facilitate an investment program

that it would find difficult to finance through the capital markets, one would expect low market-to-book firms with more liquid assets to invest more.

Management holdings of shares help align their interests with those of shareholders. At the same time, however, they protect management against outside pressures and may make management more risk-averse.[7] If holding cash is costly and management tends to hold more cash than is optimal from the perspective of maximizing shareholder wealth, then one would expect cash holdings to fall with managerial ownership. However, to the extent that managerial ownership makes management more risk averse, then one would expect cash holdings to increase with managerial ownership.

2.D. Summary

We summarize the predictions made by the various theories of cash holdings discussed in this section in Table 1. The table shows the expected signs in regressions predicting corporate liquidity for a series of variables.

3. Data

We construct a sample of firms for our empirical tests by merging the Compustat annual industrial and full coverage files with the research industrial file for the 1971-1994 period. These data include survivors and non-survivors that appeared on Compustat at any time in the sample period. We exclude financial firms (SIC codes between 6000 and 6999), because they may carry cash to meet capital requirements rather than for the economic reasons studied here. We also exclude utilities because their cash holdings can be subject to regulatory supervision in a number of states. We exclude firms with nonpositive sales for the years in which they have nonpositive sales. Finally, we exclude ADRs and firms designated as pre-FASB. We present regressions predicting cash and

[7] See Stulz (1988).

the persistence of cash holdings using the entire dataset. We also present a separate regression analysis of cash holdings in 1994 for the simple reason that data are available for the governance structure and risk management activities of firms for that year. Insider share ownership is measured as the fraction of shares outstanding held by officers and directors (reported in Disclosure). Firm diversification is measured using the Compustat segment tapes.

3.1 Measure of Liquid Asset Holdings

We measure liquid asset holdings as the ratio of cash and marketable securities (Compustat item #1) to total assets (Compustat item #6) minus cash and marketable securities. We deflate by the book value of total assets net of liquid assets (which we call net assets in the following) with the view that a firm's ability to generate future profits is a function of its assets in place. While not reported in this paper, we have also measured liquidity using the cash-to-sales ratio. This does not affect our main results in a material way.

3.2 Definition of Exogenous Variables

Investment Opportunities. We measure the likelihood that a firm will have positive NPV projects in the future using the ratio of the market value of a firm's assets to the book value of its assets. Since the book value of assets does not include future growth options, we would expect the ratio of the market value of the firm relative to the book value to be higher when a firm has a high preponderance of growth options. A variety of past papers have found that the market-to-book ratio is an important determinant of corporate financing choices thought to depend on a firm's portfolio of growth options (e.g. Smith and Watts (1992), Jung, Kim and Stulz (1996) and Barclay and Smith (1995)).

Regulation. We allow for possible effects of regulation by using a dummy variable for industries that are or have been subject to entry and price regulation. This variable is identical to

that employed by Barclay and Smith (1995). Regulated industries include railroads (SIC code 4011) through 1980, trucking (SIC codes 4210, 4213) through 1980, airlines (SIC code 4512) through 1978 and telecommunications (SIC codes 4812, 4813) through 1982.

Firm size. We measure firm size as the natural logarithm of the book value of assets in 1994 dollars.

Financial Leverage. We measure leverage using the debt/assets ratio defined as (long-term debt+short-term debt)/book value of assets.

Dividend Payout Dummy. We define a dummy set equal to one in years where a firm pays a dividend. Otherwise the dummy equals zero.

Cash flow. We measure cash flow as earnings after interest, dividends and taxes but before depreciation divided by net assets.

Cash flow riskiness. We measure cash flow riskiness using two measures. First, we use the standard deviation of industry cash flow computed as follows. For each firm, we compute cash flow standard deviation for the previous twenty years if available using Compustat since 1950 (industry sigma). We then take the average across the 2-digit SIC code of the firm cash flow standard deviations. Second, we compute a firm's cash flow standard deviation for 1994 using the previous twenty years of data if available.

Financial distress costs. We measure the potential for financial distress costs using the R&D expense-to-sales ratio. Firms that do not report R&D expenses are considered to be firms with no R&D expenses.

Management-Shareholder Incentive Alignment. It is difficult to measure the extent of conflict of interest between managers of a corporation and its shareholders. In theory, the severity of this conflict is affected by a number of hard-to-measure concepts including the efficiency of the managerial labor market and the extent of product market discipline (Fama and Jensen (1983)). Nonetheless, there is a large body of literature that suggests that certain types of firms are more

likely to suffer from agency conflicts. For example, firms with inside ownership in excess of 5% but less than 25-40% are known to trade at somewhat higher market valuations than other firms (Morck, Shleifer and Vishny (1988), McConnell and Servaes (1990)). We employ a dummy for whether insider ownership of a firm is in the 5 to 25% range and a dummy for whether insider ownership is greater than 25%.

Availability of Cash Substitutes. Firms may choose to insure themselves against losses by holding liquid assets besides cash. For example, it is common for firms to sell off non-core assets in periods of economic distress. It is also becoming increasingly frequent for firms to liquidate receivables through factoring or securitization as a means of raising liquidity. We use net working capital minus cash as a measure of liquid asset substitutes. In addition, we employ a count of the number of reported business segments to measure whether firms have non-core assets that could be liquidated in periods of economic distress.

Derivatives usage. To assess a firm's derivatives usage in 1994, we use the *Corporate Risk Management Handbook* from *Risk Publications* for that year. We collect information on whether an S&P 500 corporation uses derivatives and on the total of the notional amount of the derivatives it reports.

3.3 Data Description

Table 2 describes the main variables used in the study. There is wide variation in the ratio of cash and marketable securities to assets. The median firm has cash equal to approximately 6% of net assets (i.e. total assets - cash). On a dollar basis, the median firm has cash holdings of $6.28 million, a relatively small amount. This reflects the size distribution of firms on Compustat: The median firm in the sample has an asset base of $90.1 million.

3.4 Variation Across Time

Figure 2 shows the median cash-to-assets ratio in the 1952-1994 period for firms with real assets in the $90-110 million range and in the $900 million to $1.1 billion range in 1994 dollars (inflation-adjusted with the CPI). There has been a secular decline in cash holdings since the 1950s, mostly accomplished by the mid-1960s. This decline is consistent with the view that payment automation reduced the overall need for cash in many companies. It is also likely that cash balances were abnormally high at the beginning of the 1950s because firms were typically not able to invest in their primary business areas during World War II.

4 The Determinants of Cash Balances

4.1 Do Firms Have Target Cash Levels?

The hypotheses presented in this paper hold that firms adjust their cash holdings for a variety of reasons. An alternative hypothesis would state that firms passively allow cash holdings to rise and fall with cash flow. This argument is not unlike that implied by Myers' (1984) pecking-order story that firms allow their debt ratios to float with cash flow.

We test this hypothesis by estimating a first order autoregressive model for each Compustat firm of the form $\Delta(\text{Cash/Assets})_t = \alpha + \beta\ \Delta(\text{Cash/Assets})_{t-1} + \varepsilon$, where ε is an i.i.d disturbance with zero mean. Figure 3 shows the distribution of the autoregressive coefficients (β) from this regression for all Compustat firms with more than five years of data in the 1950-94 period. The median coefficient is negative, indicating that cash balances are mean reverting. It appears that there are systematic factors that cause firms not to let cash balances rise too high nor fall too low.

4.2 Univariate Tests

Table 3 presents univariate comparisons of key descriptive variables by cash/assets quartile. We are interested in whether the characteristics of companies which hold high cash balances (say, in the fourth quartile) differ from those with low cash balances (first quartile). We test the hypothesis that the fourth-quartile firms differ significantly from the first-quartile firms using a *t*-test.

Firms that hold high amounts of cash differ substantially from those with less cash along several dimensions. For example, the mean market-to-book ratio of fourth quartile cash holders is substantially higher than that of firms in the first quartile. This is consistent with the view that firms will hold more cash in order to protect the value of growth options and to avoid the high transactions costs associated with raising capital in the face of informational asymmetries. This is also evidenced by the very large difference in the R&D/sales ratio across groups.

4.3 Regression tests on the 1971-1994 Sample

Table 4 presents panel regressions predicting liquidity levels in the 1971-1994 period with the independent variables described earlier. Firms are allowed to enter and leave the panel. We report panel regressions that include year dummies and a similar regression where all variables are industry-adjusted. Because liquidity cannot be negative, we use the logarithm of liquidity as our dependent variable. In cases where we look at industry adjusted variables, our dependent variable is the log of the ratio of firm liquidity over the median liquidity in the 2-digit SIC industry. Our qualitative results are not affected by using the level of liquidity as the dependent variable. However, when we use the level rather than the logarithm of liquidity as the dependent variable, we have the rather nonsensical result that some firms are predicted to have a negative amount of cash. The assumption of independent and identically distributed errors may be violated in this regression due to the persistence in cash holdings noted earlier and, possibly, due to omitted variable bias.

Therefore, we also report fixed effects regression results as well as coefficient estimates for a regression where we use the sample means of the variables for each firm.

The results are consistent with the univariate findings discussed earlier. Larger firms hold less cash. From the first regression, it follows that going from small firms to large firms, say increasing real assets by a factor of 100, multiplies the liquid assets ratio by about 4/10. These are also firms that would be least likely to face financing problems due to asymmetric information in periods of poor economic activity. Large firms are also likely to face economies of scale in cash holdings. The results indicate that firms with high market-to-book ratios and high R&D expenditures hold more cash. An increase in the market-to-book ratio from the first quartile to the third quartile multiplies cash holdings by about 1.3. A similar change for R&D multiplies cash holdings by about 1.16. This is consistent with the idea that firms with high growth potential hold cash in order to ensure that they will be able to realize expected future profit even if capital becomes difficult to obtain. These are firms that would be most likely to face financing problems in periods of economic distress due to asymmetric information. Since firms with better investment opportunities invest more, it is not surprising that we also find a positive relation between capital expenditures and cash.

Riskiness of cash flows has a strong positive effect on cash holdings when that riskiness is proxied by the industry standard deviation of cash flow to assets. Whereas one would expect regulated firms to be less risky and less subject to information asymmetries, there is no clear evidence that these firms hold less cash.

We hypothesized that firms with alternative sources of liquidity should hold less cash. Firms that pay dividends can generate cash by cutting dividends, so that one would expect them to hold less cash. There is support for this hypothesis in all but the fixed effects regression. The fixed effects regression estimates the correlation between cash holdings and a change in dividend policy

from no dividends to paying dividends. Such a change in dividend policy might be associated with increased cash because the firm is doing better than it used to.

One would expect a negative relation between net working capital (more money expected to come in over the next year than to go out) and cash since net working capital is a substitute for cash. This hypothesis finds considerable support in our regressions.

Leverage and cash holdings could be positively or negatively related. First, a firm with high leverage faces greater costs of raising outside funds and hence might want a larger buffer of cash. Second, firms with greater agency costs of debt will have lower leverage, but the greater agency costs of debt make cash holdings also more useful. Third, firms with more debt have greater debt service costs and hence cannot accumulate as much cash out of cash flow as firms with less debt. It turns out that there is a strong negative relation between leverage and cash holdings, suggesting that it is more worthwhile for firms to reduce debt than to hold more precautionary cash balances when leverage is high. This could simply result from the fact that firms with high leverage are firms that have fewer reasons to hold liquid assets because they do not have valuable investment opportunities that they would lose in the absence of cash holdings. One might worry that leverage and cash holdings are determined simultaneously and that, consequently, we should have chosen a different estimation strategy. When we estimate the regressions in Table 4 without leverage, however, none of our inferences change.

Cash holdings increase in past cash flow. This suggests that firms are reluctant to pay out past cash flow that they do not immediately invest. Finally, cash holdings are highest when a firm is in an industry where cash flows are relatively volatile (measured by industry sigma).

4.4. Regression tests on the 1994 sample

For 1994, we also have available data on managerial ownership, derivatives usage, bond ratings, and anti-takeover charter amendments. We restrict the sample to firms for which the degree of

diversification as measured by the number of segments is available. Table 5 estimates cross-sectional regressions using the explanatory variables from table 4 and additional explanatory variables. The first two regressions in Table 5 use the full sample. The other two regressions use only the S&P 500 firms for which derivatives usage information is available and for which all our other variables are also available. Looking at the first two columns, we find that the explanatory variables that are in these regressions as well as in the earlier regressions lead to the same inferences. In most cases, the coefficient estimates are very similar. For instance, the coefficient on market-to-book is 0.1445 in Table 5 and 0.1422 in the first column of Table 4.

The additional variables are managerial ownership, firm volatility, debt rating, and number of segments, which proxies for diversification. Firm volatility has a strong positive effect on cash holdings even when we control for industry volatility (industry sigma). Management ownership has a positive effect on cash holdings significant at the 0.10 level for low ownership, but cash holdings do not increase further as ownership increases past 5%. This result is consistent with managerial risk aversion insofar as managers may wish to protect their human capital with a cash buffer. Not surprisingly, firms that have an investment grade bond rating hold less cash. Although the diversification variable has the predicted sign, it is not significant.

In the last two columns, we present regressions for S&P 500 firms only. The results are mostly similar to the ones for the full sample. One exception is that diversification has a negative coefficient significant at the 0.10 level. Now whether a firm pays dividends or not does seem to matter, which may reflect the fact that most firms in this subsample pay dividends. The coefficients on inside ownership are not significant and neither is the bond rating dummy. In addition, the presence of anti-takeover amendments does not have a significant effect on cash holdings. We would note, however, that the great majority of S&P 500 firms have an anti-takeover amendment. Cash holdings are unrelated to whether a firm uses derivatives or not but not to the intensity of derivatives usage. A dummy variable that takes value one if a firm's has derivatives with a notional

amount in excess of 10% of assets has a significant positive coefficient. Consequently the regressions in Table 5 do not provide support for the view that cash holdings and derivatives are substitutes, but is not inconsistent with the view that cash holdings and derivatives are complements.

5.0 Does excess cash affect spending?

We compute a measure of excess cash based on the residual from the first regression in Table 4. A company with positive excess cash is one that holds more cash than predicted by our model. To get a sense of the patterns of excess cash holdings, we report cash holdings and excess cash holdings for firms with total assets in 1994 in excess of $25 billion in Table 6. The table shows that there is high cross-sectional variability in the cash/assets ratio and in excess cash. Not surprisingly, the companies with the largest ratios of liquid assets to assets are also the companies with the largest ratios of excess cash to assets. It is interesting to note that Chrysler held $5.15 billion of cash in 1994, of which over $3 billion was excess cash according to our model.

To more fully understand how firms manage their cash, we show in Table 7 how spending patterns in year t+1 are related to excess cash in year t. We use the Compustat flow of funds data to identify spending patterns on an annual as well as on a cross-sectional basis. In this section, we confine our analysis to the firms with positive excess cash. Firm years are separated into quartiles on the basis of the market-to-book ratio. If the market-to-book ratio (MB) is a good proxy for the presence of profitable growth opportunities, then our discussion of the agency costs of managerial discretion predicts that these agency costs are small in high MB firms. We therefore compare firms in the highest and lowest quartiles of market-to-book for different quartiles of positive excess cash. The excess cash quartiles are computed separately across all firms each year, so that the number of firms in each cell varies but firms in the same excess cash quartile have similar amounts of excess cash irrespective of their market-to-book ratio.

For capital expenditures, we find that they increase monotonically in excess cash for both high MB and low MB firms. For all quartiles of excess cash, high MB firms invest significantly more than low MB firms but there is no evidence that capital expenditures increase faster for low MB firms than for high MB firms as excess cash increases.[8] The increase in capital expenditures across excess cash quartiles is small compared to the increase in excess cash. Moving from the first quartile of excess cash to the fourth quartile of excess cash, capital expenditures increase by about 2% of net assets for high MB firms and 1.4% for low MB firms. However, excess cash increases dramatically since average excess cash is 1.2% of net assets in the first quartile and 58.05% in the fourth quartile. As a result, investment increases by about 2% of assets when excess cash increases by more than 20% of net assets. Although we do not reproduce results for firms with negative excess cash, it is interesting to note that capital expenditures are U-shaped in excess cash when we look both at positive and negative excess cash. Low MB firms in the lowest quartile of negative excess cash have capital expenditures that are similar to those of low MB firms in the highest quartile of positive excess cash (0.0773 versus 0.0762). The same result holds for high MB firms (0.1157 versus 0.1175). In summary, there is no evidence that the firms where one would expect the agency costs of managerial discretion to be highest, namely low MB firms, have a relatively high propensity to spend excess cash on capital expenditures.

For acquisitions, the relation between excess cash and spending on acquisitions is not monotonic for high MB firms. Further, the difference between spending on acquisitions for the fourth quartile and first quartile of excess cash is barely significant. For low MB firms, spending on acquisitions more than doubles when one moves from the lowest quartile of excess cash to the highest. Hence, for firms with poor investment opportunities, there is evidence consistent with Harford (1997) that more spending takes place on acquisitions as excess cash increases. When one

[8] The ratio of high MB to low MB capital expenditures is 1.57 for the first quartile of positive excess cash, 1.42 for the second, 1.43 for the third, and 1.54 for the fourth quartile.

looks at spending on acquisitions in relation to excess cash for both positive and negative amounts of excess cash, firms with negative excess cash spend less than half as much on acquisitions as do firms in the fourth quartile of positive excess cash. Again, however, spending increases much more slowly across excess cash quartiles than does excess cash.

Payments to shareholders, which are the sum of dividends and stock repurchases, do not seem to be related to excess cash for high MB firms but are related for low MB firms. Low MB firms pay out less to shareholders in the first three quartiles of excess cash than do high MB firms, but pay out more in the fourth quartile.

The last panel of the table provides data on operating cash flow divided by net assets. On average, high MB firms have higher cash flow as one would expect. There seems to be no relation between cash flow and excess cash across the first three quartiles of excess cash. However, firms with the highest quartile of excess cash have surprisingly low operating cash flow relative to the other firms irrespective of MB. Further, high MB firms do not have higher cash flow than low MB firms. High excess cash holdings in a given year are not associated with high cash flows the next year. One would not want to interpret this result as suggesting that high excess cash holdings cause low performance, however. It could well be that firms that know that they will have lower cash flow the next year accumulate cash to be able to finance their investment program despite the cash flow deficiency.

The bottom line from all this is that the spending of low MB firms is more sensitive to excess cash. Rather surprisingly in light of the predictions of free cash flow theory, the impact of excess cash on payouts to shareholders is of the same magnitude as the impact of excess cash on investment and spending on acquisitions. Perhaps not surprisingly, firms with negative excess cash have lower payouts than other firms.

Firms with more excess cash have higher capital expenditures and spend more on acquisitions even when they have poor investment opportunities. How do we know, however, that

this is a manifestation of the agency costs of excess cash as opposed to the outcome of a plan to spend more? One way to investigate this issue is to estimate investment equations that control for investment opportunities and allow excess cash to influence investment. The traditional investment equation allows us to predict the "normal" amount of investment. Table 8 reports such investment equations for firms in our sample. We find that after controlling for the determinants of investment, it is still the case that greater excess cash leads firms to invest more whether they have good investment opportunities or not. At the same time, however, it appears that the impact of excess cash on investment is significantly smaller for positive excess cash than negative excess cash. In other words, negative excess cash reduces investment more than positive excess cash increases investment. This could be viewed as evidence for credit constraints of the type discussed in Fazzari, Hubbard and Petersen (1988). Again, however, the results suggest that the propensity to spend out of positive excess cash is small.

6.0 What happens to excess cash?

In Section 5, we saw that an increase in excess cash leads to a surprisingly small increase in capital expenditures, acquisitions spending, and payout to shareholders. This suggests that there is substantial persistence in excess cash levels. Firms appear to sit on cash for extended periods of time. To better document the extent of this persistence, we divide the sample into excess cash quartiles. In Table 9, we report a transition matrix for firms in the highest excess cash quartile. Firms are only included in this table for the first time that they enter this quartile. The quartile is a transitory state for nearly half of the firms. Roughly 55 percent of firms remain in the top excess cash quartile by the next year. However, firms that remain in the highest excess cash quartile for one year tend to remain in that quartile for a substantial amount of time. In all, 39.5 percent of firms that start in the highest excess cash quartile remain in that quartile five years later. A similar

result holds for firms in the lowest quartile. There is clearly strong persistence in excess cash holdings.

The counterpart of this persistence is spending patterns do not change dramatically after a firm appears in either the first or fourth excess cash quartile. Table 10 shows spending patterns for firms in the first and fourth quartiles for five years. Firms in the fourth quartile spend more than firms in the first quartile. They still spend more on acquisitions and shareholder payouts five years after having been identified as firms in the fourth quartile of excess cash. However, there is no dramatic upward jump in spending after a firm has been identified to be in the fourth quartile of excess cash. In other words, there is no evidence that firms in the fourth quartile of excess cash make quick spending adjustments to reduce their excess cash

Table 10 also provides results on operating cash flow as a proportion of net assets. The results on operating cash flow confirm our conjecture in the previous section that firms accumulate excess cash in anticipation of lower cash flow. Firms that are in the fourth quartile of excess cash in one year experience a fall in operating cash flow the next year. Operating cash flow then increases steadily to be higher in year five than in year zero. Similarly, firms that are in the lowest quartile of excess cash have low operating cash flow in year zero. Their operating cash flow increases steadily after year zero, so that in year five there is no difference between firms that have high excess cash in year zero and those that have low excess cash.

Why is it that firms experience large changes in excess cash? We have seen that on average expenditure patterns of high excess cash firms are not such that they use up their excess cash quickly. We therefore look at firms that go from the top quartile of excess cash to the bottom quartile of excess cash in one year. We then look at the expenditure and cash flow patterns for these firms. The results are reproduced in Table 11. The clear result in that table is that firms that experience large changes in excess cash, on average, experience large negative operating cash flows. Note that in the table the end of year 0 is used to assign a firm to an excess cash quartile.

We then select the firms that go from quartile 4 to quartile 1. The largest swing in the ratios reported is the one for operating cash flow. For these firms, the average operating cash flow as a percentage of net assets falls from −1.11 percent to −9.15 percent. This swing represents a change on average of eight percent of assets. Neither capital expenditures nor acquisitions increase by as much as one percent of assets. This further confirms the precautionary motive as a major determinant of cash holdings, in that managers hold cash for a rainy day. The results in Table 11 also show that lumpiness of capital expenditures and acquisitions is not an important reason for large changes in excess cash. Firms that experience large increases in excess cash also experience them because of large swings in operating cash flow. In Panel A, firms that go from the first quartile of excess cash to the fourth quartile experience an average swing in operating cash flow of more than 10 percent of total assets! Strikingly, however, this dramatic shift in cash flow has a small impact on capital expenditures, acquisitions, and payments to shareholders. In other words, the firms that experience such a large increase in excess cash keep it.

7.0 Conclusion

We examine the determinants of corporate holdings of cash and marketable securities among publicly traded US firms from 1971-1994. Our results indicate that firms with strong growth opportunities and firms with riskier activities hold more cash than other firms. Firms that have the greatest access to the capital market (e.g. large firms and those with credit ratings) tend to hold less cash. These results are consistent with the view that firms hold liquid assets to ensure that they will be able to keep investing when cash flow is too low relative to investment and when outside funds are expensive. Our analysis provides limited support for the view that positive excess cash leads firms to spend more on investment or acquisitions. Whereas acquisitions increase with excess cash, payouts to shareholders increase with excess cash also. However, in both cases, the propensity to use excess cash on investment and acquisitions is quite limited. This suggests that

risk aversion is an important driver of cash hoarding. An important issue for further research is whether, when a firm runs into difficulties, excess cash leads firms to avoid making required changes.

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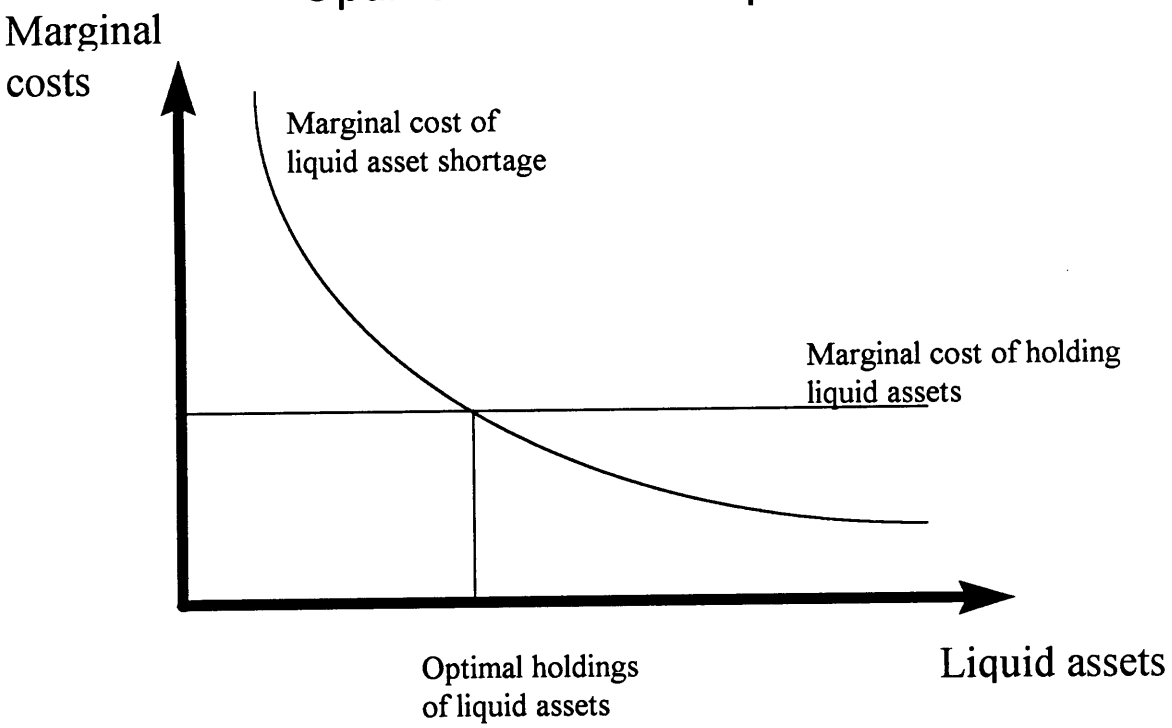
Figure 1
Optimal amount of liquid assets



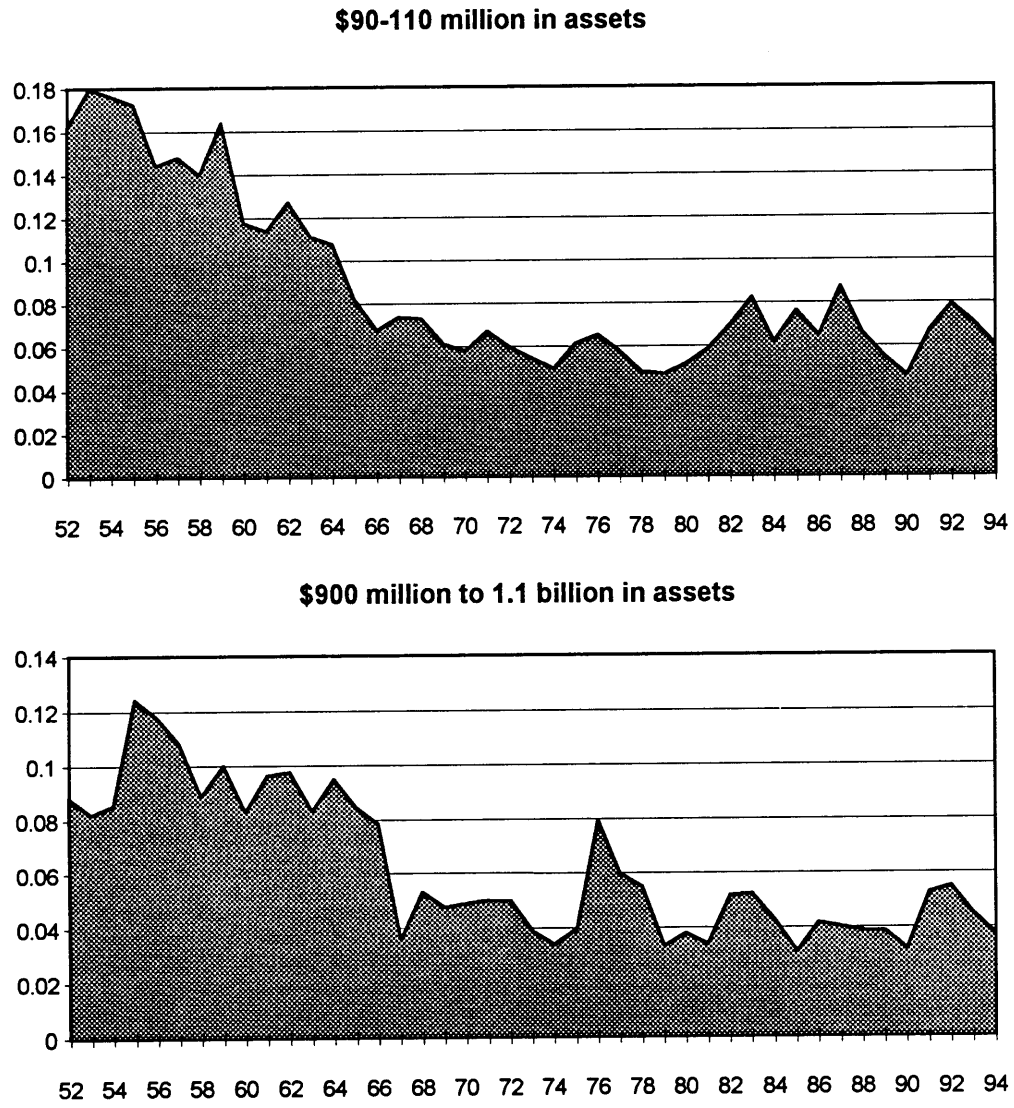


Figure 2. Median Cash/Assets, 1952-1994

Median Cash/Assets Ratio in the 1952-1994 period for Compustat firms with real assets in the $90-110 million range and in the $900 million to $1.1 billion range in 1994 dollars (inflation-adjusted with the CPI). Cash/assets is cash and marketable securities over assets less cash.

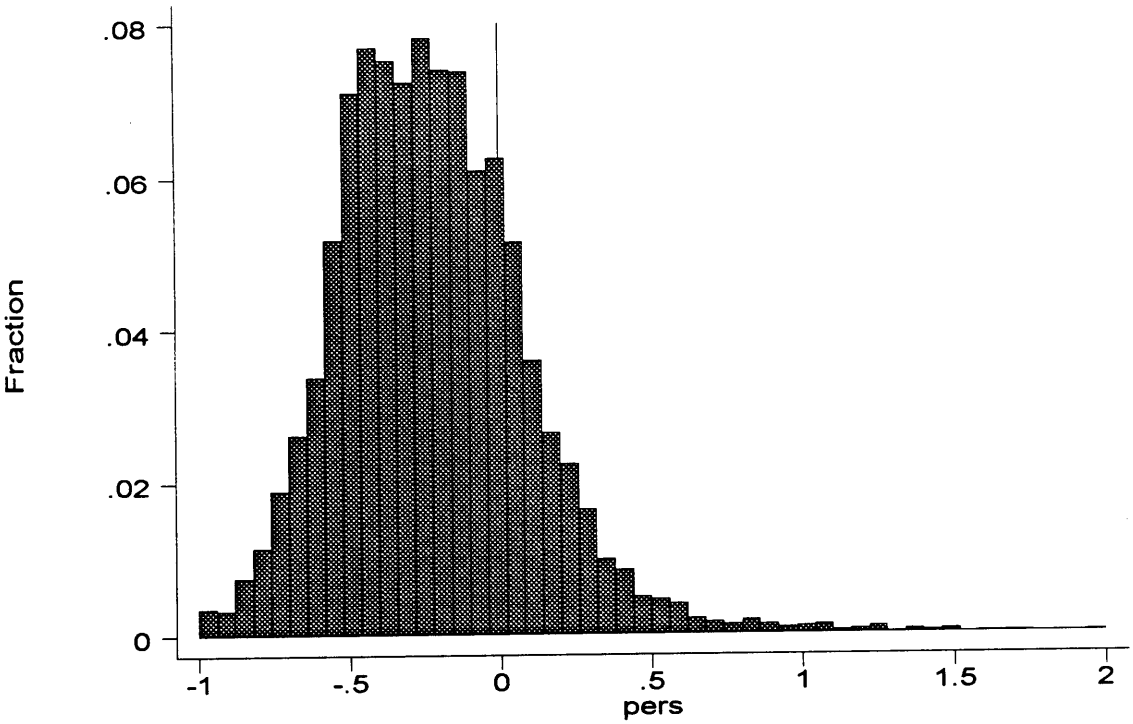


Figure 3. Distribution of Coefficients on Lagged Change in Cash/Assets

Distribution of coefficients on lagged change in cash/assets from the firm-wise regression:

$$D(\text{Cash/Assets})_t = \alpha + \beta\, D(\text{Cash/Assets})_{t-1} + e,$$

where D is a first difference operator and time steps are annual. Cash/assets is defined as cash and marketable securities over assets less cash and marketable securities. The chart includes information on 10,441 U.S. based firms on Compustat with at least five years of data on cash holdings in the 1950-94 period. The median coefficient value is -0.242.

Table 1. Expected Signs on Coefficients in Regressions Predicting Cash Holdings

	Cost of Raising Cash When Needed				Expected Benefits of Cash Reserve			Expected Costs of Cash Reserve	
	Costs Due to Legal, Time & Filing	Costs Due to Information Asymmetry	Costs Due to Agency Problems of Debt	Availability of Other Sources of Liquidity	Completion of Transactions	Protect Value of Investment Opportunities	Protect Assets in Place / Avoid Financial Distress	Cost of Financing Cash (Risk Premium)	Agency Costs of Cash
Firm Size	-	-			-				+
Bond Rating Dummy	-	-						-	
Cash Flow / Assets				-		- / +	- / +		
Market-to-book ratio		+	+			+			-
R&D/sales		+	+			+	+		
Regulated Industry Dummy		-	-						
Standard deviation of firm level Cash Flow/Assets				+	+	+	+		
Debt/Assets		+	+						-
Dividend Payer Dummy		-		-					
Business Segment Count				-	-				
Expense of Hedging				-					
(Current Assets-Current Liabilities - Cash) / Assets				-					
Corporate investments / Assets				-					
Takeover defense Dummies									-
Fraction of inside share ownership									-
Slope of the term structure								-	

Table 2
Description of Variables for the 1971-1994 Compustat Sample

This table presents descriptive statistics on key variables for the 1971-1994 sample of U.S.-based publicly traded firms. Variables deflated by assets are deflated by the book value of assets less cash and marketable securities. Real variables are deflated by the Consumer Price Index to obtain 1994 dollars. Size is defined as the natural logarithm of assets. Market to book is measured by (book value of assets - book value of equity + market value of equity)/assets. Cash flow is defined as (earnings before interest and taxes - interest - taxes - common dividends). Net working capital is calculated without cash. Payout to shareholders is the sum of cash dividends/assets and stock repurchases/assets. Industry sigma is a measure of the volatility of an industry's cash flow for a 20-year period. Industries are defined by 2-digit SIC codes. Total leverage is total debt/total assets. Sample Size is the number of non-missing observations in the sample.

Variable	*Mean*	*First Quartile*	*Median*	*Third Quartile*	*Sample Size*
Cash /Assets	18.03%	2.16%	6.05%	17.22%	127,284
Real Size	4.1909	2.6769	4.1251	5.5984	126,131
Market-to-Book	1.5845	0.9289	1.1832	1.7386	97,801
R&D / Sales	2.96%	0.00%	0.00%	1.50%	127,462
Cash Flow / Assets	0.74%	0.76%	6.37%	10.91%	125,532
Net Working Capital / Assets	13.36%	-0.95%	15.51%	32.30%	122,511
Capital Expenditures / Assets	8.87%	2.93%	6.10%	11.49%	127,063
Acquisitions / Assets	0.94%	0.00%	0.00%	0.00%	125,311
Payout to Shareholders	1.54%	0.00%	0.18%	2.11%	123,903
Industry Sigma	12.26%	5.59%	8.80%	16.90%	126,067
Total Leverage	27.96%	10.05%	24.94%	40.49%	127,165

Table 3
Firm Characteristics by Excess Cash Levels

Univariate comparison of means of measures of firm characteristics of 87,117 firm years which comprise the 1971-1994 sample of U.S.-based publicly traded firms for which excess cash could be calculated. Excess cash is determined by a first pass regression to predict log(cash/(assets-cash)). Variables deflated by assets are deflated by the book value of assets less cash and marketable securities. Real variables are deflated by the Consumer Price Index to obtain 1994 dollars. Size is defined as the natural log of assets. Market to book is measured by (book value of assets - book value of equity + market value of equity)/assets. Cash flow is defined as (earnings before interest and taxes - interest - taxes - common dividends). Net working capital is calculated without cash. Payout to shareholders is the sum of cash dividends/assets and stock repurchases/assets. Industry sigma is a measure of the volatility of an industry's cash flow for a 20-year period. Industries are defined by 2-digit SIC codes. Total leverage is total debt/total assets. The *t*-statistic is for a difference of means from the first to the fourth quartile. Each quartile contains approximately 21,780 firm years.

Variable	*First Cash/Assets Quartile*	*Second Cash/Assets Quartile*	*Third Cash/Assets Quartile*	*Fourth Cash/Assets Quartile*	*t-statistic (p-value)*
Excess Cash /Assets Range	**-850% to -2.69%**	**-2.69% to 0.59%**	**0.59% to 9.02%**	**9.02% to 337%**	
Real Size	4.2694	5.0127	4.9209	4.1423	*7.13 (0.0001)*
Market-to-Book	1.4706	1.2351	1.3432	1.8151	*-5.92 (0.0001)*
R&D / Sales	0.0366	0.0119	0.0152	0.0430	*-5.44 (0.0001)*
Cash Flow / Assets	0.0289	0.0432	0.0483	0.0287	*0.09 (0.9295)*
Net Working Capital / Assets	0.1697	0.1961	0.1723	0.1648	*2.07 (0.0389)*
Capital Expenditures / Assets	0.0974	0.0793	0.0855	0.0970	*0.45 (0.6509)*
Acquisitions / Assets	0.0101	0.0117	0.0122	0.0106	*-1.63 (0.1030)*
Payout to Shareholders	0.0151	0.0151	0.0169	0.0224	*-24.40 (0.0001)*
Industry Sigma	0.1326	0.1026	0.1052	0.1429	*-11.06 (0.0001)*

Table 4
Regressions Estimating the Determinants of Log (Cash/(Assets-Cash))

The dependent variable in all regressions is the natural log of cash/(assets-cash). In all the independent variable denominators, except for total debt to assets, assets are really (assets-cash). The year dummy regressions are run with a dummy variable for each year from 1972-1994. Real size is the natural log of assets deflated by the CPI to 1994 dollars. Market to book is measured by (book value of assets - book value of equity + market value of equity)/assets. Cash flow is defined as (earnings before interest and taxes - interest - taxes - common dividends). NWC is defined as (net working capital - cash). Industry sigma is the mean of standard deviations of cash flow/assets over 20 years for firms in the same industry as defined by 2 digit SIC code. Dividend dummy is a variable set to one if the firm paid a dividend in the year and set to 0 if it did not. Regulation dummy is a variable set to 1 if the firm is in a regulated industry for the year and set to 0 if it isn't. Industry adjusted means that all variables are adjusted for industry (including cash/(assets-cash)) by subtracting the median of the 2-digit SIC code from each firm. All t-statistics are corrected for heteroskedasticity using White's correction. The adjusted R^2 of the fixed effect model is computed without the fixed effects. The fixed effects and cross-sectional regressions exclude firms with only one observation.

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Independent Variable	*Year-Dummies*	*Year-Dummies Industry-Adjusted*	*Pooled*	*Pooled Industry-Adjusted*	*Cross Sectional*	*Fixed Effects*
Intercept	N.A.	N.A.	-1.9206 (-82.89)	0.0011 (0.15)	-2.0005 (-34.35)	N.A.
Market/Book	0.1422 (27.60)	0.1343 (25.97)	0.1369 (27.11)	0.1259 (25.10)	0.1105 (9.96)	0.1026 (18.74)
Real Size	-0.0402 (-13.37)	-0.0412 (-13.96)	-0.0455 (-15.09)	-0.0434 (-14.64)	-0.0326 (-4.27)	-0.1070 (-13.83)
Cash flow /Assets	0.1618 (4.44)	0.0838 (2.33)	0.1709 (4.71)	0.0759 (2.13)	-0.1163 (-1.83)	0.0792 (2.09)
NWC/Assets	-0.8136 (-31.24)	-0.7807 (-26.36)	-0.7537 (-29.04)	-0.7061 (-24.18)	-0.5589 (-8.72)	-0.5016 (-15.58)
Capital Expenditures/ Assets	0.4850 (7.38)	0.5465 (8.14)	0.5699 (8.77)	0.6191 (9.35)	0.9581 (5.23)	0.7484 (12.20)
Total debt /Assets	-3.0234 (-101.61)	-3.0361 (-100.40)	-3.0105 (-101.44)	-2.9889 (-100.01)	-3.2697 (-42.73)	-2.3190 (-66.00)
Industry Sigma	1.1636 (14.92)		0.1060 (1.77)		0.4889 (3.08)	
R&D/Sales	1.6606 (19.81)	1.5508 (19.87)	1.7756 (21.02)	1.4909 (19.42)	1.3443 (12.36)	0.7591 (9.13)
Dividend Dummy	-0.1275 (-11.35)	-0.1172 (-11.14)	-0.0997 (-8.94)	-0.0699 (-6.82)	-0.1463 (-4.09)	0.0482 (3.75)
Regulation Dummy	-0.0968 (-2.16)	0.1006 (2.83)	-0.0103 (-0.23)	0.1923 (5.41)	0.1721 (1.37)	0.0431 (1.00)
N	87,117	88,755	87,117	88,755	10,869	88,587
Adjusted R^2	21.87%	19.41%	20.99%	18.69%	33.27%	9.85%

Table 5
Derivative Use and Cash/Assets

This table shows the relation between a firm's cash to assets and other variables including the use of derivatives in 1994. In this table we use the actual value of the derivatives as reported by Risk Publications deflated by the total assets minus cash. INSIDE0to5 equals inside ownership if inside ownership is less then 5% and 5% if inside ownership is greater than 5%. INSIDE5to25 = 0 if inside ownership is less than 5%, equals inside ownership minus 5% if inside ownership is greater than 5% but less than 25% and equals 20% if inside ownership is greater than 25%. INSIDEover25 = 0 if board ownership is less than 25% and equals inside ownership minus 25% if inside ownership is greater than 25%. The bond rating dummy is equal to 1 if the firm's debt has an investment grade rating (BBB or higher) and 0 if it is below investment grade (BBB- or lower) or it has no rating reported on Compustat for 1994. Due to some very significant outliers in the R&D to sales variable, it has been trimmed at the one-percent level. ***, **, * represent 1%, 5%, and 10% significance levels.

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	Full 1994 Sample		S&P 500 That Reported Derivatives	
Variable	Log(Cash/Assets)	Log(Cash/Assets)	Log(Cash/Assets)	Log(Cash/Assets)
Intercept	-2.3514 (-16.055)***	-2.050 (-15.140)***	-3.0222 (-3.435)***	-2.9136 (-3.345)***
Market-to-book	0.1445 (7.348)***	0.1597 (8.166)***	0.23505 (1.875)*	0.2422 (1.981)**
Log of Assets	-0.0360 (-1.667)*	-0.0463 (-2.144)**	0.0388 (0.406)	0.0336 (0.353)
Firm Sigma	0.4446 (3.646)***	0.5127 (4.206)***	4.7610 (2.079)**	4.7900 (2.093)**
R & D to Sales	0.9018 (6.516)***	1.0394 (7.608)***	6.5442 (2.452)**	7.6400 (3.221)***
Cash Flow/Assets	0.6320 (3.934)***	0.6676 (4.136)***	-1.9262 (-1.009)	-1.9811 (-1.039)
Net Working Capital/Assets	-1.2330 (-9.394)***	-1.2333 (-9.345)***	-0.8547 (-1.202)	-0.9188 (-1.299)
Capital Expenditure/Asset	0.6426 (1.670)*	0.4575 (1.187)	1.6739 (0.970)	1.5133 (0.889)
Total Debt to Assets	-3.0598 (-20.505)***	-3.1271 (-20.920)***	-4.0950 (-5.993)***	-4.1210 (-6.040)***
Number of Segments	-0.0234 (-0.740)	-0.0201 (-0.633)	-0.1011 (-1.736)*	-0.1001 (-1.719)*
Industry Sigma	1.2546 (5.233)***		0.5488 (0.897)	
Dividend Payer Dummy	-0.1422 (-1.954)**	-0.1701 (-2.331)**	-0.2718 (-0.970)	-0.2548 (-0.910)
INSIDE 0% to 5%	3.8038 (1.853)*	4.1918 (2.032)**	3.5415 (0.657)	3.7571 (0.699)
INSIDE 5% to 25%	-0.9004 (-1.471)	-1.0007 (-1.626)*	-0.1298 (-0.048)	-0.1029 (-0.038)
INSIDE over 25%	-0.0870 (-0.328)	-0.1090 (-0.401)	0.3899 (0.069)	0.5101 (0.090)
Bond Rating Dummy	-0.5211 (-4.505)***	-0.4770 (-4.112)***	-0.1240 (-0.624)	-0.1005 (-0.510)
Anti-takeover Dummy			-0.1870 (-1.171)	-0.1841 (-1.154)
Derivative Use Dummy			0.0319 (0.110)	0.0107 (0.037)
Derivative Use > 10% of Assets			0.2822 (1.681)*	0.3100 (1.880)*
Adjusted R^2 N	28.6% 2400	27.8% 2400	36.4% 216	36.4% 216

Table 6
Cash Holdings in 1994 Among Firms with Assets Over $25 Billion

Non-financial firms ranked by their cash and marketable securities to assets ratio using Compustat fiscal 1994 data. Cash/assets is defined as cash and marketable securities over assets less cash. Firms are required to have assets in excess of $25 billion. The bond rating is the S&P senior bond rating as of 1994. Industry cash/assets is the median industry cash/assets ratio in 1994 where industry is defined by 2-digit SIC. Excess cash to assets is defined as excess cash over assets less cash. Excess cash is the residual from a first pass regression predicting the natural log of cash to assets less cash. An entry of n.a. indicates that one or more data items required to estimate excess cash was missing from the Compustat tape.

Rank	Company	Bond Rating	Total Cash ($ mil)	Cash / Assets	Industry Cash/ Assets	Excess Cash / Assets	EBITDA ($ mil)
1	IBM	A	10554	14.96%	6.71%	10.85%	9202
2	PROCTER & GAMBLE	AA	2656	11.61%	9.88%	4.24%	4579
3	CHRYSLER	A-	5145	11.59%	4.43%	8.27%	7223
4	FORD MOTOR	A+	13822	6.73%	4.43%	5.46%	25408
5	AMOCO	AA	1789	6.50%	5.07%	1.76%	4143
6	GENERAL MOTORS	A-	10939	5.83%	4.43%	3.67%	21565
7	DOW CHEMICAL	A	1134	4.46%	9.88%	-2.03%	3795
8	CHEVRON	AA	1306	3.95%	5.07%	0.03%	4925
9	DU PONT	AA	1109	3.10%	9.88%	-4.04%	6944
10	XEROX	A	1058	2.82%	8.11%	-1.18%	1961
11	SHELL	AAA	617	2.40%	5.07%	n.a.	2820
12	VIACOM	BB	597.7	2.16%	5.55%	-1.04%	824
13	EXXON	AAA	1775	2.06%	5.07%	-2.73%	11942
14	BELLSOUTH	AAA	657.3	1.95%	1.78%	-2.43%	7317
15	TEXACO INC	A	464	1.85%	5.07%	-1.44%	2668
16	SEARS ROEBUCK	BBB	1421	1.57%	4.25%	-1.96%	1999
17	AT&T CORP	AA	1208	1.55%	1.78%	-2.15%	13137
18	SBC COMMUNICATIONS	A	364.6	1.42%	1.78%	-2.97%	4828
19	RJR NABISCO	BBB-	423	1.37%	3.32%	-1.40%	3698
20	GENERAL ELECTRIC	AAA	2591	1.35%	7.18%	-0.93%	16194
21	MOBIL CORP	AA	531	1.30%	5.07%	-3.11%	6611
22	GTE CORP	BBB+	323	0.77%	1.78%	-2.90%	8072
23	NYNEX CORP	A	137.5	0.46%	1.78%	-3.26%	5090
24	PHILIP MORRIS INC	A	184	0.35%	5.18%	-2.81%	11080
25	BELLSOUTH	AAA	94.4	0.35%	1.78%	n.a.	6541
26	WAL-MART STORES	AA	45	0.14%	4.25%	-2.42%	5120

Table 7
Spending patterns based on Market to Book and Previous Year's Excess Cash

The sample includes only firm years in which the firm has positive lagged excess cash. Firm years are ranked into quartiles by market to book as measured by (book value of assets - book value of equity + market value of equity)/assets in the current year. High (low) market to book firms are those ranked in the top (bottom) quartile. The firm years are also independently broken into quartiles based on the previous years holdings of excess cash. The excess cash holding is the antilog of a residual from a first pass regression to predict the natural log of cash/(assets-cash). The cash quartiles are generated for every year and firms are regrouped each year. Panel A shows capital expenditures, Panel B shows expenditures on acquisitions, Panel C shows payments to shareholders which is defined as stock repurchases plus cash dividends, and Panel D shows the operating cash flow. All variables are from the flow of funds statement and are deflated by (total assets - cash). Number of firm years of each quartile are also included in brackets. The t-statistic is generated from a difference of means test between the first and fourth quartiles of excess cash (column) or the difference between high and low market to book (row).

Previous Year Excess Cash Holdings					
Panel A:	Quartiles				
Capital Expenditures	First	Second	Third	Fourth	*t-statistic (p-value)*
High market to book firm years	0.0969 [1367]	0.1009 [1920]	0.1080 [2573]	0.1177 [3533]	*-7.01 (0.0001)*
Low market to book firm years	0.0621 [3838]	0.0705 [3288]	0.0750 [2627]	0.0790 [1634]	*-7.34 (0.0001)*
t-statistic (p-value)	*-13.67 (0.0001)*	*-13.39 (0.0001)*	*-14.63 (0.0001)*	*-14.12 (0.0001)*	

Previous Year Excess Cash Holdings					
Panel B:	Quartiles				
Acquisitions	First	Second	Third	Fourth	*t-statistic (p-value)*
High market to book firm years	0.0135 [1356]	0.0125 [1918]	0.0131 [2571]	0.0157 [3512]	*-1.64 (0.1005)*
Low market to book firm years	0.0049 [3824]	0.0061 [3260]	0.0079 [2612]	0.0110 [1630]	*-6.14 (0.0001)*
t-statistic (p-value)	*-7.40 (0.0001)*	*-5.88 (0.0001)*	*-5.34 (0.0001)*	*-3.78 (0.0002)*	

Previous Year Excess Cash Holdings					
Panel C:	Quartiles				
Payments to Shareholders	First	Second	Third	Fourth	*t-statistic (p-value)*
High market to book firm years	0.0208 [1340]	0.0250 [1892]	0.0280 [2456]	0.0216 [3309]	*-0.66 (0.5111)*
Low market to book firm years	0.0130 [3791]	0.0147 [3253]	0.0182 [2592]	0.0241 [1567]	*-11.71 (0.0001)*
t-statistic (p-value)	*-8.00 (0.0001)*	*-11.22 (0.0001)*	*-9.94 (0.0001)*	*2.18 (0.0289)*	

Table 7, Cont'd					
Previous Year Excess Cash Holdings					
Panel D:	Quartiles				
Operating Cash Flow	First	Second	Third	Fourth	*t-statistic (p-value)*
High market to book firm years	0.0932 [756]	0.1063 [1060]	0.1088 [1444]	0.0399 [1714]	*4.99 (0.0001)*
Low market to book firm years	0.0679 [3201]	0.0756 [2644]	0.0788 [1952]	0.0335 [973]	*4.14 (0.0001)*
t-statistic (p-value)	*-3.33 (0.0001)*	*-4.80 (0.0001)*	*-4.57 (0.0001)*	*-0.57 (0.5678)*	

Table 8
Regression Results for Determinants of Capital Expenditures

Regression results for uses of cash using a sample of firms which excess cash could be calculated. A firm had to be observed for at least 2 years to be included in the regressions. The dependent variable in all regressions is capital expenditures divided by assets in year t. Denominator of assets is really (assets - cash) in all variables. All right hand side numerators come from the flow of funds statements. Cash flow is defined as (earnings before interest and taxes - interest - taxes - common dividends). Sales Growth is the natural log of sales in year t minus the natural log of sales in year t-1. $(\text{Excess Cash / Assets})_{t-1}$ is the antilog of a lagged residual from a first pass regression to determine the natural log of cash/(assets-cash). $(\text{Normal Cash / Assets})_{t-1}$ is the antilog of a lagged predicted value from a first pass regression to determine the natural log of cash/(assets-cash). POSX is a dummy variable which is given a value of 1 if there is positive excess cash in the firm year and zero otherwise. For the industry-adjusted data, all the variables are adjusted by subtracting the industry median. Industries are defined by 2 digit SIC codes. The t subscripts indicate time periods. t-statistics are in parentheses and calculated using White's correction for heteroskedasticity. The adjusted R^2 for fixed effects models are computed without the fixed effects.

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	Raw				Industry Adjusted			
	OLS	OLS	Fixed Effects	Fixed Effects	OLS	OLS	Fixed Effects	Fixed Effects
Intercept	0.0563 (61.36)	0.0559 (60.60)	N.A.	N.A.	0.0036 (2.51)	0.0056 (3.45)	N.A.	N.A.
$(\text{Cash Flow/Assets})_t$	0.0870 (23.42)	0.0860 (23.17)	0.0240 (7.25)	0.0273 (8.42)	0.0806 (23.17)	0.0796 (22.86)	0.0228 (7.42)	0.0246 (7.98)
Sales Growth	0.0158 (11.41)	0.0159 (11.51)	0.0173 (14.42)	0.0156 (13.20)	0.0164 (11.55)	0.0167 (11.73)	0.0162 (14.13)	0.0149 (13.15)
Market to Book	0.0076 (15.00)	0.0076 (15.17)	0.0098 (18.91)	0.0092 (18.42)	0.0083 (15.83)	0.0083 (15.96)	0.0101 (18.21)	0.0099 (18.02)
$(\text{Normal Cash/Assets})_{t-1}$	0.0381 (3.04)	0.0923 (4.07)	0.0475 (2.86)	0.0945 (7.01)	0.0035 (1.60)	0.0036 (1.63)	0.0078 (3.25)	0.0079 (3.41)
$(\text{Normal Cash/Assets})_{t-2}$	0.0535 (4.66)	0.0521 (4.41)	0.0632 (6.33)	0.0608 (7.44)	0.0066 (4.60)	0.0066 (4.57)	0.0087 (6.92)	0.0086 (6.86)
$(\text{Normal Cash/Assets})_{t-3}$	0.0054 (0.77)	0.0028 (0.41)	0.0191 (3.42)	0.0203 (3.67)	-0.0004 (-0.58)	-0.0005 (-0.69)	0.0008 (1.28)	0.0008 (1.30)
$(\text{Excess Cash/Assets})_{t-1}$		0.0827 (3.35)		0.0636 (14.59)		0.0038 (2.80)		0.0026 (8.13)
$(\text{Excess Cash/Assets})_{t-2}$		-0.0019 (-0.63)		0.0072 (2.94)		-0.0001 (-0.83)		0.0001 (1.11)
$(\text{Excess Cash/Assets})_{t-3}$		-0.0073 (-3.38)		0.0022 (1.16)		-0.0004 (-3.69)		-0.0001 (-0.72)
POSX	0.0000 (0.01)	0.0005 (0.41)	-0.0007 (-2.15)	-0.0018 (-5.53)	0.0003 (0.13)	-0.0010 (-0.43)	0.0012 (3.29)	0.0007 (1.86)
POSX * $(\text{Normal Cash/Assets})_{t-1}$	0.0499 (3.38)	0.0015 (0.07)	0.0764 (3.52)	0.0208 (1.12)	0.0017 (0.84)	0.0017 (0.84)	0.0002 (0.07)	0.0006 (0.24)
POSX * $(\text{Excess Cash/Assets})_{t-1}$		-0.0757 (-3.07)		-0.0396 (-8.04)		-0.0037 (-2.72)		-0.0020 (-6.18)
Sample size	58,938	58,938	58,938	58,938	57,437	57,437	57,437	57,437
Adjusted R^2	6.56%	6.66%	5.04%	6.41%	7.55%	7.61%	5.88%	6.16%

Table 9. Highest Quartile Excess Cash Persistence

This table shows the persistence of levels of excess cash for firms selected based on the first time they enter the highest quartile of excess cash. The are followed for the next five years to determine the quartile in which they belong in the subsequent years. Quartile 4 represents the highest excess cash quartile and Year 0 is the measurement year. The number of firm years in each quartile is in brackets.

	% in Quartile 4	% in Quartile 3	% in Quartile 2	% in Quartile 1
Year 0	100.0 [6281]			
Year 1	56.1 [2911]	23.0 [1194]	8.8 [456]	12.1 [627]
Year 2	47.0 [2116]	25.0 [1127]	13.1 [591]	14.9 [672]
Year 3	40.7 [1588]	27.0 [1056]	15.1 [588]	17.2 [672]
Year 4	40.6 [1417]	26.4 [920]	15.2 [529]	17.9 [624]
Year 5	39.5 [1229]	26.4 [821]	16.1 [501]	18.0 [561]

Table 10
Future Cash Disposition for Firms' with High and Low Excess Cash

The sample includes firms only the first year that they were in the first or fourth excess cash quartile (year zero). The firm years are independently broken into quartiles based on the previous year's holdings of excess cash. The excess cash holding is the antilog of a residual from a first pass regression to predict the natural log of cash/(assets-cash). The cash quartiles are generated for every year and firms are regrouped each year. Panel A shows firms in the fourth quartile and Panel B shows firms in the first quartile. Panel C shows the t-statistics (in parentheses) and the p-values for the tests of differences of means between the first and fourth quartile for each variable and each year. The table shows operating cash flow, capital expenditures, expenditures on acquisitions, and payments to shareholders which is defined as stock repurchases plus cash dividends. All variables are from the flow of funds statement and are deflated by (total assets - cash). Number of firm years of each quartile are also included in brackets. t-values for the difference in means from YEAR 0 are shown in parentheses in Panels A and B.

Panel A. First Quartile Excess Cash Holdings in Year 0

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Operating Cash Flow	0.0145 [4112]	0.0559 [4044] (-9.38)	0.0628 [3495] (-11.07)	0.0695 [3068] (-12.57)	0.0733 [2699] (-13.02)	0.0800 [2359] (-14.65)
Capital Expenditures	0.1130 [6363]	0.0957 [5663] (9.23)	0.0903 [5036] (12.03)	0.0875 [4517] (13.41)	0.0829 [4064] (15.81)	0.0820 [3673] (16.25)
Acquisitions	0.0124 [6212]	0.0103 [5596] (2.95)	0.0099 [4968] (3.37)	0.0087 [4450] (5.08)	0.0086 [3999] (5.19)	0.0086 [3618] (5.14)
Payments to Shareholders	0.0123 [6153]	0.0124 [5547] (-0.17)	0.0129 [4922] (-1.48)	0.0143 [4422] (-4.16)	0.0149 [3978] (-5.30)	0.0158 [3586] (-6.70)

Panel B. Fourth Quartile Excess Cash Holdings in Year 0

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Operating Cash Flow	0.0760 [3754]	0.0331 [3806] (7.00)	0.0599 [3270] (2.74)	0.0723 [2868] (0.63)	0.0869 [2482] (-1.82)	0.0892 [2032] (-2.22)
Capital Expenditures	0.1151 [6281]	0.1129 [5597] (1.10)	0.0972 [4951] (9.34)	0.0898 [4383] (13.07)	0.0848 [3936] (15.74)	0.0846 [3542] (15.33)
Acquisitions	0.0105 [6162]	0.0151 [5542] (-5.86)	0.0132 [4906] (-3.54)	0.0128 [4333] (-2.84)	0.0102 [3910] (0.30)	0.0107 [3518] (-0.31)
Payments to Shareholders	0.0143 [6026]	0.0150 [5493] (-1.37)	0.0155 [4847] (-2.22)	0.0166 [4302] (-4.06)	0.0174 [3866] (-5.25)	0.0181 [3478] (-6.10)

Panel C. t-statistics for Difference in Means of First and Fourth Quartiles						
	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Operating Cash Flow	(-10.88) 0.0001	(4.55) 0.0001	(0.62) 0.5351	(-0.59) 0.5563	(-2.77) 0.0056	(-1.91) 0.0569
Capital Expenditures	(-1.05) 0.2958	(-9.17) 0.0001	(-3.80) 0.0001	(-1.27) 0.2054	(-0.99) 0.3200	(-1.41) 0.1598
Acquisitions	(2.67) 0.0076	(-6.14) 0.0001	(-4.19) 0.0001	(-4.97) 0.0001	(-2.18) 0.0296	(-2.60) 0.0093
Payments to Shareholders	(-4.19) 0.0001	(-5.34) 0.0001	(-4.86) 0.0001	(-4.02) 0.0001	(-4.19) 0.0001	(-3.41) 0.0006

Table 11
Future Cash Disposition for Firms' Going From the Highest to the Lowest Quartile, or Vice Versa, in One Year

The sample includes firms only the first time that they were in the first (fourth) excess cash quartile (year zero) and then in the fourth (first) excess cash quartile the next year (year 1). The firm years are independently broken into quartiles based on the previous year's holdings of excess cash. The excess cash holding is the antilog of a residual from a first pass regression to predict the natural log of cash/(assets-cash). The cash quartiles are generated for every year and firms are regrouped each year. Panel A shows firms which moved from the first to the fourth quartiles and Panel B shows firms which moved from the fourth to the first quartile. Panel C shows the t-statistics (in parentheses) and the p-values for the tests of differences of means between the two groups of firms for each variable and each year. The table shows operating cash flow, capital expenditures, expenditures on acquisitions, and payments to shareholders which is defined as stock repurchases plus cash dividends. All variables are from the flow of funds statement and are deflated by (total assets - cash). Number of firm years of each quartile are also included in brackets. t-values for the difference in means from YEAR 0 are shown in parentheses in Panels A and B.

Panel A. First Quartile Excess Cash Holdings in Year 0, Fourth Quartile in Year 1

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Operating Cash Flow	-0.0512 [257]	0.0594 [266] (-4.09)	0.0242 [224] (-2.96)	0.0524 [188] (-4.21)	0.0338 [157] (-3.06)	0.0668 [137] (-4.58)
Capital Expenditures	0.1099 [413]	0.1004 [413] (1.36)	0.1095 [366] (0.05)	0.0899 [326] (2.68)	0.0849 [283] (3.36)	0.0840 [251] (3.36)
Acquisitions	0.0172 [401]	0.0146 [406] (0.77)	0.0179 [359] (-0.17)	0.0108 [317] (1.98)	0.0129 [280] (1.18)	0.0089 [249] (2.49)
Payments to Shareholders	0.0088 [397]	0.0114 [400] (-1.45)	0.0112 [354] (-1.42)	0.0125 [320] (-2.00)	0.0152 [278] (-3.11)	0.0149 [243] (-2.85)

Panel B. Fourth Quartile Excess Cash Holdings in Year 0, First Quartile in Year 1

	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Operating Cash Flow	-0.0111 [341]	-0.0915 [413] (3.38)	0.0095 [346] (-0.87)	0.0388 [284] (-2.08)	0.0519 [236] (-2.59)	0.0577 [179] (-2.79)
Capital Expenditures	0.1385 [627]	0.1479 [627] (-1.30)	0.0989 [544] (6.10)	0.0926 [458] (6.73)	0.0885 [406] (7.45)	0.0920 [358] (6.54)
Acquisitions	0.0131 [611]	0.0197 [610] (-2.28)	0.0105 [540] (1.00)	0.0118 [450] (0.47)	0.0106 [406] (0.94)	0.0108 [356] (0.79)
Payments to Shareholders	0.0123 [598]	0.0106 [609] (1.03)	0.0101 [538] (1.33)	0.0114 [449] (0.54)	0.0129 [402] (-0.33)	0.0127 [353] (-0.23)

Panel C. t-statistics for Difference in Means of Firm Groups						
	Year 0	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*
Operating Cash Flow	(-1.47) 0.1424	(6.42) 0.0001	(0.69) 0.4899	(0.65) 0.5183	(-0.73) 0.4673	(0.40) 0.6921
Capital Expenditures	(-3.94) 0.0001	(-6.85) 0.0001	(1.58) 0.1145	(-0.38) 0.7022	(-0.52) 0.6025	(-1.04) 0.2976
Acquisitions	(1.30) 0.1948	(-1.64) 0.1021	(2.29) 0.0222	(-0.37) 0.7106	(0.72) 0.4749	(-0.064) 0.5265
Payments to Shareholders	(-2.09) 0.0367	(0.43) 0.6649	(0.68) 0.4950	(0.62) 0.5374	(1.06) 0.2901	(1.00) 0.3188