

# DISCUSSION PAPER SERIES

No. 3499

## CORPORATE LIQUIDITY

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*FINANCIAL ECONOMICS*



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# CORPORATE LIQUIDITY

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Discussion Paper No. 3499  
August 2002

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August 2002

## ABSTRACT

### Corporate Liquidity\*

Agency problems are an important determinant of corporate liquidity. For a sample of more than 11,000 firms from 45 countries, we find that corporations in countries where shareholders' rights are not well protected hold up to twice as much cash as corporations in countries with good shareholder protection. In addition, when shareholder protection is poor, factors that generally drive the need for liquidity, such as investment opportunities and asymmetric information, actually become less important. These results strengthen after controlling for capital market development. In fact, consistent with the importance of agency costs, we find that managers actually hold larger cash balances when capital markets are better developed. Our evidence indicates that investors in countries with poor shareholder protection cannot force managers to disgorge excessive cash balances.

JEL Classification: G31, G32 and G34

Keywords: cash holdings, corporate liquidity and shareholder rights

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\*We are grateful to Viral Acharya, João Cocco, Francesca Cornelli, Espen Eckbo, David Goldreich, Jarrad Harford, John McConnell, Darius Miller, and seminar participants at London Business School, and the International Corporate Governance conference at Dartmouth for helpful comments and discussions.

Submitted 16 July 2002

## 1. Introduction

At the end of 1998, the largest corporations around the world (as listed on the Global Vantage database) held \$1.5 trillion of cash and cash equivalents, which is almost 9% of the book value of their assets and slightly above 9% of the market value of their equity. These numbers indicate that investments in liquidity are important for corporations. Until recently, however, scholars paid relatively little direct attention to the causes and consequences of corporate liquidity. Transactions costs were assumed to be the major determinant of cash holdings and firms with a higher marginal cost of cash shortfalls would hold more cash [see, for example, Miller and Orr (1966), Meltzer (1993), and Mulligan (1997)]. With few exceptions, discussions of other factors that affect corporate liquidity were not the central theme of research.

In an important recent paper, Opler, Pinkowitz, Stulz, and Williamson (1999) expand our knowledge of the determinants of corporate liquidity considerably. Opler et al. (1999) consider two broad explanations for liquidity, which have their antecedents in the capital structure literature. The trade-off theory suggests that firms trade off the costs and benefits of corporate liquidity to derive the optimal liquidity holdings. In this context, they do not only consider the transaction costs motive described earlier, but also the effect of asymmetric information, and the agency costs of outside financing. The financing hierarchy theory, on the other hand, suggests that there is no optimal amount of cash, based on arguments similar to the pecking order theory of capital structure. Levels of debt decrease and cash increase as the firm becomes more profitable and does not need external financing.

Opler et al. (1999) examine the trade-off and hierarchy views of corporate liquidity for all firms on the Compustat database over the period 1952-1994. They find substantial support for the trade-off model. Firms hold more cash when they are smaller, have higher capital expenditures and R&D and better investment opportunities, when they have higher and more volatile cash flows and lower net working capital. Both transactions costs and costs due to asymmetric information are important factors in this trade-off model. However, there is little evidence in their data to suggest that agency

costs of managerial discretion matter because managers who are more likely to be entrenched do not hold more liquid assets. Consistent with this finding, Mikkelson and Partch (2002) find no differences between the ownership structures of cash-rich firms and those with normal cash levels. This contrasts with the work of Harford (1999), who focuses on the impact of cash holdings on the acquisitions made by companies. He finds that cash-rich firms are more likely to attempt acquisitions, which is perhaps not surprising. However, cash-rich bidders are more likely to overpay in these transactions and their post-acquisition operating performance is worse than for other acquirers, which suggests that agency costs matter when managers decide to use the liquidity they built up.<sup>1</sup>

One reason why Opler et al. (1999) may find little support for the agency cost motive for cash holdings is that shareholders in the U.S. enjoy good protection and can therefore force managers to return excess funds to them [see LaPorta, Lopez-de-Silanes, Shleifer and Vishny (2000) (LLSV) for supporting evidence]. The primary motivation for this paper is to shed additional light on the role of corporate governance in the determination of corporate liquidity through the use of international data. To do this, we employ data for approximately 11,000 companies from 45 countries. The main reason for taking the arguments to international data is that the variation in agency costs of equity across countries is likely to be at least as substantial as the variation across companies within a particular country. In addition, differences across countries in capital market development allow us to construct several tests of the importance of agency problems, which cannot be developed on data from one country. We focus our analysis on 1998, which is the most recent year for which comprehensive data are available on the Global Vantage database (at the start of our research).

Our results provide strong support for the importance of corporate governance in determining corporate liquidity. For the median firm in countries with high shareholder protection, the ratio of cash and cash equivalents to net assets (assets minus cash) is 6.30% compared to 8.60% in countries with

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<sup>1</sup> Lang, Stulz, and Walkling (1991) also provide some support for this hypothesis. They find that firms with high cash flows and low q ratios are more likely to overpay in acquisitions; of course, they look at cash flow, rather than the level of cash, so their evidence is merely indirect. Blanchard, Lopez-de-Silanes, and Shleifer (1994) also have some evidence that large cash holdings affect firm behavior. They look at 11 firms that received cash windfalls over the period 1980-1986 without affecting their investment opportunity set. Generally, they find that these firms do not return the funds to equityholders or debtholders, but use it for endeavours that are not value creating, on average.

low shareholder protection. This difference persists when we control for the median of the other characteristics that affect liquidity. In particular, we find that the median liquidity ratio is higher in countries with higher median market-to-book ratios and higher median R&D expenses, which provides further support for the trade-off theory. However, after controlling for these differences, the impact of shareholder protection persists and its magnitude is virtually unaffected. Furthermore, if we also control for capital market development, our results actually become stronger. We also verify that our results persist after controlling for dividend payments to ensure that our findings are not merely the flip-side of LLSV (2000) who report that dividends are higher in countries with good shareholder protection.

One issue with cross-country comparisons using country medians is that they hide the cross-sectional variation within each country. We therefore also employ the individual firm observations in our regression models, which allows us to control for firm-specific characteristics. Our findings persist in these specifications. When we control for industry composition and include firm characteristics, we find that firms in countries with the highest level of shareholder protection have about 40% less cash and equivalents than firms in countries with the lowest level of shareholder protection. The sign and significance of the other variables is consistent with U.S. evidence. Larger firms hold fewer liquid assets while firms with better investment opportunities, as proxied by their market-to-book ratio are more liquid. In addition, firms with more R&D are more cash-rich. Finally, firms with higher net working capital, which can easily be converted to cash, are also less liquid. Thus, working capital and cash appear to be substitutes in most countries.

Two other tests confirm that corporate governance has a significant impact on cash holdings, and that this is caused by increased managerial discretion and is therefore likely to be to the detriment of shareholders. First, we examine whether the sensitivity of corporate liquidity to investment opportunities depends on shareholder rights. This allows us to consider (and reject) a more nuanced interpretation of the relation between governance and liquidity. One interpretation of our findings is that managers hold more cash because shareholders cannot force them to disgorge the funds. This

allows managers to make more decisions ignoring the interests of shareholders. There is an alternative interpretation of this result, however. In countries with low shareholder protection, it may be more costly to raise external funds. Managers are therefore more inclined to hoard cash in case good opportunities come along. This interpretation of the result is much more benign. However, if this is the case, then we would expect firms with good investment opportunities to hold more cash in countries with low shareholder protection, because the inability to raise financing is more costly for these firms. On the other hand, if the cash holdings are an outcome of the agency conflict, we would expect managers to pay less attention to investment opportunities when shareholders have little protection since this transactions cost motive is not the primary determinant of liquidity. This interpretation implies that the relationship between investment opportunities and cash is strongest in countries with fewer agency problems. Consistent with the latter interpretation, we find that the effect of the market-to-book ratio is much weaker in countries with few shareholder rights.

The second test is related to the work of Rajan and Zingales (1998) on financial dependence and growth. They show that manufacturing firms from industrial sectors that need more outside financing grow more in countries with more developed capital markets. We employ their measure of outside financing in our analysis of the determinants of cash holdings to further distinguish between the transaction cost and agency cost explanations of our findings. We find that firms in industries with more dependence on external finance have more cash. Interestingly, this effect weakens significantly in countries with poor shareholder protection. This lack of concern for external financing needs is further evidence of the agency motive for cash holdings. If firms simply held cash because it is costlier to raise outside financing when shareholder protection is weak, we would have expected the opposite effect.

Overall, the evidence in this paper indicates that shareholder rights, and therefore agency costs, are important in determining corporate liquidity throughout the world. There is little other systematic evidence on the determinants of corporate cash holdings outside the United States. Rajan and Zingales (1995) present some descriptive statistics of cash holdings in the G-7 countries for 1991.



What stands out from these figures is that Japanese firms have almost twice as much cash and equivalents as the companies in the other countries. However, their analysis is focused on differences in capital structure, not liquidity. Pinkowitz and Williamson (2001) focus on the large cash holdings in Japan. They argue that these holdings derive from the power exerted by the strong Japanese banks and they find that these holdings decline as bank power weakened over time.

The remainder of this paper is organized as follows. Section 2 discusses the various determinants of corporate liquidity in greater detail. Section 3 describes our data collection procedure. Section 4 contains our results, and Section 5 concludes.

## **2. Corporate liquidity and corporate governance**

Opler et al. (1999) develop a useful framework for thinking about the determinants of cash holdings by firms. As mentioned previously, they discuss two views of cash holdings: the trade-off model, which suggests that firms trade off various costs and benefits of debt financing when they decide how much liquidity to maintain, and the financing hierarchy model, which suggests that cash balances are the outcome of firm profitability and financing needs. We now discuss both views in more detail, and discuss some variables that can be employed as proxies in these views.

### *2.1. The trade-off model of corporate liquidity*

We can identify two costs of holding cash and cash equivalents. If we assume that managers maximize shareholder wealth, then the only cost of holding cash is the lower return earned on it, relative to other investments of the same risk. This cost is often called the cost-of-carry: the difference between the return on cash and the interest that would have to be paid to finance an additional dollar of cash. If we relax the assumption of shareholder wealth maximization, then the costs of holding cash increase since managers now have the opportunity to engage in wasteful capital spending and acquisitions or, in some countries, outright theft.

The benefits of holding cash balances stem from two motives. According to the transaction costs motive, firms hold more cash when the costs of raising it and the opportunity costs of shortfalls are higher. The current literature employs several variables to proxy for these costs. Given the substantial fixed costs involved in raising outside financing, small firms are likely to find it costlier to raise outside funds. In addition, there may be economies of scale in cash management, which also suggest that small firms hold more cash. Firms with better investment opportunities are expected to hold more cash because the opportunity cost of lost investment is larger for these companies; similarly, we expect firms with more volatile cash flows to hold more cash to protect against the higher likelihood of cash shortfalls. The level of capital spending, itself, should also be positively related with levels of liquidity if it captures investment needs. When cash flows are higher, on the other hand, firms need to hold less cash to meet future investment needs. Finally, firms that pay dividends can always cut them to raise more funds, and they are therefore expected to hold fewer liquid assets. Kim, Mauer, and Sherman (1998) develop a trade-off model of optimal cash holdings. Many of the predictions that follow from their model are similar to those highlighted by Opler et al (1999). They also argue that optimal liquidity is decreasing in the rate of return on current investment opportunities.

The precautionary motive for holding cash is based on the impact of asymmetric information on the ability to raise funds. In particular, even when firms have access to capital markets to raise the necessary financing, they may not want to do so at a particular point in time because the securities they are planning to issue are undervalued. Myers and Majluf (1984) argue that firms can overcome this problem by building up financial slack, which they define as cash, cash equivalents, and unused risk-free borrowing capacity. Since firms with high R&D expenses are more opaque, the level of R&D to sales is a good proxy for asymmetric information. We already employ the market-to-book ratio of the firm because it captures growth opportunities, which are important in the transactions cost motive. Of course, there is generally more uncertainty about the value of growth opportunities than about assets in place. As such, the market-to-book ratio can also be employed as a proxy for asymmetric information.

## 2.2. *The financing hierarchy view of corporate liquidity*

The financing hierarchy view, as developed by Opler et al. (1999), suggests that there is no optimal level of corporate liquidity, just as there is no optimal level of debt. The level of cash is simply the outcome of the investment and financing decisions made by the firm as suggested by the pecking order theory of financing. Firms with high cash flows pay dividends, they pay off their debts, and accumulate cash. Firms with low cash flows draw down their cash and issue debt to finance investment, but they refrain from issuing equity because it is too costly. Unfortunately, many of the variables that are correlated with cash flows can also be employed as proxies in the trade-off theory. The major difference between the two views is that the trade-off theory predicts a positive relationship between investment (in capital expenditures and R&D) and cash levels, while the hierarchy view predicts a negative sign. Additionally, the hierarchy view sees debt and cash merely as opposite sides of the same coin.

## 2.3. *Shareholder protection and cash holdings*

As discussed in section 2.1, the agency cost view of corporate liquidity suggest that managers who are less concerned with shareholder wealth hoard cash and invest it in negative NPV projects or use it to overpay in acquisitions. Of course, simply holding on to too much cash destroys value because of the cost of carry. In addition, if the protection provided by these cash holdings reduces the discipline imposed on management, corporate decision making may be affected, resulting in reduced firm earnings. One of the issues in the well-known 1995 Chrysler case was not that holding onto cash was wasteful per se or that management would spend it on negative NPV projects, but that management would not take much action in case the U.S. economy went into a recession. Management had basically informed shareholders that the \$7.5 billion cash hoard would be needed (i.e., used up) to weather a recession. Consistent with this view, Opler et al. (1999) show that firms that move from high to low cash holdings are loss-making firms.

Overall, however, Opler et al. (1999) argue that there is little support for the agency cost motive because ownership structure and corporate liquidity are not strongly related in their sample. An alternative interpretation of this evidence, however, is that in the U.S. shareholders enjoy good legal protection and can therefore force companies to disgorge the cash. LLSV (2000) report evidence on dividend policy consistent with this interpretation. They find that firms pay out more of their earnings in the form of dividends in countries with good legal protection for shareholders. We therefore take the question to international data and see whether cash holdings are higher in countries where shareholders have fewer rights. In addition, we study whether the variables that measure the transactions costs and precautionary motives for holding cash are less important when shareholder rights are weak. This is a corollary to the earlier tests: if cash holdings are partly the outcome of weak shareholder protection, then the other determinants should be less important. An alternative explanation for high cash holdings in countries with weak shareholder protection is that firms simply hold more cash because capital markets are not very receptive to new financing. That would make the precautionary and transactions costs motives for cash holdings more important. We examine this possibility in three ways. First, we determine whether the development of the equity and debt market affects cash holdings or whether these effects are indeed dominated by shareholder protection. Second, we determine whether the importance of proxies for the precautionary and transactions costs motives is larger in countries with more shareholder protection. Third, we analyze whether firms with greater need for outside financing hold more cash and whether these holdings are affected by the level of shareholder protection.

There is also another, more benign, interpretation of the relation between shareholder rights and liquidity. We know from the work by LLSV that ownership is more concentrated in countries with few shareholder rights. It is possible that controlling families force firms to hold more cash as a store of wealth because the taxes that need to be paid when taking the funds out are too high. To study the merits of this interpretation, we include dummies for family control and dividend taxation in some specifications.

### 3. Data Collection and Variable Construction

We gather data from the Global Vantage database for 1998. This was the most recent year of data available when we started our research. The database contains financial information for 16157 companies from 80 countries. To measure shareholders rights we employ the shareholder rights measure developed by LLSV (1998). This is an index formed by adding 1 when each of six criteria relating to the extent to which minority shareholders have a say in corporate governance is met. LLSV construct this measure for 49 countries; firms from other countries are excluded from our analysis. These countries are mainly current and former Communist and African countries. In addition, four countries for which LLSV have shareholder rights data are not included in Global Vantage: Ecuador, Nigeria, Sri Lanka, and Uruguay. Thus, corporations from 45 countries are included in this paper.

We further remove the following sets of firms from the sample: (a) firms with operations in financial services (SIC codes starting with 6); (b) firms that are considered governmental or quasi governmental (SIC codes starting with 9); (c) firms for which cash and equivalents and/or assets are missing; (d) firms which do not present consolidated financial statements.<sup>2</sup> The remaining sample consists of 11591 companies from 45 countries.

We define liquidity as the ratio of cash and cash equivalents to net assets, where net assets are computed as assets less cash and equivalents. This procedure mimics the approach followed by Opler et al. (1999); the main reason for netting out cash from assets is that a firm's profitability is mainly related to assets in place and cash should be measured relative to this base. We also report on robustness checks where we use the ratio of cash to sales.

Table I presents a first look at the data. In this table, we divide the countries into two groups based on LLSV's shareholder rights variable. Twenty-nine countries are in the high shareholder rights group (shareholder rights variable equal to 3, 4, or 5) and 16 are in the low shareholder rights group (shareholder rights variable equal to 0, 1, or 2). The United States, Japan, and the United Kingdom

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<sup>2</sup> The majority of the firms in each country report consolidated financial statements, except for India and South Korea. To see whether our results are affected when we eliminate countries in which many firms choose not to consolidate their financial statements, we apply the following procedure: we remove countries when more than x% of the firms do not consolidate, where x varies between 90% and 10%. We then re-estimate all regressions for each subset of countries. Our findings persist for all cut-offs.

are the countries with the largest representation in the sample. There is substantial variation in firm size as measured by book value of assets. The median firm in Mexico has a book value of \$1.16 billion, while the median firm in Pakistan has a book value of only \$72 million. Since size is one proxy for the transactions costs associated with raising external financing, it will be important to control for this cross-country variation in the analysis.

The key ratio of interest, which is cash to net assets, is displayed in the third column of Table 1. There is tremendous cross-country variation in this ratio. The overall median is 6.6%, but many countries have median cash to net assets of over 10%. Egypt, with cash to net assets of 29.57% and Israel with cash to net assets of 20.93% stand out. Japanese firms have a median cash to net assets ratio of 15.49%, which is the highest of the countries with developed capital markets. In fact, this ratio is twice as high as for the U.K. and more than double the level of the U.S. and Germany. Our figures for Germany, Japan, and the U.S. broadly correspond to those reported by Pinkowitz and Williamson (2001).

Notice that firms in the high shareholder rights group have median cash to net assets of 6.30%, compared to 8.60% in countries with low shareholder rights, consistent with the view that firms hold more cash when shareholder protection is weak.<sup>3</sup> For example, the median U.S. firm is close in size to the median Swiss firm, but median US cash holdings are only \$19.5 million versus \$31.7 million in Switzerland (median cash holdings are not reported in the table).

Table 1 also reports country medians for some of the other variables employed in our analysis. We do not have the same number of observations for these variables because they are not available on Global Vantage or because they require data to be available for prior years. In addition to size, investment opportunities are important for both the transaction costs and the precautionary motive. The market-to-book ratio of the firm, computed as  $(\text{market value equity} + \text{book value liabilities}) / \text{total}$

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<sup>3</sup> Brazil, Chile, Colombia, and Greece require their companies to pay out a certain fraction of income as dividends, which may lower these firms' cash balances; all our results continue to hold when we control for this minimum payout level. As expected, firms with minimum payouts have lower cash balances.

assets is employed as a proxy for investment opportunities.<sup>4</sup> Note that the U.S has the highest median market-to-book ratio of the countries with developed capital markets at 1.51. We also report median book leverage, the ratio of net working capital to net assets, the ratio of cash flow to net assets, and the level of capital expenditures to net assets. Cash flow is defined as EBITDA – interest payments – taxes – dividends. Unlike for the U.S., capital expenditures data are not consistently available for most countries. We therefore proxy for capital spending by taking the difference in net fixed assets compared to the previous year and adding depreciation. The other variables included in the main analysis, but not reported in the table are: (a) a dummy variable, equal to 1 if the firm pays a dividend and zero otherwise; and (b) the ratio of R&D expenses to sales as a measure of opaqueness.

We include leverage in some specifications to see whether firms simply finance additional cash holdings with more debt or whether there is not a one-for-one relationship. The ratio of net working capital to net assets is included as a control variable. Net working capital is normally computed as current assets minus current liabilities, but we remove cash from the current assets computation. This ratio captures additional liquidity held by the firm and our goal is to determine whether this liquidity acts as a complement or substitute for cash and equivalents. All of the ratios included in the analysis show substantial variability across countries.

#### **4. Results**

This section contains the findings of our investigation of the determinants of cash holdings across the countries in our sample. In section 4.1, we focus on the median cash to net assets ratios in each country and use country characteristics and medians of the other explanatory variables in the estimation. Section 4.2 contains a more detailed analysis at the firm level and section 4.3. explores interactions between shareholder rights and firm characteristics.

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<sup>4</sup> We have repeated all our tests using a modified market-to-book ratio where we subtract cash and cash equivalents from both the numerator and the denominator of the ratio. Our results are virtually unchanged. The correlation between the original and modified market-to-book ratio is 0.83 at the firm level and 0.99 at the country median level.

#### 4.1. *Explaining country medians*

Table 2 contains the analysis of country medians. To maintain consistency with the work by Opler et al. (1999), we employ the log of the ratio of cash to net assets as the dependent variable. Significance levels are adjusted to reflect White's heteroskedasticity correction of the standard errors. In model (i), we only include a dummy variable, equal to 1 if shareholders rights are high (equal to 3, 4 or 5) and zero otherwise. Consistent with the agency motive for cash holdings, the coefficient on the dummy is negative and significant at the 7% level. The economic significance is substantial. The median firm in a country with low shareholder rights holds 50% more cash to net assets than in a country with weak shareholder rights. This dummy variable alone explains 4% of the cross-country variation in liquidity.

As LLSV (1998) demonstrate, shareholder rights are correlated with the legal origin of a country, where the main distinction is between countries with a common law tradition versus those with a civil law tradition. We investigate in column (ii) whether our results also holds when we include a common law dummy in the regression instead of the shareholder rights dummy. While the coefficient on the common law dummy is negative, it is not significantly different from zero. To further differentiate between the effects of shareholder rights and rule of law, we estimate the regression for civil law countries only. Those results are presented when we discuss sensitivity tests.

Our interpretation of the result in column (i) is that managers like to hold a lot of cash because it reduces pressures to perform and allows them to spend these funds on projects that increase their non-pecuniary benefits, but have a negative impact on shareholder wealth. There is an alternative interpretation for this result, however, which is much more benign. We know from LLSV (1997) that capital markets are not well developed in countries with poor shareholder protection. This implies that the transactions costs of raising additional funds are higher, and firms may respond to this by holding onto higher cash balances.

In regression (iii) of Table 2, we include two measures of capital market development to investigate whether this alternative interpretation is more consistent with the data. The first measure



is the ratio of external capital market to GNP and is discussed in greater detail in LLSV (1997). This ratio employs the stock market capitalization held by minority shareholders as the numerator. This may be a better measure of the size of capital markets in countries where shareholdings are highly concentrated. The second measure captures the size of the credit market. It is the ratio of Private Credit by Deposit Money Banks and Other Financial Institutions to GDP. This measures the total amount of debt finance to private firms from all financial institutions, except central banks. We obtain this ratio from Levine, Loayza, and Beck (2000). After controlling for the development of the capital market, we continue to find that shareholder rights are important, and the economic and statistical significance of the result remains as strong as in model (i). In addition, the sign on the size of the stock market is positive, albeit insignificant, while the sign on the size of the debt market is positive and marginally significant. This result suggests that, if anything, firms hold more liquid assets when capital markets are large, and does not support the view that cash holdings are driven by the inability of corporations to raise funds. Instead, the easier it is to raise funds, the more cash companies hold, which is supportive of the agency view.

The first three models in Table 2 do not control for differences in the characteristics of the firms across countries, and, as illustrated in Table 1, these differences are substantial. Moreover, we know from prior work that these variables affect liquidity significantly. We therefore re-estimate models (i) through (iii) but include the country medians of a number of other determinants of cash holdings. These results are displayed in regressions (iv) through (vi). Consistent with prior evidence, we find higher median cash balances in countries with higher market-to-book ratios and higher R&D intensity. The coefficients on median size, cash flow, and net working capital are not significant. The impact of market-to-book and R&D intensity is also economically important. For example, increasing the market-to-book ratio from the 25<sup>th</sup> percentile in the distribution to the 75<sup>th</sup> percentile increases cash levels by 21% (based on model (vi)). In both models (iv) and (vi), where the shareholder rights dummy is included, we continue to find that firms in countries with better shareholder protection hold lower median cash balance. In fact, the full model (vi) shows that the economic impact of this result

has changed little after including the other variables, which indicates that the agency motives is independent of the transactions costs and precautionary motives. Also note that in model (vi), the development of the debt and equity markets has no significant impact on cash levels.

One concern with the analyses reported in Table 2 is that the country medians hide substantial cross-sectional variation within each country. If this variation in the explanatory variables is properly controlled for, it may be the case that the importance of shareholder rights declines. In other words, perhaps the shareholder rights dummy is only important because it captures some aspect of the effect of the independent variables not properly controlled for by the use of medians. We perform two sets of tests to investigate this possibility. In the next section, we estimate regressions at the firm level. In the remainder of this section, we employ some of this firm-level information to compute a median 'excess' cash measure at the country level. To do this, we develop two 'optimal liquidity' benchmarks. Both make use of U.S. data to determine what the base-case level of liquidity should be. This assumes that a benchmark based on U.S. data provides a good indication of what cash levels should be when shareholder rights are strong. Williamson and Pinkowitz (2001) employ a similar approach in their analysis.

The first benchmark is simply the median cash level in the same U.S. two-digit SIC code industry. Thus, for each firm in the sample, we adjust the cash ratio by the median of the firms in the same two-digit SIC code in the U.S.<sup>5</sup> Column (i) of Table 3 contains the median excess cash level for each country using this benchmark. Note that the median excess cash level in countries with high shareholder protection is only 1.15% compared to 2.96% in countries with low shareholder protection. To obtain the second benchmark, we estimate a cross-sectional regression model of cash holdings for U.S. firms, which includes the following explanatory variables: market-to-book, log size, cash flow over net assets, net working capital over net assets, and R&D over sales. Two-digit SIC code dummies are also included in this regression. This is equivalent to the reduced form model of Opler et al. (1999),

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<sup>5</sup> SIC codes are not self-reported by firms, but assigned by the data vendor. The methodology employed to assign these SIC codes is the same across countries. Thus, there is no reason to believe that SIC codes are less representative for some companies in some countries than for others or that there is a relation between shareholder rights and SIC code assignments.

except that we do not include industry cash flow volatility since the industry dummies capture this effect. They call this a reduced form model because it excludes leverage, capital spending, and a dividend-paying dummy. These variables are excluded from the reduced form model since the trade-off theory would argue that leverage, cash holdings, and investment policy are jointly determined. We also do not include a regulation dummy because regulation varies dramatically by country.<sup>6</sup>

The results of this estimation are reported in Table 4. For completeness, we also report the regression results for the full model in addition to the reduced form model, which is the one employed for benchmarking. Firms have a higher ratio of cash to net assets when they have a higher market-to-book ratio, higher R&D expenses relative to sales, less debt, lower capital expenditures, when they do not pay a dividend, and when they are smaller. Net working capital is negatively related to liquidity in the second model, while the effect of cash flows is positive. The results are generally consistent with the evidence presented by Opler et al. (1999) and Kim et al. (1998).

Column (ii) of Table 3 contains the country medians of the excess cash levels based on this benchmark. Again, there is a substantial difference between the median excess cash levels of high protection countries (0.88%) and those of low protection countries (4.34%). Note that the developed capital market with the highest deviation according to both benchmarks is Japan. Using U.S. firms from the same industry, Japanese firms have median excess cash levels of 8.61%, and controlling for other firms actually increases excess cash to 10.92%. Since Japan is also in the high shareholder protection category, we require further study to investigate this observation. Moreover, our data are from 1998, so Pinkowitz and Williamson's (2001) explanation that strong banks forced companies to hold cash in previous decades can only be a partial explanation for this phenomenon. By 1998, bank power in Japan had been reduced substantially.

Table 5 contains regressions similar to those in Table 2, except that we now employ the excess cash levels as the dependent variable. Obviously, the median firm characteristics are not

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<sup>6</sup> As mentioned previously, there is a difference between Opler et al. (1999) and this paper in the computation of the capital expenditures variable. While Opler et al. employ the capital expenditures figure from Compustat, we compute capital expenditures as the difference in fixed assets plus depreciation. Obviously, this implies that assets sales are also part of our measure. The reason for employing this indirect measure is that capital expenditures data are not available for many of the firms outside the U.S.

included in these models because they have been included in some of the models employed to estimate the dependent variable. The first three regressions are based on U.S. industry adjusted cash levels, and models (iv) through (vi) use regression model (i) of Table 4 to determine excess cash levels. In columns (i) and (iv) we only use the high shareholder rights dummy to explain the level of excess cash across countries. The result is consistent with the raw cash regressions: firms with high shareholder protection have significantly lower cash holdings. In addition, the significance of the shareholder rights dummy has increased compared to Table 2. In columns (ii) and (v) we employ a common law dummy instead of a shareholder rights dummy; while the coefficient on the common law dummy is of similar magnitude as that of the shareholder rights dummy, it is not significant. Finally, in columns (iii) and (vi) we control for the size of the debt and equity market; both of these coefficients are insignificant and they have little impact on the magnitude or significance of the shareholder rights dummy.

Before moving to firm-specific regressions, we conduct a number of sensitivity tests. These are reported in Tables 6 and 7. Table 6 focuses on the construction of the variables, while Table 7 examines a variety of other issues.

In model (i) of Table 6, we employ the level of shareholder rights instead of a dummy variable to explain the median country cash levels. We continue to find that firms in countries with better shareholder protection hold more cash. The coefficient of  $-0.19$  on shareholder rights indicates that firms in countries where the shareholder rights variable is 0 hold more than twice the amount of cash compared to firms in countries where the shareholder rights variable is 5. The dependent variable in model (ii) is the excess cash level computed using the regression on U.S. data, and the level of shareholder rights is the explanatory variable of interest. Again, our findings persist. In column (iii), we employ the ratio of cash to sales as the dependent variable instead of cash to net assets. While we use net assets to deflate cash levels to maintain consistency with other studies, there are substantial cross-country differences in accounting conservatism, which may affect book assets [see, for example, Flower and Ebberts (2002)]. Sales figures are less likely to be affected by conservatism

than assets, which justifies employing a sales deflator. The coefficient on shareholder rights remains negative and significant in this specification. In column (iv), the dependent variable is the excess cash to sales ratio based on a regression on U.S. data; again, the impact of shareholder rights is significant. In columns (v) and (vi) of Table 6, we use sales to deflate the cash level and the independent variables. The raw log cash ratio is employed in column (v), while the excess cash level is employed in column (vi). The coefficient is insignificant for raw cash levels, but it regains significance when we compute cash levels relative to their predicted level.

Table 7 contains the results of a battery of additional robustness checks. We know from the work by LLSV (2000) that firms pay lower dividends in countries with little shareholder protection. Our finding indicates that these firms also hold more cash. Are these really independent results or are the cash holdings simply a consequence of the lower payout level? To investigate this possibility, we include the ratio of dividends to sales in our model as an additional explanatory variable.<sup>7</sup> Column (i) contains the result. Interestingly, the coefficient on the dividend control is actually positive, but insignificant. Shareholder rights remain important, however. This indicates that our finding is not merely a consequence of the evidence presented by LLSV on the relation between shareholder rights and dividends.

Another concern is that the explanatory variables are measured with different errors across countries; this could be particularly troubling for R&D, because in some countries certain development expenditures need to be capitalized, while they are expensed in other countries [see Flower and Ebbers (2002)]. Capitalized R&D expenses are accounted for as capital expenditures, which implies that our measure of opaqueness is biased. This bias may well be correlated with shareholder rights because it is in countries with low shareholder rights that firms have more freedom in deciding whether to capitalize R&D expenses or not. We include our measure of implied capital expenditures in the regression model to determine whether this is a serious concern. The results, which are reported in column (ii) of Table 7, show that the negative impact of shareholder rights on liquidity

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<sup>7</sup> Our findings are very similar if we employ the ratio of dividends to cash flows or dividends to net income.

persists. In addition, we find that the relation between liquidity and capital spending is not significant at the country level.

We are also worried that the market-to-book ratio is not a good proxy for investment opportunities for two reasons. First, it really captures both the value of investment opportunities, together with the probability that the firm will take them, and this probability may vary across countries. Second, the market-to-book ratio is also affected by differences in the measurement of book assets across countries. We therefore use past sales growth as a measure of investment opportunities, in line with LLSV (2000). Sales growth is averaged over the prior five years or however many years of data are available on Global Vantage. Model (iii) contains the results of this model: shareholder rights remain significant.

In model (iv) of Table 7, we control for the risk of expropriation, which is the risk of confiscation or forced nationalization as tabulated by LLSV (1998); lower scores represent a higher risk. We would expect lower cash balances in countries with a high risk of expropriation, because it may be easier to confiscate cash than other assets. Indeed, the coefficient on expropriation is positive, with a p-value of 0.11; the importance of shareholder rights is not affected, however.

Model (v) of Table 7 contains the results for OECD countries only. These are countries with more similar capital market development. The coefficient on the shareholder rights dummy is still negative in this specification, with a p-value of 0.11. When we use the level of shareholder rights instead of a dummy, the coefficient is significantly negative at the 3% level (not reported in the table). In addition, when we estimate the model at the firm level, the coefficient is also significantly negative. In model (vi), we examine civil law countries in isolation to determine whether our finding is more about the legal origin of a country or its protection of shareholders. The regression indicates that the negative effect of shareholder rights persists within the civil law country subset. Models (vii) and (viii) show that the results also hold for the surrounding years, although the p-value for the shareholder rights dummy is only 0.14 in 1997.

We perform one final robustness check. As mentioned previously, it is possible that controlling families use their companies to store wealth because taking the funds out through dividends is too costly in terms of taxes. We create two dummy variables to study the merits of this explanation. The first dummy is equal to one when more than half of the largest companies in the country are family controlled, based on the work of La Porta, Lopez-de-Silanes, and Shleifer (1999). The second dummy is equal to one when the advantage of dividends over capital gains is larger than the sample median, based on the dividend advantage computed by LLSV (2000). We would expect firms to hold more cash when family control is high and the dividend tax advantage is low. The coefficients on the dummies are in the right direction, but not significant (not reported in a table), but their inclusion does not affect the magnitude or significance of the coefficients on the shareholder rights dummy.

Overall, the models of liquidity estimated at the country level indicate that firms in countries with low shareholder rights hold higher cash balances, that this effect is not caused by differences in capital market access, and unlikely to be caused by measurement problems.

#### *4.2. Explaining liquidity at the firm level*

In this section, we estimate models of cash holdings at the firm level. Such an analysis is warranted to see how important the shareholder rights variable is after we are able to take into account the variation in cash holdings within a country as well as across countries. Moreover, this analysis allows us to subject the agency costs hypothesis to further tests.

Table 8 contains the major regression specifications. The unit of observations in these models is the individual firm, but the number of observations changes across regressions because not all data items are available for all companies. To avoid problems with outliers, we winsorize all variables at their 99<sup>th</sup> percentile. In addition, we again adjust the standard errors to allow for heteroskedasticity. The level of shareholder rights (going from 0 to 5) is employed as the explanatory variable in these models, but our results are very similar if we employ a dummy variable instead to separate countries

with high and low shareholder protection. We will present the results of robustness tests to illustrate this point.

Model (i) of Table 8 contains the model with just shareholder rights and industry dummies as the explanatory variables. The coefficient is negative and significant, which is consistent with the country regressions. Increasing shareholder rights from 0 to 5 leads to a decrease in cash holdings of 18%. In column (ii), we include a common law dummy instead of shareholder rights. Unlike in the country median regressions, the common law dummy is negative and significant in this specification. The coefficient of  $-0.44$  indicates that firms in common law countries hold 35% less cash than those in civil law countries. Model (iii) includes measures of the development of the stock and debt markets to make sure that the shareholder rights variable does not proxy for capital markets access. The coefficient on the development of the debt market is actually positive, which is not consistent with the capital markets access argument, but does support the agency cost explanation. Also note that the impact of shareholder rights increases substantially after controlling for the size of capital markets. The coefficient of  $-0.11$  implies that an increase in shareholder rights from 0 to 5 leads to a decline in cash holdings of 43%.

Models (iv) through (vi) of Table 8 repeat the previous analyses, but they include firm specific characteristics in addition to the industry dummies. If anything, the results are stronger after controlling for firm-specific characteristics. The coefficient on shareholder rights increases from  $-0.04$  in model (i) to  $-0.11$  in model (iv) and from  $-0.11$  in model (iii) to  $-0.19$  in model (vi). Based on model (vi), moving from 0 to 5 in the shareholder rights category reduces the level of cash and cash equivalents by 61%. Also note that many of the control variables are significant and have the expected sign. Thus, controlling for industry is not sufficient to capture the dispersion in the cash ratios. Consistent with the country median regressions, we find that firms with higher market-to-book ratios and higher levels of R&D expenses relative to sales have higher cash holdings, which supports both the transactions costs and precautionary motives. We also find an important size effect at the firm level: larger firms hold less cash. This effect did not appear in the cross-country regressions,



possibly because there is much more variation in size within each country than across countries. Finally, the negative coefficient on the ratio of net working capital to net assets suggests that cash holdings and net working capital are substitutes. The other determinants of cash holdings are also important economically. For instance, increasing firm size from its 25<sup>th</sup> percentile (\$74 million) to its 75<sup>th</sup> percentile (\$889 million) reduces cash holdings by 12%, based on model (vi); increasing the market-to-book ratio from its 25<sup>th</sup> percentile (0.95) to its 75<sup>th</sup> percentile (1.74), on the other hand, leads to an increase in cash holdings of 12%.

Table 9 reports the findings of a number of tests conducted to examine the robustness of these findings. Model (i) includes include the shareholder rights dummy as an explanatory variable instead of the level. Our inferences are unchanged. Model (ii) employs the ratio of cash to sales as the dependent variable. Again, the importance of shareholder rights persists. This is also the case in model (iii) where we use the ratio of cash to sales as the dependent variable and the shareholder rights dummy as one of the explanatory variables. In model (iv), we include the variables excluded from the reduced form model: leverage, a dividend dummy, and the level of capital expenditures, albeit that these variable are likely to be endogenous. Nevertheless, even after controlling for these effects, we continue to find that firms hold lower cash balances in countries where shareholders are not as well protected.<sup>8</sup> In model (v), we also include measures of capital market development, without affecting the findings. Instead of the dividend dummy, we include the level of dividends to sales as a control variable in model (vi) to insure that our results are not the flip-side of the LLSV dividend findings. Surprisingly, the level of dividends is actually positively related to cash holdings, while the effect of shareholder rights remains negative. The economic significance of this finding is quite small, however: increasing the ratio of dividends to sales from its 25<sup>th</sup> percentile (0) to its 75<sup>th</sup> percentile (0.0147) increases cash holdings by 3% only.

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<sup>8</sup> We also examine whether firms are indifferent between having one more dollar of cash or one less dollar of debt. The specification estimated in Table 8 employs the log of the cash ratio as the dependent variables, but the level of the leverage ratio as one of the explanatory variables, and is therefore not suited to examine this question. Using levels on both sides, we find the coefficient on leverage is always significantly larger than  $-1$ . Thus, the decision between holding cash and paying off debt is not a matter of indifference.

One concern about the firm-level regressions is that the results are caused by observations from large countries. The regressions at the country level suggest that this is probably not the case, but, nevertheless, we subject this concern to further scrutiny. In model (vii) of Table 9, we remove the two countries with the largest number of observations in our sample: the U.S. and Japan. The impact of shareholder rights continues to be significant in this model. In model (viii), we estimate a weighted least squares model, where the weight of each observation is the inverse of the number of observations in each country, so that each country receives equal weight in the estimation. We also use the shareholder rights dummy instead of the level. Again, our findings persist.

In model (ix) all the explanatory variables are scaled by sales to make sure that our results are not caused by differences across countries in the measurement of book assets. Similarly, size is measured as the log of sales. This does not affect our findings. Our results also continue to hold when we employ past sales growth to capture investment opportunities in model (x). Model (xi) shows that the results also hold for G-7 countries, while models (xii) and (xiii) illustrate that our findings are robust over time. In unreported models, we also verify that the coefficient on shareholder rights remains significant after including family control and dividend tax preference dummies in the regression model and when we look at the subsets of OECD and civil law countries.

In sum, the results of this subsection further strengthen our conclusion that agency problems have an important impact on corporate cash holdings. In particular, after controlling for industry and firm-specific characteristics, we continue to find that firms in countries with poor shareholder protection have substantially higher cash holdings.

#### *4.3. Interactions between firm characteristics and shareholder rights*

In the previous analysis, we assumed that the impact of firm characteristics on cash holdings is constant across countries. However, this does not need to be the case. In fact, the trade-off theory of the determinants of corporate liquidity has implications for the effects of these variables across countries.

Let us first consider the transactions cost and precautionary motives. In our previous discussion, we assumed that the cost of raising funds was constant, except for a size effect: large corporations are assumed to be able to raise funds at a lower cost. The expected variation in liquidity therefore comes from differences in the opportunity cost of lost investment. But, there are substantial differences across countries in the costs of raising funds, as demonstrated by LLSV (1997). This implies that firms should pay more attention to the opportunity cost variables in countries where raising funds is more difficult. The agency cost hypothesis, on the other hand, suggests that the ease of raising money may actually lead firms to hold more cash when they have the ability to do so. To examine the validity of these arguments, we divide the countries into two groups according to the median ratio of external capital to GNP (cut-off is 0.25) and also in two groups according to the median ratio of private credit to GDP (cut-off is 0.645). We then create dummy variables equal to one if a firm is in a country with well-developed equity / debt markets. These dummies are then interacted with the two key variables used to capture opportunity costs and asymmetric information: the market-to-book ratio and the ratio of R&D to sales.

Column (i) of Table 10 contains the results of this enquiry. Note that we do not include capital market size itself, because the prior discussion indicates that its importance should only be relevant to the extent that it affects the magnitude of the other explanatory variables. The results are striking and not fully consistent with the transactions cost or precautionary motives for cash holdings. The coefficient on market-to-book itself is positive, but insignificant. The interactions with the large equity market and debt market dummies are positive, and significant for the debt market interaction. This result implies that the market-to-book ratio is more important in deciding how much cash to hold when debt markets are larger, which is more consistent with an agency cost explanation: firms hold more cash when they have the ability to raise more funds. The results on the R&D interactions are insignificant. Thus, the cash holdings of more opaque firms are not affected by the size of the capital market. Note that shareholder rights continue to have a significant negative impact on a firm's holdings of cash and equivalents.

In column (ii) of Table 10, we interact market-to-book and R&D with a high shareholder rights dummy. The goal here is to determine whether, as predicted by the agency cost motive, managers care more about the variables that affect cash holdings when shareholder rights are high. Our evidence provides some support for this conjecture. The market-to-book ratio has a significant impact on cash holdings in countries with low shareholder rights, but its impact is much more substantial in countries with high shareholder rights. Adding up the coefficient on market-to-book and its interaction with the high shareholder rights dummy, we find a coefficient of 0.15, with a p-value of 0.00. To interpret this effect, moving from the 25<sup>th</sup> percentile of the market-to-book ratio (0.95) to the 75<sup>th</sup> percentile (1.74), increases cash holdings by about 5% in countries with low shareholder protection and by 13% in countries with high shareholder protection. Thus, managers in countries where shareholder have few rights appear to take into account other factors when considering how much cash to hold. Regarding R&D, we do not find that the impact of the R&D to sales ratio on cash holdings depends on the level of shareholder protection.<sup>9</sup>

To make sure that shareholder rights do not proxy for capital market development, model (iii) combines the interactions of models (i) and (ii). The impact of shareholder rights on the effect of the market-to-book ratio persists in this regression. In addition, the interaction between the R&D to sales ratio and the shareholder rights dummy is also positive, which implies that opaqueness is a more important determinant of cash holdings in countries with good shareholder protection.

The last two columns of Table 10 contain the results of our final test on the importance of shareholder rights in different institutional settings. In previous tests, we included the market-to-book ratio to capture investment opportunities. We now consider a more direct measure of the need for external financing, which is a measure of an industry's dependence on external financing developed

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<sup>9</sup> An alternative way of analyzing this issue is to estimate regressions on a country-by-country basis and report average coefficients on the shareholder rights variables by country. The problem with this estimation is that many countries have relatively few data points. If we estimate a model with five explanatory variables plus (up to) 66 industry dummies for each country, we obviously lose a lot of countries/observations. For example, if we limit ourselves to countries with at least 75 observations, we are left with 21 countries. For this sample, the average coefficient on the market-to-book ratio for countries with high shareholder rights is 0.128, while the average coefficient for countries with low shareholder rights is 0.047. The p-value of a difference test is only 0.19, however.

by Rajan and Zingales (1998). For their study of the impact of financial development on growth, Rajan and Zingales (1998) compute such a measure using U.S. data, based on the view that capital markets are relatively frictionless in the U.S. We employ this data item for two purposes. First, we examine whether firms with greater financing needs hold more cash. One may argue that this variable better captures the transactions cost motive than the market-to-book ratio since it focuses exclusively on financing needs, and not investment opportunities. Second, we interact financing needs with our high shareholder rights dummy to determine whether firms care more about financing needs when shareholder rights are strong.

The regression in column (iv) of Table 10 contains the need variable but not the interaction; as expected firms hold more liquid assets when they operate in industries with higher needs for external financing. Note that we have fewer observations in this model because Rajan and Zingales (1998) compute the need variable for manufacturing firms only. In column (v), we interact the need variable with a high shareholder rights dummy. The need variable is no longer significant in this model; only the interaction term is relevant. Thus, firms hold more cash when the need for external financing is greater only in countries where shareholders enjoy good protection. This supports the agency costs hypothesis: in countries where shareholders are not well protected, firms hold cash for other reasons, in countries where they are well protected, firms care more about the transactions cost motive.

## **5. Conclusion**

When managers decide how much cash to hold in the firm, do they care only about shareholder wealth or about their personal well being as well? Our evidence indicates the latter: agency problems are of primary importance in determining cash holdings. Using data on more than 11,000 companies from 45 countries, we find significantly higher cash holdings in countries where shareholders enjoy little protection. Moreover, the other determinants of cash holdings appear to be less important in such countries. None of the evidence points to the fact that managers hold more cash simply because it is more difficult to access capital markets in countries with poor shareholder

protection. If anything, firms hold more cash when it is easier to raise more funds, not less. These results also hold after controlling for dividend payments, which indicates that our findings are not simply a consequence of LLSV's evidence that dividend payments are lower in countries with low shareholder protection.

We have performed a battery of robustness checks to reduce the possibility that our results are caused by measurement problems due to international differences in accounting data. Nevertheless, it is not possible across a large set of countries to capture the subtleties of differences in the accounting treatment of many of the variables we employ. This is clearly a caveat of this research.

What we did not investigate in this paper are the consequences of having 'excess cash'. The evidence by Harford (1999) suggests that, even in the U.S., where shareholders are well protected, managers with too much cash on their hands waste it on poor acquisitions. Opler, et al. (1999) find less evidence that excess cash gets wasted, but this may be because this is less likely to happen in the U.S. Nevertheless, they do find that firms with large amounts of excess cash appear to lose more money in the future. Mikkelson and Partch (2002), on the other hand, find that the operating performance of firms with large cash holdings does not differ from that of a size and industry matched control sample. Again, we do not know whether this result would hold in an international context where shareholders have fewer rights. Investigating the consequences of high cash holdings in an international setting is therefore clearly an important area of future research.

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**Table 1**  
**Summary Statistics**

All numbers except for # of firms are country medians. Net assets are total assets minus cash and equivalents. Firm size is the book value of total assets in US Dollars (millions). Market-to-book is the market value of equity plus the book value of liabilities divided by the book value of total assets. Book leverage is short-term plus long-term debt divided by the book value of total assets. Net Work. Cap. is current assets minus current liabilities minus cash and equivalents. Cash flow is operating income plus depreciation and amortization minus interest minus taxes minus dividends. ICAPX is the year-on-year change in net fixed assets plus depreciation.

Country	# of firms	Cash & Equivalents / Net Assets	Firm Size	Market-to-Book	Book Leverage	Net Work. Cap. / Net Assets	Cash Flow / Net Assets	ICAPX / Net Assets
<i>High Shareholder Rights</i>								
Argentina	24	1.7%	828	0.99	35.8%	0.4%	7.2%	7.0%
Australia	324	5.7%	130	1.19	19.8%	-0.3%	2.5%	6.0%
Brazil	131	7.3%	594	NA	28.6%	-7.7%	1.5%	6.2%
Canada	471	4.5%	220	1.20	26.0%	3.4%	6.2%	9.5%
Chile	87	3.1%	261	0.92	22.9%	2.1%	6.6%	8.6%
Colombia	13	1.5%	416	0.66	13.7%	-0.2%	1.0%	13.0%
Finland	95	7.6%	268	1.11	21.9%	8.2%	8.3%	6.8%
France	535	11.1%	116	1.22	19.9%	7.3%	9.0%	5.9%
Hong Kong	133	13.1%	192	0.82	18.9%	-3.7%	-0.7%	0.7%
India	8	3.4%	107	1.16	19.3%	11.3%	6.3%	5.2%
Ireland	59	7.9%	133	1.45	21.8%	-3.4%	6.0%	8.2%
Israel	37	20.9%	214	1.17	18.3%	3.1%	6.2%	7.2%
Japan	1853	15.5%	476	1.02	29.8%	-3.5%	4.0%	3.4%
Kenya	1	0.3%	45	1.13	12.0%	-2.6%	5.3%	9.6%
Malaysia	379	6.3%	101	0.99	28.7%	-1.9%	2.2%	3.3%
New Zealand	67	1.7%	117	1.07	28.8%	-0.2%	6.6%	10.0%
Norway	127	12.7%	140	1.04	24.0%	0.1%	4.3%	5.3%
Pakistan	30	5.3%	72	0.89	37.2%	-2.3%	7.3%	5.8%
Peru	15	3.1%	224	0.57	21.2%	3.9%	9.2%	10.8%
Philippines	75	4.9%	146	0.81	27.1%	-2.6%	1.9%	7.2%
Portugal	43	3.6%	286	1.12	24.2%	-3.0%	7.5%	10.6%
Singapore	247	10.2%	116	0.93	24.2%	-3.0%	3.8%	3.8%
South Africa	98	8.6%	494	1.21	10.2%	4.7%	7.4%	9.7%
Spain	110	5.3%	388	1.46	17.0%	0.8%	8.0%	6.7%
Sweden	222	9.4%	109	1.21	19.1%	12.9%	7.2%	7.6%
Taiwan	95	11.6%	656	1.43	29.3%	-1.9%	3.3%	8.2%
United Kingdom	1164	8.1%	117	1.39	16.9%	0.4%	6.5%	6.8%
United States	3429	6.4%	319	1.51	23.6%	5.9%	7.2%	8.3%
Zimbabwe	5	2.9%	134	0.93	21.0%	-5.4%	7.4%	13.3%
<b>Median</b>	<b>95</b>	<b>6.3%</b>	<b>192</b>	<b>1.11</b>	<b>21.9%</b>	<b>-0.2%</b>	<b>6.3%</b>	<b>7.2%</b>

Table 1 (continued)

Country	# of firms	Cash & Equivalents / Net Assets	Firm Size	Market-to-Book	Book Leverage	Net Work. Cap. / Net Assets	Cash Flow /Net Assets	ICAPX / Net Assets
<i>Low Shareholder Rights</i>								
Austria	73	8.4%	217	1.12	26.3%	7.0%	6.9%	8.1%
Belgium	81	10.3%	215	1.42	25.0%	2.2%	9.0%	5.8%
Denmark	118	12.7%	160	1.07	23.4%	8.1%	7.3%	7.4%
Egypt	6	29.6%	284	2.11	17.5%	-12.9%	0.1%	19.8%
Germany	449	7.3%	212	1.25	16.8%	16.1%	8.2%	7.0%
Greece	55	5.0%	153	1.94	22.1%	15.3%	8.8%	8.3%
Indonesia	112	10.3%	206	1.03	64.0%	-20.0%	5.4%	8.8%
Italy	151	8.8%	444	1.14	21.2%	6.4%	6.7%	4.6%
Jordan	1	2.8%	256	1.51	27.8%	1.7%	11.8%	NA
Mexico	77	5.6%	1164	0.85	29.6%	1.7%	6.9%	16.4%
Netherlands	186	5.0%	217	1.43	18.5%	10.1%	9.4%	7.1%
South Korea	8	8.9%	746	0.95	36.6%	-8.6%	3.2%	19.1%
Switzerland	166	11.4%	311	1.17	24.4%	8.5%	8.1%	4.7%
Thailand	189	3.8%	94	0.92	46.0%	-11.5%	1.6%	3.1%
Turkey	34	13.4%	173	1.32	18.5%	3.8%	4.7%	23.2%
Venezuela	9	6.6%	523	0.47	17.1%	2.4%	5.3%	9.8%
<b>Median</b>	<b>79</b>	<b>8.6%</b>	<b>217</b>	<b>1.15</b>	<b>23.9%</b>	<b>3.1%</b>	<b>6.9%</b>	<b>8.1%</b>
<b>Overall Median</b>	<b>95</b>	<b>6.6%</b>	<b>214</b>	<b>1.12</b>	<b>22.1%</b>	<b>0.8%</b>	<b>6.6%</b>	<b>7.3%</b>

**Table 2**  
**Regression of Country Medians**

All variables are country medians. The dependent variable is the log of cash and equivalents divided by net assets. Net assets are total assets minus cash and equivalents. The shareholder rights variable is a dummy variable equal to one if shareholder rights are high, and zero otherwise. The common law variable is a dummy equal to one for common law countries, and zero otherwise. External capital is the stock market capitalization held by minority shareholders. Private credit is the credit provided by deposit money banks and other financial institutions to non-government owned firms. Market-to-book is the market value of equity plus the book value of liabilities divided by the book value of total assets. Size is the log of the book value of total assets in US Dollars. NWC is current assets minus current liabilities minus cash and equivalents. Cash flow is operating income plus depreciation and amortization minus interest expenses minus taxes minus dividends. The numbers in parentheses are p-values based on robust standard errors.

Variable	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Shareholder Rights (Dummy)	-0.41 (0.07)		-0.43 (0.06)	-0.36 (0.06)		-0.50 (0.04)
Common Law		-0.33 (0.24)			-0.42 (0.07)	
External Capital / GNP			0.17 (0.50)			0.30 (0.31)
Private Credit / GDP			0.32 (0.10)			0.28 (0.25)
Market-to-Book				0.74 (0.01)	0.85 (0.00)	0.68 (0.03)
Size				0.25 (0.36)	0.16 (0.55)	-0.02 (0.88)
NWC / Net Assets				0.91 (0.61)	0.59 (0.73)	-1.01 (0.45)
Cash Flow / Net Assets				-8.23 (0.12)	-9.01 (0.12)	-1.94 (0.66)
R&D / Sales				39.54 (0.00)	43.09 (0.00)	41.94 (0.00)
Constant	-2.53 (0.00)	-2.67 (0.00)	-2.74 (0.00)	-4.30 (0.01)	-4.00 (0.02)	-3.28 (0.00)
Adj. R-squared	0.04	0.02	0.12	0.15	0.15	0.30
N	45	45	43	44	44	42

**Table 3**  
**Excess Cash Levels**

Excess cash based on U.S. Industry equivalent is computed by subtracting the median cash level of firms in the U.S. in the same two-digit SIC code industry. Excess cash based on regression on U.S. data is cash and equivalents divided by net assets minus the predicted value from the US cash regression of model (i) in table 4. Net assets are total assets minus cash and equivalents.

Country	Excess Cash Based on US Industry equivalent	Excess Cash Based on Regression on US data
<i>High shareholder rights</i>		
Argentina	-0.92%	0.32%
Australia	0.32%	0.25%
Brazil	1.85%	NA
Canada	-0.71%	-0.94%
Chile	-0.55%	-0.77%
Colombia	-0.43%	-0.90%
Finland	2.66%	2.61%
France	3.15%	4.91%
Hong Kong	5.86%	7.45%
India	-16.66%	-1.11%
Ireland	3.58%	5.10%
Israel	12.87%	16.80%
Japan	8.61%	10.92%
Kenya	-3.41%	-4.60%
Malaysia	1.58%	0.62%
New Zealand	-1.08%	6.19%
Norway	5.65%	-1.73%
Pakistan	-0.22%	0.73%
Peru	0.51%	0.03%
Philippines	0.58%	0.00%
Portugal	-1.06%	-0.87%
Singapore	3.39%	4.31%
South Africa	3.08%	4.94%
Spain	1.11%	0.88%
Sweden	1.33%	2.36%
Taiwan	3.36%	6.20%
United Kingdom	1.19%	1.37%
Zimbabwe	0.46%	31.81%
<b>Median</b>	<b>1.15%</b>	<b>0.88%</b>

**Table 3** (continued)

Country	Excess Cash Based on US Industry equivalent	Excess Cash Based on Regression on US data
<i>Low shareholder rights</i>		
Austria	2.84%	4.24%
Belgium	3.09%	4.43%
Denmark	5.44%	5.34%
Egypt	26.80%	27.53%
Germany	0.43%	1.60%
Greece	0.52%	0.20%
Indonesia	6.50%	7.02%
Italy	3.52%	5.89%
Jordan	0.02%	0.21%
Mexico	1.68%	2.09%
Netherlands	-0.05%	-0.30%
South Korea	1.27%	6.11%
Switzerland	3.81%	5.71%
Thailand	-0.15%	-0.27%
Turkey	7.40%	12.07%
Venezuela	4.35%	3.62%
<b>Median</b>	<b>2.96%</b>	<b>4.34%</b>
<b>Overall Median</b>	<b>1.58%</b>	<b>2.36%</b>

**Table 4**  
**US Cash Regression**

The dependent variable is the log of cash and equivalents divided by net assets. Net assets are total assets minus cash and equivalents. Market-to-book is the market value of equity plus the book value of liabilities divided by the book value of total assets. Size is the log of the book value of total assets in US Dollars. Cash flow is operating income plus depreciation and amortization minus interest expenses minus taxes minus dividends. NWC is current assets minus current liabilities minus cash and equivalents. Leverage is short-term plus long-term debt divided by the book value of total assets. ICAPX is the year-on-year change in net fixed assets plus depreciation. All regressions include industry dummy variables defined at the two-digit SIC code level. Numbers in parentheses are p-values based on robust standard errors.

Variable	(i)	(ii)
Market-to-Book	0.19 (0.00)	0.16 (0.00)
Size	-0.16 (0.00)	-0.13 (0.00)
Cash Flow / Net Assets	0.01 (0.82)	0.16 (0.01)
NWC / Net Assets	-0.08 (0.28)	-0.21 (0.01)
R&D / Sales	1.17 (0.00)	1.05 (0.00)
Leverage		-2.52 (0.00)
Dividend (Dummy)		-0.47 (0.00)
ICAPX		-0.02 (0.00)
Constant	-1.13 (0.00)	-2.50 (0.00)
Adjusted r-squared	0.34	0.48
N	2553	1535

**Table 5****Country Excess Cash Median Regression Model**

All variables are country medians. The dependent variable in models (i) – (iii) is the log of cash and equivalents divided by net assets minus the US industry median, defined at the two-digit SIC code level. The dependent variable in models (iv) – (vi) is the log of cash and equivalents minus the predicted value from the US cash regression of model (i) in table 4. Net assets are total assets minus cash and equivalents. The shareholder rights variable is a dummy variable equal to one if shareholder rights are high, and zero otherwise. The common law variable is a dummy equal to one for common law countries, and zero otherwise. External capital is the stock market capitalization held by minority shareholders. Private credit is the credit provided by deposit money banks and other financial institutions to non-government owned firms. The numbers in parentheses are p-values based on robust standard errors.

Variable	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Shareholder Rights (Dummy)	-0.46 (0.02)		-0.42 (0.05)	-0.52 (0.03)		-0.46 (0.06)
Common Law		-0.40 (0.13)			-0.41 (0.18)	
External Capital / GNP			0.08 (0.74)			0.01 (0.96)
Private Credit / GDP			0.11 (0.64)			0.19 (0.44)
Constant	0.54 (0.00)	0.38 (0.00)	0.47 (0.04)	0.77 (0.00)	0.59 (0.00)	0.67 (0.01)
Adjusted r-squared	0.08	0.05	0.06	0.07	0.03	0.07
N	44	44	42	43	43	41

**Table 6****Robustness Checks of Country Medians Regression – Construction of Variables**

The dependent variable in model (i) is the log of cash and equivalents divided by net assets. The dependent variable in model (ii) is the log of cash and equivalents divided by net assets minus the predicted value from the US cash regression of model (i) in table 4. The dependent variable in models (iii) and (v) is the log of cash and equivalents divided by sales. The dependent variable in models (iv) and (vi) is the log of cash and equivalents divided by sales minus the predicted value from a US cash regression identical to that of model (i) in table 4, but with the log of cash and equivalents divided by sales as the dependent variable. When assets are employed as the deflator, they are computed as total assets minus cash and equivalents, except in the computation of the market-to-book ratio when they are total assets. The shareholder rights variable is a dummy variable equal to one if shareholder rights are high, and zero otherwise. The shareholder rights (level) variable goes from 0-5. External capital is the stock market capitalization held by minority shareholders. Private credit is the credit provided by deposit money banks and other financial institutions to non-government owned firms. Market-to-book is the market value of equity plus the book value of liabilities divided by the book value of total assets. Size is the log of the book value of total assets in US Dollars, except when sales are employed as the deflator in which case size is the log of sales in US Dollars. NWC is current assets minus current liabilities minus cash and equivalents. Cash flow is operating income plus depreciation and amortization minus interest minus taxes minus dividends. Numbers in parentheses are p-values based on robust standard errors.



Table 6 (continued)

Variable	(i)		(ii)		(iii)		(iv)		(v)		(vi)	
	Dependent var: Log (cash/assets)	Deflator: assets	Dependent var: Excess Log(cash/ assets)	Deflator: assets	Dependent var: Log(cash/sales)	Deflator: assets	Dependent var: Excess Log(cash/ sales)	Deflator: assets	Dependent var: Log(cash/sales)	Deflator: sales	Dependent var: Excess Log(cash/ sales)	Deflator: sales
Shareholder Rights (Dummy)												
Shareholder Rights (Level)	-0.19 (0.02)		-0.15 (0.05)		-0.33 (0.09)		-0.46 (0.07)		-0.30 (0.12)		-0.47 (0.05)	
External Capital / GNP	0.35 (0.27)		0.04 (0.91)		0.28 (0.29)		0.29 (0.33)		0.30 (0.20)		0.17 (0.54)	
Private credit / GDP	0.30 (0.20)		0.22 (0.36)		0.00 (0.99)		-0.18 (0.53)		-0.07 (0.78)		-0.03 (0.92)	
Market / Deflator	0.81 (0.01)				0.51 (0.06)				0.003 (0.68)			
Size	-0.05 (0.76)				0.06 (0.66)				0.03 (0.83)			
NWC / Deflator	-1.10 (0.44)				-2.77 (0.01)				-2.43 (0.03)			
Cash Flow / Deflator	-2.45 (0.61)				-4.87 (0.26)				-3.26 (0.32)			
R&D / Sales	36.73 (0.00)				46.06 (0.00)				47.60 (0.00)			
Constant	-3.08 (0.00)		0.80 (0.01)		-3.02 (0.00)		1.23 (0.00)		-2.35 (0.00)		0.98 (0.00)	
Adjusted r-squared	0.29		0.04		0.37		0.02		0.30		0.03	
N	42		41		42		41		43		41	

**Table 7**  
**Robustness Checks of Country Medians Regression – Other Tests**

The dependent variable is the log of cash and equivalents divided by net assets. Net assets are total assets minus cash and equivalents. The shareholder rights variable is a dummy variable equal to one if shareholder rights are high, and zero otherwise. External capital is the stock market capitalization held by minority shareholders. Private credit is the credit provided by deposit money banks and other financial institutions to non-government owned firms. Market-to-book is the market value of equity plus the book value of liabilities divided by the book value of total assets. Size is the log of the book value of total assets in US Dollars. NWC is current assets minus current liabilities minus cash and equivalents. Cash flow is operating income plus depreciation and amortization minus interest minus taxes minus dividends. Expropriation is the International Country Risk guide's assessment of the risk of 'outright confiscation' or 'forced nationalization' as tabulated by LLSV (1998). Past sales growth is the average of the last five years of sales growth or however many years are available on Global Vantage. Numbers in parentheses are p-values based on robust standard errors.

Table 7 (continued)

Variable	Control for dividends (i)	Control for capital expenditures (ii)	Sales growth as measure of investment opportunities (iii)	Control for Expropriation (iv)	OECD Countries (v)	Civil Law Countries (vi)	1997 (vii)	1999 (viii)
Shareholder Rights (Dummy)	-0.48 (0.05)	-0.47 (0.06)	-0.55 (0.06)	-0.51 (0.02)	-0.41 (0.11)	-0.58 (0.02)	-0.33 (0.14)	-0.38 (0.06)
External Capital / GNP	0.30 (0.31)	0.29 (0.32)	0.19 (0.52)	0.12 (0.11)	0.32 (0.62)	0.17 (0.78)	0.16 (0.60)	0.23 (0.41)
Private credit / GDP	0.33 (0.21)	0.35 (0.18)	0.36 (0.11)	0.43 (0.17)	0.15 (0.47)	0.42 (0.10)	0.25 (0.23)	0.39 (0.03)
Expropriation				0.12 (0.11)				
Market-to-Book	0.46 (0.19)	0.62 (0.05)		0.61 (0.07)	-0.43 (0.36)	0.45 (0.17)	0.49 (0.00)	0.28 (0.00)
Past Sales Growth			0.12 (0.94)					
Size	-0.03 (0.84)	-0.07 (0.66)	-0.04 (0.77)	0.01 (0.96)	-0.18 (0.51)	-0.40 (0.03)	0.08 (0.59)	-0.09 (0.38)
NWC / Net assets	-0.80 (0.55)	-0.85 (0.54)	-0.81 (0.58)	-1.56 (0.22)	-1.19 (0.52)	-2.39 (0.20)	-2.49 (0.09)	-2.55 (0.09)
Cash Flow / Net assets	-0.45 (0.93)	-1.68 (0.72)	-2.09 (0.72)	-2.52 (0.59)	3.19 (0.75)	-4.46 (0.51)	3.13 (0.40)	0.72 (0.82)
R&D / Sales	42.67 (0.00)	42.58 (0.00)	42.57 (0.00)	41.98 (0.00)	71.10 (0.31)	181.62 (0.00)	23.54 (0.00)	49.60 (0.00)
Dividends / Sales	3.31 (0.29)							
Capex / Sales		1.79 (0.45)						
Constant	-3.17 (0.00)	-3.20 (0.00)	-2.39 (0.02)	-4.19 (0.00)	-1.26 (0.57)	-0.68 (0.56)	-0.33 (0.15)	-2.73 (0.00)
Adjusted r-squared	0.30	0.29	0.18	0.33	-0.29	0.37	0.23	0.32
N	42	42	43	42	23	27	42	42

**Table 8**  
**Pooled Cross-Country Regression**

The dependent variable is the log of cash and equivalents divided by net assets. Net assets are total assets minus cash and equivalents. The shareholder rights variable goes from 0-5. The common law variable is a dummy equal to one for common law countries, and zero otherwise. External capital is the stock market capitalization held by minority shareholders. Private credit is the credit provided by deposit money banks and other financial institutions to non-government owned firms. Market-to-book is the market value of equity plus the book value of liabilities divided by the book value of total assets. Size is the log of the book value of total assets in US Dollars. NWC is current assets minus current liabilities minus cash and equivalents. Cash flow is operating income plus depreciation and amortization minus interest minus taxes minus dividends. All regressions include industry dummy variables, defined at the two-digit SIC code level. The numbers in parentheses are p-values based on robust standard errors.

Variable	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Shareholder Rights (Level)	-0.04 (0.00)		-0.11 (0.00)	-0.11 (0.00)		-0.19 (0.00)
Common Law		-0.44 (0.00)			-0.62 (0.00)	
External Capital / GNP			-0.00 (0.98)			0.18 (0.00)
Private Credit / GDP			0.45 (0.00)			0.45 (0.00)
Market-to-Book				0.13 (0.00)	0.14 (0.00)	0.13 (0.00)
Size				-0.03 (0.01)	-0.05 (0.00)	-0.05 (0.00)
NWC / Net Assets				-0.15 (0.00)	-0.15 (0.01)	-0.14 (0.00)
Cash Flow / Net Assets				0.02 (0.20)	0.02 (0.19)	0.02 (0.24)
R&D / Sales				1.26 (0.00)	1.31 (0.00)	1.27 (0.00)
Constant	0.04 (0.38)	0.32 (0.00)	-0.14 (0.02)	-2.45 (0.00)	-2.52 (0.00)	-2.91 (0.00)
Adjusted r-squared	0.12	0.14	0.14	0.17	0.20	0.19
N	11413	11414	11411	8447	8447	8445

**Table 9****Pooled Cross-Country Regression: Robustness Tests**

The dependent variable in models (i), (ii), (iii), and (ix) is the logarithm of cash and equivalents divided by sales. The dependent variable in models (iv) – (viii) and (x) – (xiii) is the logarithm of cash and equivalents divided by net assets. Model (vii) excludes the US and Japan. Model (viii) uses weighted least squares where the weight is the inverse of the number of observations for each country. Net assets are total assets minus cash and equivalents. The shareholder rights (level) variable goes from 0-5. The shareholder rights (dummy) variable is a dummy variable equal to one if shareholder rights are high, and zero otherwise. External capital is the stock market capitalization held by minority shareholders. Private credit is the credit provided by deposit money banks and other financial institutions to non-government owned firms. Market-to-book is the market value of equity plus the book value of liabilities divided by the book value of total assets. Deflator is equal to sales in model (ix) and to net assets in models (x) – (xiii), except in the computation of the market-to-book ratio, where deflator is total assets in models (x) – (xiii). Sales growth is computed as the average sales growth over the previous five years or however many years are available on Global Vantage. Size is the log of the book value of total assets in US Dollars, except when sales are employed as the deflator in which case size is the log of sales in US Dollars. NWC is current assets minus current liabilities minus cash and equivalents. Cash flow is operating income plus depreciation and amortization minus interest minus taxes minus dividends. Leverage is short-term debt divided by the book value of total assets. ICAPX is the year-on-year change in net fixed assets plus depreciation. All regressions include industry dummy variables. The numbers in parentheses are p-values based on robust standard errors.



Table 9 (continued)

Variable	Scale all variables by sales (ix)	Sales growth as measure of investment opportunities (x)	G7 Countries (xi)	1997 (xii)	1999 (xiii)
Shareholder Rights (Level)	-0.22 (0.00)	-0.17 (0.00)	-0.38 (0.00)	-0.17 (0.00)	-0.31 (0.00)
External Capital / GNP	0.35 (0.00)	0.13 (0.02)	0.83 (0.00)	0.20 (0.00)	0.27 (0.00)
Private credit / GDP	0.48 (0.00)	0.38 (0.00)	0.78 (0.00)	0.26 (0.00)	0.72 (0.00)
Market / Deflator	0.02 (0.00)		0.15 (0.00)	0.19 (0.00)	0.14 (0.00)
Past Sales Growth		0.02 (0.00)			
Size	-0.13 (0.00)	-0.06 (0.00)	-0.07 (0.00)	-0.02 (0.09)	-0.07 (0.00)
NWC / Deflator	-0.01 (0.26)	-0.17 (0.00)	-0.14 (0.05)	-0.20 (0.02)	-0.02 (0.58)
Cash Flow / Deflator	0.00 (0.04)	0.02 (0.13)	-0.14 (0.05)	-0.00 (0.97)	0.02 (0.26)
R&D / Sales	1.26 (0.00)	1.42 (0.00)	1.26 (0.00)	1.63 (0.00)	1.19 (0.00)
Constant	-1.01 (0.06)	-0.69 (0.00)	-5.46 (0.00)	-4.63 (0.00)	-0.53 (0.34)
Adjusted r-squared	0.24	0.18	0.25	0.19	0.27
N	8447	8973	5785	8069	7665

**Table 10**  
**Pooled Cross-Country Regression: Interactions**

The dependent variable is the logarithm of cash and equivalents divided by net assets. Net assets are total assets minus cash and equivalents. All variables and interaction terms preceded by “High” are 0-1 dummies (high means above the median). The shareholder rights variable goes from 0-5. Market-to-book is the market value of equity plus the book value of liabilities divided by the book value of total assets. External capital is the stock market capitalization held by minority shareholders. Private credit is the credit provided by deposit money banks and other financial institutions to non-government owned firms. Need for External Financing is the US industry median level of the fraction of capital expenditures not financed with cash flow from operations from 1980 – 1990 from Rajan and Zingales (1998). Size is the log of the book value of total assets in US Dollars. NWC is current assets minus current liabilities minus cash and equivalents. Cash flow is operating income plus depreciation and amortization minus interest minus taxes minus dividends. All regressions include industry dummy variables, defined at the two-digit SIC code level. The numbers in parentheses are p-values based on robust standard errors.



**Table 10** (continued)

Variable	(i)	(ii)	(iii)	(iv)	(v)
Shareholder Rights (Level)	-0.12 (0.00)	-0.14 (0.00)	-0.15 (0.00)	-0.07 (0.00)	-0.14 (0.00)
Market-to-Book	0.05 (0.15)	0.06 (0.01)	0.01 (0.85)		
M/B x High Ext. Cap. / GNP	-0.01 (0.72)		-0.02 (0.31)		
M/B x High Priv. Cred. / GDP	0.08 (0.02)		0.08 (0.03)		
M/B x High Shldr. Rghts.		0.09 (0.01)	0.08 (0.00)		
Need for External Financing				0.72 (0.00)	0.07 (0.65)
Need for Ext. Fin. x High Sh. Rghts.					0.80 (0.00)
Size	-0.03 (0.01)	-0.03 (0.01)	-0.03 (0.01)	-0.01 (0.37)	-0.01 (0.29)
NWC / Net Assets	-0.15 (0.00)	-0.15 (0.01)	-0.15 (0.01)	-0.18 (0.06)	-0.17 (0.07)
Cash Flow / Net Assets	0.02 (0.19)	0.02 (0.22)	0.02 (0.21)	0.07 (0.02)	0.07 (0.05)
R&D / Sales	1.46 (0.00)	1.24 (0.00)	1.43 (0.00)	1.19 (0.00)	1.14 (0.00)
R&D / Sales x High Ext. Cap. / GNP	0.55 (0.37)		0.16 (0.72)		
R&D / Sales x High Priv. Cred. / GDP	-0.75 (0.23)		-3.22 (0.03)		
R&D / Sales x High Shldr. Rghts.		0.01 (0.96)	2.87 (0.06)		
Constant	-2.43 (0.00)	-2.15 (0.00)	-2.18 (0.00)	-1.74 (0.00)	-1.47 (0.00)
Adjusted r-squared	0.17	0.18	0.18	0.19	0.19
N	8445	8447	8445	3904	3904