Legal Protection, Equity Dependence and Corporate Investment:
Evidence from around the World

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Abstract

In this paper, we investigate whether legal protection and the equity financing channel affect the relationship between corporate investment and stock prices in an international setting. We find that equity-dependent firms display larger sensitivity of corporate investment to stock prices, which is consistent with the equity-financing channel argument. In addition, firms in countries with stronger legal protection have corporate investment that is more sensitive to their stock prices. This relationship is found to be more pronounced for equity-dependent firms. Overall, our evidence complements the earlier finding by Baker et al. (2003) and does not support the notion that the stock market is just a sideshow.

1. Introduction

Existing literature has documented ample evidence on the positive relationship between corporate investment and stock prices. In an informationally efficient market, one traditional explanation for the observed positive association is that stock prices (measured by Tobin's Q) reflect the market's information about investment opportunities or the marginal rate of return on capital. However, recent papers in behavioral finance have suggested that market is inefficient and offered an alternative explanation of the relationship between corporate investment and stock prices through the equity-financing channel. More specifically, the existence of a non-fundamental component of stock prices affects a firm's equity financing and consequently, its investment decisions. Studies by Morck et al. (1990) and Blanchard et al. (1993) argue that the presence of market inefficiency effectively limits the role of stock prices in explaining investment. That is, the stock market is just a sideshow.

If the equity-financing channel is the cause of the positive relationship between corporate investment and the stock market, corporate investment of equity-dependent (those that rely more on external funds to finance investment projects) firms should be more sensitive to changes in the non-fundamental component of stock prices than that of nonequity-dependent firms. Baker et al. (2003) provide a simple theoretical model and their empirical evidence for firms in the U.S. is consistent with the equity-financing channel view. Yet, very little is known regarding the relationship between corporate investment and the stock market outside the U.S., particularly in the emerging markets where capital markets are less-developed.

Most recent international studies document that institutional factors such as legal environment, cultures, taxes, perceptions of corruption, etc., matter for capital market

development, corporate governance, capital structure and cost of capital.[1] In particular, countries with strong legal protection of investor rights usually have more developed capital markets (LLSV (1998)) and lower cost of equity (Hail and Leuz (2004); Chen et al. (2004)).

Besides, stronger legal protection of investor rights further promotes more efficient allocation of capital by preventing managers from overinvesting in declining sectors (Wurgler (2000)). Hence, legal protection of minority shareholders affects corporate investment decisions. However, there is also a lack of studies that examine whether cross-country differences in institutional characteristics are possible determinants of firm-level corporate investment decisions.[2]

The primary objective of our paper is to examine whether legal protection and the equity-financing channel affects the relationship between corporate investment and stock prices around the world. We hypothesize that firms in countries with stronger legal protection of investors should have corporate investment that is more sensitive to their stock prices. In addition, if the equity-financing argument is valid, we predict that the investment-to-price sensitivity should increase with the degree of equity dependence. Our last hypothesis considers the interaction between legal protection and equity dependence. Specifically, we predict that the effect of legal protection on the sensivity of corporate investment to stock prices should be more pronounced for equity-dependent firms. To the best of our knowledge, there has been no previous empirical study which examines these issues.

We use three indexes from La Porta et al. (LLSV (1998, 2003) and the modified *KZ* index from Kaplan and Zingales (1997) as our measures of legal protection and equity-dependence

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[1] See Beck and Levine (2005) for an excellent review of the law and finance literature.
[2] One paper that looks at the role of investor protection and real investment is Kelley and Woidtke (2005), but, their focus is on the foreign investments made by multinational U.S. firms. Another paper by Hartzell et al. (2005) examines the effect of firm-level governance mechanisms on corporate investment of REIT firms.

respectively. In our first test, we find that legal protection is positively related to the sensitivity of corporate investment to stock prices. In other words, firms in countries with strong legal protection display higher sensitivity of corporate investments to stock prices. Next, we replicate the test in Baker et al. (2003) and confirm the role of the equity-financing channel in our international sample in that investment-to-price sensitivity increases monotonically with the degree of equity dependence. Finally, our last test on the interaction between legal protection and equity dependence reveal that the positive association between legal protection and investment-to-price sensitivity is more pronounced for equity-dependent firms. In summary, our empirical findings are consistent with our three main hypotheses and are robust to alternative specifications.

We interpret our results as providing further evidence that counters the notion of the stock market being just a sideshow. This concurs with the conclusion reached by Baker et al. (2003) for the sample of U.S. firms. Both legal protection and the equity financing-channel matter in influencing managers' corporate investment decisions with respect to changes in stock prices. Investor protection in the forms of anti-directors rights and securities laws serves to prevent managers from undertaking value-destroying investments. On the other hand, the equity-financing channel argument suggests that the corporate investment of equity-dependent firms with financing constraints is more responsive to non-fundamental variations in stock prices. Overall, these two factors collaborate in guiding equity-dependent firms achieve efficient investment level.

The remainder of our paper is as follows. Section 2 reviews the literature and develops our hypotheses. Section 3 describes the source of our data. Section 4 presents the empirical tests of the hypotheses and discusses the results. Section 5 concludes the paper.

2. Literature Review and Hypothesis Development

2.1 Legal protection, equity dependence, corporate investment and the stock market

Most of the theoretical work on whether the stock market affects the pattern of corporate investment predicts that corporate investment will be positively associated with the stock market. The traditional view is that stock prices represent investment opportunities, which suggests that there is a positive relation between corporate investment and firm value measured by Tobin's Q (see Tobin (1969)).[3] An alternative view is based on the equity-financing channel. For example, Keynes (1936) points out that stock market mispricing has an effect on the cost of equity, while Bernanke and Gertler (1995) and others argue that stock market mispricing can also affect the cost of debt though its effect on perceived collateral values. Stein (1996), Baker et al. (2003), and others suggest that since mispricing causes the effective cost of external equity to deviate from the cost of other forms of capital, stock prices can influence equity financing pattern, and in turn corporate investment.

The empirical evidence is, however, less settled. While Morck et al. (1990) and Blanchard et al. (1993) find little evidence that the stock market affects corporate investment, Chirinko and Schaller (2001), Baker et al. (2003), and Chen et al. (2005) find that the stock market may have important effects on corporate investment.

In particular, Baker et al. (2003) extend the model in Stein (1996) and derive implications on the role of the equity-financing channel on corporate investment. They argue that stock market irrationality is unlikely to affect the investment decisions of nonequity-dependent firms (those with sufficient liquidity and no debt). In contrast, equity-dependent firms will not want to go the external market to issue equity in cases of undervaluation, despite their need to raise funds

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[3] Chen et al. (2005) use price synchronicity and PIN (the probability of informed trading) as proxies for the degree of price informativeness and find that these measures increase the sensitivity of investment to stock prices.

for investments. The opposite happens in cases of overvaluation in that equity-dependent firms are now willing to issue equity to finance their investments. Therefore, equity-dependent firms have investment that is more sensitive to variations in non-fundamental component of stock prices than nonequity-dependent firms.

Baker et al. (2003) use a modified *KZ* index, first constructed by Kaplan and Zingales (1997) as a measure for equity dependence.[4] More specifically, their modified *KZ* index is negatively related to cash flows, cash dividends, and cash balances; and is positively associated with leverage. The original *KZ* index has been widely used to measure the degree of financial constraint.[5]

Our hypothesis on the effect of financing constraint follows that in Baker et al. (2003). Specifically, we expect that the sensitivity of corporate investment to stock prices is stronger for equity-dependent firm. Empirical findings for firms in the U.S. are consistent with the theoretical prediction.

Legal protection includes not only the rights written into regulations and laws, but also the effectiveness of enforcement. A series of papers by LLSV (1997, 1998, and 2002) examine the various aspects of legal protection of outside investors across 49 countries and document that these institutional characteristics matter for capital market development, corporate governance, and firm value. In particular, they find that legal protections are the strongest in English common law countries and the weakest in French civil law countries, with German and Scandinavian civil law countries falling in between. Moreover, countries that protect shareholders better have better corporate governance, more developed capital and debt markets, larger stock market

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[4] The original *KZ* index also includes Tobin's Q, which is positively associated with the *KZ* index. However, Baker et al. (2003) report similar results when they use the original *KZ* index. Baker et al. (2003) define a firm as equity-dependent if the firm's stock price is undervalued and its available wealth is low enough such that it has to issue undervalued equity to achieve the first-best level of investment.

capitalizations, larger numbers of listed securities per capita, and a higher rate of IPOs. They further show that firms in countries with stronger shareholder protection have higher firm values.

A more recent paper by LLSV (2003) examines how securities laws affect capital market development for the same 49 countries. Their findings strongly suggest that law does matter, especially for those that facilitate private enfocement through disclosure requirements and liability rules.

Meanwhile, Hail and Leuz (2004) document a negative association between legal enforcement and country-level cost of equity. Chen et al. (2004) further report that firms in emerging markets with more effective corporate governance have lower implied cost of equity, especially in economies with low investor protection. In addition, Wurgler (2000) shows that financial markets play important role in the efficient allocation of capital. More importantly, legal protection of investor rights is one mechanism through which efficient allocation of capital can be achieved.

Since legal protection of investors affects the development of financial markets, cost of capital, and efficient investment level, we expect that legal protection of investors should have important effects on the sensitivity of corporate investment to changes in stock prices, especially for equity-dependent firms. Studies in corporate governance have suggested that managers have incentives to engage in empire building and other destructive activities, which leads to inefficient corporate investment decisions. Therefore, firms' corporate investments may not be sensitive to changes in the investment opportunity (stock prices).

Strong legal protection helps to alleviate the agency conflicts between corporate managers and minority shareholders by directing managers into investing in growing sectors and prevent them from overinvesting in declining sectors. In addition, firms in countries with stronger legal

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[5] For example, Lamont et al. (2001) use the *KZ* index to examine the impact of financial constraints on stock returns.

protection of investors face fewer constraints in raising external funds to finance their investment projects. Taken together, this implies that the corporate investment of these firms should be more responsive to changes in their stock prices. Therefore, we hypothesize that legal protection should be positively associated to the sensitivity of corporate investment to stock prices.

Baker et al. (2003) further argue that the presence of agency problem increases the incentives of managers of nonequity-dependent firms to smooth investment. Hence, the corporate investment of these firms may not be responsive to changes in their stock prices. However, the sensitivity of corporate investment to stock prices should increase with the degree of equity-dependence. Combining the effect of legal protection and equity-financing channel, we hypothesize that the positive relationship between legal protection and investment-to-price sensitivity should be more pronounced for equity-dependent firms.

To summarize, we have the following three main hypotheses:

Hypothesis 1: *Firms in countries with stronger legal protection have **higher** sensitivity of corporate investment to stock prices*.

Hypothesis 2: *Equity dependent firms have **higher** sensitivity of corporate investment to stock prices*.

Hypothesis 3: *Equity dependent firms in countries with stronger legal protection have **higher** sensitivity of corporate investment to stock prices*.

2.2 Cash flow and corporate investment

Although the relationship between cash flow (i.e., liquidity) and corporate investment is not the focus of our study, we also include cash flow in our investment equation as an important control variable. Beginning with Fazzari et al. (1988), a large number of studies have investigated the relationship between corporate investment and cash flow to test for the role of financial constraint. Most of these studies provide strong support for the existence of financing constraints.[6] Basically, they find that cash flow is a more important determinant of corporate investment for firms that are a priori identified as the most likely to be financially constrained. These studies categorize firms according to firm characteristics, such as dividend payout, dividend changes, firm size, debt rating, bank borrowing, or corporate group membership, that are designed to measure the degree of financing constraint they face.

However, using different classifications, recent studies by Kaplan and Zingales (1997) and Cleary (1999) provide conflicting results. They find that investment is the most sensitive to cash flow for firms that are the least likely to be financially constrained. Kaplan and Zingales classify firms according to their degree of financial constraint based on quantitative and qualitative information obtained from company annual reports, while Cleary classifies firms according to the financial variables related to financial constraints.

A recent paper by Cleary (2006) attempts to resolve the conflicting explanations by examining the interrelationship among measures of financial constraints in an international setting. He focuses on three common measures: size, financial strength, and dividend payouts. His findings indicate that investment-cash flow sensitivity is stonger for firms with better financial strength and high lower dividend payouts. He also argues that cash-flow volatility is an

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[6] Hubbard (1998) provides an extensive summary of this literature.

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important variable which seems to drive the results for constrained firms. This implies that high cash-flow volatility firms tend to have lower investment-cash flow sensitivities.

Wei and Zhang (2004) examine the effect of ownership structure on the sensitivity of investment to cash flow for firms with dual-class shares in the U.S. and find that the sensitivity of a firm's investment to its cash flow increases with the cash-flow ownership of its insiders but decreases with the voting rights of its insiders. The result is consistent with the underinvestment hypothesis, and provides evidence to support the positive enhancement effect of managerial cash-flow rights and the negative entrenchment effect associated with managerial voting rights.[7]

3. Data and Sample Statistics

We collect two sets of data. The first dataset involves measures of legal protection of investors at the country level. Following previous literature, we measure legal protection of investors based on the following three indexes from LLSV: (1) anti-directors rights; (2) public enforcement; and (3) private enforcement.

The second dataset consists of firm-level financial data. Our firm-level data comes from Worldscope and Datastream, which are provided by Thomson Financial. Excluding the U.S. and Canada, we manage to retrieve firm-level data for 42 out of the 49 countries covered by LLSV. For each firm, we collect financial variables which include capital expenditures, cash flow, cash balances, cash dividends, total debt, total assets, and book value of equity from Worldscope; and market value of equity from Datastream. From the initial sample, we exclude firms with missing

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[7] Papers by Titman, Wei, and Xie (2004a, 2004b) examine stock performance subsequent to capital investment. Titman, Wei, and Xie (2004a) find that the firms in the U.S. that spend the most on capital investments relative to their sales or total assets subsequently achieve negative benchmark-adjusted returns, especially for less financially constrained firms, which is consistent with the overinvestment hypothesis. Titman, Wei, and Titman (2004b) examine the relation between capital investment and subsequent stock returns for Japanese firms and find that the

firm-year observations; firms in operating in the financial industry (firms with SIC codes between 6000 and 6999); and firms with book-value of total assets of less than $10 millions in local currency. Overall, our filtering process yields an unbalance panel data of 134,298 firm-year observations for 21,239 firms from 42 countries. The sample period is from 1985 to 2004.

Table 1 partitions the countries into 4 groups: Asia-Pacific (14 countries), Western-Europe (18 countries), South-America (7 countries), and Africa (3). The second column of Table 1 reports the total firm-year observations for each country in the final sample. Japan and United Kingdom dominate the sample, each with firm-year observations of more than 20,000.[8]

3.1 Country-level legal protection variables

As mentioned earlier, the legal protection variables are directly taken from the work of LLSV (1998, 2003). The first variable, the anti-directors rights index, has been widely used in many studies as a proxy for corporate governance.[9] It is constructed by adding one to the six rights which are intended to measure the degree of minority shareholders' involvement in corporate decisions. It ranges from 0 to 6 with higher values indicating stronger degree of legal protection.

The second and third measures are obtained from LLSV (2003).[10] The private enforcement index is constructed by taking an arithmetic average of the disclosure requirement index and burden-of-proof index. It ranges from 0 to 1. Similarly, higher values of the index suggest more effective private enforcement of securities laws. The disclosure requirement index regulates the information that must be disclosed in an IPO transaction and the burden-of-proof index measures

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result is significantly different between *keiretsu* firms and independent firms; and between the bubble period (pre-1990) and the after-bubble period (post-1990).

[8] We also exclude Japan and United Kingdom in one of our robustness checks to ensure that our main results are not driven by observations from these two countries.

[9] Dittmar et al. (2003) examine the cash holdings decisions for 45 countires and find that firms in countries with higher anti-directors rights (which imply more effective corporate governance) hold less cash.

the procedural difficulty in recovering losses from directors, distributors, and accountants. In sum, the private enforcement index measures the costs that investors need to incur to recover losses from corporate insiders, distributors of securities and accountants.

The public enforcement index is constructed by taking an arithmetic average of the supervisor characteristics index, investigative powers index, orders index, and criminal index. It ranges from 0 to 1, with higher values of the index signifying more effective enforcement of securities laws by the regulators. The supervisor characteristics index captures four aspects of the Supervisor: its independence, criteria of dismissal, focus on the securities markets, and power to regulate equity-issance and/or listing rules on the exchanges. The investigate power index measures the power of the Supervisor in gathering the necessary documents and the ability to subpoena witness' testimony in case of a litigation. The orders index measures the power of the Supervisor in imposing sanctions to issuers, distributors, and accountants for non-criminal violations of securities laws. The criminal index measures the power to enforce sanctions for criminal violations of securities laws. In sum, the public enforcement index measures the power of the capital market supervisory agency in regulating and enforcing the securities laws.

In addition to the three legal protection measures, we also use the legal origin variable because LLSV (1998) have shown that the common-law countries offer stronger legal protection to investors.[11] For convenience, we use a dummy variable that equals 1 for English common-law countries and 0 for French or German or Scandinavian civil-law countries in regression specifications that include legal origin as an independent variable.

From the third column of Table 1, we observe that there is wide variation in the legal origin

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[10] See La Porta et al. (2003) for a more complete explanation of the various indexes making up the private enforcement and public enforcement index.

[11] Ball et al. (2000) provide evidence that the demand for timely and conservative accounting numbers is higher in common-law countries as compared to code-law countries.

of the countries in our sample. The majority of countries in Asia-Pacific (10 out of 14) and Africa (2 out of 3) adopt English common-law system. In contrast, French civil-law system is followed in South-America and most of the countries in Western-Europe (8 out of 18). The third column of Table 1 shows that Asia-Pacific countries display the highest anti-directors rights (3.57) and Western-Europe countries display the lowest (2.56). Only Belgium has anti-directors rights score of 0 and 5 countries (Hong Kong, India, Pakistan, Chile, South Africa) have anti-directors rights score of 5.

The fourth and fifth columns of Table 1 provide the statistics for the private and public enforcement indexes. The public enforcement score ranges from 0.18 (Austria) to 0.92 (Phillipines) and the private enforcement score ranges from 0 (Japan) to 0.90 (Australia). Similar to the pattern we have earlier for the anti-directors rights index, Asia-Pacific countries exhibit the highest scores for both indexes (0.70 and 0.59), while South-America and Africa exhibit the lowest scores for the private enforcement index (0.34) and public enforcement index (0.36) respectively.

Similar to the finding by LLSV (1998), we also document that there exists a correlation between legal-origin and anti-directors rights index, with common-law countries reporting higher anti-directors rights scores and civil-law countries reporting lower anti-directors rights scores. This is consistent with the notion that common-law countries in general provide stronger legal protection of investors.

[Insert Table 1 here]

3.2 Firm-level financial variables

For each firm i, our measure of corporate investment ($CAPX_{it}$) is calculated as capital expenditures in year t divided by total assets at the end of year t-1. Cash-flow (CF_{it}) is calculated

as income before extraordinary items plus depreciation and amortization in year t divided by total assets at the end of year t-1. Finally, our measure of stock price, Tobin's Q (Q_{it}) is calculated as market value of equity (stock price multiplied by number of shares outstanding) plus total assets minus book value of equity divided by total assets (at the end of year t). We winsorize all financial variables at the 1 and 99 percent levels to minimize the problems of outliers.

Kaplan and Zingales (1997) construct the original five-variable KZ index for a sample of 49 low-dividend manufacturing firms in the U.S. as a measure of financial constraint. They estimate the following regression equation to construct the KZ index for each firm-year observation:

$$KZ_{it} = -1.002CF_{it} - 39.368DIV_{it} - 1.315CASH_{it} + 3.139LEV_{it} + 0.283Q_{it} \qquad (1)$$

where for each firm i, KZ_{it} is its KZ score in year t. $CASH_{it}$ is calculated as cash balances at the end of year t divided by total assets at the end of year t-1. LEV_{it} is calculated as the sum of long-term debts and debt in current liabilities divided by the sum of long-term debts, debt in current liabilities, and book value of equity (all measured at the end of year t). Dividend (DIV_{it}) is calculated as cash dividends paid in year t divided by total assets at the end of year t-1. CF_{it} and Q_{it} are cash flow and Tobin's Q in year t, which we have defined earlier.

However, Baker et al. (2003) argue that Q captures information about stock mispricing and is often used a proxy for investment opportunities. To avoid this dual role for Q, we follow their approach and use a modified four-variable version of the KZ index which omits Q in the baseline specification. We use this modified KZ index as our measure for equity-dependence.[12] Firms with higher KZ scores are considered to be more equity-dependent or more reliant on external equity for their investment projects.

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[12] Note that we first winsorize the components of the KZ index at the 1 and 99 percent before estimating equation (2)

More specifically, we estimate equation (2) below to construct the four-variable KZ index for each firm-year observation:[13]

$$KZ_{it} = -1.002CF_{it} - 39.368DIV_{it} - 1.315CASH_{it} + 3.139LEV_{it} \qquad (2)$$

Panel A and B of Table 2 presents the summary statistics for the financial variables. The mean (median) corporate investment ($CAPX_t$) across the 42 sample countries is 6.8 (4.1) percent. The value for our international sample is lower compared to the mean (median) of 8.2 (6) percent reported by Baker et al. (2003) for the U.S. sample. Meanwhile, the mean (median) cash flow (CF_t) is 6.2 (6.9) percent; the mean (median) Tobin's Q (Q_t) is 1.4 (1.1); and the mean (median) KZ Index is 0.12 (0.24). For the subsample results, we observe that Asia-Pacific countries have the largest mean KZ score and the smallest mean corporate investment, Tobin's Q, and cash flow. South-American countries have the largest mean corporate investment; Western-European countries have the largest mean Tobin's Q; and African countries have the smallest KZ Index.

Additionally, we compute the Pearson's correlations among the financial variables and the legal protection measures. The results are presented in Panel B of Table 2.[14] All the correlations are found to be statistically significant at the 1 percent level. We observe that the KZ index is negatively correlated to all other financial variables as well as the legal protection variables. The correlations between the other financial variables and the legal protection variables are generally negative (6 out of 9), with magnitudes ranging between -0.537 to 0.209. The correlations between corporate investment with stock price (as measured by Q) and cash-flow are both positive, which are consistent with the evidence reported in the literature. We will verify the univariate results by estimating the baseline investment regression in the next section. Finally,

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[13] We use the modified KZ index in our subsequent empirical tests. However, in our unreported tests, we obtain similar results when we use the original 5 variable KZ index.

[14] The country-median values for the financial variables are used in computing the correlation coefficients.

the correlations among the three legal protection variables are all in the right direction (positive) with magnitudes ranging from 0.40 to 0.50.

[Insert Table 2 here]

3. Results and Discussions

In this section, we formally investigate the role of legal protection of investors and equity dependence in the relationship between a firm's stock price and its corporate investment. Specifically, we will empirically examine (i) whether legal protection of investors affects corporate investment, (ii) whether the empirical evidence found for the U.S. firms on the equity-financing channel and corporate investment (Baker et al. 2003) can be extended to international markets, and (iii) whether legal protection of investors has an effect on corporate investment via the equity-financing channel. Our research design follows Baker et al. (2003) closely.

4.1 Specification of the investment equation: the role of legal protection of investors

Following Fazzari et al. (1988) and Baker et al. (2003), we estimate the following baseline investment equation for our international sample:

$$CAPX_{it} = a_i + a_t + bQ_{it-1} + fCF_{it} + u_{it} \qquad (3)$$

where for each firm *i*, $CAPX_{it}$ is its corporate investment in year *t*; Q_{it-1} is its Tobin's Q in year *t*-1; and CF_{it} is its cash flow in year *t*. These variables are defined earlier in the previous section. *b* and *f* are regression coefficients which measure the sensitivity of corporate investment to stock prices and cash flows respectively.

We adopt the same approach as Baker et al. (2003) and Chen et al. (2005) in estimating fixed effects model for our panel data. We include firm (a_i) and year (a_t) dummies to control for

the individual firm and year effects. u_{it} is the error term which is assumed to be independent of the explanatory variables. In order to mitigate the problems of serial auto-correlation and heteroskedasticity, we estimate White's heteroskedasticity corrected robust standard errors (clustered by firm).

Model (1) of Table 3 presents the coefficients for the baseline investment equation (3) with $CAPX_{it}$ as the dependent variable and Q_{it-1} and CF_{it} as explanatory variables. We find that both the b and f coefficients are positive and statistically significant at the 1 percent level. In addition, the magnitude of f (0.115) is almost ten times that of b (0.012). The finding for our international sample corroborates the prevailing general result that corporate investment is positivitely correlated with both stock prices and cash flow.

Our next task is to test whether legal protection of investors affects the sensitivity of corporate investment to stock prices. In order to test Hypothesis (1), we modify equation (3) to include our measures of legal protection and estimate the modified investment equation below:

$$CAPX_{it} = a_i + a_t + bQ_{it-1} + c(Q_{it-1} \times LP_i) + fCF_{it} + u_{it} \tag{4}$$

where LP_i is one of the legal protection of investors measures for firm i. Note that firms from the same country will have similar value of LP. The other variables are as defined previously. The coefficient of interest in this case is the interaction coefficient c. Hypothesis 1 predicts that c is positive. In other words, we conjecture that legal protection of investors increases the sensitivity of corporate investment to stock prices.

We estimate equation (4) by including the interaction of each of the three measures of legal protection (Anti-Directors Rights, Private Enforcement, and Public Enforcement) with Tobin's Q

as an additional independent variable and report the results of fixed-effects regressions in Models (2) to (4) of Table 3 respectively.[15, 16]

Although the b coefficients are now smaller in magnitude compared to that in Model (1), they continue to be positive and stastically significant at the 1 percent level. The magnitudes of the f coefficients are also stable across Models (1) to (4). More importantly, we find that the interaction coefficient c is positively significant in all three models (with t-stats of 4.30, 4.00, and 5.39 respectively), which is supportive of Hypothesis 1. The economic significance of the result is pretty substantial. A 1 point change in the the anti-directors rights index changes the sensitivity of corporate investment to stock prices by about 23 percent. Similarly, a 0.10 change in the private (public) enforcement indexes leads to a 24 (21) percent change in the sensitivity of corporate investment to stock price.[17]

[Insert Table 3 here]

Since legal origin is correlated with the legal protection variables, we estimate an alternative specification to equation (4) below:

$$CAPX_{it} = a_i + a_t + bQ_{it-1} + c(Q_{it-1} \times LO_i) + fCF_{it} + u_{it} \qquad (4)$$

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[15] We have also estimated fixed-effects regressions that include the legal protection measures as another independent variable and obtain similar results. The interaction coefficients remain positively significant at the 1 percent level. More interestingly, we find that our measures of legal protection are all negatively associated to corporate investment, suggesting that firms in countries with stronger legal protection engage in smaller corporate investments.
[16] In another unreported regressions, we include the legal protection measures and their interactions with cash flow as additional regressors. While the interaction terms with the legal protection measures displays positive association with corporate investment, the interaction terms with cash flow are found to be negative and significant at the 1 percent level. Our interpretation is that strong legal protection helps to overcome the information asymmetry between managers and minority shareholders. As a result, firms in countries with stronger legal protection show smaller sensitivity of corporate investment to cash flow. In those countries, firm's corporate investment decisions are not so much affected by its liquidity constraints, which mitigate the problem of underinvestment.
[17] For anti-directors rights, the change in sensitivity of corporate investment to stock price is (0.0015/0.0066)*100% = 23 percent. For private enforcement index, the value is [(0.1*0.0114)/0.0048)]*100% = 24 percent. For private enforcement index, the value is [(0.1*0.0116)/0.0056)]*100% = 21 percent.

where LO_i is the legal origin dummy variable for firm i. It equals 0 for civil-law countries and 1 for common-law countries. Similar to LP, firms from the same country also have similar LO values. The other variables are as defined previously. We again hypothesize that c is positive. Firms in countries with common-law system have corporate investment that is more sensitive to stock prices than firms from countries with civil-law system.

We estimate equation (4) using fixed-effects model and present the coefficients in Model (1) of Table 4. The result confirms our prediction as c is found to be significant with the right sign (positive). In fact, firms in English common-law countries display a substantially higher sensitivity of corporate investment to stock prices than firms in civil-law countries by about 60%.[18]

By combining legal origin and the legal protection measures, we estimate equation (5) below:

$$CAPX_{it} = a_i + a_t + bQ_{it-1} + c(Q_{it-1} \times LO_i \times LP_i) + fCF_{it} + u_{it} \qquad (5)$$

where the variables are as defined previously. Likewise, we expect c to be positive. Firms in countries with common-law system and strong legal protection have corporate investment that is more sensitive to stock prices than firms from countries with civil-law system and weak legal protection.

We include the interaction of each of the three measures of legal protection with the legal origin dummy as well as Tobin's Q as an additional independent variable and present the estimation results of equation (5) using fixed-effects model in Models (2) to (4) of Table 4. Indeed, we find that c is positively significant at the 1 percent level in all three models as we expect. In terms of economic significance, when firm moves from a common-law country to a civil law country and the anti-directors rights index changes by 1 point, the sensitivity of its corporate investment to stock prices changes by about 10 percent. A similar move coupled by a

0.10 change in the private (public) enforcement index leads to an 8 percent change in the sensitivity of corporate investment to stock prices.[19]

[Insert Table 4 here]

Subsequently, we perform a series of additional checks to examine whether our results are robust to alternative specifications. Since the results for all the three measures of legal protection are similar, we only report the results for the anti-directors rights index for the sake of brevity.

In the first robustness test, we re-estimate equation (4) using country random-effect specification to control for cross-country variations and report the coefficients in Model (1) of Table 5. The standard errors reported are White's heteroskedasticity corrected robust standard errors (clustered by country). Despite the reduction in the adjusted R^2 of the model from 0.40 to 0.12, our main result continues to hold in that we still obtain positive and significant coefficient for c (t-stats = 3.37). As for the other coefficients, the coefficient b has also dropped from 0.0066 to 0.0039 and it is now significant at the 5 percent level. The magnitude and significance of coefficient f are similar to that found in Table 3.

Next, we exclude Japan and the United Kingdom from our sample to check if our result persists after dropping observations from the two countries that dominate our sample. We re-estimate equation (4) using fixed-effects model and report the results in Model (2) of Table 5. We show that the coefficient c retains its positive significance (t-stats = 3.82), which suggest that our main finding is not driven by observations from Japan and the United Kingdom.

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[18] The increase in sensitivity of corporate investment to stock price is (0.0055/0.0091)*100% = 60 percent.
[19] For anti-directors rights, the change in sensitivity of corporate investment to stock price is (0.0010/0.0095)*100% = 11 percent. For private enforcement index, the value is [(0.1*0.0070)/0.0092)]*100% = 7.6 percent. For private enforcement index, the value is [(0.1*0.0072)/0.0093)]*100% = 7.5 percent.

In addition, we employ two other measures which previous studies have found to be alternative measures of corporate governance. The first measure is corporate board index from the Institute for Management Development. The index is available for 34 out of the 42 countries in our sample, with South Korea having the smallest score (4.45) and Denmark and Finland having the highest score (7.55). Since a higher score on the index suggests more effective governance from the board of directors, our prediction is similar as before.

The second measure is the earnings management index constructed by Leuz et al. (2003).[20] The index is available for only 30 countries in our sample, ranging from the minimum score of 4.8 (Australia) to the highest score of 28.3 (Austria and Greece). Unlike the other measures of legal protection, a higher score on the index implies that firms in the particular country is more prone to earnings management, indicating that legal protection is likely to be low for that country. This time, we predict that the coefficient c should be negative.

We repeat the estimation of equation (4) by including interaction terms involving the two alternative indexes and present the results of fixed-effects regressions in Models (3) and (4) of Table 5. We find that the coefficient c is positively significant (t-stats = 4.40) in Model (3) and negatively significant (t-stats = -5.41) in Model (4) respectively, which are consistent with our predictions. Therefore, firms in countries with higher scores on the corporate board index and lower scores on the earnings management index display larger sensitivity of corporate investment to stock prices. The results on the other control variables in the investment equation are also robust regardless of the measures of legal protection used in the specification.

Finally, we are interested in finding whether our main result could be influenced by the level of capital market development. We use the ratio of stock market capitalization to GNP per capita (both also obtained from LLSV (1998)) as proxy for how developed a country's capital market is

and include it as an additional control variable in the estimation of equation (4).[21] From Model (5) of Table 5, we find that the coefficient c remains positively significant (t-stats = 4.30). Legal protection increases the sensitivity of corporate investment to stock prices, even after accounting for the level of capital market development. Besides, the coefficient on the capital market development measure is also positively significant (t-stats = 4.30), which imply firms in more developed countries have a tendency to take on more investment projects.

To summarize, our findings so far highlight the important role that legal protection play in the relationship between corporate investment and stock prices. In general, firms in countries with strong legal protection of investors have corporate investment that is more sensitive to stock prices than firms in countries with weak legal protection.

[Insert Table 5 here]

4.2 The roles of equity-financing channel and legal protection of investors

After we have established that legal protection matters in firm's sensitivity of corporate investment to stock prices, we now explore the role of the equity-financing channel and its interaction with the legal protection measures. As elaborated in the earlier section, we use the four-variable *KZ* index as our measure equity dependence to test Hypotheses 2 and 3.

We first assign firms to *KZ* quintile portfolio, where quintile 1 represents the portfolio consisting of firms in the bottom 20% of *KZ* score. Correspondingly, quintile 5 represents the portfolio of firms in the top 20% of *KZ* score. Following Baker et al. (2003), the assignment of firm is based on firm median *KZ* score over the whole sample period.[22]

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[20] See Leuz et al. (2003) for details on the construction of the earnings management index.

[21] The same variable is used by Dittmar et al. (2003) as a proxy for capital market development. They find that capital market development increases a firm's tendency to hold more cash balances.

[22] Alternatively, we assign firms based on firm-year *KZ* score and obtain similar but slightly weaker results.

We then estimate the baseline investment equation (3) separately for each *KZ* quintile portfolio. As before, we estimate fixed-effects model that control for firm and year effects, with White's heteroskedasticity corrected robust standard errors (clustered by firm). Hypothesis 2 predicts that *b* increases with *KZ* quintiles. In other words, we conjecture that the sensitivity of corporate investment to stock prices should increase with the degree of equity-dependence.

Models (1) to (5) of Table 6 present the estimation results of equation (3) for *KZ* quintile 1 to 5 respectively. We observe that the coefficient *b* increases monotonically from 0.0060 in the bottom quintile to 0.0173 in the top quintile. Firms classified as more equity-dependent displays a larger sensitivity of investment to stock prices than those firms which are classified as nonequity-dependent. The finding for our international sample is consistent with Hypothesis 2 and complements the finding in Baker et al. (2003) for the U.S. sample. Hence, we interpret our result as supportive of the equity financing channel as a potential explanation on the relationship between corporate investment and stock prices for international firms.

Although the magnitude of the coefficient *f* is the largest (0.1461) for the bottom *KZ* quintile and the smallest (0.1031) for the top *KZ* quintile, it does not appear to display any meaningful pattern. Both Kaplan and Zinglaes (1997) and Baker et al. (2003) report similar results.

In terms of economic significance, one standard deviation change in Tobin's Q changes corporate investment by 1.1 (bottom *KZ* quintile) to 3.1 percent (top *KZ* quintile).[23] Hence, the economic effect is quite sizeable, considering that the median corporate investment over the whole sample period is 4.1 percent. Similarly, one standard deviation change in cash flow changes corporate investment by 1.4 (bottom *KZ* quintile) to 2 percent (bottom *KZ* quintile). The analysis suggests that the effect of stock prices on corporate investment outweighs that of cash

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[23] For firms in the bottom *KZ* quintile, the change in corporate investment is (1.776*0.0060) = 1.07 percent. Correspondingly, for firms in the top *KZ* quintile, the value is (1.776*0.0173) = 3.07 percent.

flows for firms in the top *KZ* quintile (those which are considered to be most dependent on external equity). This finding is similar to that found by Baker et al. (2003) for the U.S. sample.

We also follow Baker et al. (2003) in reporting *t*-statistics which essentially tests the hypothesis that the difference between the *b* coefficients in *KZ* quintile 2 to 5 with that in *KZ* quintile 1 is zero. These *t*-statistics are obtained by estimating equation (3) on the 5 *KZ* quintiles simulatenously. Table 6 demonstrates that all the *t*-statistics are positive and highly significant at the 1 percent level. In particular, the *t*-statistic of the difference between the *b* coefficients in the top and bottom *KZ* quintile is 5.37.

[Insert Table 6 here]

An alternative specification to test Hypothesis 2 is to estimate the following pooled investment equation:

$$CAPX_{it} = a_{it} + bQ_{it-1} + c(Q_{it-1} \times KZ_i) + fCF_{it} + u_{it} \tag{6}$$

where for each firm *i*, KZ_i is its median *KZ* score. The other variables are as defined previously. The coefficient of interest in this case is *c*. We expect that *c* is positive. That is, corporate investment of equity-dependent firms is more sensitive to Tobin's Q than that of nonequity-dependent firms.

We include the interaction of Q with the *KZ* score as an additional regressor and estimate equation (6) using fixed-effects model. As shown in Model (1) of Table 7, the regression yields a positive and significant coefficient for *c* (t-stats = 7.98), which support the earlier finding in Table 6. The economic significance of the result is substantial too as one standard deviation

change in the *KZ* Index causes the sensitivity of corporate investment to stock prices to change by one-third.[24]

Next, in order to explore the interrelationship between legal protection and equity dependence, we estimate the following regression:

$$CAPX_{it} = a_{it} + bQ_{it-1} + c(Q_{it-1} \times LP_i) + d(Q_{it-1} \times LP_i \times KZ_i) + fCF_{it} + u_{it} \qquad (7)$$

where the variables are as defined previously. The coefficient of interest is *d*, which Hypothesis 3 predicts to be positive. Explicitly, the corporate investment of equity-dependent firms in countries with stronger legal protection should be more sensitive to stock prices relative to that of nonequity-dependent firms.

We include two interaction terms: the first one, the interaction between Tobin's Q and legal protection measures, has been used extensively in the previous regressions. The second interaction term involves Tobin's Q, the legal protection measures, as well as the firm-median *KZ* score. We estimate equation (7) using fixed-effects model and report the results in Models (2) to Models (4) of Table 7, where each specification corresponds to one of the three legal protection measures.

We find that even after controlling for the interaction coefficient *c*, the interaction coefficient *d* is positive and significant at the 1 percent level in all three models, which is consistent with the prediction from Hypothesis 3. Equity-dependent firms in countries with stronger legal protection exhibit higher sensitivity of corporate investment to stock prices than nonequity-dependent firms. The signs and significance of the other control variables are also similar to that found in the previous tables.

[Insert Table 7 here]

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[24]The change in sensitivity of corporate investment to stock price is [(0.0024*1.776)/0.0128]*100% = 33 percent.

As a robustness check, we re-estimate equation (4) separately for each *KZ* quintile portfolio. Models (1) to (5) of Table 8 present the estimation results using fixed-effects model for *KZ* quintile 1 to 5 respectively. We observe that the coefficient *b* continues to exhibit the same monotonic increasing pattern documented in Table 6, with *b* rising from 0.0016 (bottom *KZ* quintile) to 0.0173 (top *KZ* quintile). However, the coefficient is only statistically significant in quintiles 3 to 5. We confirm that the difference between the *b* coefficients in the top and bottom *KZ* quintile is 5.97, which is statistically significant at the 1 percent level.

The interaction coefficient *c* is perhaps of more interest in this case. We detect that the coefficient increases from 0.0012 (bottom *KZ* quintile) to 0.0027 (middle *KZ* quintile), before dropping back to 0.0017 (top *KZ* quintile). All the coefficients are positive but statistically significant only in the first three *KZ* quintiles.[25] Therefore, our results for Hypothesis 3 are relatively robust in the sense that equity-dependence does seem to influence firm's sensitivity of corporate investment to stock prices even after controlling for the effect of investment protection.

[Insert Table 8 here]

Taken together, our empirical results offer fresh evidence that both legal protection measures and equity dependence are important determinants of firm's sensitivity of corporate investment to stock prices.

4. Conclusion

We explore the role of legal protection and the equity-financing channel on the sensitivity of corporate investment to stock prices for an international sample that covers 42 countries. Our

measures of legal protection and equity dependence are the three indexes (anti-directors rights, public and private enforcement) from LLSV and the modified *KZ* index as our measure for equity-dependence. We find that firms in countries with strong legal protection of minority shareholders display higher sensitivity of corporate investments to stock prices. In addition, the investment to-price sensitivity increases with the degree of equity-dependence, which is consistent with the equity-financing channel view. Combining the two effects, we observe that the relationship between legal protection and investment-to-price sensitivity is more pronounced for equity-dependent firms. Our results are robust to various alternative specifications.

Past studies have argued that in the face of market inefficiency, the stock market is just a sideshow, that is stock prices have little effect on real investment. However, Baket et al. (2003) show that this may not be the case for certain firms. For a sample of U.S. firms, they document that the sensitivity of investment to stock prices is the largest for equity-dependent firms. Our results corroborate the finding in Baker et al. (2003) by providing additional evidence that legal protection and equity dependence matter for investment-to-price sensitivity in an international setting.

Our findings have important implications in that they can help individual firms and regulators better appreciate the role of legal protection of investors on corporate investment behavior through the equity-financing channel. The equity-financing channel argument suggests that the investment of firms with financing constraints is more responsive to non-fundamental variations in stock prices. Understanding that legal environment affects both capital market development and the sensitivity of corporate investment to stock prices, regulatory agencies can put in place the appropriate level of rights afforded to minority shareholders and enforcement of

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[25] Our findings mirror that of Chen et al. (2005). In their case, they also find that the interaction term between their price informativeness measures and Tobin's Q is positive and more statistically significant in the bottom to middle

securities laws. Subsequently, the rights and securities laws influence individual firm's corporate investment decisions by acting as effective mechanisms to restrain managers' tendency from engaging in dsynfunctional activities, especially for equity-dependent firms. Overall, legal protection and equity dependence interact with each other, with the objective of attaining efficient allocation of capital to investment projects.

KZ quintiles.

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Table 1
Legal protection variables

The table presents the legal protection variables for our sample. Legal Origin refers to the legal origin of the company law or commercial code of each country from LLSV (1998). Anti-Director Rights is an index of shareholder protection that ranges from 0 to 6 (with a higher value denoting stronger protection) from LLSV (1998). Private Enforcement is an index calculated as the average of disclosure requirement and burden-of-proof indices from LLSV (2003). Public Enforcement is an index calculated as the average of supervisor characteristics, investigative powers, orders and criminal indices from LLSV (2003). The sample consists of 42 countries from Asia-Pacific, Western-Europe, South-America, and Africa. The sample period is from 1985 to 2004.

Country	Firm-Year Observations	Legal Origin	Anti-Director Rights	Private Enforcement	Public Enforcement
Asia Pacific					
Australia	7,105	English	4	0.71	0.90
Hong Kong	5,232	English	5	0.79	0.88
India	2,583	English	5	0.79	0.72
Indonesia	1,714	French	2	0.58	0.56
Japan	21,032	German	4	0.71	0.00
Malaysia	5,419	English	4	0.79	0.84
New Zealand	885	English	4	0.55	0.40
Pakistan	628	English	5	0.51	0.50
Philippines	1,108	French	3	0.92	0.81
Singapore	3,048	English	4	0.83	0.88
South Korea	4,285	German	2	0.71	0.29
Sri Lanka	103	English	3	0.60	0.33
Taiwan	2,872	German	3	0.71	0.44
Thailand	2,448	English	2	0.63	0.67
Average	**4,176**		**3.57**	**0.70**	**0.59**
Western-Europe					
Austria	1,093	German	2	0.18	0.19
Belgium	1,578	French	0	0.43	0.19
Denmark	1,991	Scandinavian	2	0.68	0.27
Finland	1,489	Scandinavian	3	0.58	0.35
France	8,109	French	3	0.49	0.80
Germany	6,899	German	1	0.21	0.25
Greece	304	French	2	0.39	0.35
Ireland	925	English	4	0.61	0.27
Israel	357	English	3	0.67	0.75
Italy	2,597	French	1	0.44	0.38
Netherlands	2,591	French	2	0.75	0.38
Norway	1,686	Scandinavian	4	0.51	0.40
Portugal	631	French	3	0.54	0.50
Spain	1,866	French	4	0.58	0.38
Sweden	2,863	Scandinavian	3	0.46	0.44
Switzerland	2,457	German	2	0.55	0.21
Turkey	787	French	2	0.36	0.56

United Kingdom	26,299	English	5	0.75	0.67
Average	**3,585**		**2.56**	**0.51**	**0.41**
South-America					
Argentina	421	French	4	0.36	0.50
Brazil	1,858	French	3	0.29	0.52
Chile	1,172	French	5	0.46	0.54
Colombia	2,518	French	3	0.26	0.52
Mexico	1,032	French	1	0.35	0.25
Peru	340	French	3	0.50	0.75
Venezuela	127	French	1	0.19	0.48
Average	**992**		**2.86**	**0.34**	**0.51**
Africa					
Egypt	29	French	2	0.36	0.33
South Africa	3,744	English	5	0.75	0.29
Zimbabwe	77	English	3	0.47	0.46
Average	**1,283**		**3.33**	**0.53**	**0.36**

Table 2
Univariate analysis

Panel A and B presents the summary statistics for the financial variables. $CAPX_t$ is calculated as capital expenditures in year t divided by total assets at the end of year t-1. Q_t (Tobin's Q) is calculated as the market value of equity plus total assets minus total equity (at the end of year t). CF_t is calculated as income before extraordinary items plus depreciation and amortization in year t divided by total assets at the end of year t-1. KZ Index is a measure of equity-dependence calculated using the modified version of the Kaplan and Zingales (1997) index. All financial variables are winsorized at the 1% and 99% levels. Panel C presents the Pearson correlation between the country-median financial variables and the legal protection variables. All correlations are statistically significant at the 1% level. The sample consists of 42 countries from Asia-Pacific, Western-Europe, South-America, and Africa. The sample period is from 1985 to 2004.

Panel A								
Variable	N	Mean	Median	Std Dev	Min	Max	1st Quartile	3rd Quartile
$CAPX_t$	134,298	0.068	0.041	0.089	0.000	0.551	0.014	0.084
Q_t	134,298	1.432	1.126	1.035	0.454	7.511	0.913	1.535
CF_t	134,298	0.062	0.069	0.138	-0.597	0.458	0.024	0.122
KZ Index	125,701	0.115	0.244	1.776	-7.681	4.576	-0.659	1.184

Panel B								
Sample	Asia-Pacific		Western-Europe		South-America		Africa	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
$CAPX_t$	0.058	0.032	0.073	0.047	0.088	0.053	0.078	0.053
Q_t	1.343	1.058	1.533	1.200	1.222	1.007	1.455	1.156
CF_t	0.047	0.055	0.070	0.080	0.087	0.088	0.106	0.113
KZ Index	0.334	0.466	-0.008	0.090	-0.159	0.284	-0.726	-0.378

	$CAPX_t$	Q_t	CF_t	KZ Index	Anti-Director Rights	Private Enforcement	Public Enforcement
$CAPX_t$	1.000						
Q_t	0.434	1.000					
CF_t	0.814	0.398	1.000				
KZ Index	-0.209	-0.487	-0.408	1.000			
Anti-Director Rights	-0.303	0.043	-0.173	-0.507	1.000		
Private Enforcement	-0.537	-0.284	-0.310	-0.178	0.497	1.000	
Public Enforcement	-0.018	0.209	0.179	-0.550	0.401	0.391	1.000

Panel C

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Table 3
Investment regressions: the role of legal protection

This table presents the coefficients of regressions of corporate investments on Q, cash flows, and legal protection variables. The dependent variable is $CAPX_t$. $CAPX_t$ is calculated as capital expenditures in year t divided by total assets at the end of year t-1. Q_t (Tobin's Q) is calculated as the market value of equity plus total assets minus total equity (at the end of year t). CF_t is calculated as income before extraordinary items plus depreciation and amortization in year t divided by total assets at the end of year t-1. All financial variables are winsorized at the 1% and 99% levels. Anti-Director Rights is an index of shareholder protection that ranges from 0 to 6 (with a higher value denoting stronger protection) from LLSV (1998). Private Enforcement is an index calculated as the average of disclosure requirement and burden-of-proof indices from LLSV (2003). Public Enforcement is an index calculated as the average of supervisor characteristics, investigative powers, orders and criminal indices from LLSV (2003). White's heteroskedasticity corrected robust standard errors (clustered by firm) are reported in the parentheses. The sample consists of 42 countries from Asia-Pacific, Western-Europe, South-America, and Africa. The sample period is from 1985 to 2004. *, ***, *** denote statistical significance at the 10, 5, and 1 percent level respectively.

Independent Variables	(1)	(2)	(3)	(4)
Q_{t-1}	0.0120***	0.0066***	0.0048***	0.0056***
	(0.0006)	(0.0013)	(0.0018)	(0.0010)
CF_t	0.1148***	0.1146***	0.1146***	0.1146***
	(0.0048)	(0.0048)	(0.0048)	(0.0048)
Q_{t-1} * Anti-Directors Rights		0.0015***		
		(0.0003)		
Q_{t-1} * Private Enforcement			0.0114***	
			(0.0029)	
Q_{t-1} * Public Enforcement				0.0116***
				(0.0018)
Firm and Year fixed-effects	YES	YES	YES	YES
Number of firms	21,239	21,239	21,239	21,239
Adjusted R-square	0.40	0.40	0.40	0.40
Number of observation	134,298	134,298	134,298	134,298

Table 4
Investment regressions: the role of legal origin and legal protection

This table presents the coefficients of regressions of corporate investments on Q, cash flows, and legal protection variables. The dependent variable is $CAPX_t$. $CAPX_t$ is calculated as capital expenditures in year t divided by total assets at the end of year t-1. Q_t (Tobin's Q) is calculated as the market value of equity plus total assets minus total equity (at the end of year t). CF_t is calculated as income before extraordinary items plus depreciation and amortization in year t divided by total assets at the end of year t-1. All financial variables are winsorized at the 1% and 99% levels. Legal Origin is a dummy variable that equals 0 for countries with French or German or Scandinavian civil-law system and 1 for countries with English common-law system. Anti-Director Rights is an index of shareholder protection that ranges from 0 to 6 (with a higher value denoting stronger protection) from LLSV (1998). Private Enforcement is an index calculated as the average of disclosure requirement and burden-of-proof indices from LLSV (2003). Public Enforcement is an index calculated as the average of supervisor characteristics, investigative powers, orders and criminal indices from LLSV (2003). White's heteroskedasticity corrected robust (clustered by firm) standard errors are reported in the parentheses. The sample consists of 42 countries from Asia-Pacific, Western-Europe, South-America, and Africa. The sample period is from 1985 to 2004. *, ***, *** denote statistical significance at the 10, 5, and 1 percent level respectively.

Independent Variables	(1)	(2)	(3)	(4)
Q_{t-1}	0.0091***	0.0095***	0.0092***	0.0093***
	(0.0007)	(0.0007)	(0.0007)	(0.0007)
CF_t	0.1146***	0.1147***	0.1146***	0.1147***
	(0.0048)	(0.0048)	(0.0048)	(0.0048)
Q_{t-1} x Legal Origin	0.0055***			
	(0.0010)			
Q_{t-1} x Legal Origin x Anti-Directors Rights		0.0010***		
		(0.0002)		
Q_{t-1} x Legal Origin x Private Enforcement			0.0070***	
			(0.0014)	
Q_{t-1} x Legal Origin x Public Enforcement				0.0072***
				(0.0014)
Firm and Year fixed-effects	YES	YES	YES	YES
Number of firms	21,239	21,239	21,239	21,239
Adjusted R-square	0.40	0.40	0.40	0.40
Number of observation	134,298	134,298	134,298	134,298

Table 5
Alternative specifications

This table presents the coefficients of regressions of corporate investments on Q, cash flows, and legal protection variables. The dependent variable is $CAPX_t$. $CAPX_t$ is calculated as capital expenditures in year t divided by total assets at the end of year t-1. Q_t (Tobin's Q) is calculated as the market value of equity plus total assets minus total equity (at the end of year t). CF_t is calculated as income before extraordinary items plus depreciation and amortization in year t divided by total assets at the end of year t-1. All financial variables are winsorized at the 1% and 99% levels. Anti-Director Rights is an index of shareholder protection that ranges from 0 to 6 (with a higher value denoting stronger protection) from LLSV (1998). Corporate Board is corporate board index from the Institute for Management Development. Earnings Management is the earnings management index constructed by Leuz et al. (2003). Capital Market Development is the stock market capitalization divided GNP per capita from LLSV (1998). White's heteroskedasticity corrected robust (clustered by firm) standard errors are reported in the parentheses for fixed-effects model. The sample consists of 42 countries from Asia-Pacific, Western-Europe, South-America, and Africa. The sample period is from 1985 to 2004. *, ***, *** denote statistical significance at the 10, 5, and 1 percent level respectively.

Independent Variables	(1)	(2)	(3)	(4)	(5)
Q_{t-1}	0.0039**	0.0065***	-0.0061	0.0178***	0.0066***
	(0.0016)	(0.0016)	(0.0041)	(0.0012)	(0.0013)
CF_t	0.1270***	0.1210***	0.1145***	0.1060***	0.1146***
	(0.0211)	(0.0014)	(0.0049)	(0.0046)	(0.0048)
Q_{t-1} x Anti-Directors Rights	0.0017***	0.0017***			0.0015***
	(0.0004)	(0.0004)			(0.0003)
Q_{t-1} x Corporate Board			0.0030***		
			(0.0007)		
Q_{t-1} x Earnings Management				-0.0004***	
				(0.0001)	
Capital Market Development					0.0505**
					(0.0117)
Firm and Year fixed-effects	NO	YES	YES	YES	YES
Number of categories	42	14,769	19,615	18,877	21,239
Adjusted R-square	0.12	0.37	0.40	0.41	0.40
Number of observation	134,298	86,969	129,444	125,381	134,298

Table 6
Investment regressions: The role of equity dependence

This table presents the coefficients of regressions of corporate investments on Q and cash flows by quintiles of firm-median *KZ* Index. The dependent variable is *CAPX$_t$*. *CAPX$_t$* is calculated as capital expenditures in year *t* divided by total assets at the end of year *t*-1. *Q$_t$* (Tobin's Q) is calculated as the market value of equity plus total assets minus total equity (at the end of year *t*). *CF$_t$* is calculated as income before extraordinary items plus depreciation and amortization in year *t* divided by total assets at the end of year *t*-1. *KZ* Index is a measure of equity-dependence calculated using the modified version of the Kaplan and Zingales (1997). All financial variables are winsorized at the 1% and 99% levels. Models (1) to (5) refers to *KZ* quintiles 1 to 5. White's heteroskedasticity corrected robust standard errors are reported in the parentheses. *t*-statistic tests the hypothesis that the difference between the coefficient in each *KZ* quintile and quintile 1 is zero. The sample consists of 42 countries from Asia-Pacific, Western-Europe, South-America, and Africa. The sample period is from 1985 to 2004. *, ***, *** denote statistical significance at the 10, 5, and 1 percent level respectively.

| | *KZ* Quintile | | | | |
Independent Variables	(1)	(2)	(3)	(4)	(5)
Q_{t-1}	0.0060***	0.0108***	0.0153***	0.0157***	0.0173***
	(0.0009)	(0.0010)	(0.0013)	(0.0017)	(0.0019)
CF$_t$	0.1461***	0.1059***	0.1040***	0.1333***	0.1031***
	(0.0100)	(0.0105)	(0.0105)	(0.0126)	(0.0099)
t-statistics	-	[3.46]	[5.70]	[5.14]	[5.37]
Firm and Year fixed-effects	YES	YES	YES	YES	YES
Number of firms	4,108	4,052	4,056	3,896	4,224
Adjusted R-square	0.45	0.45	0.41	0.39	0.36
Number of observation	26,584	26,568	26,573	26,576	26,571

Table 7
Investment regressions: The roles of equity dependence and legal protection

This table presents the coefficients of regressions of corporate investments on Q, cash flows, financial constraint, and investor protection variables. The dependent variable is $CAPX_t$. $CAPX_t$ is calculated as capital expenditures in year t divided by total assets at the end of year t-1. Q_t (Tobin's Q) is calculated as the market value of equity plus total assets minus total equity (at the end of year t). CF_t is calculated as income before extraordinary items plus depreciation and amortization in year t divided by total assets at the end of year t-1. KZ Index is a measure of equity dependence calculated using the modified version of the Kaplan and Zingales (1997). All financial variables are winsorized at the 1% and 99% levels. Anti-Director Rights is an index of shareholder protection that ranges from 0 to 6 (with a higher value denoting stronger protection) from LLSV (1998). Private Enforcement is an index calculated as the average of disclosure requirement and burden-of-proof indices from LLSV (2003). Public Enforcement is an index calculated as the average of supervisor characteristics, investigative powers, orders and criminal indices from LLSV (2003). White's heteroskedasticity corrected standard errors are reported in the parentheses. The sample consists of 42 countries from Asia-Pacific, Western-Europe, South-America, and Africa. The sample period is from 1985 to 2004. *, ***, *** denote statistical significance at the 10, 5, and 1 percent level respectively.

Independent Variables	(1)	(2)	(3)	(4)
Q_{t-1}	0.0128***	0.0060***	0.0041***	0.0056***
	(0.0006)	(0.0013)	(0.0018)	(0.0010)
CF_t	0.1165***	0.1164***	0.1163**	0.1163***
	(0.0048)	(0.0048)	(0.0048)	(0.0048)
Q_{t-1} x KZ Index	0.0024***			
	(0.0003)			
Q_{t-1} x Anti-Directors Rights		0.0019***		
		(0.0004)		
Q_{t-1} x KZ Index x Anti-Directors Rights		0.0006***		
		(0.0001)		
Q_{t-1} x Private Enforcement			0.0138***	
			(0.0029)	
Q_{t-1} x KZ Index x Private Enforcement			0.0036***	
			(0.0004)	
Q_{t-1} x Public Enforcement				0.0132***
				(0.0018)
Q_{t-1} x KZ Index x Public Enforcement				0.0037***
				(0.0005)
Firm and Year fixed-effects	YES	YES	YES	YES
Number of firms	20,336	20,336	20,336	20,336
Adjusted R-square	0.40	0.41	0.41	0.41
Number of observation	132,872	132,872	132,872	132,872

Table 8
Robustness-test: The role of equity dependence and legal protection

This table presents the coefficients of regressions of corporate investments on Q and cash flows by quintiles of firm-median *KZ* Index. The dependent variable is *CAPX_t*. *CAPX_t* is calculated as capital expenditures in year *t* divided by total assets at the end of year *t*-1. Q_t (Tobin's Q) is calculated as the market value of equity plus total assets minus total equity (at the end of year *t*). CF_t is calculated as income before extraordinary items plus depreciation and amortization in year *t* divided by total assets at the end of year *t*-1. *KZ* Index is a measure of equity-dependence calculated using the modified version of the Kaplan and Zingales (1997). All financial variables are winsorized at the 1% and 99% levels. Anti-Director Rights is an index of shareholder protection that ranges from 0 to 6 (with a higher value denoting stronger protection) from LLSV (1998). Models (1) to (5) refers to *KZ* quintiles 1 to 5. White's heteroskedasticity corrected robust standard errors are reported in the parenthesis. *t*-statistic tests the hypothesis that the difference between the coefficient on Q in each *KZ* quintile and quintile 1 is zero. The sample consists of 42 countries from Asia-Pacific, Western-Europe, South-America, and Africa. The sample period is from 1985 to 2004. *, ***, *** denote statistical significance at the 10, 5, and 1 percent level respectively.

	KZ Quintile				
Independent Variables	(1)	(2)	(3)	(4)	(5)
Q_{t-1}	0.0016	0.0029	0.0059**	0.0104***	0.0173***
	(0.0021)	(0.0023)	(0.0027)	(0.0036)	(0.0019)
CF_t	0.1452***	0.1065***	0.1030***	0.1334***	0.1031***
	(0.0100)	(0.0105)	(0.0105)	(0.0126)	(0.0099)
Q_{t-1} x Anti-Directors Rights	0.0012**	0.0022***	0.0027***	0.0016	0.0017
	(0.0005)	(0.0006)	(0.0008)	(0.0010)	(0.0013)
t-statistics	-	[3.82]	[6.15]	[5.65]	[5.97]
Firm and Year fixed-effects	YES	YES	YES	YES	YES
Number of firms	4,108	4,052	4,056	3,896	4,224
Adjusted R-square	0.45	0.45	0.41	0.39	0.36
Number of observation	26,584	26,568	26,573	26,576	26,571