INVESTOR PROTECTION, OWNERSHIP, AND INVESTMENT

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ABSTRACT

In this paper, we bring together recent research on determinants of corporate ownership structure with research on costly external financing for investment to highlight the role played by contracting costs in the absence of strong investor protection on both firm financial structure and the cost of external funds for investment. Our principal findings, using firm-level data for a broad sample of countries, are two: First, the weaker is legal protection, the more likely is concentrated inside equity ownership of firms and the higher is the marginal cost of equity financing. Second, to the extent that the size of the firm's equity base reduces the cost of debt financing, the marginal cost of debt financing is more sensitive to changes in firm net worth (proxied by leverage) in countries in which weak investor protection has made the cost of external financing high. Implications of these basic results for analysis of cross-country variation in effects of monetary policy action and analysis of cross-country variation in industrial development are important topics for future research.

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I. INTRODUCTION

In both theoretical and empirical research on investment, asset market signals form the basis of many forward-looking models of investment decisions by value-maximizing firms.[1] In practice, however, the usefulness of asset markets both as sources of external financing and as sources of signals about investment opportunities and the cost of external financing depends importantly on the legal system for financial contracting in those asset markets. In many analyses of investment decisions, costs of using asset markets – measured by investor protection or the efficiency of the legal system – are ignored.

In this paper, we bring together these branches of research on asset markets and investment with the idea that legal systems for investor protection influence significantly whether costs of external financing for investment can be reasonably inferred from asset market information. We emphasize relationships among legal systems for investor protection, concentration of inside ownership of firms, and the sensitivity of firm investment to proxies for internal net worth.

The first premise of our paper is that firms operating in countries with strong investor protection for minority shareholders, *ceteris paribus*, should find it easier to sell equity shares to anonymous shareholders, and should therefore have lower levels of inside ownership. That is, strong investor protection should lower the marginal cost of equity because it reduces firms'

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[1] In particular, the *Q* model of investment (Hayashi, 1982) offers (under certain assumptions) particularly simple links between firm asset values and firm investment. Concern over the empirical usefulness of asset market information through *Q* as a predictor of investment led many researcher to augment asset market information with information about firm liquidity or net worth (see, *e.g.*, Fazzari, Hubbard, and Petersen, 1988, and related studies) or to develop forward-looking proxies not relying on asset prices alone (as in Abel and Blanchard, 1986; and Gilchrist and Himmelberg, 1998).

reliance on the scarce supply of what Gorton and Kahl (1999) call "agency-cost-free" capital, namely, capital concentrated in the hands of rich investors. Our second premise is that equity is complementary to debt in the firm's capital structure, so that in equilibrium, a lower marginal cost of equity implies a lower marginal cost of debt. This implies that the marginal cost of debt financing – which is overwhelmingly the marginal source of external funds for most firms – should be lower in countries with strong legal protection for minority shareholders.

We exploit the conjectured relationships among investor protections, shareholder concentration and the marginal cost of debt financing to estimate Euler equations for investment in which the marginal cost of capital is assumed to vary with the firm's leverage ratio. Consistent with the predictions of our theoretical arguments, firms in countries with weak legal protection for minority shareholders have more highly concentrated shareholdings, and the cost of capital implied by their investment behavior displays more sensitivity to changes in the leverage ratio. From this evidence we conclude that countries with weak legal protection of minority equity investors are likely to have corporate financial structures more exposed to shocks to interest rates or firm net worth. These cross-country differences are also related to earlier analyses of connections between financial development and economic growth and of cross-country variation in output sensitivity to monetary policy (see, *e.g*, Cecchetti, 1999).

Much of the recent resurgence of interest in links between financial structure and economic growth reflects a growing understanding of the links between finance and corporate governance. The finding of a positive cross-country relationship between financial development and economic growth by King and Levine (1993) stimulated attempts to assess causality (see, *e.g.*, Levine and Zervos, 1998; Demurguc-Kunt and Maksimovic, 1998; and Beck, Levine, and

Loyaza, 2000). Studies using firm-level data often focus on consequences of capital-market imperfections for the cost of external financing and investment (see, *e.g.*, the review of studies in Hubbard, 1998).

The growing appreciation for the importance of imperfections in contracting mechanisms and enforcement in microeconomic models has led further to the search for exogenous variation in the scope of these imperfections (see especially the discussion of legal systems in the work of La Porta, Lopez-di-Silanes, Shleifer, and Vishny (1997, 1998, 1999a, 1999b, 2000), which we describe below). Some researchers have considered whether cross-country variation in financial development is associated with differences in the efficiency of capital allocation, which may be associated with growth. For example, Demurguc-Kunt and Maksimovic (1999) estimate for a sample of countries the fraction of firms where growth is faster than the growth possible using only internally generated funds. They conclude that this fraction is positively related to indicators of financial development and legal protection of investors. In another example, Rajan and Zingales (1998) use industry data to argue that industries requiring more external financing grow faster in countries with greater financial development. Finally, Wurgler (2000) shows that countries with greater financial development display greater industry-level sensitivity of investment growth to value-added growth (as a proxy for investment opportunities).

While suggestive, these studies allow substantial room for additional research. First, these studies do not control for firm-level investment opportunities. The evidence reported in Rajan and Zingales (1998) and Wurgler (2000), for example, is ambiguous for the well known reason that proxies for financial market access tend to be highly correlated with investment opportunities. In Rajan and Zingales (1998), industry growth in the United States is used as a proxy for the

investment opportunities of the same industry outside the United States, but this does not control convincingly for investment opportunities. For example, the fact that semiconductor manufacturing, for example, is growing in the United States, but not in Mexico, may reflect the absence of production externalities rather than lack of access to external financing. In Wurgler (2000), a high elasticity of investment with respect to sales is interpreted as evidence that firms are responding to fundamentals, and therefore not constrained by poorly developed financial markets. The opposite interpretation is equally plausible, however; because cash flow (internal financing) is highly correlated with sales, a high elasticity of investment to sales could just as easily reflect more binding financing constraints. In short, the issue calls for firm-level evidence that distinguishes investment opportunities from variations in the cost of capital due to the legal environment.

Second, the recent cross-country studies have not fully exploited the predictions of the theory derived from the endogenous response of ownership structure. In countries with weak investor protection, one would expect to see external financing flowing less freely to firms with the highest-valued projects. One would also expect to see owners attempting to respond optimally to less favorable contracting environments by seeking external equity financing from smaller numbers of wealthier investors who would be better equipped to deal with the expropriation dangers faced by small investors. This prediction confronts theory with more dimensions of the data; measures of investor protection should negatively predict inside shareholder concentration, and to the extent that the legal environment forces firms in a country to resort to "second best" ownership structures, one should expect investment to be more responsive to internal and external financing shocks.

To make progress on these points, we proceed in two steps. First, following La Porta, Lopez-di-Silanes, Shleifer, and Vishny (1998), we emphasize differences in legal protection for investors as the source of cross-country differences in both corporate ownership structures and the relationship between asset markets and investment. Using firm-level Worldscope data for 39 countries, we extend the cross-country evidence in La Porta, Lopez-di-Silanes, Shleifer, and Vishny (1998), and document empirically the strong relationship between measures of investor protection and ownership concentration. Second, using firm-level data from Worldscope for a subset of industrial countries, we document empirically the strong relationship between predicted ownership concentration and the marginal cost of external financing for firm investment. In particular, the substantial cross-country variation in effects of changes in firm net worth on investment suggest that, even within European countries, a common monetary policy is unlikely to eliminate the substantial cross-country asymmetries in output responses to policy evidenced in the pre-EMU period (see, *e.g.*, the reviews by Dornbusch, Favero, and Giavazzi, 1998; Guisso, Kashyap, Panetta, and Terlizze, 1999; Ehrmann, 1998; and Hubbard, 2000).

II. INVESTOR PROTECTION AND FINANCIAL STRUCTURE

How should investor protection affect financial structure? The logic of optimal contracting in the presence of moral hazard suggests weak investor protection would require substantial commitment of funds by firm insiders (concentrated inside ownership) and high (perhaps prohibitively high) costs of external financing. In Gertler and Hubbard (1988), for example, a moral hazard problem arises from the assumption that investable funds may go for "hard capital" (say, machines, which are observable) or complementary "soft capital" (say,

management or R&D activities entailing unobservable effort). In this case, insiders may be tempted to divert funds intended for soft capital to personal use in the absence of investor protection. In that setting, weak investor protection increases the potential for expropriation or diversion, raising the fraction of investment which must be funded by the insider and increasing the shadow cost of external funds.[2]

To explore this prediction empirically, we follow the approach of Demsetz and Lehn (1985) and Himmelberg, Hubbard, and Palia (1999) by modeling the determinants of inside equity ownership concentration. We allow cross-sectional variation in ownership concentration to depend on firm variables proxying for agency problems; we augment these by country-specific measures of legal protection for suppliers of funds. For country-level measures of investor protection, we use three of the proxies assembled by La Porta, Lopez-di-Silanes, Shleifer, and Vishny (1998): "shareholder rights," "creditor rights," and "efficiency of the judicial system." The "shareholder rights" index measures how strongly the legal system favors minority shareholders against managers or dominant shareholders in the corporate decisionmaking process. The "creditor rights" index measures the rights of secured creditors against borrowers in reorganizations and liquidations. The "efficiency of the judicial system" is a survey measure compiled by a private credit rating agency, and provides an assessment of the efficiency and integrity of the legal environment for business.[3]

The structure of the legal system is implicit in most models of financial structure. In the

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[2] La Porta, Lopez-di-Silanes, Shleifer, and Vishny (1999) also illustrate partial equilibrium relationships among investor protection, inside ownership, and the value of the firm.

[3] We provide further details in section II.

classic description by Modigliani and Miller (1958) of the firm as a set of investment projects and cash flows, it is assumed managers can frictionlessly assign cash flows to investors. In the Alchian and Demsetz (1972) and Jensen and Meckling (1976) model of the firm, expropriation of outside investors is limited by residual equity ownership by insiders (entrepreneurs). In the residual control rights frameworks of Grossman and Hart (1988) and Hart and Moore (1990) corporation, securities, and bankruptcy laws are assumed to outline at least some of the rights accorded to insiders and outside investors.

The legal system approach of LaPorta, Lopez-di-Silanes, Shleifer, and Vishny is based in part on the idea that commercial legal codes derive from a few legal parents including English (common) law, and French and German (civil) law derived from Roman civil law (see, e.g., David and Brierley, 1985).[4] Central to this distinction is its usefulness in describing protections given to outside investors,[5,6] with strongest protection in common law countries, weakest protection in

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[4] The emphasis on specific legal protection emphasized in the La Porta, Lopez-di-Silanes, Shleifer, and Vishny research program differs from the "private contracting" emphasis in the law and economics literature in which entrepreneurs, knowing that investors understand exploration possibilities, have a strong incentive to offer contracts to limit the scope of expropriation (as in Jensen and Meckling, 1976). This Coase (1961) theorem line of argument assumes effective enforcement of contracts (as in Stigler, 1964; and Easterbrook and Fischel, 1991).

[5] Coffee (2000) explains the superior protection of outside investors in a common law system as stemming from judicial decisionmaking based on legal precedent guided by a principle of fiduciary responsibility. Civil law courts are argued to be less challenging of managerial diversion as long as some plausible business case can be made. La Porta, Lopez-di-Silanes, Shleifer, and Vishny (1999a) argue that this intuition masks a deeper historical factor that the state has traditionally regulated business activity to a greater degree in civil law than in common law countries.

[6] La Porta, Lopez-di-Silanes, Shleifer, and Vishny (2000) observe that, as a rule, differences among legal parents relate to the protection of outside investors generally as opposed to differences in the strength of protection of shareholders and creditors.

French civil law countries, and generally in-between levels of protection in German civil law and Scandinavian countries. These traditions spread through colonization and voluntary adoption. England and its farmer colonies have corporate relations based on common law, while French civil law extends to former French, Belgian, Spanish, and Dutch colonies. Germany and its former colonies have commercial legal codes based on German civil law tradition; Scandinavian countries form their own tradition. We do not exploit the data on legal origin, but instead use data on actual legal environment which have evidently evolved from these origins.

III. OWNERSHIP AND THE MARGINAL COST OF DEBT FINANCING

To establish a link between financial structure and investment requires a structural model of the firm's investment decisions. Our model of investment is standard except for modifications meant to capture the assumption that external debt and equity financing are costly. We do not model directly the external cost of equity financing; instead, we assume the cost of external equity financing is sufficiently expensive that it is not frequently used as the active margin for external financing. We model debt financing by assuming that the marginal cost of debt is increasing in the firm's leverage ratio, measured as the ratio of debt relative to debt plus the market value of equity. This assumption implicitly focuses on debt financing as the active margin for external financing, where it is generally assumed that the additional premium would emerge from a wide class of models where borrowers face incentive or commitment constraints. Following Gilchrist and Himmelberg (1998), we conjecture that financial frictions in this class of models can be represented empirically by modeling the gross return on debt required by debtholders as:

$$(1 + r_t)(1 + h(B_t, K_t, x_t)),$$

where r_t is the risk-adjusted required rate of return by debtholders, and $h(B_t, K_t, x_t)$ is a state-contingent external financing premium. The state variables in this simple representation of the firm are debt, B_t, physical capital, K_t, and a "profitability" shock, ξ_t. Hence the value of the firm would be denoted $V(K_t, B_t, \xi_t)$. In our empirical specification, we assume the functional form of $h(B_t, K_t, x_t)$ is locally approximated by:

$$h(B_t, K_t, x_t) \cong \text{ constant } + \frac{1}{2} A b_t,$$

where b_t is "market leverage":

$$b_t = \frac{B_t}{B_t + V_t(B_t, K_t, x_t)},$$

and A is a parameter indexing the costliness of external debt financing. This specification for the external financing cost premium incorporates two key assumptions that form the link between ownership structures and the cost of debt financing, and are therefore important to our interpretation of the evidence on ownership concentration across countries.

First, we assume that debt and equity are "complements," so that increases in value of the firm's equity reduce the marginal cost of debt financing. This complementarity stems from the fact the debtholders lose value in default states of the world (*e.g.*, due to costly state verification and/or higher agency costs when the firm is highly leveraged). The probability of incurring these costs (*i.e.*, the probability of default) depends positively on the firm's leverage, which therefore links the marginal cost of debt to the leverage ratio. This logic motivates our assumption that the

external finance premium on the cost of debt financing is increasing in the leverage ratio.

Second, we assume that the marginal cost of equity financing is higher in countries with weak investor protection. The idea is that inside equity holders would, if they could do so cheaply, sell additional equity to "minority" shareholders, which, by reducing the leverage ratio, lower the marginal cost of debt financing. In countries with weak legal protection, however, the contracting environment is such that the insiders cannot easily commit to not expropriating wealth from outside shareholders. Thus countries with weak legal protections for minority shareholders will face high marginal costs of equity financing, and therefore, high marginal costs of debt financing.

This argument generates an empirical implication that we exploit in the next section. In countries with weak legal protections for minority shareholders, we expect share ownership to be more highly concentrated, because concentrated shareholders can more easily coordinate to reduce expropriation. Hence concentrated share ownership endogenously reveals firms (countries) where the marginal cost of equity financing is high, and therefore identifies firms (countries) where the marginal cost of debt financing is high. Models predicting shareholder concentration as a function of the contracting environment should therefore be useful for predicting which firms and countries should display more sensitivity to financial frictions in their investment behavior. We estimate this sensitivity using an Euler equation for investment.

To derive the required Euler equation, we insert our model of debt financing into a standard adjustment cost model of investment. As is well known, financial frictions introduce an additional term to the Euler equation – a "shadow discount rate" – which is high when the firm is constrained and therefore allocating investment as if it faced a high discount rate. The shadow

discount rate is a function of the Lagrange multipliers on the equity-financing constraint, which are not observed in data. Fortunately, the first-order condition for debt relates the shadow discount rate to the debt-to-equity ratio, so the Euler equation for investment can be specified in terms of observed data.

We specify the balance of the formal model as follows. Let $\Pi(K_t, x_t)$ denote the maximized value of current profits, taking as given the beginning-of-period capital stock, K_t, and a profitability shock, ξ_t. Assume the required time to build and install one unit of capital is one period, where δ is the rate of capital depreciation and I_t is the investment expenditure, so that the capital stock evolves according to the equation $K_{t+1} = (1 - \delta)K_t + I_t$. Let $C(I_t, K_t)$ denote the adjustment cost of installing I_t units of capital; let the purchase price of capital be normalized to one; and let $(1 + r_{t+1})^{-1}$ the ex ante, one-period discount factor used to value period $t + 1$ dividends at time t. Then the manager's problem is given by:

$$V(K_t, B_t, x_t) = \max_{\{I_{t+s}, B_{t+s+1}\}_{s=0}^{\infty}} D_t + E_t \sum_{s=1}^{\infty} \prod_{k=1}^{s} \left(\frac{1}{1 + r_{t+k}} \right) D_{t+s}, \tag{1}$$

subject to:

$$D_t = \Pi(K_t, x_t) - C(I_t, K_t) - I_t + B_{t+1} - (1 + r_t)(1 + h(B_t, K_t, x_t))B_t, \tag{2}$$

$$K_{t+1} = (1 - d)K_t + I_t, \tag{3}$$

$$D_t \geq 0, \tag{4}$$

where E_t is the expectations operator conditional on the time t information set Ω_t.

We can describe the effect of financial frictions by studying the firm's stochastic Euler equations for investment and borrowing. Let λ_t be the Lagrange multiplier for the non-negativity

constraint on dividends. The multiplier λ_t indicates the shadow value of paying a "negative" dividend, and can thus be interpreted economically as the shadow cost of internally generated funds. That is, one dollar of internal funds is worth $(1 + \lambda_t)$ because the marginal value of investment projects for a constrained firm exceeds their replacement cost. The role of this shadow cost in the firm's investment decision can be seen most clearly by deriving the Euler equation for investment:

$$(1+c_t) = E_t\left[\left(\frac{1}{1+r_{t+1}}\right)\left(\frac{1+l_{t+1}}{1+l_t}\right)\left(p_{t+1} + (1-d)(1+c_{t+1})\right)\right], \tag{5}$$

where c_t is the marginal cost of adjustment, $\partial C_t / \partial I_t$, and π_t is the marginal profitability of capital, $\partial(\Pi_t - C_t)/\partial K_t$.[7]

In the absence of financing frictions, equation (5) says that the marginal cost of an additional dollar of investment, $1+c_t$, equals the (discounted) future benefit, $p_{t+1} + (1-d)(1+c_{t+1})$. With financing constraints, these marginal costs and benefits are valued at their respective "shadow values," $(1+l_t)$ and $(1+l_{t+1})$.

The above Euler equation is familiar from several papers that have investigated the optimal behavior of investment under financing frictions.[8] If there were no external financing cost premium associated with equity or debt financing, the dividend constraint would not bind ($\lambda_t = 0$), and the firm would be indifferent toward issuing debt or issuing equity. That is, the shadow

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[7] In our empirical specification, we assume the magnitude of $\partial C_{it} / \partial K_{it}$ is second order.

[8] See, *e.g.*, Hubbard and Kashyap (1992); Whited (1992); Bond and Meghir (1994); Hubbard, Kashyap, and Whited (1995); and Gilchrist and Himmelberg (1998).

cost of internal funds, $(1+l_{t+1})/(1+l_t)$, would equal unity, and the Euler equation would be identical to the equation derived under perfect capital markets.

In the presence of financial market imperfections, however, $\eta_t > 0$, and the firm will generally find itself in states of the world where it would like to issue equity at the fair price, but cannot; hence ($\lambda_t > 0$). Note that $\lambda(K_t, B_t, \xi_t)$ is, in general, state-dependent, and therefore time-varying. To simplify, we assume that the external financing premium, η_t, is non-stochastic (does not depend on ξ_{t+1}). This implies that η_{t+1} is in the firm's information set at time t. The first-order condition for debt requires that:

$$E_t\left\{\frac{1+l_{t+1}}{1+l_t}\right\}\left(1+h\left(K_{t+1},B_{t+1}\right)+\frac{\partial h\left(K_{t+1},B_{t+1}\right)}{\partial B_{t+1}}B_{t+1}\right)=1. \qquad (6)$$

The marginal cost of debt determines the shadow cost of funds today versus tomorrow (*i.e.*, λ_t versus λ_{t+1}), and hence provides a time varying discount factor that depends on the level of net financial liabilities, B_t (among other state variables).

Our functional form assumption for η_t implies $h_t+\frac{dh_t}{dB_t}\cdot B_t = Ab_t$. Under the assumption that the covariance among the various terms in the Euler equation is approximately constant, and using our functional form assumption for η_t, we can substitute the first-order condition for debt into the Euler equation for investment to obtain (approximately – up to a constant):[9]

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[9] Our approach to measuring the marginal product of capital, π, is as follows. If firms face a downward-sloping demand curve with a constant price elasticity of demand equal of ω and production is Cobb-Douglas, then it is easy to verify that the marginal profitability of capital is given by

$$p=\left(1+w^{-1}\right)a_K\left(S/K\right)$$

$$c_t + Ab_t + E_t(r_{t+1}) = E_t\left[p_{t+1} + (1-d)c_{t+1}\right], \tag{7}$$

Thus our parametric model of the debt premium says that firms with higher leverage "b_t" and/or higher values of the parameter "A" will have higher marginal costs of external (debt) financing.

In our empirical investigation, we model countries with weak legal protection for minority shareholders as countries with higher values of the parameter "A." We identify the level of this parameter across firms and countries by estimating a first-stage regression predicting the concentration of share ownership, and then we use the predicted value from this regression to index the level of "A." Specifically, we interact the predicted value of ownership concentration with leverage in the Euler equation for investment, and we expect that the leverage sensitivity of the shadow cost of debt financing is increasing in the predicted degree of ownership

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where S is sales and a_k is the capital share parameter in production. In general, it is unreasonable to assume that manufacturing firms in different industries face the same price elasticity of demand, ω, or the same capital share of sales, a_k. Hence we follow the approach described in Gilchrist and Himmelberg (1998) and construct estimates of $\left(1+w^{-1}\right)a_k$ at the industry level. These estimates are formed by assuming that firms are, on average, at their equilibrium capital stocks. In steady state, the marginal profitability of capital equals the cost of capital, $E(p_{it}) = r_{it} + d_{it}$, where r_{it} and δ_{it} are the risk-adjusted discount rate and depreciation rate of capital, respectively. Substituting the previous equation for π_{it} and averaging over all firms $i \in I(j)$ and years $t \in T(i)$ in industry j suggests that a reasonable estimate of $q_j = \left(1+w^{-1}\right)a_k$ is given by:

$$\hat{q}_j = \left(\frac{1}{N_j}\sum_{i\in I(j)}\sum_{t\in T(i)}(S/K)_{it}\right)^{-1}\frac{1}{N_j}\sum_{i\in I(j)}\sum_{t\in T(i)}(r_{it}+d_{it}),$$

where N_j is the number of firm-year observations for industry j. In practice, we assume that $1/NT\sum_{i\in I(j)}\sum_{t\in T(i)}(r_{it}+d_{it}) = 0.18$ for all industries, so that we estimate of the marginal profit using: $p_{it} = \hat{q}_j(S_{it}/K_{it})$.

concentration.

To summarize, the empirical implementation of our model assumes that the marginal cost of external financing, Ab_t, in the investment Euler equation can be approximated as (dropping the constant):

$$E_t(\eta_{t+1}) \cong a_1 b_t + a_2 \hat{m}_t b_t,$$

where a_1 and a_2 are parameters, and $\hat{m}_t$ is the predicted level of ownership concentration from a first-stage regression of ownership on variables characterizing the contracting environment.

We also assume a flexible form for the adjustment cost function:

$$c_t = a\left[(I/K)_t - g(I/K)_{t-1}\right].$$

Combining these parametric assumptions, the parameter estimates we below are based on the Euler equation (dropping the constant):

$$E_t(\pi_{t+1}) \cong -a(1-d)E_t(I/K)_{t+1} + a\left(1+g(1-d)\right)(I/K)_t - ag(I/K)_{t-1} + a_1 b_t + a_2 \hat{m}_t b_t. \quad (8)$$

Note that $E_t(r_{t+1})$ has been absorbed into the constant term; this reflects the fact that all estimates reported in the next section are estimated with separate year dummies for each industry. We estimate this equation using instrumental variables, as described in the next section.

IV. EMPIRICAL RESULTS

A. Data

We take our firm-level data from the Worldscope database, which contains information on large, publicly traded firms, in which there is an investor interest. As noted by La Porta, Lopez-di-Silanes, Shleifer, and Vishny (1997), the coverage within countries varies widely from as little as one percent of all listed domestic firms included (for India) to as many as 82 percent (for Sweden). The benefit of using this sample lies in a cross-country comparability of firms included in the sample, which, again, focuses on publicly traded firms. This sample allows one to compare "apples to apples" across countries and separate the effects of different financial and legal environments, which is the center of attention here. Large firms are more important for aggregate economic growth than are small firms. An additional benefit of using these data is the attempt by Worldscope to standardize accounting information to improve cross-country comparability.[10]

From the Worldscope database we selected a sample of 40 countries with over 7000 firms for the years 1988-1998. We present details on the sample selection are given below. Table 1 gives the list of countries in the sample with the number of firms and observations per country. The main firm-level variables are ownership concentration, the investment to capital ratio, sales-to-capital ratio, book leverage, and market leverage (see Table 2 for definitions). One variable that requires additional explanation is the beginning-of-period capital stock which appears in the adjustment cost function and in the construction of our proxy for the marginal product of capital.

[10] For example, if one company reports sales with included excise taxes and another company excludes taxes, Worldscope corrects this difference and presents both with tax excluded. This is important for our purposes because sales is the key ingredient in the measure of the marginal product of capital, so it is therefore desirable that it have as much cross-country comparability as possible.

The most obvious empirical analogue would be the lagged capital stock (*i.e.*, period *t*-1 used as the beginning of the period *t* capital stock), but this measure is potentially contaminated by potentially serious measurement error due to mergers, acquisitions, divestitures, or other capital-changing events. Moreover, there is no systematic way of identifying these transactions in the data, and it such events are identified by omitting observations with "unexplainable" changes in the capital stock, too much of the sample is lost. The alternative is to calculate capital according to the capital accumulation formula (Table 2), which is robust to these capital-changing events.

We augment these firm-level data using three country-level indicators of the legal system and investor protection, developed by La Porta, Lopez-di-Silanes, Shleifer, and Vishny (1998). Specifically, we use "shareholder rights," "creditor rights," and a measure of law enforcement, "efficiency of the judicial system." The "shareholder rights" index measures how strongly the legal system favors minority shareholders against managers or dominant shareholders in the corporate decisionmaking process. This index is a sum of seven characteristics, each of which is assigned a value of one if the right increases shareholder protection, and zero otherwise. The "creditor rights" index measures the rights of senior secured creditors against borrowers in reorganizations and liquidations. This index is a sum of four characteristics, each of which is assigned the value of one if the right increases creditor protection, and zero otherwise. The components of these indexes are described in the Appendix.

The “efficiency of the judicial system” is an assessment of the efficiency and integrity of the legal environment as it affects business, particularly foreign firms. The index is produced by the country-risk rating agency Business International Corporation. The value we use is the average between 1980-1993, scaled from 0 to 10, with lower scores for lower efficiency levels.

Table 3 reports summary statistics for the universe of firms available in Worldscope that we use for our empirical work. This table reveals that the number of firms varies widely across countries. This variation reflects several factors. First, and most obviously, some countries are simply larger, and therefore have larger firm populations. Second, these data cover only publicly traded firms, so the sample reflects the endogenously decision of firms to go public or remain private. For example, there are more firms in countries like the United Kingdom (1129 firms) which have strong legal protection for minority shareholders than there are in countries like Germany (468 firms), which has a larger economy but weaker shareholder protection. Third, in countries like India (269), data collection is simply more difficult, and investor interest, perhaps, is not as strong, so Worldscope has not collected complete data on the available universe of publicly traded firms.

B. Ownership Concentration

Our first empirical exercise is to estimate the effect of country-level measures of investor protection (described above) on inside ownership, holding constant firm characteristics influencing ownership. This regression resembles the regression reported by La Porta, Lopez-di-Silanes, Shleifer, and Vishny (1998). Their analysis was based on a cross-country regression of the mean ownership concentration of the ten largest firms in the country on a set of country-level explanatory variables which included measures of legal efficiency and protection, as well as country-level control variables like log of GNP and log of GNP per capita. Our specification, by contrast, uses *firm*-level data to control for the country-specific composition of firm characteristics that are known to affect ownership concentration. We included the most important

firm-level explanatory variables for ownership concentration reported by Himmelberg, Hubbard, and Palia (1999) in our specification for ownership concentration.[11] Specifically, we use log sales (as measures of firm size), the Sales/Capital ratio, the R&D/Sales ratios (as a measure of soft capital), two-digit (SIC) industry dummies, and year dummies. The variable *RDDUM* is a dummy variable which equals unity if no R&D information is reported, and zero otherwise. This variable provides an additional discrete indicator of R&D intensity because R&D is usually reported missing when it is zero. As our measure of inside ownership, we use the variable "closely held shares" as reported by Worldscope. To insure robustness of our results to the possibility of selection bias introduced by the idiosyncracies of the Worldscope data, we report estimates using a number of subsets of the data.

We report four sets of estimated coefficients for models of ownership concentration in Table 4. The first two columns use data for 39 countries in our Worldscope sample; the second set of two columns uses a subset of the data containing most of the European countries plus Japan, Canada, and the United States. In the table headings, we refer to these countries as the "Subset of 18." Within each set of firms, results are presented for samples of the largest 300 and 150 firms, respectively, to ensure comparability of firms in similar positions in the size distribution.

The results reported in Table 4 broadly support the idea that ownership concentration is endogenously determined by the scope for moral hazard (specifically, by the scope for expropriation of minority shareholders by insiders). Just as in Himmelberg, Hubbard, and Palia

[11] Himmelberg, Hubbard, and Palia (1999) also report that variables like advertising intensity help to predict ownership intensity. We omitted this variable from the present specification because of data limitations.

(1999), we find that the firm-level determinants – log sales, capital intensity, and R&D intensity – are all statistically significant predictors of ownership concentration with the predicted signs. Moreover, we find strong confirmation for the results reported by La Porta, Lopez-di-Silanes, Shleifer, and Vishny (1998), that estimated effects on ownership concentration of country-level measures of legal efficiency and the degree of protection afforded to creditors and minority shareholders have the predicted signs, and for the most part, are highly statistically significant.

Our preferred specification appears in the third column of Table 4, and reports results using data for the largest 300 firms in each of the "Subset of 18" countries (Europe plus the United States, Japan, and Canada). The estimated coefficients on legal efficiency, creditor protection, and shareholder protection are all negative. These results are robust for the broader sample of 39 countries as well as to the cutoff choice for looking at either the top 150 or top 300 firms in each country. The negative signs on legal efficiency and shareholder protection support the argument made by La Porta, Lopez-di-Silanes, and Vishny (1998) that ownership concentration is a substitute for legal institutions as a mechanism for constraining the expropriation of outside equity investors. The economic intuition for the negative coefficient on creditor protection is less obvious, but also supports this view; to the extent that debt financing is costlier due to weak creditor protection, firms will rely more on equity financing. Because the marginal source of equity financing is presumably not coming from inside shareholders, this reliance will tend to reduce ownership concentration and increase the marginal cost of external financing.[12, 13]

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[12] Though not reported here, holdings of cash relative to total assets (a potential indicator of the high cost of external financing – see Opler, Pinkowitz, Stulz, and Williamson, 1998; and Hubbard, Kuttner, and Palia, 1999) are also negatively related to the measures of investor

Using the results from the first column of Table 4, we report the ranking of countries by predicted ownership in Table 5. Two observations about the rankings in Table 4 are particularly noteworthy. First, predicted and actual inside ownership are generally quite close. Second, there is substantial variation in ownership even among countries in the "Subset of 18" sample. In the next section, these predicted ownership levels are used as interaction variables in the specification of Euler equation relating leverage ratios to the marginal cost of debt finance

C. Euler Equation Estimates

We now turn to the question of how predicted ownership concentration based on country and firm characteristics affects the sensitivity of the cost of debt financing. For these results, we restrict the sample to the "Subset of 18" because we are primarily interested in identifying cross-country differences in the sensitivity of the cost of capital for members of the European Monetary Union. To increase sample size, however, and for sake of comparison, the "Subset of 18" also includes several large industrial and European countries that are not part of the EMU.

All of the model specifications reported in Table 6 are estimated by instrumental variables where instruments include all of the variables in the model that are dated time t - 1 and t-2. For added efficiency, we also include time t-1 and t-2 values of *CASH/TA* (stock of cash/total assets), *COGS/K* (cost of goods sold/capital stock), and *CF/K* (cash flow/capital stock), although the results are not sensitive to the inclusion of these additional instruments. All variables are country-

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protection, holding constant firm characteristics.

[13] In a related analysis, Claessens, Djankov, and Lang (2000) study ownership of 3000 firms in nine East Asian economies. With the exception of Japan, which offers reasonably good protection of outside investors, they find concentrated ownership by families.

time differenced to allow for country-specific aggregate shocks. Columns titled "SIC-adj." have been adjusted for industry effects by transforming to deviations from two-digit SIC means. All estimates are for the sample of the 300 largest firms for each country. We adjust standard errors are adjusted for heteroscedasticity and serial correlation within the firm.

The Euler equation estimates for the eight specifications reported in Table 6 imply reasonable values for the structural parameters of the model, namely, the adjustment cost parameters and the parameter measuring the implied sensitivity of the marginal cost of funds to changes in the leverage ratio. The values of the structural parameters are particularly reasonable in those specifications that allow the leverage sensitivity to vary across countries according to the predicted level of ownership concentration. Our preferred specification appears in the last column of Panel A, which reports the specification estimated with two-digit industry dummies and leverage interactions with predicted ownership.

First, from the Euler equation in equation (8), the theoretical coefficients on $(I/K)_{t+1}$, $(I/K)_t$, and $(I/K)_{t-1}$ are, respectively:

$$b_1 = -a(1-d),\ b_2 = a(1+g(1-d)),\ \text{and}\ b_3 = -ag,$$

The estimated values of these coefficients in our preferred specification (reported in the last column of Table 6, Panel A) are $b_1 = -0.69$, $b_2 = 2.42$, and $b_3 = -0.82$, respectively. Hence the estimated coefficients all have the predicted sign and are estimated with reasonable precision. Moreover, the signs and magnitudes of implied values for α, and γ are reasonable. To obtain estimates of these structural parameters from the reduced form parameters, we use a minimum distance estimator. Setting δ=0.10, the estimated value of α is 3.46 with a *t*-statistic of 10.60, and the estimated value of γ is 0.30 with a *t*-statistic of 19.42. To gauge the reasonableness of these

adjustment cost parameters, if the mean investment rate were 0.20, then the average *marginal* adjustment cost would be 3.46(1 - 0.30)0.2 = 0.48, which says that *on the margin*, the magnitude of adjustment costs represent 48 percent of the purchase cost.

Having established the plausibility of our Euler equation specification and parameter estimates, we turn to the interpretation of our estimates of the marginal cost of external financing. Recall that our empirical specification was motivated in part by the observation that debt is the active margin of external financing for most firms. Hence we assumed that the external finance premium depends on leverage, and we further assumed that the magnitude of this sensitivity depends on the marginal cost of equity financing, which we measured using the predicted level of ownership concentration for the firm. This logic gave rise to the following specification for the marginal cost of external financing:

$$h_t + \frac{dh_t}{dB_t} \cdot B_t = \text{ constant } + \left(a_1 + a_2 \cdot \hat{m}_t\right) \cdot b_t.$$

Table 6 reports the estimates of a_1 and a_2. In the baseline specification, reported in the first two columns of Panel A, we estimate a restricted version of the model in which we impose the assumption that the sensitivity of the external finance premium to leverage is the same across all firms and countries (*i.e.*, $a_2 = 0$). In the first column, the estimated value of a_1 is 0.22 with a *t*-statistic of 5.62. In the second column, when we control for two-digit SIC industry dummies, the estimated coefficient rises to 0.26, and the *t*-statistic rises to 8.04. Hence the Euler equation estimates reveal that there is an additional shadow cost term for investment that is correlated with changes in the firm's leverage ratio. Specifically, the estimated value of $a_1 = 0.26$ implies, for example, that a leverage change of one standard deviation (which equals 0.09 for the sample)

implies a change in the marginal cost of external financing of 2.34 percentage points. That is, if one were to observe a firm increasing its leverage from, say, 0.40 to 0.49, then we could infer from these estimates that its cost of capital had risen by 2.34 percentage points. In Panel B, the use of book rather than market leverage produces similar effects, though of a somewhat smaller magnitude (0.15 and 0.28, respectively, with *t*-statistics of 5.05 and 7.84).

The second half of Table 6 reports unrestricted Euler equation specifications in which the sensitivity of the external finance premium is allowed to vary across countries according to the estimated cost of external equity financing (as proxied by the predicted level of ownership concentration). The last column of the table reports the results controlling for industry effects, which is our preferred specification. (We obtain qualitatively similar results when industry effects are not included.) The estimated values of a_1 and a_2 are 0.10 and 0.30, with *t*-statistics of 2.44 and 4.00, respectively. To interpret these estimates, recall that the "sensitivity" of the finance premium to leverage changes is $a_1 + a_2 \hat{m}_t$. Hence this sensitivity ranges from 0.20 for the United Kingdom (which had a predicted ownership concentration of $\hat{m}_t = 0.33$) to 0.28 for Portugal (which had predicted ownership concentration of $\hat{m}_t = 0.63$). To put these estimates in cost-of-capital terms, if one were to observe a firm increasing its leverage from 0.40 to 0.49, then one could infer from these estimates that its cost of capital had risen by 1.80 percentage points if it were located in the United Kingdom, and by 2.52 percentage points if it were located in Portugal.

D. Cross-Country Variation in Sensitivity of Firm Investment to Net Worth Shocks

We can use the estimates presented in Table 6 to estimate cross-country differences in the sensitivity of the cost of external financing (and hence investment) to a change in leverage. To demonstrate the sense in which the estimated sensitivities in Table 6 are correlated with cross-country aggregate measures of output sensitivity to monetary policy, Figure 1 plots our measures of predicted ownership against the monetary policy impact variable synthesized by Cecchetti (1999). The two measures are positively related with a correlation of 0.56 when we exclude Japan.

Because Japan is an "outlier," it makes an interesting case study for comparing our measure with Cecchetti's. His index assigns Japan a monetary impact index of 2.67, which places it at the top end with other "high impact" countries like Italy and Austria. Our index, by contrast, places Japan at the extreme opposite end; our estimates assign a sensitivity-to-leverage parameter of 0.19, which is the lowest among the "Subset of 18" firms included in our Euler equation estimates, similar to the United States and Great Britain. The difference stems from the fact that Cecchetti's index is based strictly on the features of the banking system (consistent with a narrow "credit view" of the monetary transmission mechanism) whereas our measure estimates variations in the cost-of-capital sensitivity to leverage according to the predicted ownership concentration. Our measure is designed to capture the broader "net worth" channels of monetary policy in which disruptions to net worth (as measured by the market value of leverage) are transmitted to real investment decisions through their effect on the effective marginal cost of external financing. For the case of Japan, therefore, we would conclude that despite having a banking system that resembles Italy and Austria, Japan has legal structures and financial institutions that protect

minority shareholders (allowing diffusely held share ownership), which in turn indicate a lower the marginal cost of external equity and lower marginal cost of debt.

V. CONCLUSIONS AND IMPLICATIONS

In this paper, we bring together recent research on determinants of corporate ownership structure with research on costly external financing for investment to highlight the role played by contracting costs in the absence of strong investor protection on both firm financial structure and the cost of external funds for investment. Our principal findings, using firm-level data for a broad sample of countries, are two: First, the weaker is legal protection, the more likely is concentrated inside equity ownership and the higher is the marginal cost of equity financing. Second, to the extent that the size of the firm's equity base reduces the cost of debt financing, the marginal cost of debt financing is more sensitive to changes in firm net worth (proxied by leverage) in countries in which weak investor protection has made the cost of external financing high.

Three implications of these basic results warrant further exploration. First, we have shown that the impact of net worth shocks varies systematically across legal regimes for investor protection. To the extent that monetary policy actions affect internal net worth (see, *e.g.*, Gertler and Hubbard, 1988; Gertler and Gilchrist, 1994; and Bernanke, Gertler, and Gilchrist, 1996, 1999), a common European monetary policy is still likely to generate asymmetric responses of investment and output across countries (beyond the asymmetry arising simply from differences in the interest sensitivity of investment across countries).[14] Second, even if policy actions affect net

[14] La Porta, Lopez-di-Silanes, Shleifer, and Vishny (2000) argue that a key element in facilitating international convergence in the protection of outside investors is mandatory, thorough disclosure of financial information by securities issuers, with accuracy enforced by regulated financial intermediaries.

worth, models of the monetary transmission mechanism should be careful to consider differences across countries in the vulnerability of firms' net worth to monetary shocks. Our results imply that legal regimes lacking in strong investor protection leave firms' net worth more vulnerable to monetary shocks. For example, to the extent that the legal system leads to a relatively greater reliance on short-term debt, firms' liquidity is more exposed to short-term interest rate fluctuations. Third, our results suggest that the complexion of industrial development across countries is probably affected by the degree of investor protection (see also Carlin and Mayer, 1998). We are currently pursuing extensions in all three areas.

DATA APPENDIX

Data

As indicated in the text, our "shareholder rights" index is a sum of seven characteristics, each of which is assigned a value of one if the right increases shareholder protection, and zero otherwise. The components of this index are:

- *One share-one vote rule*: Investors are better protected when dividend rights are linked tightly to voting rights, thereby preventing insiders from exercising disproportionate control.
- *Proxy by mail allowed*: Voting by mail makes it easier for shareholders to exercise their votes.
- *Shares not blocked before meeting*: In some countries, the law requires depositing shares with the company several days prior the shareholder meeting; this practice prevents shareholders from selling their shares around the meeting time, and it also prevents shareholders who did not deposit from voting.
- *Cumulative voting / proportional representation*: This right give power to minority shareholders to put their representatives on boards of directors.
- *Oppressed minority rights*: These give rights to shareholder to challenge director's decisions in court or force the company to repurchase the shares from minority shareholders who object to management's decisions.
- *Preemptive right to new issues*: This right protects shareholders from dilution.
- *Percentage of share capital required to call an extraordinary shareholder meeting*: The higher the percentage – the harder it is for minority shareholders to

challenge the management; this variable is assigned value of one if the percentage is below the world median of 10 percent).

The "creditor rights" index is a sum of four characteristics, each of which is assigned the value of one if the right increases creditor protection, and zero otherwise. The components of this index are:

- *No automatic stay on assets*: This variable is assigned a value of one if country does not allow automatic stay on assets, which would protect the management and unsecured creditors against secured creditors, and prevent the latter from seizing collateral.
- *Secured creditors paid first*: This right gives priority to secured creditors to be first in line in reorganization; in some countries secured creditors are in line behind both the government and workers.
- *Restrictions on going into reorganization*: This variable gives a value of one to the countries that require creditors' consent to file for reorganization; for example, the United States' Chapter 11 does not require creditors' consent, which gives management more power in reorganizations – therefore the United States gets zero on this measure.
- *Management does not stay in reorganization*: This variable gives a value of one if management is replaced at the start of reorganization procedure, and zero otherwise.

Sample Selection

Countries in the Worldscope database (May 1999 Global Researcher CD) with at least 30 firms and at least 100 firm-year observations are included in the sample (the exception is Venezuela which is included with 80 observations only); we exclude data from former socialist economies. This results in a sample of 40 countries. The sample does not include firms for which primary industry is either financial (one-digit-SIC code of 6) or service (one-digit-SIC codes of 7 and above). In addition, we delete the following (see Table 2 for variable definitions):

- All companies with three or fewer years of coverage.
- All firm-years with *CAPX* or *PPENT* or *SALES* missing.
- Observations with zero *PPENT* (200 observations, of which 28 percent are for Brazil due to hyperinflation and revaluations of the currency).
- Observations with negative *KBEG* (277 observations).
- Observations with negative *CASH/TA* or *COGS* (27 observations).
- Observations with $I/K > 2.5$ (1 percent of all observations).
- Observations with $S/K > 20$ (5 percent of all observations).[15]
- Observations with $COGS/K > 20$ (80 observations).
- Observations with $CASH/TA > 0.6$ (1 percent of all observations); this excludes mostly financial firms.

[15] The reasoning for this stricter rule is that it excludes firms for which capital is not a big factor in productivity. Half of these were in the United States and United Kingdom; Japan, France, and Denmark combined had another 25 percent – these were primarily service industries originally in the sample.

- 50 percent of all U.S. firms with at least four years of data available were selected by random sample.[16]
- The resulting dataset has about 59,500 observations; we present the number of observations by country in Table 1.

[16] The original sample for the United States is the largest, with over 25,700 observations (firm-years), while for all other countries at most there are 12,000 for the United Kingdom, 5,000 for Japan, and for the rest of countries on average there are fewer than 1,000 observations. The sampling of the U.S. firms was performed to make the United States more comparable to other contries in the number of observations. Even after the sampling, the United States has the most data available.

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Table 1. Sample Coverage Across Countries

Country	Code	#Obs	#Firms	Average #Years/Firm
Argentina	AR	198	28	7.1
Austria	AT	454	55	8.3
Australia	AU	1,571	197	8.0
Belgium	BE	561	71	7.9
Brazil	BR	687	94	7.3
Canada	CA	3,382	391	8.6
Switzerland	CH	1,043	132	7.9
Chile	CL	411	55	7.5
Colombia	CO	150	20	7.5
Germany	DE	3,970	468	8.5
Denmark	DK	1,045	126	8.3
Spain	ES	947	114	8.3
Finland	FI	747	84	8.9
France	FR	3,274	402	8.1
United Kingdom	GB	9,931	1,129	8.8
Hong Kong	HK	969	142	6.8
Indonesia	ID	531	84	6.3
Ireland	IE	427	47	9.1
Israel	IL	152	29	5.2
India	IN	1,507	269	5.6
Italy	IT	1,149	132	8.7
Japan	JP	4,646	624	7.4
South Korea	KR	1,264	187	6.8
Mexico	MX	502	69	7.3
Malaysia	MY	1,476	205	7.2
Netherlands	NL	1,280	147	8.7
Norway	NO	680	84	8.1
New Zealand	NZ	315	43	7.3
Peru	PE	101	17	5.9
Philippines	PH	271	43	6.3
Pakistan	PK	418	72	5.8
Portugal	PT	254	42	6.0
Sweden	SE	1,162	137	8.5
Singapore	SG	841	122	6.9
Thailand	TH	1,045	177	5.9
Turkey	TR	145	23	6.3
Taiwan	TW	405	83	4.9
United States	US	10,422	1,247	8.4
Venezuela	VE	81	11	7.4
South Africa	ZA	1,151	135	8.5
Total		59,565	7,537	

Table 2. Variable Definitions

Abbreviation	Description
Firm-Level Variables (from Worldscope)	
PPENT	Property, plant and equipment, net of depreciation
CAPX	Capital expenditure
DA	Depreciation and amortization expense
K	Beginning period capital = PPENT-CAPX+DA
I/K	Investment to capital ratio = CAPX / K
S/K	Sales to capital ratio = Sales / K
MPK	Marginal profit of capital constructed from SK using SIC adjustment described in Gilchrist and Himmelberg (1998). (See text.)
BLEV	Book leverage = total liabilities/total assets
MLEV	Market leverage = total liabilities/ (total liabilities + market value of equity)
OWN	A measure of ownership concentration, namely, the Worldscope variable "closely held shares," which represents shares held by insiders and includes: shares held by officers, directors and immediate families; shares held in other corporations (except fiduciary), shares held in trust, shares held by pension/benefit plans, shares held by individuals who hold 5% or more of the outstanding shares.
RD/SALES	Research and development expense over sales.
RDDUM	Dummy for missing R&D (which is replaced by zero)
CASH/TA	Cash plus equivalents scaled by total assets
CF/K	Cash flow (net income + DA) scaled by "K"
COGS/K	Cost of goods sold scaled by "K"
Industry dummies	For manufacturing industries the dummies are on a two-digit-SIC level, and for the rest of industries they are at a one-digit level
Country-Level Variables (from La Porta, Lopez-di-Silanes, Shleifer, and Vishny, 1998)	
SHAREHOLDER	An index of the rights of minority shareholders (see data appendix)
CREDITOR	An index of the creditor rights (see data appendix)
EFFICIENCY	An index of the efficiency of the legal system (see data appendix)

Table 3. Descriptive Statistics for Key Variables

					Percentile					
Variable	Sample	N obs	**Mean**	Min	1%	5%	**50%**	95%	99%	Max
S/K	All countries	57557	**4.37**	0.00	0.14	0.39	**3.33**	12.59	17.62	19.99
	Subset of 18	43689	**4.72**	0.00	0.18	0.44	**3.73**	13.00	17.79	19.99
	Other	13868	**3.25**	0.00	0.10	0.27	**2.06**	10.74	16.75	19.95
MPK	All countries	57557	**0.20**	0.00	0.01	0.04	**0.16**	0.48	0.80	4.18
	Subset of 18	43689	**0.21**	0.00	0.02	0.05	**0.17**	0.48	0.78	3.90
	Other	13868	**0.18**	0.00	0.01	0.03	**0.13**	0.49	0.91	4.18
I/K	All countries	57557	**0.26**	0.00	0.00	0.03	**0.19**	0.72	1.38	2.50
	Subset of 18	43689	**0.25**	0.00	0.00	0.04	**0.19**	0.69	1.33	2.50
	Other	13868	**0.26**	0.00	0.00	0.02	**0.17**	0.83	1.52	2.47
BLEV	All countries	59883	**0.55**	0.00	0.08	0.20	**0.56**	0.86	0.99	2.27
	Subset of 18	45502	**0.57**	0.00	0.09	0.23	**0.58**	0.87	1.01	2.27
	Other	14381	**0.49**	0.00	0.05	0.14	**0.49**	0.83	0.96	1.70
MLEV	All countries	53325	**0.46**	0.00	0.04	0.10	**0.44**	0.85	0.97	1.00
	Subset of 18	40624	**0.46**	0.00	0.04	0.12	**0.46**	0.83	0.95	1.00
	Other	12701	**0.43**	0.00	0.03	0.08	**0.39**	0.89	1.00	1.00
OWN	All countries	42168	**41.16**	0.00	0.02	0.32	**40.04**	87.45	100.00	100.00
	Subset of 18	33493	**39.20**	0.00	0.02	0.27	**36.74**	88.78	100.00	100.00
	Other	8660	**48.39**	0.00	0.02	1.08	**51.05**	83.84	96.47	100.00

Note: Variables are defined in Table 2. The "Subset of 18" sample includes 13 European countries (Great Britain, Norway, Finland, Ireland, Sweden, Switzerland, Netherlands, Spain, Austria, Denmark, France, Germany, Italy, Belgium, and Portugal), plus four non-European countries (Japan, the United States, and Canada). The "Other" sample includes all countries not included in the "Subset of 18" countries.

Table 4. Determinants of Ownership Concentration

	All Countries				"Subset of 18" Countries			
	300 firms		150 firms		300 firms		150 firms	
Variable	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat
Log(SALES)	-3.13	-15.06 ***	-3.17	-13.42 ***	-1.99	-7.38 ***	-1.71	-5.59 ***
S/K	0.54	5.50 ***	0.54	4.69 ***	0.42	3.59 ***	0.38	2.62 ***
RD/SALES	-4.36	-1.76 *	18.01	1.23	-7.75	-0.65	16.70	0.70
RDDUM	8.06	10.57 ***	8.54	9.21 ***	3.76	4.04 ***	5.11	4.18 ***
EFFICIENCY	-2.33	-10.64 ***	-2.37	-10.37 ***	-5.23	-11.12 ***	-5.09	-10.46 ***
CREDITOR	-1.27	-4.41 ***	-0.28	-0.78	-3.00	-8.47 ***	-2.92	-6.18 ***
SHAREHOLDER	-4.98	-17.14 ***	-3.83	-11.58 ***	-7.79	-24.02 ***	-7.60	-19.39 ***
Constant	122.29	27.45 ***	113.96	21.16 ***	143.70	15.32 ***	121.16	11.68 ***
N (obs)	25400		19333		17112		11845	
N (firms)	4009		3060		2566		1781	
N (countries)	38		38		18		18	
Rsq	0.25		0.22		0.39		0.36	

Notes: The dependent variable is OWN, as defined in Table 2. Explanatory variables are also defined in Table 2. All models are estimated by OLS with adjustment for heteroscedasticity and within-firm serial correlation. Year dummies and two-digit SIC industry dummies are included but not reported. The "Subset of 18" countries are defined in Table 3 (JP, US, GB, CA, NO, FI, IE, SE, CH, NL, ES, AT, DK, FR, DE, IT, BE, and PT).

Table 5. Predicted Ownership Concentration Across Countries

		Investor Protection			Mean Ownership Concentration	
Country	Code	Legal efficiency	Creditor rights	Shareholder rights	Actual	Predicted
Japan	**JP**	**10.00**	**2**	**4**	**40.8**	**30.8**
United States	**US**	**10.00**	**1**	**5**	**24.9**	**31.9**
United Kingdom	**GB**	**10.00**	**4**	**5**	**29.2**	**32.9**
Hong Kong	HK	10.00	4	5	50.5	33.8
Canada	**CA**	**9.25**	**1**	**5**	**41.1**	**35.9**
New Zealand	NZ	10.00	3	4	52.4	37.3
Australia	AU	10.00	1	4	39.3	39.3
India	IN	8.00	4	5	51.1	40.5
Norway	**NO**	**10.00**	**2**	**4**	**48.0**	**41.1**
Singapore	SG	10.00	4	4	55.1	41.6
South Africa	ZA	6.00	3	5	50.1	42.3
Chile	CL	7.25	2	5	60.3	42.9
Israel	IL	10.00	4	3	57.0	43.0
Finland	**FI**	**10.00**	**1**	**3**	**46.4**	**43.2**
Ireland	**IE**	**8.75**	**1**	**4**	**31.0**	**43.5**
Sweden	**SE**	**10.00**	**2**	**3**	**47.1**	**43.5**
Malaysia	MY	9.00	4	4	49.7	44.8
Switzerland	**CH**	**10.00**	**1**	**2**	**45.7**	**48.4**
Netherlands	**NL**	**10.00**	**2**	**2**	**51.2**	**49.5**
Taiwan	TW	6.75	3	3	17.7	49.9
Spain	**ES**	**6.25**	**2**	**4**	**58.3**	**49.9**
Austria	**AT**	**9.50**	**3**	**2**	**58.4**	**51.1**
Denmark	**DK**	**10.00**	**3**	**2**	**28.0**	**51.1**
Argentina	AR	6.00	1	4	58.1	51.9
France	**FR**	**8.00**	**0**	**3**	**62.6**	**52.4**
South Korea	KR	6.00	3	2	29.0	52.4
Pakistan	PK	5.00	4	5	59.1	53.5
Germany	**DE**	**9.00**	**3**	**1**	**68.1**	**54.9**
Brazil	BR	5.75	1	3	49.4	56.0
Colombia	CO	7.25	0	3	N/A	57.5
Italy	**IT**	**6.75**	**2**	**1**	**60.6**	**60.4**
Belgium	**BE**	**9.50**	**2**	**0**	**60.0**	**60.5**
Peru	PE	6.75	0	3	66.4	61.2
Portugal	**PT**	**5.50**	**1**	**3**	**55.7**	**62.5**
Turkey	TR	4.00	2	2	68.5	64.8
Philippines	PH	4.75	0	3	54.5	65.1
Mexico	MX	6.00	0	1	54.2	65.6
Thailand	TH	3.25	3	2	44.8	66.5
Indonesia	ID	2.50	4	2	67.8	71.4
Venezuela	VE	6.50	N/A	1	94.3	N/A

Notes: Variables are defined in Table 2. Predicted values of ownership concentration are reported in percentage terms and are based on the estimates reported in the first column of Table 4 (for the top 300 firms, full sample of countries). The "Subset of 18" countries used to estimate the Euler equations for investment are highlighted in bold.

Table 6. Euler Equation Estimates for Investment

Panel A: Market Leverage

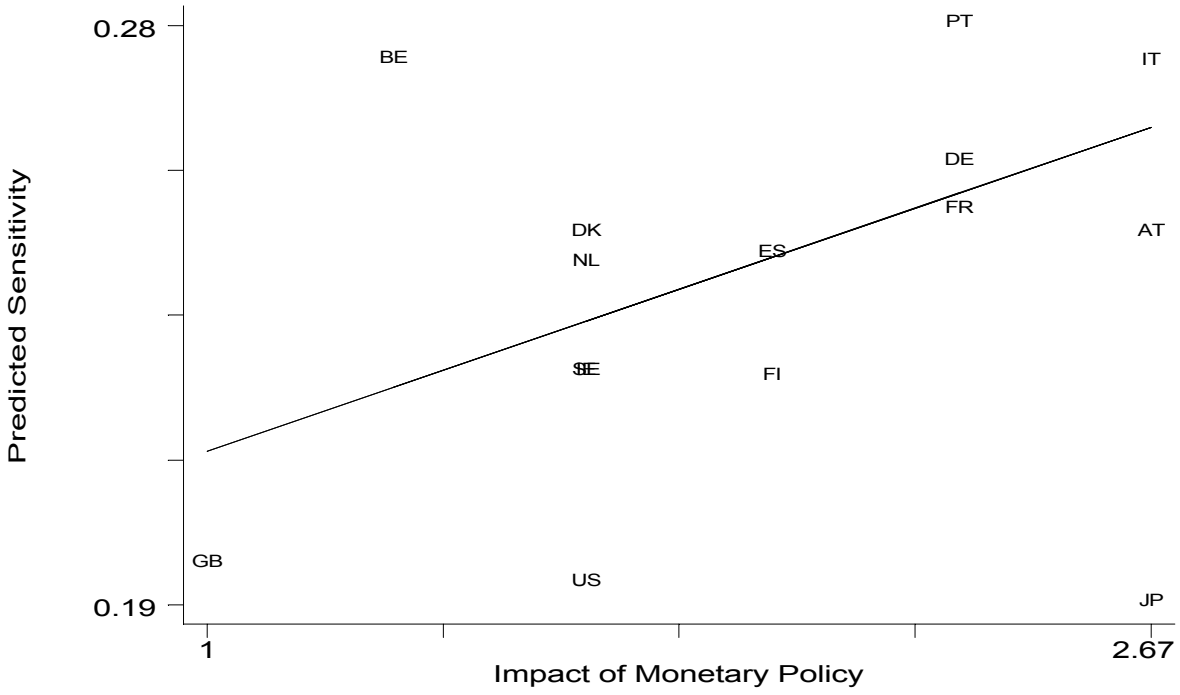
	Baseline				Interaction			
	No SIC adj.		SIC adj.		No SIC adj.		SIC adj.	
	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat
I/K(t+1)	-3.73	-3.77 ***	-1.78	-2.34 **	-1.77	-3.11 ***	-0.69	-1.54 a
I/K(t)	5.81	5.18 ***	3.90	4.91 ***	3.28	4.81 ***	2.42	4.77 ***
I/K(t-1)	-1.48	-5.86 ***	-1.16	-6.93 ***	-0.93	-5.56 ***	-0.82	-6.78 ***
MLEV(t)	0.22	5.62 ***	0.26	8.04 ***	0.03	0.72	0.10	2.44 **
POWN(t)*MLEV(t)					0.33	4.56 ***	0.30	4.00 ***
N (firms)	2266		2266		2266		2266	
N (obs)	12346		12346		12342		12342	
F-statistic	18.82		35.33		37.89		49.33	

Panel B: Book Leverage

	Baseline				Interaction			
	No SIC adj.		SIC adj.		No SIC adj.		SIC adj.	
	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat	Coeff.	T-stat
I/K(t+1)	-3.08	-3.75 ***	-1.22	-2.09 **	-1.62	-3.22 ***	-0.59	-1.55 a
I/K(t)	4.72	5.21 ***	2.84	4.70 ***	2.89	4.89 ***	1.97	4.72 ***
I/K(t-1)	-1.20	-6.15 ***	-0.88	-7.15 ***	-0.81	-5.76 ***	-0.68	-7.01 ***
BLEV(t)	0.15	5.05 ***	0.18	7.84 ***	0.00	-0.05	0.05	1.60 a
POWN(t)*BLEV(t)					0.36	6.26 ***	0.33	5.76 ***
N (firms)	2267		2267		2270		2270	
N (obs)	12371		12371		12367		12367	
F-statistic	26.32		26.32		45.53		65.28	

Notes: The sample is restricted to the "Subset of 18" countries defined in Table 3 (JP, US, GB, CA, NO, FI, IE, SE, CH, NL, ES, AT, DK, FR, DE, IT, BE, and PT). Variables are defined in Table 2. The variable OWN(t)*LEV(t) is interaction of leverage with predicted ownership concentration (as estimated in Table 4 and reported in Table 5). All models are estimated by instrumental variables, where instruments include time t-1 and t-2 variables in the models and their interactions with ownership, plus CASH/TA, COGS/K, and CF/K (see Table 2). All variables are country-time differenced to allow for country-specific aggregate shocks. Columns titled "SIC adj." have been adjusted for Industry effects by transforming to deviations from two-digit SIC means. All estimates for the sample of the 300 largest firms for each country. Standard errors are adjusted for heteroscedasticity and serial correlation within the firm. Significance levels are represented by *** for 1%, ** for 5%, *for 10%, and a for 15% levels.

Figure 1. Predicted Sensitivity of Investment and Impact of Monetary Policy



Notes: "Predicted Sensitivity" (indicated along the vertical axis) is the sensitivity of the marginal cost of capital to leverage. The parameters estimated in the last column of Panel A in Table 6 imply this sensitivity is given by 0.098+0.295*POWN(t), where POWN(t)="predicted ownership" as reported in the last column of Table 5 and calculated using the parameter estimates in Table 4. The "Impact of Monetary Policy" is the index calculated by Cecchetti (1999). Cecchetti's measure is an average of three indexes measuring the importance of small banks, bank health, and the availability of non-bank sources of finance. The regression line shown is estimated with Japan omitted from the sample (see text for discussion).