

Ownership, Economic Entrenchment and Allocation of Capital

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Abstract

In an efficient economy, capital should be quickly (re)allocated from declining firms and sectors to more profitable investment opportunities. This process is affected by the concentration of corporate control, which in turn is affected by market institutions. We employ a panel of 12,000 firms across 44 countries to estimate the functional efficiency of capital markets. We adapt a measure for the efficiency of capital allocation using the accelerator principle. Our empirical results show weak property rights and highly concentrated ownership reduce the functional efficiency of capital markets. Findings support the economic entrenchment hypothesis but not the legal origins hypothesis.

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1. Introduction

In order for an economy to function effectively, capital must be allocated to its truly most productive, value-creating end. This implies that capital is swiftly (re)allocated from sectors and firms with poor future prospects to those with high expected future returns. This process is termed the *functional efficiency* of capital markets¹ (Tobin, 1984) and has important implications for the overall performance and growth of the economy (Levine, 1997). As a fundamental input for production, the mechanisms through which firms access and manage capital are crucial for firm performance. When firms are incorporated, they are able to raise large amounts of capital but face problems of agency and incentives because control of assets is separated from ownership. The ability of capital markets to solve these problems ultimately affects the rate of economic growth². Investors must be able to overcome these problems and ensure a return on their investments.

For this reason, an important component of the corporate governance literature addresses mechanisms through which agency and incentive problems may be overcome³. Corporate governance systems include formal law, such as securities law, regulatory regimes,

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¹ Note that this term is different from the standard term *market efficiency*, which refers to how efficiently information is compounded into share prices. The term *functional efficiency* refers to how effectively capital is allocated to its highest value use. For a discussion of the various types of capital market efficiencies see Tobin (1984). See also Morck, Wolfenzon and Yeung (2005).

² For example, Beck, Levine and Loaysa (2000) show that it is the type and nature of investments, rather than the overall level, that is important for growth. See also Levine (2004) for a review of the theoretical and empirical literature on how different capital markets allocate capital, handle information asymmetries, treat agency problems and affect growth.

³ The implications of separating ownership from control were noted as early as Adam Smith, who observed that the "stewards of rich men," i.e., managers, had other objectives than their "masters," i.e., owners of corporations (1776). For more current reviews of the corporate governance literature, see Shleifer and Vishny (1997), Denis and McConnell (2003) and Gugler, Mueller and Yurtoglu (2004a).

banking structures and legal traditions (Söderström et al., 2003). The way such systems allocate resources among stakeholders affects both the structure and composition of ownership, as well as access to financial capital. This, in turn, affects investment decisions that ultimately have consequences for firm performance and economic growth.

Recent comparative research on corporate governance suggests that distribution of control over capital assets is a crucial determinant of the functional efficiency of capital markets. In particular, high ownership concentration (family control) under weak market institutions may favor the status quo, leading to economic entrenchment (Morck et al., 2005).

Economic entrenchment hinders growth for at least two related reasons. First, high ownership concentration means that a few families can hold control of a large portion of the economy, which affects the immediate allocation of capital. For example, a new firm with no connection to a controlling family would be slow to receive capital tied up in firms controlled by the family, even if the existing firms perform poorly. Second, the process through which institutions become endogenous is affected by political power. This is relevant because economic control can translate into political influence (Morck et al., 2005; Pagano and Volpin, 2005), thus affecting institutions in the future.

Research on corporate governance and especially ownership is motivated by the pervasive agency problem. To this end, we advance this literature by clarifying the relationship between ownership, basic market institutions and the allocation of capital. We analyze how the allocation of capital is affected by the concentration of corporate control in general and family ownership in particular, as well as the quality of corporate governance institutions. Although a wide range of corporate governance institutions exist, we refer primarily to the quality of property rights and investor protection in this paper. We employ an accelerator approach to derive a measure of the efficiency of capital allocation: *Elasticity of capital with respect to output (sales)*. Our method is similar to Wurgler (2000) but with the important difference that our approach is consistent with the

accelerator principle, also referred to as the capital stock adjustment principle⁴. We use a panel of about 12,000 firms over a minimum of five years across 44 countries.

In the next section, we discuss how corporate governance structures, especially ownership, can lead to economic entrenchment. In section three, we derive and discuss our measure of the functional efficiency of capital markets. We describe the data in section four and present and analyze results in section five. In section six, we conclude and outline relevant policy implications for the allocation of capital.

2. Ownership and Economic Entrenchment

In the seminal book *The Modern Corporation and Private Property*, Berle and Means (1932) describe the ownership structure of the corporation as diffused. They argue that dispersion of ownership shifts corporate control from owners to managers. As this occurs, managers become unaccountable to owners and gain incentives to cater to objectives other than shareholder value or profit maximization. This description of the corporation has been influential in motivating a large literature on managerial objectives⁵. Much research on corporate governance has focused on the behavior of managers with different incentives based on the extent of owner participation. Jensen and Meckling (1976) show that dispersion of ownership leads to diversion of interests. At the firm level, more concentrated ownership provides large controlling owners with incentives to monitor managers and exercise control (Jensen and Meckling, 1976). DeMarzo and Urošević (2006) note that if the stake of a large shareholder is high enough, they have the incentive to work, thereby performing what they consider the key social function of monitoring firm activity. From this, we might expect a positive incentive effect of ownership

⁴ Wurgler (2000) measures the functional efficiency of capital markets by calculating the elasticity of industry investments with respect to industry value-added. He shows that the elasticity of investments depends on financial development. As we focus on ownership and corporate governance issues, the relationship between financial markets and capital allocation is beyond the scope of this paper. See Wurgler (2000) and Levine (2004) for more on this relationship.

⁵ The literature on managerial objectives addresses the maximizing behavior of managers. This includes hypotheses on maximization behavior related to sales (Baumol 1959), staff and “on-the-job-consumption” (Williamson 1963) and firm growth (Marris 1964). See also Scitovsky (1943).

concentration at the firm level. However, Stulz (1988) shows that as insider ownership concentration increases, the scope for controlling owners to exploit minority investors also increases. The ability of insiders to extract value from the corporation at the expense of other shareholders is referred to as managerial entrenchment, or simply as the entrenchment effect.

The net effect therefore depends on the balance between the positive incentive effect and the negative entrenchment effect. Morck, Shleifer and Vishny (1988) provide empirical support for both effects by finding a non-linear relationship between ownership concentration and Tobin's q . This is inconsistent, however, with the research of Demsetz and Lehn (1985) and Himmelberg, Hubbard and Palia (1999).

Despite its role in the managerial economics literature, the widely held corporation described by Berle and Means (1932) is largely an Anglo-Saxon form of corporate organization. Few corporations across the world have dispersed ownership structure, even in developed countries. La Porta et al. (1999) find one large controlling (ultimate) owner for corporations across 27 developed economies, and Faccio and Lang (2000) find that family control dominates in continental Europe. Across countries, firms ranging in size are found to have controlling shareholders⁶. Claessens, Djankov and Lang (2000) find extensive family control in the majority of East Asian corporations, where problems of agency are greatest⁷. A growing literature shows that family control often is inferior to professional management (Morck, Strangeland and Yueng, 2000; Perez-Gonzales, 2001). Anderson and Reeb (2003) examine S&P 500 firms and find that family firms have a lower Tobin's q than non-family firms.

The ability of these controlling shareholders to maintain control depends on the institutional context of the country. Two institutions are particularly important in explaining cross country variation in ownership concentration: Property rights and

⁶ Most controlling shareholders belong to wealthy families (La Porta et al., 1999). Caprio et al. (2007) find a controlling shareholder, usually a wealthy family, for 75% of the ten largest banks in 44 countries.

⁷ The authors find the ten largest families in the Philippines and Indonesia control of more than half of corporate assets – 52.5% in the Philippines and 57.7% in Indonesia. It is similarly high in Thailand and Hong Kong, at 46.2% and 32.1% respectively (Claessens et al., 2000).

investor right protection⁸. Shleifer and Vishny (1997) argue that very high ownership concentration may simply be reflective of poor investor and property protection. Ownership concentration may substitute in institutional environments where investors are poorly protected (La Porta et al., 1998). Therefore, high ownership concentration can be an equilibrium outcome in the presence of a weak institutional environment. If formal property rights weaken or the protection of minority shareholders is further reduced, this would result in an upward shift in ownership concentration. In countries where small investors are insufficiently protected, only large owners can realistically expect any return on investments (La Porta et al., 1998). Further, weak institutional environments do not adequately protect the security of transactions, which can create disincentives to exchange, and control-enhancing mechanisms such as control pyramids may simply be rational adaptations to poorly functioning markets (Morck et. al., 2005). Laws protecting shareholders are shown to increase firm valuations (La Porta et al., 2002) and small investors may prevent the expropriation of bank resources by large shareholders (Caprio, Laeven and Levine, 2007). Bebchuk (1999) shows that poor investor protection increases opportunities for extraction of private benefits and thereby renders dispersed ownership structures unstable.

La Porta et al. (1998) examine ownership concentration across 49 countries and find a strong negative correlation between investor protection and aggregate ownership concentration. They conclude that in countries with insufficient legal protection of shareholders, small and diversified investors will be of minor importance. Further, they find that the quality of legal protection of investors differs systematically across countries of varying legal origin. Whereas Anglo-Saxon legal origin countries have the strongest protection, German and Scandinavian legal origin countries assume an intermediate position and French-origin countries have the poorest protection of investors. Gurgler et al. (2004b) use the rankings by La Porta et al. (1998) across a sample of some 19,000 companies across 61 countries. They find that legal origin is the most important

⁸ Legal protection of shareholders (outsiders) is associated with larger stock markets (La Porta et al., 1997), higher market-to-book values (Claessens et al., 2002; La Porta et al., 2002) and higher dividend payout ratios (La Porta et al., 2000). See also Shleifer and Wolfenzon (2002).

determinant of return on investments and in fact, it dominates differences in ownership structure.

Morck et al. (2005) argue that the diffused ownership of the Anglo-Saxon corporation is merely one possible end-point of capitalism. The other end-point is *oligarchic capitalism*, where firms are controlled by a few families through various control enhancing mechanisms⁹. The spectrum between these end-points comprises systems with more or less concentrated ownership. Control-enhancing mechanisms allow owners to control firms without maintaining a proportional share of the equity. This disproportionality between cash-flow rights and control rights alters the incentives of controlling owners, which reduces the incentive effect and enhances managerial entrenchment (Claessens, Djankov, Fan and Lang, 2002; Eklund, 2007). Eklund (2007) uses a measure of Tobin's marginal q to show that vote-differentiation of shares significantly reduces the incentive effect and enhances the entrenchment effect. In general, firms with proportional ownership structures tend to invest efficiently whereas firms where control instruments separate cash-flow from control tend to over-invest.

This can lead to economic entrenchment, whereby market forces are unable to operate. As defined by Morck et al. (2005), economic entrenchment is the macro-economic counterpart¹⁰ to firm-level managerial entrenchment (Stulz, 1988). This ultimately leads to inefficient allocation of resources, stunted entrepreneurship, capital market development and growth (Morck et al., 2005). Extensive use of control instruments may prevent capital from being reallocated to promising new ventures. For example, nascent entrepreneurs need credit but if capital cannot be released from its current activities, the economy demonstrates entrenchment¹¹. Competition and the process of creative destruction are curbed in entrenched economies, causing persistent misallocation of

⁹ The most common control enhancing mechanisms are: Dual-class shares, pyramid ownership and cross holdings. Outside of Anglo-Saxon countries these mechanisms are very common.

¹⁰ We use the term economic entrenchment in a broad sense. Morck et al. (2004) (the NBER version of their 2005 JEL article) define economic entrenchment as: "(...) *economy as exhibiting economic entrenchment if it has a highly oligarchic flavor of capitalism and exhibits signs of enduring economic inefficiency.*"

¹¹ See Schumpeter (1934) for an early analysis of the role of credit in economic development

assets¹². Morck et al. (2005) argue that family ownership in the presence of weak property rights and investor protection preserves status quo and lowers the functional efficiency of capital markets.

In fact, a number of authors assume that weak property rights benefit corporate insiders and the controlling owner at all times (Morck, Stangeland, and Yeung, 2000; Rajan and Zingales, 2003). The allocation of capital is affected by the way in which formal property rights govern transactions and the transfer of assets. In this sense, formal property rights are a necessary precondition for low transaction costs. According to de Soto (2000), an optimal property rights regime allows people to assemble their assets into increasingly valuable combinations¹³.

Morck et al. (2005) identify three effects of changes in private property rights: transferal effect, cost of capital effect and *competition effect*. First, if private property improves, wealth is transferred from the users of capital to its suppliers. Depending on the direction of change, wealth can be transferred between insiders and suppliers. Second, property rights affect the cost of capital. If private property rights weaken, the cost of capital for both insiders and entrepreneurs will increase. Finally, improvements in property rights will enhance competition. This depends on the cost of capital. If property rights improve and the cost of capital is therefore reduced, new projects become viable and more entrepreneurs will enter the market¹⁴.

This survey of the literature indicates at least two important reasons for concentration of ownership. At this firm level, large shareholders will have both the incentives and ability to monitor managers. This reduces agency costs. At the country level, ownership concentration can substitute for poor investor protection and weak property rights. As these rights improve, the equilibrium level of ownership concentration is reduced. Based

¹² Compare this with Mueller's (1977) approach to assess the efficiency of the market system by examining the persistency of profits.

¹³ de Soto notes: "*Formal property's contribution to mankind is not the protection of ownership... Property's real breakthrough is that it radically improved the flow of communications about assets and their potential. It also enhanced the status of their owners, who became economic agents able to transform assets within a broader network*" (1990).

¹⁴ For a discussion of these three effects on financial development, see Morck et al. (2005).

on this primacy of corporate governance institutions in preventing or enabling economic entrenchment, we develop the following primary hypothesis: *Countries with high ownership concentration, in combination with weak property rights and investor protection, will have poorer functional efficiency of capital markets.*

3. The accelerator principle and capital stock adjustment

Investments are defined as the flow of expenditure intended to maintain or increase the capital stock in a firm. If expected returns to firm capital decline, this implies that desired capital stock also declines. The efficient allocation of capital requires shifts from industries and firms with poor prospects to more promising investment opportunities. In a perfectly competitive frictionless economy, capital will be efficiently allocated because investments immediately respond to changes in volume and quality of investment opportunities. That is: Investments will be made at the point where marginal return matches the real interest rate.

Wurgler (2000) estimates the industry elasticity of investments with respect to industry value-added. Elasticity indicates the speed of capital reallocation and in effect, is a way to estimate the functional efficiency of capital allocation. We derive a measure built from Wurgler's (2000) approach but with several important distinctions.

We estimate the *elasticity of capital* with respect to *output*, using *sales* as the measure of output. Assuming constant prices, like Keynes, changes in sales will be proportional to changes in output. We make the crucial assumption that changes in sales provide an approximation for future sales and thus, future demand for capital (investment opportunities). *Ceteris paribus*, higher elasticity of capital with respect to sales means a quicker response to changes in future expected returns. Therefore, this means more efficient capital allocation.

To capture the time structure of investments and responses to changes in expectations, we employ an accelerator model of investments. Several different proxies for output are used as accelerators in the literature¹⁵. Tinbergen (1938; 1939) suggests that investments depend on level of profits, arguing that current profits are good predictors of future profits. Jorgenson and Siebert (1968) use gross value-added and Kuh (1963) use both retained earnings and sales. Our rationale for using sales rather than value-added is the inconsistency and unreliability of definition and data for measurements of firm value-added across countries. The accounting data is simply not reliable enough to ensure a consistently defined value-added across countries¹⁶. Further, profits would not be useful in this case because we expect profits to have asymmetric effects on investments across countries, depending on the extent of market frictions (Hubbard, 1998). If firms in one country suffer relatively more from financial constraints, it is more difficult to raise external funds and will, for example, reflect in greater sensitivity of investments with respect to profits (as compared to other countries).

In accelerator models, the desired level of capital, K_t^* , is determined by output, Y_t :

$$K_t^* = kY_t \tag{1}$$

where k is the capital coefficient (capital-output ratio)¹⁷. For simplicity, we assume K_t^* to be equal to actual capital, K_t . This means that net investments, I_t and $(K_t - K_{t-1})$, are proportional to changes in the desired stock of capital, $K_t^* - K_{t-1}^*$. Net investments, NI_t , can be expressed in the following way:

$$NI_t = \lambda(Y_t - Y_{t-1}) \tag{2}$$

¹⁵ For a discussion of accelerator models of investment and review of empirical work, see Jorgenson (1971).

¹⁶ Value-added is defined as compensation to production factors and can be calculated in two ways: 1) Sales – costs for intermediary goods, 2) Profits + cost of labor. From an accounting perspective, sales are relatively unproblematic, whereas costs of intermediary goods and labor expenses are count differently across countries. For this reason, the two alternative calculations of value-added typically do not match.

¹⁷ See Kaldor's (1963) famous statement that this capital-output ratio remains approximately constant overtime.

In this formulation, net investments are proportional to an accelerator λ . If $K_t^* = K_t$ then $\lambda = k$. This is an equilibrium assumption which is typically not fulfilled, but this is not relevant for our purposes (see Jorgenson, 1971; Tinbergen 1938; 1939)¹⁸.

For gross investments, we add replacement investments which are proportional to old capital, δK_{t-1} . We obtain gross investments in this manner:

$$I_t = \delta K_{t-1} + \lambda \Delta Y_t \quad (3)$$

We divide both sides of equation 3 with K_{t-1} to obtain:

$$\frac{I_t}{K_{t-1}} = \delta + \lambda \frac{\Delta Y_t}{K_{t-1}} \quad (4)$$

Since $K_t^* = kY_t$ this can be reformulated into the following:

$$\frac{I_t}{K_{t-1}} = \delta + \lambda^* \frac{\Delta Y_t}{Y_{t-1}} \quad (5)$$

where $\lambda^* = (\lambda/k)$, which is the *elasticity of capital* with respect to *output* (as reflected by sales). This is also useful for empirical applications because it achieves a normalization that reduces heteroskedasticity, which makes equation 4 possible to estimate empirically. Note that if $K_t^* = K_t$ in every point in time, then $\lambda = k$ which means that $\lambda^* = 1$.

We estimate the following equation for each country:

¹⁸ This assumption can be relaxed by using a flexible accelerator which allows for lags in the adjustment of the capital stock. However, using the simple accelerator as we do means that the coefficient will reflect relative adjustment costs.

$$\frac{I_{i,t}}{K_{i,t-1}} = \delta + \alpha_i + \theta_t + \lambda^* \frac{\Delta S_{i,t}}{S_{i,t-1}} + \varepsilon_{i,t} \quad (6)$$

where λ^* is the elasticity of investments with respect to sales, I is investments made by firm i in period t , K is capital stock in period $t-1$ and S is sales in period t . Since we use panel data and are primarily interested in country-specific estimates of elasticity of capital, we use a *fixed effects* model with *firm* and *time effects* (α_i and θ_t) for all estimations of λ^* . The time effects resolve possible cyclic trends of investments and the firm effects control for unobserved heterogeneity across firms. This is appropriate because we are interested in country averages, and previous studies show that investments decisions are subject to market frictions. These are, in turn, affected by firm- and industry-specific attributes (see Hubbard, 1998; Bjuggren, Eklund and Wiberg, 2007).

We consider our amendments to Wurgler (2000) appropriate for measuring capital allocation at the firm level¹⁹.

4. Data and methodology

For our purposes, we derive new estimations of the elasticity of capital. We employ existing institutional measures.

¹⁹ The original method used by Wurgler (2000) to measure elasticity of investments is inconsistent with the accelerator principle. His measure of the elasticity of investments with respect to value added, η , is estimated in the following way:

$$\ln\left(\frac{I_{ict}}{I_{ict-1}}\right) = \alpha_c + \eta_c \ln\left(\frac{V_{ict}}{V_{ict-1}}\right) + \varepsilon_{ict}$$

where I and V are industry investments (gross fixed capital formation) and value added respectively. The subscripts denote industry, country and time respectively. Presumably he uses this approach for empirical reasons, since he uses aggregated industry data. However, one may still expect a high correlation between η and λ^* . For the elasticity of capital to be equal to the elasticity of investments, it is necessary that: $\Delta K_t^* = \Delta I_t$. This is the case only if $I_{t-1} = \delta K_{t-1}$ which implies that: $K_{t-1}^* = K_{t-1}$. For other alternative specifications of elasticity's see Clements and Theil (1987).

4.1. Elasticity of Capital

To estimate the elasticity of capital, we use firm level accounting data on *investments*, *capital stock* and *sales* collected from *Standard & Poor's Compustat Global* (see Table 1 for sources and definitions of data). Gross investments are measured as:

$$I = \text{After tax profit} - \text{dividends} + \text{depreciation} + \Delta\text{Equity} + \Delta\text{Debt} + \text{R\&D}$$

This measure of investments is appropriate because it adequately reflects actual investments, which other accounting measures of investments do not. Using gross investments is also more appropriate than using net investments because it is not possible to obtain reliable estimates for replacement investments. Arguably, other expenditures such as advertising and marketing should also be included in investments (Mueller and Reardon, 1993) but the data is typically not available consistently across countries. For this reason, we exclude it.

The measure of capital is also selected to be consistent across countries. All financial firms are excluded from the sample since the nature of investments in these firms differs from non-financial firms. To adjust for differences in inflation, variables are adjusted to 2000 constant prices, using inflation data from International Financial Statistics (IMF). A total of 11984 firms are included, corresponding to 61292 observations. In order to minimize the weight of possible outliers, observations for each country are cut five percent in each end of the distribution²⁰. Naturally, the usual accounting caveats apply. Estimated elasticity $\hat{\lambda}_j^*$'s are reported in Table 3. We have grouped countries by legal origin as defined by La Porta et al. (2003).

4.2. Institutional Measures

²⁰ Trimming the data leads to a consistent definition of outliers and makes the results more robust. It is also possible to apply some sort of robust estimation technique, such as median regression or iteratively reweighted least squares. The results obtained using these techniques are essentially the same as with the simple trimmed OLS.

In order to test the primary hypothesis, we select several indicators on institutional quality and ownership concentration. Definitions and sources are presented in Table 1. We use key institutional variables that have been identified in the literature. The property rights index is from Holmes, Johnson and Kirkpatrick (1997) and is also used by La Porta et al. (2003). Anti-director or minority shareholder protection is measured by the Pagano and Volpin (2005) index, which is an extended and recoded version of the original index used by La Porta et al. (1998). This new version²¹ covers the period 1993 to 2001, and we use the average for the entire period.

As a measure of the quality of the legal system, we use the *Law and order* index from *International Country Risk Guide* (ICRG), averaged over the period 1982 to 1995. This index was also used by La Porta et al. (1998). Essentially the index measures quality of property rights; the correlation between the two indexes is 0.74. We also add legal origins as a dummy variable, using the following classification (from La Porta et al., 1999, 2003): English-origin, German-origin, French-origin, Scandinavian-origin and Socialist/Communist-origin²².

For *ownership concentration* we use two country-level measures, constructed by La Porta et al. (1998): Mean and median of the three largest owners in the ten largest firms. They compute combined cash flow rights for the three largest owners in each firm. In addition, we add two measures for *family control* of corporations, also compiled by La Porta et al. (1999). They measure family control as the share of the 20 largest firms in each country that are controlled by families. Two measures are constructed, assuming control is inferred at the levels of 10 percent and 20 percent of ownership. In this case, ownership concentration is measured as control-rights and not cash-flow rights. This is appropriate considering that investment decisions are influenced by the level of control and not cash-flow rights. In addition we have also included family data on Indonesia, the Philippines,

²¹ The new index is also called the LLSV Pagano-Volpin anti-director index. The index is based on a questionnaire sent to legal experts in each country included in the study conducted by Pagano and Volpin in 2005.

²² The legal origins hypothesis is now a dominant stream in the research on corporate governance (La Porta et al., 1999, 2003). Arguably, it is also important from an evolutionary perspective, depending on how path-dependency is treated in economic systems.

Taiwan and Thailand from Claessens et al. (2000). We recognize the problems with measures of ownership concentration and family control in La Porta et al. (1998; 1999). For example, they are likely to underestimate concentration of control in some countries by not explicitly considering pyramidal ownership structures and cross-holdings. Another problem is that these measures may be biased due to differences in absolute size of corporations across countries (for a discussion, see La Porta et. al 1999). The measures may for example reflect the fact that large corporations are likely to have less concentrated ownership simply because it requires more capital, all else equal (see Kumar, Rajan and Zingales 1999). However, despite these problems we believe that these measures provide a reasonable approximation of the concentration of corporate control across countries.

We also use standard controls for level of economic development and level of economic growth. For economic development, we take the logarithm of 1995 GDP levels. For economic growth, we use average GDP growth between 1980 and 2002. The GDP data was collected from the World Development Indicators. Taiwan is missing from this dataset, so we have used its corresponding value from La Porta et al. (1997). See Appendix 2 for a correlation matrix of the variables.

Table 1 **Variables and data**

Investments, <i>I</i>	Defined as: $I = \text{after tax profit (IB)} + \text{depreciation (DP)} - \text{dividends (DVC)} + \Delta\text{Equity (SSTK less PRSTKC)} + \Delta\text{Debt (\Delta DT)} + \text{R\&D (XRD)}$. Compustat Mnemonics: Measures within brackets. Data ranges from 1997 to 2005. Number of years differs across countries with not less than 6 years for any given country. <i>Source: Standard and Poor, Compustat Global.</i>
Firm sales, <i>S</i>	Firm sales. Compustat Mnemonics: <i>SALE</i> . <i>Source: Standard and Poor, Compustat Global.</i>
Firm capital, <i>K</i>	Defined as net cost or valuation of tangible fixed property used in the production of revenue. Compustat Mnemonics: <i>PPENT</i> ²³ . <i>Source: Standard and Poor, Compustat Global.</i>
Ownership concentration (mean and median)	Measured as average percentage and median of shares (cash-flow rights) held by the three largest shareholders in the ten largest firms in each country. <i>Source: La Porta et al. (1998)</i>
Family control (10 and 20 percent)	Measured as the share among the 20 largest firms in each country that are controlled by families. If a family has <i>control-rights</i> above a certain level the firm is assumed under family control. Control is inferred at 10 and 20 percent of control-rights. Data for 27 countries is from La Porta et al. (1999). Data for Indonesia, Philippines, Taiwan and Thailand is from Claessens, Djankov and Lang (2000). Control is also inferred at 10 and 20 percent, but data is for all available firms. <i>Source: Claessens, Djankov and Lang (2000); La Porta et al. (1999)</i>
Legal origin	Dummy variable: German, French, English and Scandinavian and Socialistic. The commercial code or Company law is used to identify legal origin. <i>Source: La Porta et al (1998), Socialist/Communist origin (La Porta et al. 2003).</i>
Shareholder protection (Volpin-Pagano LLSV Index of Anti-director rights)	Index ranges from 1 to 6. The index is a summary of: 1) proxy by mail allowed, 2) deposit of share not required prior to shareholders meeting, 3) cumulative voting allowed, 4) oppressed minority mechanism, 5) less or equal 10 percent for calling an extraordinary meeting, 6) preemptive rights. The index is Pagano-Volpain updated and extended version of the La Porta et al. (1998) anti-director index. Pagano and Volpin (2005) extend the index to cover the period 1993-2001. This is based on questionnaires sent to legal experts in each country (47). <i>Source: Pagano and Volpin (2005)</i>
Property rights	Index of quality of protection ranges from 1 to 5. 5 is strongest. <i>Source: Holmes et al. (1997)</i>
Law and order	Measures country law and order tradition. 6 is strongest. Average for 1982-1995. <i>Source: International Country Risk Guide (ICRG)</i>
Log GDP	The logarithm of GDP 1995. <i>Source: World Development Indicators. (Taiwan from La Porta et al., 1997)</i>
Growth of GDP	Average of annual GDP growth rates between 1980-2002. <i>Source: World Development Indicators. (Taiwan from La Porta et al., 1997)</i>

²³ This is a narrow definition of capital. An alternative is total assets (*AT*). *PPENT* is one component of *AT*. Accounting methods differ more with respect to *AT* than *PPENT*, the treatment of intangible assets. However, the correlation between these two alternatives is high so choosing one has a minor scaling effect.

5. Results

We estimate average capital elasticity $\hat{\lambda}^*$ for each country (see Table 3). As a first step, we empirically evaluate the robustness of our model as compared to Wurgler (2000). The merit of our model is reflected in the correlations for our control variables (see Table 8). Current GDP is positively and significantly correlated in Wurgler's measure (0.44) but *not* with our measure²⁴. Therefore, we suggest our measure is less sensitive to differences in level of economic development and is more robust for cross-country study. This is especially meaningful, given major differences in economic development across countries²⁵. Note that both measures show a negative significant relationship with GDP growth. When we regress Wurgler's estimates for investment elasticity on our measure of capital elasticity, the resulting regression coefficient is close to one (see Appendix 3).

Next, we test the legal origin hypothesis (La Porta et al., 1998) by regressing legal-origin dummies on our elasticity measure $\hat{\lambda}^*$. The all-country average $\hat{\lambda}^*$ is 0.98, which is not statistically different from an average of 1.0. We obtain the following averages based on legal origin: English origin is 0.81, French origin is 0.84, German origin is 1.10, Scandinavian origin is 1.53 and Communist/socialist origin is 0.74. Scandinavia is the only legal origin category which deviates significantly from the all-country average. It remains significant at 10 percent if the high elasticity of Norway is removed. Clearly, the within-legal origin variation is greater than the between-origin variation. Our ranking does not indicate what is consistent from the current literature on legal origins.

²⁴ Marginal q is, in effect, another measure of the functional efficiency of capital markets, developed by Mueller and Reardon (1993). It measures the return on investments relative to the opportunity cost. We also compare our elasticity measure with the estimates of marginal q by Gugler, et al. (2004b). Somewhat surprisingly, we find no significant correlation. However, marginal q is significantly correlated with ownership concentration, property rights and shareholder protection (see Appendix 2).

²⁵ For example, Norway has the highest elasticity of capital (2.34), likely due to the expansion of the oil industry. We do not treat Norway as an outlier because our measure of elasticity of capital allocation is not sensitive to the level of economic development (current GDP) and we have no reason to believe that the results are due to any measurement errors.

Table 2 Elasticity of Capital and Legal Origin

Legal origin:	Dependent variable: $\hat{\lambda}_j^*$
<i>Constant</i>	0.979 (13.81)
<i>English</i>	- 0.166 (- 1.53)
<i>French</i>	- 0.143 (- 1.37)
<i>German</i>	- 0.006 (- 0.04)
<i>Scandinavian</i>	0.549 (3.25)
<i>Socialist/communist</i>	- 0.235 (- 1.39)
R ²	0.23
F-value	2.99
No. observations	44

*, ** and *** indicate significance at 10, 5 and 1 percent respectively. The dependent variable is country specific capital elasticity and explanatory variables are legal origin dummies. The dummy variables have been constrained to sum to zero, so legal origin coefficients are interpreted as deviations from the all-country mean. Ordinary Least Squares (OLS) was used as estimator.

Table 3 contains estimations for equation 6 for each country. Again, it is a fixed effects model with firm and time effects. Separate country coefficients are reported in Table 3. Clearly, the within-group variation is substantial. In fact, only Scandinavian origin countries differ significantly from the all-country average when we regress legal-origin dummies on our measure of capital allocation (see Appendix 3). Further, we do not find any significant difference between common (English origin) and civil law (French, German and Scandinavian) countries (for detailed discussion see La Porta et al., 1999).

We also find that weak protection of private property in combination with high concentration of ownership, in particular family ownership, hampers the (re)allocation of capital. The intuition is that, all else equal, low capital elasticity is reflective of high transaction costs. This empirical result is consistent with the economic entrenchment hypothesis, which has important implications because most corporations around the world have at least one controlling owner (La Porta et al., 1999). This is typically achieved through mechanisms such as pyramid ownership and dual-class shares. This

contradicts the Berle and Means (1932) notion of dispersed ownership. The importance of property rights is not surprising and supports the idea that ownership concentration can be leveraged as a substitute for protection when investors are inadequately protected (La Porta et al., 1998). For example, Mexico has 100 percent family ownership, a weak score of 3 on the property rights index and the weakest score of 1 for anti-director rights, so our estimate of capital elasticity is fairly low at 0.715. Indonesia has 69 percent family ownership, a weak score of 3 on the property rights index and a weak score of 2 on the anti-director rights index, and we estimate low capital elasticity at 0.342.

We test the impact of minority shareholder protection, protection of property rights and law and order on ownership (see Table 4). Interestingly, shareholder protection significantly reduces ownership concentration but has no significant impact on family ownership. Not surprisingly, current GDP has a significant negative effect on ownership concentration, but no significant effect on family ownership. GDP growth also has no effect on family ownership.

We test the effect of our institutional variables and controls on our measure of elasticity of capital (see Table 5). We repeat the regressions with and without legal origin dummies. Without accounting for legal origin, the following variables are noteworthy: Property rights and law and order both have a positive and significant effect on elasticity of capital. When dummies for legal origins are included, these effects *do not change*. In fact, the results are strikingly similar: Without legal origin dummies, we get a result of 0.237 (significant at the 0.01 level) for property rights, and this actually falls to 0.2 (significant at the 0.05 level) when we include legal origin dummies. Similarly, we see a positive significant effect of 0.164 (at the 0.01 level) for law and order without legal origin dummies, but this falls to 0.132 when included.

The correlation matrix for all variables is in Table 8. Property rights and law and order have a positive and significant correlation (at the 5% level) with elasticity of investments, at 0.43 and 0.61 respectively. For the sake of model comparison, we have also included in Table 8 the original elasticity of industry investments with respect to industry value-

added, as calculated by Wurgler (2000). The most interesting comparison between our measure of elasticity of investments with Wurgler's measure of elasticity of industry investments is the correlation with our control variables. GDP growth is significant and negatively correlated with both our measure (-0.34) and with Wurgler's measure (-0.4). However, current GDP is positively and significantly correlated with Wurgler's measure (0.44) but *not* with our measure. Again, this suggests that our measure is not sensitive to current level of economic development but is sensitive to changes (growth).

Table 3 Capital Elasticities with respect to Sales, $\hat{\lambda}_j^*$

<i>Country</i>	$\hat{\lambda}_j^*$	t-value	Std. Err.	R ²	No. firms	No. obs.	Period
Australia	0.621	13.7	0.045	0.09	377	2047	1999-2005
Canada	0.849	15.0	0.057	0.14	303	1646	1999-2005
Hong Kong	0.756	8.24	0.092	0.12	101	550	1999-2005
India	0.687	13.6	0.051	0.17	169	912	1999-2005
Ireland	1.464	6.99	0.210	0.26	33	178	1999-2005
Israel	0.609	2.05	0.297	0.06	26	140	1999-2005
Malaysia	0.400	16.4	0.024	0.15	524	2371	1999-2005
New Zealand	0.829	3.02	0.275	0.07	52	234	2000-2005
Pakistan	0.367	3.09	0.119	0.12	26	164	1998-2005
Singapore	0.776	18.9	0.041	0.25	301	1363	2000-2005
South Africa	1.064	6.26	0.170	0.09	114	512	2000-2005
Thailand	0.523	9.91	0.053	0.13	217	1182	1999-2005
United Kingdom	1.276	18.8	0.068	0.09	691	3774	1999-2005
United States	1.160	42.5	0.027	0.16	2137	11642	1999-2005
<i>English legal origin average^a</i>	0.884	54.7	0.016	0.11	5071	26715	-
	(0.813)						
Argentina	0.600	7.73	0.078	0.37	21	114	1999-2005
Belgium	1.266	8.05	0.157	0.18	72	400	1999-2005
Brazil	0.551	8.41	0.066	0.15	96	524	1999-2005
Chile	0.431	7.96	0.054	0.20	80	438	1999-2005
Colombia	0.283	1.88	0.151	0.13	10	54	1999-2005
France	1.575	14.8	0.106	0.10	362	1976	1999-2005
Greece	1.034	9.96	0.104	0.27	55	296	1999-2005
Indonesia	0.342	4.92	0.069	0.07	170	764	1999-2005
Italy	0.937	8.14	0.115	0.11	160	738	2000-2005
Mexico	0.715	8.58	0.083	0.31	57	308	1999-2005
The Netherlands	1.595	11.2	0.142	0.15	113	620	1999-2005
Peru	0.675	8.89	0.075	0.44	18	123	1997-2005
The Philippines	0.645	12.8	0.050	0.31	69	373	1999-2005
Portugal	1.219	6.62	0.184	0.30	26	140	1999-2005
Spain	0.942	11.8	0.080	0.25	76	410	1999-2005
Turkey	0.567	2.53	0.224	0.06	29	156	1999-2005
<i>French legal origin average^a</i>	1.155	27.6	0.042	0.10	1414	7434	-
	(0.836)						
Austria	1.167	7.47	0.156	0.25	43	248	1999-2005
Germany	1.579	18.7	0.085	0.12	431	2344	1999-2005
Japan	0.603	38.5	0.016	0.24	2860	13230	2000-2005
South Korea	0.817	21.4	0.038	0.35	203	927	2000-2005
Switzerland	0.946	12.6	0.075	0.21	142	782	1999-2005
Taiwan	0.725	16.0	0.045	0.26	180	972	1999-2005
<i>German legal origin average^a</i>	1.098	48.6	0.023	0.13	3859	18503	-
	(0.973)						
Denmark	0.977	7.08	0.138	0.12	86	470	1999-2005
Finland	1.619	9.21	0.176	0.20	84	454	1999-2005
Norway	2.340	5.38	0.435	0.07	89	404	2000-2005
Sweden	1.177	6.91	0.170	0.05	173	961	1999-2005
<i>Scandinavian legal origin average^a</i>	1.279	11.2	0.115	0.06	432	2289	-
	(1.528)						
China	0.482	30.5	0.016	0.21	1130	6108	1999-2005
Hungary	0.730	4.41	0.165	0.29	11	60	1999-2005
Poland	1.331	5.88	0.227	0.29	19	119	1998-2005
Russia	0.434	3.42	0.127	0.36	12	64	1999-2005
<i>Socialist/communist legal origin average^a</i>	0.492	31.2	0.016	0.20	1172	6351	-
	(0.744)						
<i>Average / total^a</i>	0.914	77.5	0.012	0.10	11948	61292	-
	(0.902)						

Note: Country categorization into legal origin follows La Porta et al. (2003). Elasticities are estimated with fixed effects model with firm and year effects.

^aThese are weighted averages. Note that this gives different weights to countries. Simple averages $\hat{\lambda}_j^*$ are in brackets.

There are several possible explanations for a capital elasticity greater than one. First, indivisibilities of production factors may make the production function discontinuous, so output cannot be produced proportionally to capital. This is typically the case for firms with economies of scale in production. This may explain the high capital elasticity for Norway. During the sample period, Norwegian growth was strong and presumably driven by the expansion of the oil industry. Second, “excessive expectations” may affect estimates of capital elasticity. If investors and managers have excessive expectations on returns to their investments, this can cause an elasticity larger than one. For example, Manne (1945) argues that the accelerator principle works differently at different stages of a business cycle, arguing that firms are more responsive to changes in output during periods of economic expansion. If this is the case, we might expect a positive relationship between capital elasticity and growth rates. However, our panel of firms has no less than six annual observations for any country and we use a fixed-effect estimation, which should control for possibly cyclical investment behavior. Finally, an elasticity greater than one could arise from measurement error. If I_t or K_t contain measurement errors, this can create scaling effects so estimated capital elasticity deviates from its true value. However, this is unlikely to be a problem in our study since our variables were specifically defined to provide consistent estimation across countries. This is the reason we replace value-added with sales as our measure of output. Any measurement error will be consistent across all countries, since elasticity is a relative measure of the efficiency of capital allocation. Thus, our results are ultimately still unaffected. For example, we use a narrow measure of capital that includes only fixed tangible assets. This augments the measure of capital elasticity across all countries.

Note that the elasticity of capital is only a measure of how efficiently capital is allocated between industries. It is not a direct measure of how effectively an economy channels capital to entrepreneurs and new ventures. However, it is safe to expect that if established firms allocate capital effectively, this is also reflective of access of entrepreneurs and new ventures to external capital. For example, Wurgler (2000) shows that highly elastic investments are positively correlated with financial development.

Before we can report the effects of ownership, private property and investor protection on capital allocation, further clarification is needed on the links between variables. In Table 4 we report regressions of institutional variables on ownership measures. As noted previously, the dependent variables (ownership concentration and family control) were collected from La Porta et al. (1998, 1999) and Claessens et al. (2000). By and large, our results (see Table 4) replicate the results of La Porta et al. (1998, 1999). Not surprisingly, property rights and law and order are highly correlated (0.74). However, these indices are not significantly correlated with investor right protection. All three institutional variables have a negative effect on ownership concentration and the degree of family control. GDP has a negative effect on ownership concentration. This may be due to several factors. There may be reverse causality where high concentration of ownership reduces economic development. Growth in GDP has no robust effect on concentration of ownership or family control. This suggests that it is not possible to use all the explanatory variables simultaneously when examining the effect on elasticity of capital. This would lead to serious multicollinearity. Keeping this in mind, we analyze the effect of these variables on capital elasticity. Results are reported in Table 5.

Law and order and property rights improve capital elasticity. Ownership concentration and family control significantly reduce capital elasticity. This means that the quality of private property improves resources allocation whereas ownership reduces it. The results are robust for mean and median of ownership concentration, and family control is robust when control is inferred at 10 percent and at 20 percent. Shareholder protection does not have an effect on capital elasticity, other than through indirect effects on ownership, as reported in Table 4.

Table 4 Ownership Concentration and Corporate Governance

	Dependent variable: Ownership concentration				Dependent variable: Family ownership			
	Mean ownership		Median ownership		Control inferred at 10%		Control inferred at 20%	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Constant</i>	196.0*** (5.57)	219.7*** (6.17)	225.0*** (5.20)	255.8*** (6.02)	187.2** (2.63)	290.5*** (3.87)	185.7** (2.64)	254.04*** (3.17)
<i>Shareholder protection</i>	- 2.90** (- 2.03)	- 3.07** (- 2.24)	- 3.56** (- 2.03)	- 3.82** (- 2.33)	- 5.55 (- 1.67)	- 2.80 (- 0.87)	- 6.13* (- 1.87)	- 4.42 (- 1.31)
<i>Law and order</i>	- 3.19*** (- 2.73)		- 4.13*** (- 2.87)		- 7.89** (- 2.66)		- 9.75*** (- 3.33)	
<i>Property rights</i>		- 7.53*** (- 3.70)		- 10.16*** (- 4.19)		- 19.81*** (- 3.83)		- 21.08*** (- 3.91)
<i>Log GDP</i>	- 10.44*** (- 3.26)	- 11.14*** (- 3.59)	- 12.43*** (- 3.16)	- 13.18*** (- 3.56)	- 8.75 (- 1.36)	- 13.97** (- 2.15)	- 7.81 (- 1.23)	- 10.53 (- 1.55)
<i>Growth GDP</i>	- 2.10*** (- 2.71)	- 1.07 (- 1.06)	- 2.24** (- 2.35)	- 0.88 (- 0.73)	2.81* (1.73)	2.11 (0.91)	2.27 (1.41)	3.72 (1.54)
R ²	0.52	0.53	0.51	0.56	0.45	0.55	0.50	0.56
No observations	40	39	40	39	31	30	31	30
F-value	9.40	9.78	9.08	10.87	5.39	7.55	6.52	7.80
VIF (mean)	1.13	1.13	1.13	1.13	1.09	1.22	1.09	1.22

*, ** and *** indicates significance at 10, 5 and 1 percent respectively. Dependent variables are ownership concentration (1 - 4) and family control (5 - 8) respectively. Explanatory variables are shareholder protection, law and order, property rights, GDP level and growth in GDP. Ordinary Least Squares (OLS) have been used as estimator.

Table 5 Allocation of capital, legal origin and ownership

	Dependent variable: Elasticity of capital, $\hat{\lambda}_j^*$											
	Regressions without legal origin dummies						Regressions with legal origin dummies					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>Constant</i>	0.809 (0.65)	-0.148 (-0.10)	2.133 (1.16)	2.237 (1.27)	2.367 (1.45)	2.253 (1.38)	0.020 (0.01)	-1.248 (-0.80)	0.222 (0.11)	0.605 (0.30)	1.527 (0.92)	1.304 (0.79)
<i>Shareholder protection</i>	-0.030 (-0.59)	-0.033 (-0.58)					-0.018 (-0.29)	-0.033 (-0.50)				
<i>Law and order</i>	0.164*** (3.98)						0.132*** (2.72)					
<i>Property rights</i>		0.237*** (2.85)							0.200** (2.15)			
<i>Ownership concentration mean</i>			-0.013** (-2.18)						-0.006 (-0.79)			
<i>Ownership concentration median</i>				-0.012** (-2.45)						-0.006 (-1.13)		
<i>Family ownership, control inferred at 10%</i>					-0.009** (-2.66)						-0.010*** (-2.86)	
<i>Family ownership control inferred at 20%</i>						-0.008** (-2.58)						-0.009*** (-2.81)
<i>Log GDP</i>	-0.031 (-0.27)	0.042 (0.33)	-0.028 (-0.19)	-0.043 (-0.31)	-0.077 (-0.56)	-0.070 (-0.51)	0.040 (0.31)	0.141 (1.08)	0.097 (0.60)	0.066 (0.41)	-0.029 (-0.20)	-0.012 (-0.09)
<i>Growth GDP</i>	-0.046* (-1.69)	-0.096*** (-2.32)	-0.090*** (-2.76)	-0.089*** (-2.80)	-0.036 (-1.04)	-0.042 (-1.21)	-0.037 (-1.21)	-0.068 (-1.56)	-0.063* (-1.84)	-0.065* (-1.93)	0.002 (0.05)	-0.003 (-0.09)
R ²	0.43	0.33	0.23	0.26	0.30	0.29	0.49	0.45	0.36	0.38	0.48	0.48
No observations	40	39	40	40	31	31	40	39	40	40	31	31
F-value	6.48	4.12	3.78	4.27	3.81	3.64	4.33	3.61	3.14	3.31	3.73	3.66
VIF (mean)	1.13	1.13	1.42	1.38	1.20	1.17	1.75	1.71	1.81	1.75	1.55	1.52

Note: *, ** and *** indicates significance at 10, 5 and 1 percent respectively. Our dependent variable is the elasticity of capital with respect to sales ($\hat{\lambda}_j^*$).

Regressions 7 to 12 also include legal origin dummies. Ordinary Least Squares (OLS) have been used as estimator.

When we include legal origin dummy variables, the negative effect of ownership concentration becomes insignificant but the other variables remain significant. The results are robust even if our control variables, log GDP and GDP growth, are omitted. We include them nonetheless because they reveal the advantages of our accelerator method. As one might expect, the existing level of economic development (measured as GDP) has no impact on capital elasticity. However, economic growth (GDP growth) significantly reduces capital elasticity. This makes sense and can be interpreted with respect to the dynamics of economic growth: The pressure for structural change is reduced as growth rates increase. Obviously it should be noted that the direction of causality between resource allocation and economic growth is ambiguous.

Further research is needed in this area. One important question concerns the effect of control-enhancing mechanisms on investment behavior at the firm level. A second question is the historic development of corporate governance institutions, and how political economy conditions have made them endogenous at the country level. For example, the extent to which property rights and investor protection are endogenous to ownership structure is still largely unresolved (see Morck et al., 2005).

6. Conclusions

We examine the effect of ownership concentration and related market institutions on the allocation of capital in the economy. We measure capital elasticity for 44 countries with a panel of about 12,000 firms and 61,000 observations. We advance the literature in two ways. First, we make a methodological contribution using the accelerator principle of investments to derive a measure of the efficiency of capital allocation: *Elasticity of capital with respect to output*. The accelerator principle is applicable because if desired capital stock is proportional to output, changes in output will reflect changes in desired capital stock. We measure output with sales to achieve consistent estimates across countries. Therefore, a low elasticity of capital with respect to sales is a sign of relatively high capital adjustment costs. This measure is related to Wurgler's approach at the industry level (2000), which estimates elasticity of investments but not of capital. In contrast, our approach aligns with the accelerator principle. Our measure of elasticity requires firm level data for investments, capital stock and sales. This is a comprehensive definition of investments that reflects the actual cash available for managers to invest, thereby reducing problems related to accounting measures of investments. All three measures are selected to ensure consistent definition across countries.

Second, we empirically test two streams currently dominating in the current research on corporate governance literature. On the one hand, we find support for the economic entrenchment hypothesis. On the other hand, our empirical results do not support the hypothesis that legal origin is a key determinant of growth.

We find that protection of private property is important for capital allocation. The obvious policy implication is that property rights should be strengthened in order to improve capital allocation. This is consistent with the institutional approach to economic growth. However, we stress the importance of acknowledging the difference between *enacting* and *enforcing* institutions. For example, clauses may be written into law but poorly enforced or easily circumvented by informal institutions such as corruption. This is likely the case for India for example, where the highest value of 5 on the Volpin-

Pagano-LLSV Anti-director rights index is countered by lower values of 2.5 for law and order and 3 for property rights. We also find that family control and ownership concentration negatively influence capital allocation. We use aggregate ownership measures collected by La Porta et al. (1998, 1999) and Claessens et al. (2000). Economies with highly concentrated ownership structures display clear signs of economic entrenchment and persistent misallocation of capital. We argue that it is not ownership concentration *per se* that creates inefficiencies in the allocation of capital but rather, the condition of its governing institutions. Therefore, strong private property and investor protection reduce equilibrium concentration ownership and improve the allocation of capital. Finally, legal origin has no significant impact on our measure of capital allocation.

In the long run, strengthening key institutions will shift the equilibrium towards maximum returns on investments because these improvements facilitate the movement of capital to more productive purposes. This has significant implications for policies designed to encourage innovation in high-growth industries, not least because entrepreneurs require capital that would otherwise be tied up in other industries. Thus, we suggest that when institutions improve the allocation of capital, firms are better positioned for innovation and growth. This translates into overall better economic performance.

Appendix 1

Table 6 Corporate Governance Indicators

<i>Country^a</i>	Volpin-Pagano-LLSV Anti-director rights	Law and order	Property rights	$\hat{\eta}_j$	Marginal q , $q_{m,i}$	GDP Growth (annual %)	Log GDP
Australia	4	6.00	5	0.68	0.94	3.31	11.57
Canada	5	6.00	5	0.58	1.16	2.72	11.76
Hong Kong	5	4.93	5	0.95	0.78	5.38	11.15
India	5	2.50	3	0.10	0.80	5.63	11.55
Ireland	4	4.68	5	0.67	1.10	5.42	10.82
Israel	3	2.89	4	0.26	1.27	4.19	10.95
Malaysia	4	4.07	4	0.29	0.86	6.27	10.95
New Zealand	4	6.00	5	0.90	0.86	2.45	10.78
Pakistan	5	1.82	4	0.26	0.40	5.13	10.78
Singapore	4	5.14	5	0.49	0.97	6.99	10.92
South Africa	5	2.65	3	-	0.97	2.01	11.18
Thailand	2	3.75	5	-	0.64	6.00	11.23
United Kingdom	5	5.14	5	0.81	0.85	2.26	12.05
United States	5	6.00	5	0.72	1.05	2.90	12.87
<i>English origin</i>	4.29	4.40	4.5	0.56	1.02	4.33	11.33
Denmark	2	6.00	5	0.85	0.65	1.84	11.26
Finland	3	6.00	5	0.56	0.96	2.60	11.11
Norway	4	6.00	5	0.58	1.04	3.12	11.17
Sweden	3	6.00	4	0.85	0.65	2.02	11.40
<i>Scandinavian origin</i>	3	6.00	4.8	0.71	0.78	2.40	11.24
Austria	2	6.00	5	0.84	0.71	2.26	11.37
Germany	1	5.54	5	0.99	0.57	1.94	12.39
Japan	4	5.39	5	0.82	0.86	2.57	12.72
South Korea	2	3.21	5	0.65	0.70	6.81	11.69
Switzerland	2	6.00	5	-	0.64	1.52	11.49
Taiwan	3	5.11	-	-	1.26	11.56	12.34
<i>German origin</i>	2.33	5.21	5	0.83	0.74	4.44	12.00
Argentina	4	6.00	5	-	0.78	3.31	11.57
Belgium	0	6.00	5	0.80	0.51	2.08	11.44
Brazil	3	3.79	3	-	0.25	2.42	11.85
Chile	5	4.21	5	0.29	1.24	5.13	10.81
Colombia	3	1.25	3	0.13	0.43	2.98	10.97
France	3	5.39	4	0.89	0.57	2.11	12.19
Greece	2	3.71	4	0.64	0.54	1.71	11.07
Indonesia	2	2.39	3	0.22	0.84	5.40	11.31
Italy	1	5.00	4	0.65	0.64	1.93	12.04
Mexico	1	3.21	3	0.34	0.50	2.77	11.46
The Netherlands	2	6.00	5	0.57	0.69	2.37	11.62
Peru	3	1.50	3	0.65	0.11	1.90	10.73
The Philippines	3	1.64	4	0.31	1.00	2.67	10.87
Portugal	3	5.21	4	0.54	0.46	2.95	11.03
Spain	4	4.68	4	0.87	0.54	2.75	11.77
Turkey	2	3.11	4	0.24	0.52	3.79	11.23
<i>French origin</i>	2.56	3.94	3.9	0.51	0.59	2.89	11.37
China	-	-	-	-	0.45	9.48	11.85
Hungary	-	-	-	-	-	1.19	10.65
Poland	-	-	-	-	-	-	11.04
Russia	-	-	-	-	-	-	11.60
<i>Socialist/communist origin</i>	-	-	-	-	-	5.52	11.29
<i>Average / total</i>	3	4.43	4	0.65	0.75	3.61	11.42

Note: $\hat{\eta}_j$ is the elasticity of industry investments with respect to industry value-added, as estimated and reported by Wurgler (2000).

Marginal q are estimates of the return on investments, i , relative the cost of capital, r ($q_m = i/r$). The estimates of marginal q have been collected from Gugler et al. (2004b). Both Wurgler (2000) and Gugler et al. (2004b) report estimates for more countries than are included in our sample. See text and Table 1 for variable definitions.

Table 7 Measure of Ownership Concentration

<i>Country^a</i>	Family ownership (control inferred at 10%)	Family ownership (control inferred at 20%)	Ownership mean (3 largest)	Ownership median (3 largest)
Australia	10	5	28	28
Canada	30	25	40	24
Hong Kong	70	70	54	54
India	-	-	40	43
Ireland	15	10	39	36
Israel	50	50	51	55
Malaysia	-	-	54	52
New Zealand	45	25	48	51
Pakistan	-	-	37	41
Singapore	45	30	49	53
South Africa	-	-	52	52
Thailand	57	62	47	48
United Kingdom	5	0	19	15
United States	20	20	20	12
<i>English origin</i>	35	30	41	40
Denmark	35	35	45	40
Finland	10	10	37	34
Norway	25	25	36	31
Sweden	55	45	28	28
<i>Scandinavian origin</i>	31	29	37	33
Austria	15	15	58	51
Germany	10	10	48	50
Japan	10	5	18	13
South Korea	35	20	23	20
Switzerland	40	30	41	48
Taiwan	66	48	18	14
<i>German origin</i>	29	21	34	33
Argentina	65	65	28	28
Belgium	50	50	54	62
Brazil	-	-	57	63
Chile	-	-	45	38
Colombia	-	-	63	68
France	20	20	34	24
Greece	65	50	67	68
Indonesia	69	72	58	62
Italy	20	15	58	60
Mexico	100	100	64	67
The Netherlands	20	20	39	31
Peru	-	-	56	57
The Philippines	42	45	57	51
Portugal	50	45	52	59
Spain	25	15	51	50
Turkey	-	-	59	58
<i>French origin</i>	48	45	53	53
China	-	-	-	-
Hungary	-	-	-	-
Poland	-	-	-	-
Russia	-	-	-	-
<i>Socialist/communist origin</i>	-	-	-	-
<i>Average / total</i>	38	33	45	44

Note: Data on family ownership is from La Porta et al. (1999). Data for Indonesia, the Philippines, Taiwan and Thailand is from Claessens et al. (2000). Data on ownership concentration is from La Porta et al. (1998). For descriptions see text and Table 1.

Appendix 2

Table 8 Correlation Matrix

	$\hat{\lambda}_j^*$	Ownership (mean)	Ownership (median)	Family ownership (10%)	Family ownership (20%)	Property rights	shareholder protection	Law and order	Log GDP	GDP growth	Marginal q , q_m
$\hat{\lambda}_j^*$	1										
Ownership (mean)	-0.27	1									
Ownership (median)	-0.32	0.96	1								
Family ownership (10%)	-0.48*	0.53*	0.59*	1							
Family ownership (20%)	-0.49*	0.54*	0.57*	0.95*	1						
Property rights	0.43*	-0.51*	-0.55	-0.60*	-0.61*	1					
shareholder protection	-0.20	-0.21	-0.20	-0.30	-0.29	-0.10	1				
Law and order	0.61*	-0.44*	-0.46*	-0.54*	-0.61*	0.74*	-0.17	1			
Log GDP	0.16	-0.54*	-0.54*	-0.34	-0.38*	0.19	-0.02	0.41*	1		
GDP growth	-0.34*	-0.26	-0.22	0.27	0.30	0.17	0.10	-0.17	0.03	1	
Marginal q , q_m	0.12	-0.40*	-0.47*	-0.19	-0.17	0.44*	0.33*	0.24	0.28	0.28	1
$\hat{\eta}_j$	0.53*	-0.32	-0.34	-0.38	-0.50*	0.59*	-0.03	0.71*	0.44*	-0.48*	-0.13

Note: * indicates significance at 5 percent. $\hat{\eta}_j$ is the elasticity of industry investments with respect to industry value added estimated by Wurgler (2000). Marginal q are estimates of the return on investments, i , relative the cost of capital, r ($q_m = i/r$). The estimates of marginal q are from Gugler et al. (2003). See text and Table 1 for definitions.

Appendix 3

Table 10 Elasticity of capital, elasticity of investments and marginal q

Explanatory variables:	Dependent variable: $\hat{\lambda}_j^*$	
<i>Constant</i>	0.405** (2.38)	0.759*** (3.88)
$\hat{\eta}_j$	0.929*** (3.49)	-
$q_{m,j}$	-	0.192 (0.78)
R ²	0.28	0.01
No. observations	34	44

Note: *, ** and *** indicate significance at 10, 5 and 1 percent respectively. In this table our measure of capital allocation is compared with Wurgler (2000) measure of investment elasticity ($\hat{\eta}_j$), and Gugler et al. (2004) marginal q ($q_{m,j}$). Ordinary Least Squares (OLS) is used as estimator.

References

Anderson, Ronald C. and David M. Reeb. 2003. "Founding Family Ownership and Firm Performance: Evidence from the S&P 500." *Journal of Finance* 58(3): 1301-1328.

Bebchuk, Lucian. 1999. "A rent extraction theory of corporate ownership and control." NBER working paper no. 7203.

Beck, Thorsten, Ross Levine and Norman Loayza. 2000. "Finance and the source of growth." *Journal of Financial Economics* 58: 261-300.

Berle Adolf and Gardiner Means. 1932. *The Modern Corporation and Private Property*. New York, Macmillan: New York.

Bjuggren, Per-Olof, Johan E. Eklund and Daniel Wiberg. 2007. "Ownership structure, control and firm performance: The effects of vote-differentiated shares." *Applied Financial Economics* 17: 1323-1334.

Caprio, Gerard, Luc A. Laeven and Ross Levine. 2007. "Governance and bank valuation." *Journal of Financial Intermediation* 16(4): 584-617.

Claessens, Stijn, Simeon Djankov, Joseph P.H. Fan and Larry H.P. Lang. 2002. "Disentangling the Incentive and Entrenchment Effects of Large Shareholdings." *Journal of Finance*: 57 (6): 2741-2771.

Claessens, Stijn, Simeon Djankov and Larry H.P. Lang. 2000. "The Separation of Ownership and Control in East Asian Corporations." *Journal of Financial Economics* 58: 81-112.

Clements, Kenneth W. and Henri Theil. 1987. *Applied Demand Analysis: Results from System-wide Approaches*. Harper & Sons.

DeMarzo, Peter M. and Branko Urošević. 2006. "Ownership Dynamics and Asset Pricing with a Large Shareholder." *Journal of Political Economy* 114 (4): 774-826

Demsetz, Harold and Kenneth Lehn. 1985. "The structure of corporate ownership: Causes and consequences." *Journal of Political Economy* 93(6): 1155-1177.

Denis, Diane K and John J. McConnell. 2003. "International Corporate Governance." *Journal of Financial and Quantitative Analysis* 38(1): 1-36.

De Soto, Hernando. 2000. *The Mystery of Capital, Why Capitalism Triumphs in the West and Fails Everywhere Else*. Peruses Books.

Eklund, Johan E. 2007. "Corporate Governance in Scandinavia: Ownership Concentration and Dual-Class Equity Structure." *Working paper no. CEWP 98*, CESIS. Royal Institute of Technology, Stockholm.

Faccio, Mara and Larry H.P. Lang. 2000. "The ultimate ownership of Western European corporations." *Journal of Financial Economics* 65: 365-395.

Gugler, Klaus, Dennis C. Mueller and B. Burcin Yurtoglu. 2004a. "Corporate Governance and Globalization." *Oxford Review of Economic Policy* 20(1): 129-156.

---2004b. "Corporate Governance and the Return on Investments." *Journal of Law and Economics* 47: 589-633.

Himmelberg, Charles P., R. Glenn Hubbard and Darius Palia. 1999. "Understanding the Determinants of Managerial Ownership and the link Between Ownership and Performance." *Journal of Financial Economics* 53: 353-384.

Holmes, Kim, Bryan Johnson and Melanie Kirkpatrick. 1997. *1997 Index of Economic Freedom*. Washington, D.C.: The Heritage Foundation. New York, NY: Dow Jones & Company, Inc.

Hubbard, R. Glenn. 1998 "Capital-Market Imperfections and Investment" *Journal of Economic Literature* 36(1): 193-225.

Jensen, Michael C. and William H. Meckling. 1976. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." *Journal of Financial Economics* 3: 305-360.

Jorgenson, Dale W. 1971. "Econometric Studies of Investment Behavior: A Survey." *Journal of Economic Literature* 9:111-1147.

Jorgenson, Dale W. and Calvin D. Siebert. 1968. "A Comparison of Alternative Theories of Corporate Investment Behavior." *American Economic Review*: 681-712.

Kaldor, Nicholas. 1963. "Capital Accumulation and Economic Growth," pp. 177-222 in Lutz, F.A and Douglas C. Hague. (eds) *The Theory of Capital*. Proceedings of a conference held by the International Economic Association. MacMillan: London.

Kuh, Edwin. 1963. "Theory and Institutions in the Study of Investment Behavior." *American Economic Review* 53(2): 260-268.

Kumar, Krishna B., Raghuram Rajan and Luigi Zingales. 1999. "What determines firm size?" NBER working paper no. 7208.

La Porta, Rafael, Florencio Lopez-de-Silanes and Andrei Shleifer. 1999. "Corporate Ownership around the World." *Journal of Finance* 54(2): 471-517.

La Porta, Rafael, Florencio Lopez-de-Silanes, Cristian Pop-Eleches and Andrei Shleifer. 2003. "Judicial Checks and Balances." NBER working paper no. 9775.

La Porta, Rafael, Florencio Lopez-De-Silanes, Andrei Shleifer and Robert W. Vishny. 2002. "Investor protection and Corporate Valuation." *Journal of Finance* 57(3): 1147-1170.

---1998. "Law and Finance." *Journal of Political Economy* 106(6): 1113-1155.

---1997. "Legal Determinants of External Finance." *Journal of Finance* 52(3): 1131-1150.

Levine, Ross. 2004. "Finance and Growth: Theory and Evidence" NBER Working Paper no. 10766.

---1997. "Financial Development and Economic Growth: Views and Agenda." *Journal of Economic Literature* 35(2): 688-726.

Manne, A.S. 1945. "Some Notes on the Acceleration Principle." *Review of Economics and Statistics* 27(2): 93-99.

Morck, Randall, Andrei Shleifer and Robert W. Vishny. 1988. "Management Ownership and Market Valuation: An Empirical Analysis." *Journal of Financial Economics* 20(1): 293-316.

Morck, Randall, David A. Strangeland and Bernard Yeung. 2000. "Inherited Wealth, Corporate Control and Economic Growth: The Canadian Disease," in Morck, Randall. (ed) *Concentrated Corporate Ownership*. Chicago, University of Chicago Press.

Morck, Randall, Daniel Wolfenzon and Bernard Yeung. 2005. "Corporate Governance, Economic Entrenchment and Growth." *Journal of Economic Literature* 43 (3): 655-720.

Mueller, Dennis C. 1977. "The Persistence of Profits Above the Norm." *Economica* 44(176): 369-380.

Mueller, Dennis C. and Elizabeth A. Reardon. 1993. "Rates of Return on Corporate Investment." *Sothorn Economic Journal* 60(2): 430-453.

Pagano, Marco and Paolo Volpin. 2005. "The Political Economy of Corporate Governance." *American Economic Review* 95(4): 1005-1030.

Perez-Gonzales, Francisco. 2001. Does Inherited Control Hurt Firms' Performance? PhD Dissertation. Harvard University.

Rajan, Raghuram and Luigi Zingales. 2003. "The Great Reversals: The Politics of Financial Development in the Twentieth Century." *Journal of Financial Economics* 69(1): 5-50.

Schumpeter, Joseph A. 1934. *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*. Cambridge: Harvard University Press.

Shleifer, Andrei and Robert W. Vishny. 1997. "A Survey of Corporate Governance." *Journal of Finance* 52(2): 737-783.

Shleifer, Andrei and Daniel Wolfenzon. 2002. "Investor protection and equity markets." *Journal of Financial Economics* 66: 3-26.

Smith, Adam. 1776 (2000). *The Wealth of Nations*. Modern Library.

Söderström, Hans Tson (ed.), Erik Berglöf, Bengt Holmström, Peter Högfeldt and Eva M. Mayersson Milgrom. 2003. *Corporate Governance and Structural Change*. European Challenges, SNS Economic Policy Group Report, SNS förlag.

Stulz, Rene. 1988. "On Takeover Resistance, Managerial Discretion and Shareholder Wealth." *Journal of Financial Economics* 20: 25-54.

Tinbergen, Jan. 1939. "A Method and its Application to Investment Activity" in: *Statistical testing of business cycle theories*, vol. 1, League of Nations, Geneva.

---1938. "Statistical Evidence on the Acceleration Principle." *Economica* 5(2): 164-176.

Tobin, James. 1984. "On the Efficiency of the Financial System." *Lloyds Bank Review* 153: 1-15.

Williamsson, Oliver E. 1963. "Managerial Discretion and Business Behavior." *American Economic Review* 53(5): 1032-1057.

Wurgler, Jeffrey. 2000. "Financial Markets and the Allocation of Capital." *Journal of Financial Economics* 58: 187-214.