# Corporate Governance and Real Investment Decisions

Øyvind Bøhren, Ilan Cooper, and Richard Priestley *

March 1, 2006

**Abstract**

Within a broad sample of US manufacturing firms, we find that increased governance quality is associated with higher levels of investment and greater responsiveness of investment to growth opportunities. High quality governance mitigates the underinvestment problem that arises both from incentive problems between managers and shareholders as well as from financial constraints. In direct tests we find no evidence of overinvestment. Furthermore, when we control for the extent to which a firm is financially constrained we still find that, relative to firms with poor governance, firms with good governance investment more in line with their investment opportunities. This evidence points strongly to good governance mitigating underinvestment stemming from managers seeking the quiet life. We find no indication that the firm's governance quality is endogenous to its growth opportunities in our sample. Overall, the results suggests good governance mechanisms improve the efficiency of capital allocation within firms, and that lax governance produces underinvestment rather than overinvestment.

**Keywords**: Real investments, corporate governance, financial constraints, underinvestment
**JEL classification codes**: E22, G31, G34

*Bøhren and Priestley are from the Department of Financial Economics, BI Norwegian School of Management, and Cooper is from the Department of Economics of the University of Haifa and the Department of Financial Economics, BI Norwegian School of Management. We thank Moshe Kim and Norman Schurhoff for helpful suggestions and Pål Rydland for excellent research assistance. Financial support from the Research Council of Norway (grant no. 154949/510) is gratefully acknowledged.

# 1 Introduction

The only determinant of a firm's optimal investment decision in a frictionless environment is its investment opportunities as measured by Tobin's marginal $q$ (Tobin, 1969). However, empirical research has repeatedly refuted this prediction of the $q$ theory (Hubbard (1998)). Thus, it is natural to consider if the observed investment behavior can be explained by market imperfections such as information asymmetry (Myers and Majluf (1984)) and agency conflicts (Jensen and Meckling (1976) and Jensen (1986)). Existing empirical research on firms' investment decisions mostly ignores agency problems by assuming no conflicts of interest between managers and existing owners. Instead, it assumes managers are aligned with current owners and focuses on how asymmetric information between the firm and new financiers produces financial constraints that influence the investment decision (Fazzari, Hubbard and Petersen (1988), Kaplan and Zingales (1997), Hubbard (1998)). In a general theoretical framework, management can be thought of as making real investment decisions that deviate more from the first best solution of the $q$ theory the more asymmetric the information, and the more serious the agency conflict (Stein (2003)).

Our paper makes four contributions to the literature. First, we address the agency conflict between owners and managers by asking the novel question of how the firm's corporate governance influences its real investment decisions. We do this in two ways by first examining the relationship between the level of the firm's real investments and the quality of its corporate governance mechanisms, as reflected in the Gompers, Ishii and Metrick (2003) corporate governance index. Subsequently, we analyze how corporate governance quality influences the responsiveness of the investment decision to the firm's investment opportunities. Thus, we examine the influence of corporate governance mechanisms on the efficiency of the internal capital budgeting process in allocating funds within firms. As Stein (2003) notes, this question has been studied to a lesser extent than the efficiency of capital allocation across firms. Our approach is novel in the real investment literature, where the link to corporate governance has been missing.

Our second contribution is to show in what way investment behavior differs with the level of governance quality. Several possibilities exist, which all relate to whether managers invest too much (overinvest), too little (underinvest) relative to the first best solution from the $q$ theory. As noted by Jensen (1986), overinvestment may occur when self-serving managers build unprofitable empires at the owners' expense.[1] The underinvestment problem occurs when managerial preference for a quiet life makes them reject new investment projects with positive net present value (Bertrand and Mullainathan (2003)) or when incentive problems drive a wedge between the internal and external cost of capital (Jensen and Meckling (1976)).[2]

[1] Roll (1986) and Heaton (2002) show that overinvestment may also be driven by managerial hubris.

[2] Underinvestment may also happen when management has private information about their skills (Holmström

Finally, risk averse managers may overinvest or underinvest in inefficient, diversified conglomerates with low risk rather than invest more optimally in efficient, specialized, and risky stand-alone projects (Denis, Denis and Sarin (1997)). Better governance can help to mitigate all three problems noted above.

The third contribution of the paper is to present a simple investment model and derive its implications in terms of the relation between investment and the ratio of output to capital, which is a fundamental economic variable. We show that the model predicts that under reasonable assumptions Tobin's marginal q and the output to capital ratio contain the same information. Therefore, we can replace Tobin's Q as the measure of investment opportunities with the output to capital ratio, which has the advantage of not including market values. This is important because the market to book ratio could be a misleading measure for investment opportunities when prices deviate substantially from fundamentals. This problem is potentially serious, since our sample includes the 1990s and early 2000s.

Finally, our fourth contribution is to address the robust finding in corporate governance research that a firm's governance mechanisms are systematically related to its economic performance (Shleifer and Vishny (1997), Becht, Bolton and Roëll (2002), Gompers, Ishii and Metrick (2003)). However, the channel through which governance affects performance remains under-explored. That is, the governance literature does not tell clearly why well-governed firms produce superior performance. Since real investments determine the firm's ability to produce output, this is a key intermediate variable between governance and performance. Notice also that although earlier research has found governance quality and performance to be positively associated, this result does not imply that better governance improves the allocation of resources. This will only be true if better governance improves how managers respond to the firm's investment opportunities. However, managers of well governed firms may not be better than others at allocating real assets, but only at creating barriers to entry for potential competitors or at negotiating with labor unions. Thus, to understand whether governance drives the firm's market value by way of efficiency rather than rent extraction, the key is not the link between governance and market value. Rather, it is whether the governance mechanisms relate systematically to the way management allocates the firm's resources. Our paper tries to shed light on that question by linking governance quality to investment efficiency.

Analyzing a broad sample of US manufacturing firms from 1990 to 2003, our overall findings can be summarized as follows. First, regardless of investment opportunities and the degree to which they are financially constrained, firms invest more the higher their governance quality. Thus, better governance unconditionally reduces potential underinvestment. Second, the higher a firm's corporate governance quality, the more it behaves in line with the predictions of the $q$ theory. Specifically, investment decisions by well governed firms are substantially more sensitive to investment opportunities than investments by badly governed

and Ricart i Costa (1986)) or are short-termist (Narayanan (1985), Stein (1989).)

firms. This finding shows that traditional real investment equations can be improved upon by recognizing the role of agency conflicts when firms invest.

Third, using the methodology of Hoshi, Kashyap, and Scharfstein (1991), we test directly for overinvestment by examining the sensitivity of investments to cash flow in firms with poor investment opportunities. If overinvestment is a problem we would expect such firms to be particularly prone to overinvesting and also to be sensitive to cash flows. Moreover, this would primarily happen in badly governed firms, since weak governance makes the firm invest less in line with its investment opportunities and more in line with the availability of internal financing. We find no evidence to support this idea. These results are consistent with Bertrand and Mullainathan (2003) who find that less monitoring by owners makes managers invest less rather than more in order to enjoy the quiet life. Thus, it seems empire building is not the typical managerial response to lax governance.

Fourth, we find that when we control for differences in financial constraints using a comprehensive measure developed by Kaplan and Zingales (1997), real investments of well governed firms' investment are still substantially more sensitive to investment opportunities. This constitutes strong evidence that, in addition to the potential impact of financial constraints, governance mechanisms mitigate suboptimal investment caused by agency conflicts. Moreover, when controlling for financial constraints, investments of well governed firms are also more sensitive to cash flows than in poorly governed firms. This result is inconsistent with governance mitigating overinvestment. Combined with our finding that well governed firms invest more, we conclude that our evidence lend strong support to the notion that good governance creates value by mitigating the underinvestment problem that occurs when managers derive utility from the quiet life.

Overall, these results constitute novel evidence on why there is a positive relationship between governance quality and economic performance. It seems that one reason why firms with better governance quality perform better economically is that they invest more efficiently.[3]

Our paper is also related to the literature on how the separation between ownership and control influences aggregate investment behavior. Gugler, Mueller and Yurtoglu (2004) find that countries with a common law regime earn returns on investment that are at least as large as the cost of capital, whereas returns are below the cost of capital in civil law countries. Similarly, Wurgler (2000) concludes that investment in declining industries is more effectively curbed in countries with strong minority investor protection, which is more prevalent in

[3]One problem that we share with other empirical papers that examine the economic role of corporate governance is the assumption that governance is exogenous in the model. This is both relative to other independent variables such as investment opportunities and the dependent variable such as investment. In our setting, potential endogeneity between governance and investment opportunities seems particularly relevant. One way this may happen is if firms with attractive investment opportunities improve their governance in order to raise external funding at better terms. Using a variety of tests we find no evidence of such governance endogeneity. Thus, changes in governance quality are unrelated to changes in investment opportunities in our sample.

common law than civil law regimes. Several international studies find that strong shareholder rights are positively associated with market development, valuation multiples, and economic growth (King and Levine (1993a, 1993b), La Porta et al (1997, 1998)), Acemoglu and Zilibotti (1997), Allen and Gale (1997), Rajan and Zingales (1998), Demirgic-Kunt and Maksimovic (1998)).

Our approach differs from these studies in several ways. First, keeping the legal environment constant, we study how firm level governance quality affects the firm's investment decisions. This path is as yet unexplored in the literature. Second, we examine whether corporate governance mechanisms mitigate overinvestment, underinvestment, or both.

The existing governance research that comes closest to ours is by Hartzell, Sun and Titman (2004), who use a sample of Real Estate Investment Trusts (REITs) to investigate the relationship between governance mechanisms and investments. Their results are mixed. For example, they find that REITs are more sensitive to investment opportunities the more financial institutions own in the trust. Other governance mechanisms, such as ownership by directors, officers, and external block holders, which would all supposedly reduce the agency problem, are associated with weaker rather than stronger investment sensitivity.

Our study is distinct from Hartzell et al (2004) in four ways. First, we examine a broad sample of US manufacturing firms whereas Hartzell et al consider only REITs. Although their sample has the advantage of homogenous technology, REITs are required to pay almost all their earnings as dividends in order to be exempted from corporate taxes. This restriction practically eliminates the free cash flow problem (Jensen, 1986) and hence management's ability to finance value-destroying investments with internal funds. Thus, one would expect less severe agency conflicts within REITs than in most other firms. Consistent with this argument, Hartzell et al find no relationship between Tobin's $q$ (their measure of investment opportunities) and their proxy for corporate governance quality, which they measure by board size, board independence, managerial stock ownership, block ownership, and the concentration of institutional ownership. In contrast, we find a strong, positive link between governance quality and Tobin's $q$, which is also consistent with Gompers, Ishii and Metrick (2003).

The second difference is that we introduce the output (sales) to capital ratio as a novel measure of investment opportunities. Unlike Tobin's $q$, this proxy has the advantage of being unaffected by security mispricing. Moreover, section 2 will show that the output to capital ratio is a sufficient statistic for investment under reasonable assumptions. Third, rather than making the assumption that all firms face the same financial constraint, we allow this characteristic to vary cross-sectionally and hence influence the sensitivity to investment opportunities. Finally, while examining the relationship between corporate governance quality and investments more closely, we also explore what type of agency problems are reduced when governance improves. That is, we examine whether corporate governance mitigates the cost of overinvestment or underinvestment.

The rest of this paper is organized as follows. Section 2 derives a simple model showing that the output (sales) to capital ratio as a measure of investment opportunities is a sufficient statistic for optimal investment. The data and the variable construction are presented in section 3, and section 4 contains the empirical tests. Section 5 summarizes and concludes.

## 2 Measuring investment opportunities

There are three potential problems in using the $q$ framework to measure investment opportunities. First, $q$ may not adequately reflect future investment opportunities over the sample period. This is because the market to book ratio, which is the most common proxy for Tobin's $q$, involves market prices. These prices may not reflect asset pricing fundamentals over a certain sample period. This has been a particular concern for the 1990s, which covers most of our 1989– 2003 sample period. Second, a related problem is that if prices temporarily move away from fundamentals then managers may increase investment when prices are higher than fundamentals and decrease investment when prices are below fundamentals. That is, they will time the market in terms of when to invest and consequently investment and $q$ may be related not because $q$ measures investment opportunities, but because managers increase investment when prices are high and decrease investment when prices are low.[4] Third, Erickson and Whited (2000) point out that the market to book proxy for Tobin's $q$ does not reflect the firm's true growth opportunities. This is because the market value contains the value of non-physical assets that should not be used by the firm in its decision to invest in physical assets.

Given these potential problems in using $q$, we consider the output (sales) to capital ratio as an alternative measure of investment opportunities. This ratio, which does not include the market price of the firms, is potentially a better measure of investment opportunities than the market to book ratio. We next present a simple model which shows that under reasonable assumptions, the output to capital ratio is a sufficient statistic for optimal investment.[5] We assume the following production function:

$$F(\eta, K, L) = A\eta K^{\alpha} L^{\beta} \tag{1}$$

$A$ is a constant, $\eta$ is the stochastic productivity level, $K$ is capital stock, $L$ is labor, and $\alpha > 0$ and $\beta > 0$ represent the shares of capital and labor in production, respectively. We assume

[4] Bond and Cummins (2000) argue that the market to book ratio is an inappropriate guide to optimal investment when stocks are mispriced. On this point, Shiller (2000), Baker (2002) and others claim that there was a stock market bubble in the US during the 1990s.

[5] It could be argued that using market values is advantageous, since they embed expectations of the firm's expected growth opportunities that are not yet reflected in current output. While this could certainly be the case, it would be more likely in industries such as high-tech and biotechnology. The argument seems less valid in manufacturing, which constitutes our sample.

decreasing returns to scale, which implies $\alpha + \beta < 1$, and that labor is costlessly adjustable.[6] Cooper, Gerard and Wu (2005) show that after labor has been optimized over, the production function in expression (1) can be presented in reduced form as:

$$Y \equiv f(\theta, K) = B\theta^{1-\gamma}K^{\gamma}, \tag{2}$$

where $B$ is a constant, $\theta$ is a non-linear transformation of the productivity level, and $\gamma = \frac{\alpha}{1-\beta}$. Thus, the production function exhibits constant returns to scale with respect to $\theta$ and $K$. Reasonable values of $\gamma$ are in the vicinity of 0.9 (Cooper (2006)).

We assume that the cost of adjusting the capital stock is proportional to output. This feature can arise if the installation of new capital entails disruption to production. Such a property of the adjustment cost function is commonly assumed in the investment literature (Caballero (1997)). We follow Merz and Yashiv (2005) and assume that the cost of capital adjustment is both proportional to the firm's output and convex in the investment to capital ratio. This assumption is consistent with the empirical findings of Cooper and Haltiwanger (2005) that a model which mixes both convex and non-convex adjustment costs of investment fits the data best. We adopt the following specification for the adjustment cost function:

$$C(\theta, K, I) = \left[\frac{a^{+}}{2}\left(\frac{I}{K}\right)^{2}K\right] b\left(B\theta^{1-\gamma}K^{\gamma}\right) + \left[\frac{a^{-}}{2}\left(\frac{I}{K}\right)^{2}K\right] b\left(B\theta^{1-\gamma}K^{\gamma}\right) \tag{3}$$

The convex component of this function, $\frac{a}{2}\left(\frac{I}{K}\right)^{2}K$, is the form of the adjustment cost function adopted by Cooper and Haltiwanger (2005). $a^{+}$ is an adjustment cost parameter for positive investment, and $a^{-}$ is the adjustment cost parameter for disinvestment. As investment is largely irreversible (see, for example, Doms and Dunne (1998)), $a^{-}$ is typically substantially larger than $a^{+}$. $1 < b < 0$ is a parameter related to the fraction of output foregone whenever the firm undertakes investment.

Note that both the production function in (2) and the adjustment cost function in (3) are homogenous of degree one with respect to $\theta$ and $K$. As Caballero (1997) notes, it follows that the value of the firm must also be homogenous of degree one in $\theta$ and $K$. Let $J(\theta, K)$ be the value of the firm. The constant returns to scale with respect to $\theta$ and $K$ property implies that:

$$J(\theta, K) = \theta V(Z), \tag{4}$$

where $Z = \frac{K}{\theta}$.

Optimality of investment entails an equality between marginal $q$ and the marginal cost of

[6] Note that decreasing returns to scale imply that Tobin's average $Q$, which is usually proxied for by the market to book ratio, can no longer be used as a measure for Tobin's $Q$. Only under constant returns to scale in capital and labor can Tobin's average $Q$ be used as such a measure. See Hayashi (1982).

adjustment (with respect to investment). Note that the marginal adjustment cost is

$$C_I(\theta, K, I) = \left[\alpha\left(\frac{I}{K}\right)\right] b\left(B\theta^{1-\gamma}K^{\gamma}\right) = \qquad (\alpha b B)\, I\,(Z)^{\gamma-1}.$$

Also note that the firm's output to capital ratio is given by:

$$\frac{Y}{K} = \frac{B\theta Z^{\gamma}}{K} = BZ^{\gamma-1}, \tag{5}$$

which is a monotonic transformation of $Z$. Thus, for positive investment the marginal cost of adjustment, $C_I(\theta, K, I)$, is positively and monotonically related to the output to capital ratio. This implies that the output to capital ratio is positively and monotonically related to marginal $q$. As investment is largely irreversible, investment is rarely negative, which makes the capital to output ratio positively related to marginal $q$ most of the time. Therefore, the output to capital ratio is a sufficient statistic for investment. We will use this result in our empirical tests.

## 3 Data sources and variable construction

We use the corporate governance index of Gompers, Ishii and Metrick (2003) matched with data from COMPUSTAT. Gompers, Ishii and Metrick construct their index from the data of the Investor Responsibility Research Center (IRRC), which publishes detailed listings of corporate governance mechanisms for individual firms. The IRRC universe is drawn from the Standard and Poor's 500 firms as well as the annual lists of the largest US corporations from Forbes, Fortune, and BusinessWeek.

The IRRC describes the corporate governance quality of a firm based on 24 different provisions in the law and the corporate charter since 1990 to the present. Gompers, Ishii and Metrick split these characteristics into five major groups, which they call tactics to delay hostile bidders, voting rights, director protection, other takeover defences, and state laws, respectively. They use these characteristics to construct a governance index score per firm by adding one point for every provision that restricts shareholder rights and hence increases the managers' power.

This index does not reflect accounting data and ownership characteristics that could provide additional information on governance quality. For example, managers of firms with high financial leverage and low cash flow could be more disciplined to act on behalf of current owners because high debt and low liquidity restrict their ability to finance value-destroying investments internally. However, these two characteristics have also been used as empirical proxies in the real investment literature to assess the role of financial constraints caused by information asymmetry. But, as just argued, firms can be sensitive to their cash flows and

debt capacity due to conflicts of interest between managers and current stockholders. This agency problem may be independent of whether the firm faces financial constraints that limit its access to outside funding from new financiers. This dual role of internal financing will be evident in our empirical analysis.

Our sample period starts in 1991, ends in 2003, and includes all US manufacturing firms for which there is ranking by the Gompers, Ishii and Metrick index and for which COMPUSTAT data on several items that we specify below is available. We focus on manufacturing firms since they are capital intensive, implying that their economic performance crucially depends on the quality of their capital investment.

Our dependent variable is the ratio of investment to capital, $\frac{i}{k}$, where $i$ and $k$ are Compustat items 128 (capital expenditures) and 8 (net value of plant and equipment), respectively. Based on the model in section 2, our primary measure of investment opportunities is the firm's output to capital ratio (denoted $\frac{y}{k}$), which we estimate as sales (Compustat item 12) to capital (item 8). For robustness reasons we also measure investment opportunities by Tobin's $q$ operationalizing it as the ratio of the market value of assets to their book value. The market value of assets is defined as its book value (item 6) plus the market value of common equity (the product of items 24 and 25) less the sum of the book value of common stock (item 60) and deferred taxes (item 74).

Following the extant real investment and the corporate governance literature, we use cash flow and financial leverage as control variables that could be important investment determinants. Our proxy for cash flow, $cf$, is defined as earnings before extraordinary items (Compustat item 18) plus depreciation (item 14). We deflate this measure by the book value of assets (item 6). Leverage, $\frac{d}{e}$, is measured as the ratio of the book value of debt (item 6-item 60) to the market value of equity (item 60).

In order to separate the role of financial constraints from agency problems in investment decisions, we follow Lamont, Polk and Saa-Requejo (2001) (see their appendix in particular), who use the regression coefficients from the Kaplan and Zingales (1997) (hereafter $KZ$) model to categorize firms according to how financially constrained they are. Unlike other methods of separating firms according to their financial constraints, such as the Fazzari, Hubbard and Petersen's (1988) method of first ranking by dividend payout and then using cash flow as an investment determinant, the $KZ$ index takes account of several characteristics that can reflect how financially constrained a firm is. Given this measure, a firm will be classified as financially constrained if it has high leverage, low cash flow, and low dividend payout.

Our statistical tests use fixed effects panel data regression techniques to control for unobserved heterogeneity across firms. This is done by demeaning all the variables in a regression. That is, from each observation of $x$ for firm $i$ at time $t$, we subtract the time series average of $x$ for firm $i$. The OLS technique applied to such demeaned data provides unbiased and efficient estimates (Hsiao (2003)).

# 4 Empirical findings

The Gompers, Ishii and Metrick (2003) index score ($GQ$ hereafter) ranges from 0 (highest governance quality) to 20 (lowest governance quality). They define a democracy group as all firms with a $GQ$ of 5 or lower. A dictatorship group has firms with a $GQ$ of 14 or higher. In addition, we define a non-dictator group, which contains all firms outside the dictator group, i.e., firms with a $GQ$ below 14.

Table 1 presents summary statistics across firms classified by governance quality. We avoid extreme outliers by disregarding firms in the population of US manufacturing firms over 1991-2003 that have investment to capital ratios above one or have disinvested more than their existing capital stock. This leaves an average of 2639 firms in each year of which 187 are in the democracy group and 177 in the dictatorship group. The mean and the standard deviation of the investment to capital ratio, $\frac{i}{k}$, are higher for well governed firms (democracy) than in firms with low governance quality (dictatorship). Thus, well-governed firms invest more, but the investment also varies more from firm to firm. Since the mean $\frac{i}{k}$ in the democracy portfolio and the non-dictatorship portfolio are quite close, most of the decline in investment seems to occur when governance becomes particularly poor.

Firms in the democracy group have better investment opportunities as reflected by both a higher output to capital ratio $\frac{y}{k}$ and a higher $q$ as measured by the market to book ratio $\frac{m}{b}$. It is interesting to note that whereas average $\frac{i}{k}$ is pretty much the same in the democracy and non-dictator groups, this is not the case for $\frac{y}{k}$. Firms in the democracy portfolio have considerably better average investment opportunities than other firms. Cash flow, $cf$, is smallest in the democracy portfolio in terms of its mean, but has a much higher standard deviation. The debt to equity ratio, $\frac{d}{e}$, is approximately the same across all groups. Finally, the more comprehensive $KZ$) index, where higher score reflects lower financial constraints, shows that well-governed firms are considerably less limited in their access to outside financing than firms with weaker governance.

The summary statistics suggest that well governed firms have better investment opportunities and invest more. However, this cannot be used as evidence that these firms make better investment decisions. To understand this issue we need a more formal analysis of the relationship between investment and investment opportunities that conditions this link on the quality of the firm's governance. Similarly, whilst the finding that the volatility of $\frac{i}{k}$ is highest for well governed firms may suggest they are more liquidity constrained (unconstrained firms should have a smooth investment patterns) the fact that their mean $\frac{i}{k}$ is also higher suggests the opposite. Thus, understanding how governance, financial constraints, and real investments interact requires a more comprehensive analysis.

### 4.1 The level of investment

This section explores the relationship between corporate governance quality and the level of investment. Subsequently, in section 4.2 we examine how corporate governance affects the relationship between the level of investment and a firm's investment opportunities.

We start out with the following univariate model, which regresses investment on governance quality:

$$\frac{i}{k}_t = a_0 + a_1 GQ_{t-1} + u_t \tag{6}$$

The results appear under model (1) in table 2. The estimated coefficient for the $GQ$ index is negative and statistically significant at conventional levels. Firms that have better corporate governance have higher levels of investment. We run similar univariate regressions using the variables that have been used in the extant real investment literature. The firm's investment opportunities as proxied by the output to capital ratio (model (2)) is motivated by the perfect markets hypothesis. The cash flow (model (3)) and the Kaplan–Zingales index (model (4)) are both based on the idea that information asymmetries may create financial constraints.

There is a positive and highly statistically significant relationship between the level of investment and a firm's investment opportunities. Like the extant literature, we find a positive relationship between the level of investment and a firm's level of cash flow. This is consistent with both over- and underinvestment caused by agency problems, and with underinvestment due to financial constraints. We find a negative relationship between the level of investment and the measure of financial constraints as measured by the $KZ$ index. Since higher $KZ$ index values reflect stronger financial constraints, the negative sign suggests that as firms become more financially constrained, they invest less.

Next, we run a multivariate regression which includes all four variables from the univariate models:

$$\frac{i}{k}_t = a_0 + a_1 GQ_{t-1} + a_2 \frac{y}{k}_{t-1} + a_3 KZ_{t-1} + a_4 cf_{t-1} + u_t \tag{7}$$

The results, which are reported under model (5) in table 2, support the findings from the univariate regressions except for the $KZ$ index. Firms with higher governance quality invest significantly more than firms with lower governance quality, as the estimated coefficient for $GQ$ is -0.005 with a $t$-statistic of -2.27. The estimated coefficient on investment opportunities is positive and highly statistically significant. Economically it is important too: an increase in $\frac{y}{k}$ by two standard deviations increases the investment to capital ratio by twelve percentage points. Interestingly, the coefficient of the $KZ$ measure is not statistically significant in the multiple regression. Thus, the level of investment does not depend on the degree of financial constraints as measured by $KZ$ in our sample. In contrast, the cash flow coefficient is positive and highly significant. We will investigate later whether the $cf$ variable is proxying for financial constraints.

These results show that holding investment opportunities and financial constraints constant, firms with good governance quality invest more than firms with lower governance quality. One rationale is that good governance mitigates the underinvestment occurring when asymmetric information between managers and financiers drives a wedge between the cost of internal and external funds. That is, $GQ$ could be related to financial constraints in a way which is not captured by $KZ$. Thus, governance quality could influence the investment effect of financial constraints. Alternatively, if we have fully captured the extent to which a firm is financially constrained by the $KZ$ variable, high governance quality could reduce the underinvestment problem caused by managers' preferences for a quiet life. Either way, our result is consistent with the conjecture that closer monitoring, enabled by better governance mechanisms, leads to higher levels of investment.

### 4.2 Investment opportunities

Given our findings in table 2 that the level of investment is higher the better the firm's governance quality, the next question is whether governance matters for the way the firm responds to its investment opportunities. In particular, the positive association between governance quality and investment does not tell us whether better governed firms are investing more in line with their investment opportunities, just that they invest more. The models in this section separately regress investment on investment opportunities for firms with different governance qualities. This approach allows us to explore whether investment becomes more tightly linked to investment opportunities when governance quality improves. If this is the case the coefficient on investment opportunities will be larger the better the governance.

For each group of firms sorted by governance quality, we first estimate the following classic univariate investment equation that assumes no asymmetric information problems:

$$\frac{i}{k}_t = a_0 + a_1 \frac{y}{k}_{t-1} + u_t \tag{8}$$

The upper panel of table 3 reports the results of estimating equation (8) for the democracy group, the non-dictatorship group, and the dictatorship group, respectively. There is a positive, strong, and statistically significant relationship between $\frac{i}{k}$ and $\frac{y}{k}$ in every group. However, the economic significance is considerably stronger in the democracy group where the coefficient estimate is nearly six times higher than for the dictatorship group. To get a feel for the economic importance of governance quality on the way a firm responds to its investment opportunities, consider the impact of a one standard deviation increase in investment opportunities for firms in the democracy group and those in the dictatorship group. For the democracy group investment increase by over 15%, for the dictatorship group by 2%. Therefore, corporate governance quality appears to be having a large effect on firm's investment behavior. Democracy firms are also more sensitive when compared to the much larger

non-dictator group, i.e., all firms outside the dictatorship group.

This simple univariate setting shows that well governed firms represented by the democracy group invest more in line with their investment opportunities than badly governed firms represented by the dictatorship group. This is an important new finding showing that corporate governance does matter for investment decisions. In particular, better governed firms invest more in line with their investment opportunities than firms with weaker governance.

Does this conclusion still hold when we also allow for other control variables that are known to affect the level of investment? The lower part of table 3 reports results from estimating the following model:

$$\frac{i}{k}_t = a_0 + a_1 \frac{y}{k}_{t-1} + a_2 cf_{t-1} + a_3 \frac{d}{e}_{t-1} + v_t \tag{9}$$

The first thing to notice is that the inclusion of financial constraints in the regression does not alter the finding from the univariate model. Just like in the upper panel, firms in the democracy group respond much more strongly to their investment opportunities than firms in the dictatorship group.

Irrespective of governance quality, $cf$ has the expected positive coefficient and is statistically significant. This cash flow sensitivity of investment can arise for several reasons. First, it might proxy for the degree of financial constraints, implying that firms increase investments as their internal financing improves. Second, cash flow sensitivity might stem from agency problems related to the manager-stockholder conflict and the free cash flow hypothesis (Jensen and Meckling (1976), Jensen, 1986). Third, managers seeking the quiet life might be reluctant to raise external funds due to the exposure and scrutiny involved. Therefore, they invest only when sufficient internal funds are available. Finally, if our measure for investment opportunities is imperfect, then cash flows might appear to have explanatory power if they are correlated with investment opportunities.

The estimated coefficient for $cf$ is largest in the dictatorship group. This could be because poorly governed firms are more financially constrained since they are only weakly monitored and consequently have more asymmetric information. Hence, their investment depends more on cash being available. In contrast, better governed firms have more access to external capital markets because they are better monitored and hence there is less asymmetric information. The larger coefficient on $cf$ in the dictatorship portfolio is also consistent with the agency idea that poorly governed firms overinvest by using all available cash flow to build unprofitable empires. We test whether this is the case in section 4.3. Finally, the larger coefficient on the $cf$ variable is also consistent with poorly governed firms allowing managers to opt for a quiet life. They want to avoid being monitored so they do not raise external finance and only invest when cash flow is available.

The coefficient on leverage has the expected negative sign, indicating that more debt

financing relative to equity decreases investment. The effect for firms in the dictatorship group is statistically and economically strong and much larger than for firms in the democracy group. This evidence is supportive of the notion that poorly governed firms are more financially constrained. Like for the cash flow variable, however, the evidence is consistent with an agency rationale as well.

Note that the cash flow and leverage variables are important determinants of investment. This is reflected in the fact that when we add the two variables to the model by going from the upper to the lower panel, the pattern of the $\overline{R}^2$ values changes. They are roughly the same across firms with different governance quality when we only include investment opportunities in the model (upper panel). Adding cash flow and leverage to the equation makes the $\overline{R}^2$ much higher and particularly so for the badly governed firms (lower panel).

Table 4 shows the robustness of the results to measuring investment opportunities by Tobin's $q$ instead of the output to capital ratio used so far. We do this because $q$ is the dominant measure of investment opportunities in the literature. Recall, however, that Tobin's $q$ is not our first choice because it involves share prices which may misrepresent fundamentals, and which could also be used by managers to time their investments. The results in table 4 show that the choice of investment opportunities measure does matter. Like in table 3, the coefficient for $q$ is statistically significant in all cases and is larger in the democracy group than in the dictatorship group. Still, the difference between the coefficients is considerably smaller. Moreover, the coefficient on $cf$ is now higher in the democracy group than in the dictator group. This is the opposite of what we found when measuring investment opportunities by $\frac{y}{k}$ in table 3. This may reflect that $q$ is a weaker measure of investment opportunities than $\frac{y}{k}$. When we measure investment opportunities by $q$, this measure may omit characteristics of investment opportunities which are captured by the $cf$ variable.

Because the findings he in table 3 are based on a rather parsimonious investment regression, we tried a number of alternative specifications. We added production to capture the accelerator effect and short-term securities to reflect the possibility that the most liquid assets can quickly be transformed into cash to finance investments. Both variables could matter for the investment decision (Hoshi, Kashyap, and Scharfstein (1991)). We also added industry dummies to control for the possibility that high or low growth industries are driving our results. The results are largely unchanged by these robustness checks.

The results from the analysis of firm's investments opportunities indicate that corporate governance play at least two roles in the real investment decisions. First, differences in governance quality matter for how well firms respond to their investment opportunities. That is, the real investments of well governed firms are better aligned with their growth potential. Second, difference in governance quality leads to differences in how firms invest relative to their access to external capital markets. Investments in well governed firms are less sensitive to the

availability of self-financing.[7] They are also less sensitive to their current capital structure. These two roles are consistent with the notion that good governance disciplines management in their real investment decisions, and that it makes other disciplining mechanisms such as financial constraints less important.

These findings provide the first evidence that corporate governance quality is an important determinant of the firm's real investment decisions. In addition, the relationship we uncovered between investment and governance could explain why researchers have found a positive relationship between governance quality and performance. This seems to happen because well governed firms are better at investing in line with their investment opportunities. The results have important policy implications since outside regulators can impose a given governance quality. This would lead to investment more in line with a firm's investment opportunities and hence an increase in national wealth.

### 4.3 Overinvestment

The information arguments based on Myers and Majluf (1984) predicts that firms will underinvest. However, the role of cash flow in investment equations may also be symptomatic of overinvestment. Firms may actually overinvest for several reasons that are all based on the agency perspective. Jensen (1986, 1993) argues that managers will spend all available funds on empire-building investment if they prefer growth for its own sake.[8] Roll (1986) shows that overinvestment will occur when overconfident managers overpay for targets in takeovers. Heaton (2002) concludes that overconfident managers will overinvest in general. In all these cases, the ability to overinvest for a badly governed firm will be better the easier the access to internal financing. In this respect, the cash flow sensitivity of investments of badly governed firms may be due to overinvestment.

Hoshi, Kashyap and Scharfstein (1991) examine the overinvestment hypothesis using Japanese companies sorted into two groups. The first group contains independent firms, whereas the second contains firms belonging to a keiretsu. The overinvestment theory predicts that firms with poor investment opportunities are the firms that are most likely to overinvest. Therefore, the investment of these firms should be more sensitive to cash flows. Moreover, this sensitivity should be weaker for firms belonging to a keiretsu because they are subject to closer bank monitoring and therefore less likely to overinvest. Thus, if overinvestment is prevalent, one would expect that the cash flow sensitivity will be higher for independent firms (less monitored) with poor investment opportunities. Hoshi, Kashyap and Scharfstein (1991) find no evidence in support of the overinvestment theory.

We re-visit the overinvestment issue with our sample of US firms. We have an advantage

[7] Note that this finding is not robust to how growth opportunities are defined.

[8] Stein (2003) notes that models extending Jensen's idea of empire-building will not necessarily lead to overinvestment. Examples can be found in Hart and Moore (1985) and Stulz (1990).

relative to the work of Hoshi, Kashyap, and Scharfstein (1991) in that we analyze firms sorted by observed, rather than assumed, governance quality differences. In addition, we already know from our sample that well governed firms respond better to investment opportunities. This is consistent with the agency idea that these firms are more closely monitored by their owners. Therefore, well governed firms are less likely to overinvest.

We limit the attention to firms in the two extreme governance quality groups of democracy and dictatorship, respectively. Within each group we create a dummy variable that equals one if the firm's $\frac{y}{k}$ is below the sub-sample mean (low investment opportunities) and zero otherwise (high investment opportunities). We add an interaction term between this dummy variable and the cash flow variable in the regression. If overinvestment is important, we expect that the investment of firms with poor investment opportunities are more sensitive to cash flows, and that this sensitivity is lower for well governed firms because they are better monitored.

The results presented in table 5 show no evidence of overinvestment. Both badly and well governed firms with poor investment opportunities are *less,* rather than more, sensitive to cash flows than firms with good investment opportunities. Badly governed firms are still more sensitive to cash flow than well governed firms, but the difference between the coefficients is higher for firms with good investment opportunities than for firms with bad investment opportunities. This is the opposite of what the overinvestment theory predicts.

These results indicate that for given liquidity, firms invest less the weaker their investment opportunities. This finding is very similar to those for Japanese firms in Hoshi, Kashyap and Scharfstein (1991) in that we find no support for the overinvestment hypothesis. Along with the findings that are suggestive of underinvestment in section 4.1, our evidence is consistent with the findings of Bertrand and Mullainathan (2003) that less monitoring by owners makes managers invest less, rather than more, in order to enjoy the quiet life. Empire building is not the typical managerial response to lax governance.[9]

### 4.4 Financial constraints

This section separates more carefully between the real investment effects of governance on the one hand and those stemming from financial constraints on the other. Because financial constraint variables could reflect the use of corporate governance mechanisms, we want to ensure that the determinants of investment behavior picked up in the governance index differ from those captured by the financial constraint measures.

As already mentioned, the $KZ$ index includes several characteristics that can reflect the extent to which a firm is financially constrained, as well as certain elements of its governance.

[9] Our evidence is also consistent with McConnell and Muscarella (1985), who analyze stock market reactions to the announcement of capital expenditures in 1986-1991. The announcement effect was mostly positive except in the oil industry, where it was typically negative. According to Jensen (1986), the oil industry was characterized by chronic overinvestment in this period.

For instance, the $KZ$ index will classify a firm as financially constrained if it has high leverage, low cash flow, and low dividend payout. However, a firm with low dividend payout may also be one where closely monitoring owners see no need to reduce management discretion over investments by paying out most of the liquidity as dividends.[10]

In order to assess how governance separately influences investment while controlling for its potentially indirect effect through financial constraint proxies, we first regress a firm's $GQ$ score on its $KZ$ score. We then use the residuals from this regression as an expression of governance quality that is independent of financial constraints. We construct two governance quality groups. Firms with the lowest 7% of the residuals will be the group of well governed firms, since they have the lowest $GQ$ index score after having weeded out the part of it reflecting financial constraint proxies. The remaining 7% of firms with the highest residuals will be classified as having the lowest $KZ$-independent governance quality. We choose a 7% cut-off because it produces roughly the same number of firms in the democracy and dictatorship portfolios as when we sort on GQ alone. If corporate governance quality is important over and above financial constraints as measured by $KZ$, we would expect the same pattern of governance–related sensitivity to investment opportunities that we observed earlier.

Table 6 reports the results using firms formed into two groups based on their $GQ$ index that is orthogonal to their $KZ$ index. There is still a large difference in the coefficient on investment opportunities between the democracy and dictatorship groups. The estimates reflect that corporate governance quality does matter also after controlling for their potential indirect effect through the financial constraint measure $KZ$.

Interestingly, when we neutralize the effect of financial constraints in the governance quality measure, the coefficient on $cf$ becomes larger for the democracy group than for the dictatorship group. This finding is supportive of the idea that better governance reduces underinvestment. Our reasoning is that according to the free cash flow hypothesis, managers who are given the opportunity by non-monitoring owners will build unprofitable empires, financing this overinvestment internally with free cash flow. Thus, if governance mechanisms were mitigating overinvestment, the sensitivity of investment to cash flows would have been weaker in well governed firms than in poorly governed firms. This is contrary to our findings. Coupled with the earlier findings that firms do not overinvest, the role of governance appears to be one of mitigating underinvestment, rather than controlling overinvestment by empire building managers.

[10] Table 2 does indeed suggest that whereas the cash flow is independent of the other investment determinants, the $KZ$ index is not. The cash flow relates to investments in almost exactly the same way in the univariate model (3) and the multivariate model (5). In contrast, the highly significant $KZ$ index in the univariate model (4) becomes insignificant in (5).

### 4.5 Endogeneity

We have so far assumed that a firm's corporate governance quality is exogenous, both relative to the dependent variable (investment) and the other independent variables (investment opportunities and financial constraints).[11] The corporate governance literature has been concerned with potential endogeneity between governance (independent) and economic performance (dependent). However, the most pressing question in our setting is not whether the investment determinants are partially driven by investment itself (reverse causation). Rather, the most serious endogeneity problem may be the one between investment opportunities and governance quality, i.e., between two independent variables. This dependence could arise if firms with attractive investment opportunities improve their governance in order to raise external funding at better terms.

We want to assess whether we are safe to assume that the governance quality index ($GQ$) is exogenous to our two alternative measures of investment opportunities ($\frac{y}{k}$ and Tobin's $q$). In particular, we want to rule out the possibility that the governance mechanisms as captured by the $GQ$ index are modified in response to changes in our measures of investment options. To this end we regress the changes in the governance index on lagged values of Tobin's $q$ and $\frac{y}{k}$. To check whether this relationship depends on the size of the firm, we test these relationships separately for all firms as a whole, for small firms (firms in the bottom 33% according to book value and capital stock) and for large firms (firms in the top 66%).[12]

Table 7 shows that there is never a statistically significant relationship between changes in the governance index and past measures of past investment opportunities. Therefore, we appear to be safe in assuming that governance quality and investment opportunities are exogenous variables in our sample.

## 5 Conclusions

The real investment literature has so far paid much more attention to the role of asymmetric information and the consequent financial constraints than to conflicts of interest and agency costs. Our paper explores empirically how the level and precision of the firm's real investment

[11] Most empirical papers in corporate governance implicitly assume that causation runs from exogenous governance to endogenous performance. A typical framework of analysis is to regress Tobin's $q$ on a subset of governance mechanisms and some control variables in single-equation models, such as in McConnell and Servaes (1990) and Lehmann and Weigand (2000). As argued by for instance Demsetz (1983) and Agrawal and Knoeber (1996), however, governance and performance are both endogenous if the governance mechanisms respond to the firm's performance and vice versa. Agrawal and Knoeber (1996) find that whereas several of their governance mechanisms are significantly related to performance in single-equation models, most of these relationship become insignificant under simultaneous equation estimation. Gompers, Ishii and Metrick (2003) note that causality cannot be inferred from their findings.

[12] If ownership concentration decreases with firm size, the free rider problem makes if more difficult to adjust governance quality to investment opportunities in large firms than in small firms.

decisions depend on the quality of the firm's corporate governance system. That is, we examine whether corporate governance mechanisms improve the efficiency of capital allocation within a firm, measuring investment efficiency by the sensitivity of the firm's real investment to its investment opportunities. We also explore whether better governance improves investment efficiency by mitigating the underinvestment problem (firms invest too little) or the overinvestment problem (firms invest too much) relative to the first best solution as predicted by the Tobin's $q$ theory for frictionless markets. Our sample is US manufacturing firms from 1990 to 2003.

Overall, we find that governance strongly matters to real investments. The higher the firm's corporate governance quality, the more the firm behaves in line with predictions of the $q$ theory. Specifically, investment decisions by well governed firms are substantially more sensitive to their investment opportunities and less sensitive to cash flows than investments made by badly governed firms. This governance-driven quality improvement in real investments seems to occur through a reduced tendency for well governed firms to underinvest. Moreover, we find that governance quality affects investment efficiency both through mitigating financial constraints as well as independently of the extent to which the firm is financially constrained. Thus, our findings are consistent with the conjecture that governance mechanisms reduces the cost of underinvestment that stems from agency conflicts between shareholders and managers who seek the quiet life. This result is largely consistent with recent findings by Bertrand and Mullainathan (2003).

Our findings suggest that the existing empirical models of real investment behavior would benefit from adding corporate governance quality as a determinant beyond the investment opportunities and the financial constraints used so far. As for the corporate governance literature, our findings extend the insight by documenting that the positive relationship between governance quality and economic performance found earlier may be partially explained by an improved efficiency of real investment.

## References


[1] Acemoghlu, Daron, and Fabrizio Zilibotti,1997, Was Prometheus unbound by chance? Risk, diversification and growth, Journal of Political Economy 105, 709-751.

[2] Agrawal, Anup and Charles R Knoeber, 1996. Firm performance and mechanisms to control agency problems between managers and shareholders. Journal of Financial and Quantitative Analysis 31(3), 377-398.

[3] Allen, F. and D. Gale, 1997, Financial markets, intermediaries and intertemporal smoothing, Journal of Political Economy 105, 523-546.

[4] Baker, D., 2002, The stock market bubble and investing social security in the stock market, Pension Benefits (New York), 11, issue 9, page 11.

[5] Becht, M, P. Bolton and A. Roëll, 2002. Corporate governance and control, in George Constantinides, Milton Harris and Rene Stulz (ed), Handbook of the economics of finance, North-Holland.

[6] Bertrand M., and S. Mullainathan, 2003, Enjoying the quiet life: Corporate governance and managerial preferences, Journal of Political Economy 111, 1043-1075.

[7] Bond, S. R., and J. G. Cummins, 2000, The stock market and investment in the new economy: Some tangible facts and intangible fictions, Brookings Papers on Economic Activity, 61-108.

[8] Caballero, Ricardo J. and John V. Leahy, 1996, Fixed costs: The demise of marginal q, NBER Working Paper 5508.

[9] Caballero, Ricardo J., 1997, Aggregate investment, NBER Working Paper 6264.

[10] Cooper, Ilan, 2006, Asset Pricing Implications of Nonconvex Adjustment Costs and Irreversibility of Investment, Journal of Finance 61, 139-170.

[11] Cooper, Ilan, Bruno Gerard and Guojun Wu, 2005, Irreversible investment, real activity and the value premium, Working Paper, BI Norwegian School of Management and University of Michigan.

[12] Cooper, W. Russell and John C. Haltiwanger, 2005, On the nature of capital adjustment costs, Working Paper, University of Texas at Austin and University of Maryland.

[13] Demirguc-Kunt, A. and V. Maksimovic, 1998, Law, finance and firm growth, Journal of Finance 53, 2107-2137.

[14] Demsetz, Harold, 1983. The structure of ownership and the theory of the firm, Journal of Law and Economics 26, 375-390.

[15] Denis, David J., Diane K. Denis and Atulya Sarin, 1997, Agency problems, equity ownership, and corporate diversification, Journal of Finance 52, 135-160.

[16] Doms, Mark and Timothy Dunne, 1998, Capital adjustment patterns in manufacturing plants, Review of Economic Dynamics 1, 409-429.

[17] Erickson, Timothy, and Toni M. Whited, 2000, Measurement error and the relationship between investment and q, Journal of Political Economy 108, 1027-1057.

[18] Fazzari, Steven M, Glen R. Hubbard and Bruce C. Petersen, 1988, Financing constraints and corporate investment, Brookings Papers on Economic Activity, 1, 141-195.

[19] Gompers, Paul A., Joy L. Ishii and Andrew Metrick, 2003, Corporate governance and equity prices, Quarterly Journal of Economics 118, 107-155.

[20] Gugler, Klaus, Dennis C. Mueller and B. Burcin Yurtoglu, 2004, Corporate governance and the return on investment, Journal of Law and Economics XLVII, 589-633.

[21] Hart, O., and J. Moore, 1995, Debt and seniority: An analysis of the role of hard claims in constraining management, American Economic Review 85, 567-585.

[22] Hartzell, Jay C., Libo Sun and Sheridan Titman, 2004, The effect of corporate governance on investment: Evidence from real estate investment trusts (REITs), Working Paper, The University of Texas at Austin.

[23] Hayashi, Fumio, 1982, Tobin's marginal q and average q: A neoclassical interpretation, Econometrica 50, 213-24.

[24] Heaton, John B., 2002, Managerial optimism and corporate finance, Financial Management 31, 33-45.

[25] Holmström, B. and J. Ricart i Costa, 1986, Managerial incentives and capital management, Quarterly Journal of Economics 101, 835-860.

[26] Hoshi, T., A. Kashyap and D. Scharfstein, 1991, Corporate structure, liquidity, and investment: Evidence from Japanese industrial groups, Quarterly Journal of Economics 106, 33-60.

[27] Hsiao, Cheng, 2003. Analysis of panel data. Cambridge University Press.

[28] Hubbard, R. Glenn, 1998, Capital market imperfections and investment, Journal of Economic Literature 36, 193-225.

[29] Jensen, Michael C., 1986, Agency costs of free cash flow, corporate finance, and takeovers, American Economic Review 76, 323-329.

[30] Jensen, Michael C., 1993, The modern industrial revolution, exit, and the failure of internal control systems, Journal of Finance 48, 831-880.

[31] 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.

[32] Kaplan, Steven N. and Luigi Zingales, 1997, Do investment-cash flow sensitivities provide useful measures of financing constraints?, Quarterly Journal of Economics 112, 169-215.

[33] King, R.G. and R. Levine, 1993a, Finance and growth: Schumpeter might be right, Quarterly Journal of Economics 108, 717-737.

[34] King, R.G. and R. Levine, 1993b, Finance, entrepreneurship and growth: theory and evidence, Journal of Monetary Economics 32, 513-542.

[35] Lamont, Owen, Christopher Polk and Jesus Saa-Requejo, 2001, Financial constraints and stock returns, Review of Financial Studies 14, 529-554.

[36] LaPorta R., F. Lopez-de-Silanes, A. Shleifer, and R. Vishny, 1997, Legal determinants of external finance, Journal of Finance 52, 1131-1150.

[37] LaPorta R., F. Lopez-de-Silanes, A. Shleifer, and R. Vishny, 1998, Law and finance, Journal of Political Economy 106, 1113-1155.

[38] Lehmann, Erik and Jürgen Weigand, 2000. Does the governed corporation perform better? Governance structures and corporate performance in Germany. European Finance Review 4, 157—195.

[39] McConnell, John J. and Henri Servaes, 1990. Additional evidence on equity ownership and corporate value, Journal of Financial Economics 27, 595—612.

[40] McConnell, John J. and C.J. Muscarella, 1985, Corporate capital expenditure decisions and the market value of the firm, Journal of Financial Economics 14, 399-422.

[41] Merz, Monika and Eran Yashiv, 2005, Labor and the market value of the firm, Working Paper, University of Bonn and Tel Aviv University.

[42] Myers, S.C., and N.C. Majluf, 1984, Corporate financing and investment decisions when firms have information that investors do not have, Journal of Financial Economics 13, 187-222.

[43] Narayanan, M.P., 1985, Managerial incentives for short-term results, Journal of Finance 40, 1469-1484.

[44] Rajan, R.G., and L. Zingales, 1998, Financial dependence and growth, American Economic Review 88, 559-586.

[45] Roll, Richard, 1986, The hubris hypothesis of corporate takeovers, Journal of Business 59, 197-216.

[46] Shiller, R., 2000, Irrational exuberance, Princeton University Press.

[47] Shleifer, Andrei and Robert W. Vishny, 1997. A survey of corporate governance, Journal of Finance 52 (2), 737-783.

[48] Stein, Jeremy, 1989, Efficient capital markets, inefficient firms: A model of myopic corporate behavior, Quarterly Journal of Economics 104, 655-669.

[49] Stein, Jeremy, 2003, Agency, information and corporate investment. In Handbook of the Economics of Finance, Edited by George Constantinides, Milton Harris and Rene Stulz, Elsevier Science B.V.

[50] Stulz, R.M., 1990, Managerial discretion and optimal financing policies, Journal of Financial Economics 26, 3-27.

[51] Tirole, Jean, 2001. Corporate governance. Econometrica 69(1), 1–35.

[52] Tobin J., 1969, A general equilibrium approach to monetary theory, Journal of Money Credit and Banking 1, 15-29.

[53] Wurgler, Jeffrey, 2000, Financial markets and the allocation of capital, Journal of Financial Economics 58, 187-214.

**Table 1**
**Summary statistics**

The table reports the mean and standard deviation (in parentheses) of key variables used in the statistical analysis. $\frac{i}{k}$ is the investment to capital ratio, $\frac{y}{k}$ is the output to capital ratio, $\frac{m}{b}$ is the market to book ratio (the operationalization of Tobin's $q$), $cf$ is the cash flow, $\frac{d}{e}$ is the ratio of debt to equity, $KZ$ is the Kaplan and Zingales (1997) measure of financial constraints, and $N$ is the number of observations. Firms in the democracy (dictatorship) group have a $GQ$ index score of 5 or less (14 or more), whereas non-dictatorship firms have a score below 14. The $GQ$ index is a proxy for the firm's corporate governance quality developed and estimated by Gompers, Ishii and Metrick (2003). The potential $GQ$ score for a firm ranges from 0 (highest governance quality) to 20 (lowest governance quality). The data are for US manufacturing firms sampled annually from Compustat over the period 1991–2003.

| | All firms | Democracy firms | Non-dictatorship firms | Dictatorship firms |
|---|---|---|---|---|
| $\frac{i}{k}$ | 0.231 | 0.247 | 0.233 | 0.199 |
| | (0.15) | (0.20) | (0.15) | (0.09) |
| $\frac{y}{k}$ | 6.341 | 7.024 | 6.369 | 5.980 |
| | (9.70) | (9.39) | (9.84) | (7.77) |
| $\frac{m}{b}$ | 2.152 | 2.254 | 2.193 | 1.635 |
| | (1.66) | (2.02) | (1.71) | (0.79) |
| $cf$ | 0.104 | 0.084 | 0.105 | 0.094 |
| | (0.12) | (0.25) | (0.13) | (0.05) |
| $\frac{d}{e}$ | 0.555 | 0.581 | 0.552 | 0.595 |
| | (0.23) | (0.37) | (0.23) | (0.16) |
| $KZ$ | −4.373 | −11.664 | −3.953 | −2.071 |
| | (20.58) | (44.29) | (18.04) | (2.60) |
| $N$ | 2639 | 187 | 2462 | 177 |

**Table 2**
**Investment levels and governance quality**

This table shows the results from four univariate regressions (models (1)-(4)) and one multiple regression (model (5)). We regress the investment to capital ratio $\frac{i}{k}$ on the Gompers, Ishii and Metrick (2003) corporate governance quality index $GQ$, the output to capital measure of investment opportunities $\frac{y}{k}$, the cash flow $cf$, and the Kaplan and Zingales (1997) measure of financial constraints $KZ$. $\overline{R}^2$ is the adjusted $R^2$, and t-ratios are in parentheses. The data are for US manufacturing firms sampled annually from Compustat over the period 1991–2003.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| $GQ$ | −0.005 | | | | −0.005 |
| | (−2.56) | | | | (−2.27) |
| $\frac{y}{k}$ | | 0.006 | | | 0.006 |
| | | (16.66) | | | (15.69) |
| $cf$ | | | 0.327 | | 0.304 |
| | | | (16.95) | | (16.12) |
| $KZ$ | | | | −0.001 | −0.0002 |
| | | | | (−5.15) | (−1.25) |
| $\overline{R}^2$ | 0.15 | 6.00 | 0.65 | 6.05 | 11.30 |

**Table 3**
**Investment opportunities and governance quality**

The upper panel of this table reports the results from regressing the investment to capital ratio $\frac{i}{k}$ on investment opportunities $\frac{y}{k}$. The lower panel regresses $\frac{i}{k}$ on $\frac{y}{k}$ and two measures of financial constraints, which are cash flow $cf$ and the debt to equity ratio $(\frac{d}{e})$. $\overline{R}^2$ is the adjusted $R^2$, and t-ratios are in parentheses. Firms in the democracy (dictatorship) group have a GQ index score of 5 or less (14 or more), whereas non-dictatorship firms have a GQ score below 14. The GQ index is a proxy for the firm's corporate governance quality developed and estimated by Gompers, Ishii and Metrick (2003). The potential GQ score for a firm ranges from 0 (highest governance quality) to 20 (lowest governance quality). The data are for US manufacturing firms sampled annually from Compustat over the period 1991–2003.

| | All firms | Democracy firms | Non-dictatorship firms | Dictatorship firms |
|---|---|---|---|---|
| $\frac{y}{k}$ | 0.0057 | 0.0163 | 0.0064 | 0.0028 |
| | (9.93) | (3.36) | (9.86) | (3.27) |
| $\overline{R}^2$ | 3.57 | 5.24 | 3.75 | 5.24 |
| $\frac{y}{k}$ | 0.0058 | 0.0248 | 0.0066 | 0.0028 |
| | (10.52) | (4.48) | (10.39) | (3.63) |
| $cf$ | 0.3732 | 0.3985 | 0.3700 | 0.497 |
| | (14.69) | (4.78) | (14.18) | (3.76) |
| $\frac{d}{e}$ | −0.0836 | −0.0297 | −0.0768 | −0.219 |
| | (−4.68) | (−7.43) | (−4.12) | (−3.36) |
| $\overline{R}^2$ | 11.67 | 14.99 | 11.63 | 24.58 |

**Table 4**
**Measuring investment opportunities by Tobin's $q$**

This table reports the results from regressing the investment to capital ratio $\frac{i}{k}$ on the alternative measure of investment opportunities Tobin's $q$, and also on $cf$ and $\frac{d}{e}$. $\overline{R}^2$ is the adjusted $R^2$, and t-ratios are in parentheses. Firms in the democracy (dictatorship) group have a $GQ$ index score of 5 or less (14 or more), whereas non-dictatorship firms have a score below 14. The $GQ$ index is a proxy for the firm's corporate governance quality developed and estimated by Gompers, Ishii and Metrick (2003). The potential $GQ$ score for a firm ranges from 0 (highest governance quality) to 20 (lowest governance quality). The data are for US manufacturing firms sampled annually from Compustat over the period 1991–2003.

| | All firms | Democracy firms | Non-dictatorship firms | Dictatorship firms |
|---|---|---|---|---|
| $\frac{m}{b}$ | 0.0219 | 0.0624 | 0.0215 | 0.0450 |
| | (10.28) | (5.19) | (9.92) | (2.84) |
| $cf$ | 0.3300 | 0.2314 | 0.3314 | 0.1231 |
| | (12.80) | (2.89) | (12.53) | (6.78) |
| $\frac{d}{e}$ | −0.0797 | −0.0491 | −0.0722 | −0.2331 |
| | (−4.55) | (−1.22) | (−3.88) | (−3.58) |
| $\overline{R}^2$ | 11.51 | 17.74 | 11.30 | 22.34 |

**Table 5**
**Overinvestment and corporate governance**

This table reports the results from testing if firms overinvest. A dummy variable ($\frac{y}{k}dummy$) is created which takes on the value of one if the firm's investment opportunities $\frac{y}{k}$ are below the mean investment opportunities in that group (democracy or dictatorship). Otherwise, the dummy is zero. This dummy is interacted with the cash flow measure $cf$. If firms overinvest, we expect firms with poor investment opportunities to be more sensitive to $cf$, and firms in the dictatorship portfolio to be more sensitive than those in the democracy portfolio. $\overline{R}^2$ is the adjusted $R^2$, and t-ratios are in parentheses. Firms in the democracy (dictatorship) group have a $GQ$ index score of 5 or less (14 or more). The $GQ$ index is a proxy for the firm's corporate governance quality developed and estimated by Gompers, Ishii and Metrick (2003). The potential $GQ$ score for a firm ranges from 0 (highest governance quality) to 20 (lowest governance quality). The data are for US manufacturing firms sampled annually from Compustat over the period 1991–2003.

| | Democracy firms | Dictatorship firms |
|---|---|---|
| $\frac{y}{k}$ | 0.0266 | 0.0031 |
| | (4.75) | (3.87) |
| $cf$ | 0.6462 | 1.0224 |
| | (3.57) | (3.27) |
| $cf$ $\frac{y}{k}$ $dummy$ | −0.3100 | −0.6092 |
| | (−1.54) | (−1.85) |
| $\frac{d}{e}$ | −0.0177 | −0.2106 |
| | (−0.43) | (−3.25) |
| $\overline{R}^2$ | 15.63 | 25.63 |

**Table 6**
**Separating corporate governance effects from financial constraint effects on real investment**

This table reports results from estimating the investment regressions after sorting firms into two groups based on the GQ index that is orthogonal to the KZ index of financial constraint. $\frac{y}{k}$ is the measure of investment opportunities, $cf$ and $\frac{d}{e}$ are the measures of financial constraints. $\overline{R}^2$ is the adjusted $R^2$, and t-ratios are in parentheses. GQ index is the Gompers, Ishii and Metrick (2003) index. The data are for US manufacturing firms sampled annually from Compustat over the period 1991–2003.

| | Orthogonal democracy group | Orthogonal dictatorship group |
|---|---|---|
| $\frac{y}{k}$ | 0.0123<br>(3.13) | 0.0028<br>(3.75) |
| $CF$ | 0.7464<br>(6.20) | 0.3962<br>(3.86) |
| $\frac{d}{e}$ | 0.0477<br>(0.70) | −0.2519<br>(−4.40) |
| $\overline{R}^2$ | 14.24 | 23.69 |

**Table 7**

**Potential endogeneity between governance quality and investment opportunities**

This table shows the results of regressing the change in the firm's corporate governance index from year $t-1$ to year $t$ on its investment opportunities in year $t-1$. The alternative measures of investment opportunities are $\frac{y}{k}$ (output over capital stock) and $\frac{m}{b}$ (Tobin's $q$ operationalized as market over book value of assets). Small firms are in the bottom 33% according to their book value and capital stock, and large firms are in the top 66%. $\overline{R}^2$ is the adjusted $R^2$, and t-ratios are in parentheses. The data are for US manufacturing firms sampled annually from Compustat over the period 1991–2003.

| | All firms | Small firms | Large firms |
|---|---|---|---|
| Lagged $\frac{y}{k}$ | $-0.0002$ | $3.7E-5$ | $-0.0082$ |
| | $(-0.18)$ | (0.03) | $(-1.61)$ |
| $\overline{R}^2$ | -0.000 | -0.001 | 0.002 |
| Lagged $\frac{m}{b}$ | $-0.0031$ | $-0.0014$ | 0.0032 |
| | $(-0.51)$ | $(-0.17)$ | (0.33) |
| $\overline{R}^2$ | -0.000 | $-0.001$ | $-0.001$ |