

Comovement in investment and corporate governance^{*}

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Abstract

This paper examines the propensity of firms to comove in investment decisions. Although stock return comovement and herding among investors received considerable attention in existing work, little is known about correlated investment behavior of firms. After controlling for the similarity of firm characteristics, investments are expected to comove more when firms imitate other firms and rely on public information rather than on firm specific private information about investment opportunities. We consider the effects of agency conflicts on comovement and find evidence in support of managerial shirking of information acquisition effort. Weakly governed managers rely less on private information acquisition and comove more in their investment decisions. Our results also show that the effect is strongest for firms in industries with high information intensity and specialized assets. Further, comovement in investment is decreasing in shareholder rights and property rights protections and increasing in the degree of information asymmetry. The results are obtained after controlling for similarity in firm investment opportunities, correlation in cash flows, fraction of tangible assets, and industry concentration. Critically, we find that comovement in investment has a negative effect on firm and industry performance and productivity growth, after controlling for other factors.

JEL classification: G30, G31, G34, K00

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1. Introduction

This paper investigates firms' propensity to comove in corporate investment and the performance implications of such behavior. Existing work has analyzed comovement in stock returns, herding among investors, analysts and fund managers, and business cycle comovement. Instead, we document and analyze the key determinants of comovement in firm investment. We identify and empirically test several explanations for comovement in firm investment decisions. Further, we find a strong negative effect of comovement on operating performance and growth both in a US sample and in a sample of international firms.

If corporate investments depend mainly on firm specific private information, we will observe less comovement, all else given. However, managers that aren't well incentivized and monitored may shirk on the acquisition and use of firm specific information. We indeed find that corporate investments comove more when monitoring is limited. The identified corporate governance effect is strongest in information-intensive industries; in industries with highly specialized assets (where information acquisition is most relevant for investment); and in industries where costs of imitation are low due to a short investment cycle. In addition, we examine the extent of information acquisition about new products using research and development expenditure data. We find that corporate governance increases both the average level and the dispersion of R&D expenditure across firms in the industry. At the country level, we observe less comovement in the presence of strong shareholder rights protections.

Investment comovement could be due to factors other than managerial shirking. When information asymmetries hinder shareholders' appraisal of investments that rely on private information, managers may be constrained to invest on the basis of public information and observable actions of other firms. Small firms and firms with limited analyst

following are expected to face more severe information asymmetries. We find that investments of smaller firms and of firms with limited analyst coverage comove more.

High idiosyncratic returns to investments based on private information are more likely to be expropriated by governments in the absence of strong property rights, which reduces expected gains from private information acquisition. We find that weak protection of private property rights from rent seeking and expropriation increases comovement in investment.

In obtaining the above results, we control for several underlying variables that contribute to comovement: similarities in investment opportunities and cash flows; asset structure; product market concentration; and industry characteristics. Our conclusions are supported by firm and industry level analyses both in the US and international samples. We also find supporting evidence in country level regressions. Our results survive a battery of robustness tests using a number of monitoring and investor rights protection measures, two-stage least squares estimation, tests of R&D activity, and tests of differences in the propensity to comove across industries with varying information intensity, asset specificity and investment cycle length.

Finally, we examine the effect of comovement in investment on operating performance and growth. If investment comovement is due to managerial failure to incorporate private information in investment decisions, firm performance suffers. On the other hand, if firms make similar yet efficient investment decisions or if the costs of information acquisition are prohibitively high, comovement need not hurt performance. Empirically, we find a significant negative effect of comovement on operating performance and growth.

Our paper is a part of a larger literature that examines investment distortions due to agency conflicts and weak corporate governance. Wurgler (2000) shows that investment is less sensitive to value added in the absence of developed financial markets and investor protections. John, Litov, and Yeung (2008) show that weak corporate governance leads to excessive avoidance of risky investment projects, causing slower growth. Love (2003) finds that investor protection reduces financing constraints. Fisman and Love (2004) examine the effects of financial development on sectoral growth in pairs of countries in the presence of common economic shocks. Focusing on stock returns, Morck, Yeung, and Yu (2000) show that returns comove more in countries lacking property rights and investor rights protections. Durnev, Morck, and Yeung (2004) show that high stock return comovement is associated with less efficient capital budgeting decisions. Barberis, Shleifer, and Wurgler (2005) find support for a sentiment-driven view of stock return comovement.

This paper contributes to the existing literature in three main ways. First, to the best of our knowledge, this is the first paper to document the patterns of comovement in firm investments. Second, we empirically reveal the determinants of investment comovement, including monitoring mechanisms, investor rights protections, analyst following, managerial incentives, similarities in firm characteristics, asset structure, size, and product market concentration. In particular, managers comove more in investment decisions when monitoring is limited, all else given. Third, we show the negative effect of comovement in investment on operating performance and growth rates, holding other factors constant.

The rest of the paper is organized as follows. The second section discusses the main hypotheses. The third section describes data and variables. The fourth section presents the results. The final section concludes.

2. Comovement in investment

Our analysis focuses on comovement in firm investments within a given industry (and country). Information about a firm's investment opportunities is critical to making investment decisions. Investments of different firms can be similar for a number of reasons, including correlated investment opportunity sets, cash flows, and firm characteristics. However, managerial incentive conflicts also play a role in explaining correlated investment choices. To the extent that managers (insiders) collect information about investment projects and make corporate investment decisions, managerial agency conflicts will affect the similarity of corporate investments across firms.

Agency conflicts and investment comovement

Investment comovement among firms could be attributed to the use of a common subset of public information. Public information includes aggregate industry investment data and information inferred from observable decisions of other firms³. However, public information alone is not sufficient for a full evaluation of the projects available to the firm. Adding private firm specific information, managers can more precisely identify and evaluate future investment prospects and make better investment decisions. Firm investments exhibit less comovement when managers utilize more private information in directing investment decisions. Since it is up to managers to choose the extent to which public information is supplemented with private information for the purpose of investment decisions, manager - shareholder conflicts of interest are expected to affect comovement.

Agency conflicts can have two opposite effects on comovement.

³ The literature on herding behavior (among investors, mutual funds, securities analysts etc.) proposes another explanation based on the concept of informational cascades. Imperfectly informed investors decide whether to invest in a publicly available asset. Investors can observe the actions of predecessors and draw inference about the attractiveness of a single investment opportunity. There exists a rational equilibrium in which the investor ignores her private information and imitates the predecessors (see, e.g., Bikhchandani, Hirshleifer, and Welch, 1992; Wermers, 1999; etc.).

First, agency conflicts can lead to increased comovement in investment. Private firm specific information, together with public information, allows the manager to invest more efficiently. However, the acquisition of firm specific information requires an unobservable privately costly effort on the part of the manager. A classical principal-agent conflict (e.g., Holmstrom, 1979) arises: managers shirk on the acquisition of private firm specific information. As a result, the company's investment pattern can be explained reasonably well by general (public) information. More intensive monitoring mitigates shirking, leading to increased information acquisition and higher private information content of corporate investment decisions; in turn, firm investments comove less.

In the case of severe agency conflicts due to weak investor rights, entrenched insiders can expropriate outside shareholders' wealth. Spending the firm's funds to acquire information improves overall firm value but produces uncertain payoffs for insiders. Instead, undiversified insiders can increase their utility with certainty by extracting private benefits from corporate resources.

Hypothesis 1a: Investment comovement is decreasing in corporate governance.

Alternatively, intense scrutiny can have the effect of increasing the propensity to comove with other firms. In the extreme, entrenched insiders can treat the company's resources as an extension of personal wealth. Entrenched insiders may use private information to pursue idiosyncratic projects with high private benefits and to enhance their disposable resources (although minority outside investors will still receive low returns). There is another possible reason why stronger disciplinary mechanisms can lead to increased herding. Stein (2003) and Scharfstein and Stein (1990) demonstrate that managers have the tendency to herd in their behavior due to career (reputational) concerns. A herding manager

is less likely to be fired if bad performance is attributable to a common negative shock that affects all managers (Holmstrom, 1999). As a result, managers may choose to follow other managers' observable investment decisions to mask their underlying quality. Lax shareholder oversight reduces labor market penalties for poor performance (threats to managerial job security and pay) and potentially mitigates career concerns. Following this argument, entrenched managers protected from firing would be less likely to imitate other firms and more likely to invest in an idiosyncratic fashion.

The above discussion yields the following prediction:

Hypothesis 1b: Comovement in investment is increasing in corporate governance.

It is not clear whether intense monitoring decreases (Hypothesis 1a) or increases comovement in investment (Hypothesis 1b). We will use several corporate governance measures that capture disparities in shareholder and managerial incentives to test the two hypotheses.

Other explanations: information asymmetries and property rights

Other factors besides corporate governance are expected to influence the manager's decision to forgo private investment information. Some firms and industries have a high level of information asymmetry about the quality of investment projects. If investment decisions are highly dependent on unverifiable private information, the cost of capital could be particularly high, rendering the investments less valuable. Firms faced with high information asymmetries may opt for investments that are based on verifiable public information, which would result in an increase in investment comovement. We expect comovement in investment to increase with the degree of intrinsic information asymmetry.

At the country level, failures in property rights protection such as corruption, weak

rule of law, risk of contract repudiation, or threat of state expropriation, can increase investment comovement. Weak property rights reduce the expected return on firm specific value creation, resulting in lower R&D and growth (Murphy, Shleifer, and Vishny, 1993). In the same vein, weak property rights should erode gains from investments and thus reduce private information acquisition and increase investment comovement. We expect investment comovement to decrease with property rights protection.

Clearly, agency conflicts are not the only determinant of firms' propensity to comove in investment. In addition to measures of governance, we include a set of control variables and other determinants of comovement. We discuss them in greater detail in the next section.

Investment comovement and performance

The final part of our analysis deals with the effects of investment comovement on performance. To the extent that investment opportunity sets vary across firms, the use of private information provides a more accurate assessment of a firm's investment opportunities than would be the case if investments were based on public information only. The use of private information increases the likelihood of correct detection of positive- and negative-NPV projects. Furthermore, private information may enable managers to identify firm specific projects and improvements in investment technology that cannot be identified with public information alone. Thus, private information improves capital allocation and augments firm value. Hence, if investment comovement is due to suboptimally low reliance on private information, it will have a negative effect on operating performance and growth:

Hypothesis 2. Investment comovement has a negative effect on operating performance and growth, all else equal.

However, several other considerations can influence the sign of the relation between comovement and performance. If all firms are making similar but correct decisions, operating

performance would not be affected by high comovement. A special case is the presence of a single owner with control rights in multiple firms. The resultant information sharing can lead to higher comovement in environments with weak corporate governance without decreasing performance. Further, if the costs of firm specific information acquisition outweigh the gains from more efficient capital allocation, imitation is optimal while excessive information acquisition is value-destroying (see, e.g., Milbourn, Shockley, and Thakor, 2001). We will use empirical tests to address the question of whether high comovement in investment has a distortionary effect on performance.

3. Data and methodology

We use two samples in our analyses. First, we obtain data on characteristics of US and non-US firms from Compustat Global (Industrial/Commercial and Global Issues datasets). Accounting variables denominated in foreign currency are converted into US dollars using exchange rates from the Compustat Global Currency series. International firm level corporate governance data is obtained from Standard & Poor's Transparency and Disclosure dataset for 1998-2002. We also require data on the number of one-year-ahead analyst earnings forecasts (I/B/E/S) and country level indexes of shareholder rights and rule of law. We exclude financial firms (SIC codes 6000-6999), regulated utilities (SIC codes 4900-4949) and firms in industries with fewer than ten annual observations in a given year.

The second sample includes US firms only and spans 1995-2004. Firm characteristics are obtained from Compustat Industrial Annual and CRSP. We require the availability of data on boards (IRRC Directors); public pension fund blockholdings (CDA Spectrum 13f filings); takeover defenses (IRRC Governance); CEO stock option holdings and CEO stake in the firm (Execucomp). We also obtain the number of business segments from Compustat

Segments. Utilities, financials, and firms with assets under twenty million are excluded.

The main variables are described below. Table 1 reports their summary statistics.

[Table 1]

Comovement in investment

To test our hypotheses, we perform industry, country, and firm level tests of investment comovement.

The industry level comovement index for both the international and US samples captures comovement in firm investment (capital expenditure or capital expenditure plus R&D). Following Morck, Yeung, and Yu (2000), we define the index as the ratio of the higher of the number of firms with increases in investment and the number of firms with decreases in investment to the total number of firms in a given year:

$$Comov(X) = \frac{Max(N_{X_incr}, N_{X_decr})}{N} \quad (1)$$

By construction, the index varies between 0.5 and 1. In Table 1, the average of the index of comovement in investment is between 0.60 and 0.65, with a standard deviation of between 0.10 and 0.12, depending on the measure and sample. Higher values of the index reflect more comovement in investment decisions across firms within a given industry.

The country level index of comovement in investment is constructed similarly.

At both industry and country levels, the index of comovement is regressed on measures of agency conflicts and a set of controls. The regressions are specified as follows:

$$Comov(I) = \beta_0 + \beta_1 Gov + \beta_2 X_1 + \beta_3 X_2 + \varepsilon \quad (2)$$

where *Gov* is a set of corporate governance and shareholder rights variables; X_1 includes the degree of information asymmetry, protection of property rights against expropriation,

equity incentives and ownership concentration, asset tangibility, the index of comovement in investment opportunities, the index of comovement in cash flows, product market concentration, number of segments; X_2 includes miscellaneous controls such as past investment opportunities, past profitability, number of firms, year effects, and industry or country effects (random effects if time-invariant country variables are used). Country level regressions also include macroeconomic volatility defined as the standard deviation of real GDP per capita.

At the firm level, we empirically estimate the propensity to comove as the sensitivity of firm level investment changes to industry level changes in investment⁴. We examine the interaction between industry investment changes and corporate governance, information asymmetry, and other determinants of comovement. The following specification is used for firm level regressions:

$$\Delta I = \beta_0 + \beta_1(\Delta I_{IND} \times Gov) + \beta_2(\Delta I_{IND} \times X_1) + \beta_3\Delta I_{IND} + \beta_4Gov + \beta_5X_1 + \beta_6X_2 + \varepsilon, \quad (3)$$

where ΔI is the change in investment for a given firm; ΔI_{IND} is the industry change in investment; and Gov , X_1 , and X_2 were described above.

The degree of comovement of firm investment changes with industry investment changes is characterized by $(\beta_1 \times Gov + \beta_2 \times X_1 + \beta_3)$. For variables that increase (reduce) comovement, the respective β coefficient enters with a positive (negative) sign. Industry investment changes are defined using two-digit SIC medians for the international sample and three-digit SIC medians for the US sample. For robustness, we use average industry investment changes computed excluding the sample firm.

⁴ John and Knyazeva (2006) find that weakly governed firms' investments are more sensitive to industry cash flow shocks. However, this paper examines the response of firm investments to industry investment changes.

Both for Equations (2) and (3), Hypothesis 1a predicts that β_I is negative while Hypothesis 1b suggests that β_I is positive.

In firm level performance analyses, we use firm level synchronicity in investment, $Synch(I)$. It is based on a dummy variable that equals 1 if firm and industry investments change in the same direction in a given year, and 0 otherwise. To mitigate potential noise and simultaneity concerns, the described dummy variable is averaged over three years prior to the sample year to construct $\underline{Synch}(I)$. In order to ensure that a high degree of synchronicity is not merely capturing industry characteristics, we control for industry investment increases in addition to using industry dummies in a robustness test. To eliminate the possibility that firms with a weak competitive position both comove more and perform poorly due to their inability to withstand industry downturns, we add a control for product market share for robustness.

The variables used to measure determinants of comovement in Equations (2) and (3) are discussed below.

Determinants of comovement in investment

Corporate governance

The tests of comovement in the US sample use several firm level corporate governance variables identified in existing work. The Gompers, Ishii, and Metrick (2003) index of anti-takeover defenses, G_Index , assigns 1 for the presence of each of the 24 takeover deterrent provisions in the firm charter and bylaws such as staggered boards, poison pills, limits to amend charter and bylaws etc. The average firm has nine provisions. Higher values of the index indicate greater managerial entrenchment.

Existing work has demonstrated the activist role of large public pension funds. To

capture monitoring by this group of institutional investors, we compute the percentage stake of public pension funds in the firm (*Stake_PPF*). The variable is constructed using 13f filings from CDA Spectrum following the list of large public pension funds identified in Cremers and Nair (2005).

Independent directors have been shown to monitor management more effectively than inside or affiliated directors. A high proportion of independent directors on the board (*Board_Indep*) can be viewed as an indicator of strong corporate governance. Data on independent directors is obtained from the IRRC (RiskMetrics) Directors dataset. Year 1996 data is used to proxy for year 1995 board independent observations. (In unreported checks, omission of year 1995 from the sample does not affect the results.)

For the international sample, corporate governance data is obtained from Standard & Poor's Transparency and Disclosure study (see, e.g., Doidge, Karolyi, and Stulz, 2007; Durnev and Kim, 2005). Our measure of firm level governance, *Gov*, is the sum of "Ownership Structure and Investor Rights" (shareholder rights) and "Board and Management Structure and Process" (boards) scores, each scaled to [0;1]. The resulting variable evaluates voting and shareholder meeting procedures, the transparency of ownership structure, board structure and composition, role of the board, independence of key committees, director training and compensation, executive compensation and evaluation. Higher values of the score reflect better governance. More details on the Transparency and Disclosure governance measure are provided in Patel and Dallas (2002). The mean governance score is 1.1. Industry level analyses use industry medians of firm level governance score.

We perform several tests to address potential concerns about the endogeneity of corporate governance mechanisms to investment decisions. First, we examine the effect of

differences in anti-takeover provisions in state laws on comovement in investment among US firms. The state anti-takeover laws index aggregates the provisions of business combination, fair price, control share acquisition, cash out, anti-greenmail, and director's duties laws. It is a more exogenous measure of corporate governance relative to the index of takeover defenses that uses firm charter and bylaw provisions (see, e.g. Bertrand and Mullainathan, 2003).

Second, we employ country level measures of shareholder rights in industry comovement regressions. Since an average industry is unlikely to affect shareholder rights at the country level, investor rights laws are a more exogenous measure of agency conflicts. Country level shareholder rights measures are discussed in greater detail in the next section.

Third, we estimate two-stage least squares regressions to verify the robustness of our results. In international analyses, we use country legal origin as an exogenous predictor of average governance quality in a given industry (La Porta et al., 1998). In US analyses, we use two predictors of governance quality. First, median governance quality within a broader industry group is used to capture variation in the relative costs and benefits of monitoring. Second, historical takeover activity in the industry is introduced to measure the likelihood of corporate control threats at the initial stage when firms designed their monitoring mechanisms (Knyazeva, 2007). Historical takeover activity is defined as the proportion of M&A-related delistings in the first year the firm was listed in CRSP. Both factors are expected to influence corporate governance and the intensity of monitoring of the manager.

Legal protection of shareholder rights

The use of an international sample allows us to exploit cross-country variation in shareholder rights measures, which are arguably exogenous to investment choices at the

industry level. The anti-director rights index (La Porta et al., 1998), *Anti_Dir_Rights*, aggregates the rights to vote by mail; not to deposit shares prior to the General Shareholders' Meeting; to vote cumulatively; to challenge a resolution of the shareholders and/or the board (oppressed minorities mechanism); to call an Extraordinary Shareholders' Meeting when the minimal ownership stake required is less than or equal to ten percent; and the preemptive right to buy new issues of shares. As an alternative to the anti-director rights index, we use the anti-self-dealing index (Djankov et al., 2008), *Anti_Self_Dealing*, which captures ex ante and ex post ability of outside shareholders to limit insiders' self-dealing transactions. The index includes requirements for approval of transactions involving insiders by disinterested shareholders; disclosure by the parties; independent review of transactions; disclosure in periodic filings; and the ability to sue or rescind the transaction, hold transaction parties liable, and access transaction-related evidence.

Private property rights protection

In country level analyses, comovement in investment is also affected by the strength of property rights. The empirical measures are rule of law, *Rule_Law*; index of protection of investors from expropriation, *Risk_Exp*; and the index of property rights protection (*Property_Rights*) that assigns equal weights to the control of corruption, risk of expropriation, rule of law and risk of repudiation measures from La Porta et al. (1998). Higher values of the index indicate better legal protection. The source of country legal environment data is La Porta et al. (1998).

Incentives and ownership structure

Managerial (insider) ownership is expected to align managerial and shareholder interests and mitigate shirking. However, high levels of managerial ownership may also lead

to entrenchment (Morck, Shleifer, and Vishny, 1988). For US firms, we measure the relative strength of a CEO's equity incentives similarly to Bergstresser and Philippon (2006). First we compute the change in CEO wealth from a one percent change in stock price, *onepct*, as the product of share price and the sum of shares and stock options held by the CEO, divided by 100. The equity incentive ratio *Equity_Incentives* is then defined as *onepct*, divided by the sum of *onepct* and cash compensation. The source of data is Execucomp.

Concentrated insider ownership can align managers and shareholders in a weak investor rights environment (La Porta et al., 1999; Burkart, Panunzi, and Shleifer, 2003). Ownership concentration also often enables a single owner to control investment decisions of multiple firms through the use of dual class shares, cross shareholdings, and pyramids (see, e.g., Morck, Wolfenzon, and Yeung, 2005; Stulz, 2005). If the dominant inside owner uses overlapping subsets of private information, investment comovement may increase. The predicted effect of ownership concentration is ambiguous. In cross-country tests, ownership concentration (*Own_Concentr*) is defined as the percentage of common shares owned by the three largest shareholders in the ten largest nonfinancial privately owned domestic firms. We also use the Fogel (2006) family control index, computed using as the proportion of the ten largest private sector conglomerates or business groups that are majority-controlled by wealthy families (*Own_Concentr II*).

Information asymmetry

As discussed earlier, comovement can be affected by information asymmetry. Analyst coverage and disclosure standards are expected to mitigate information asymmetries. Analyst following (*Analysts*) is defined as the log of the number of one-year-ahead analyst earnings forecasts obtained from I/B/E/S. Another, albeit noisier, firm level proxy for information

asymmetries is firm size. Small firms tend to face more severe information asymmetries. At the country level, we expect more sophisticated disclosure standards (La Porta et al., 1998) to decrease the level of information asymmetry.

Other determinants of comovement

Apart from agency conflicts, information asymmetries and ownership incentives, we need to account for other determinants of comovement. Below we describe several important controls used in our tests.

Firms facing similar investment opportunities naturally comove more. We capture the common trend in investment opportunities with the index of comovement in market-to-book ratio changes, $Comov(MB)$, computed similarly to the index of comovement in investment changes. Also, similarity in underlying firm opportunities and constraints may be reflected in correlated cash flow changes, which we capture by the index of comovement in ROA changes, $Comov(ROA)$. Both indexes are defined according to Equation (1).

Further, the nature of a firm's assets can affect the use of public information and the imitation of other firms. Public and aggregate industry information could be more relevant for investment decisions of firms with few intangible assets and significant tangible assets. Asset tangibility is defined as the share of property, plants, and equipment in total assets.

Competition can affect the trade-off between imitation of other firms and acquisition of firm specific information. In more competitive industries, acquisition of private information and continued innovation may be essential for maintaining a competitive advantage. We use sales-based Herfindahl index to capture product market concentration, $Ind_Concentr$.

Business diversification, measured by the number of business segments,

Num_Segments, is also expected to affect comovement. Diversified firms are in a better position to pursue idiosyncratic investments due to the ability to access internal capital markets. At the same time, when idiosyncratic investments by divisions are aggregated at the firm level, they may appear to be driven by an economy wide common factor. Although the sign of the effect of diversification on comovement is unclear, we include it for robustness.

Country level analyses of comovement also incorporate macroeconomic volatility, *Macro_Volatility*, defined as the standard deviation of real GDP per capita. When the macro environment is more volatile, investment behavior may need to be more sensitive to aggregate information about the economy.

Additional tests of comovement: industry variation in investment technology

To verify the information acquisition interpretation of the effect of corporate governance on the propensity to comove, we perform additional tests that exploit variation in industry investment technology. We interact firm level corporate governance with industry characteristics that affect the benefits and costs of information acquisition relative to imitation: information intensity, asset specificity and investment cycle length. Operationally, we assume that industry characteristics are similar across countries (see, e.g., Rajan and Zingales, 1998); we proxy for industry characteristics using US data on two-digit SIC industries.

First, investment decisions in information intensive industries are expected to require more information acquisition on the part of the manager. If the information acquisition hypothesis (Hypothesis 1a) is correct, corporate governance would have a stronger effect on the propensity to comove in information intensive industries. The empirical measure, *IT_Intensity*, characterizes the use of information technology within two-digit SIC industries.

It is defined as the industry average ratio of new investment in computers and data processing equipment to expenditure on new machinery and equipment (see also Chun et al., 2007). Examples of IT-intensive industries are industrial machinery and computer equipment, electronic and electrical equipment, and instruments. The source of data is the 1992 Census of Manufacturers of US firms, conducted prior to the start of our international sample period, for manufacturing industries (two-digit SIC codes 20-39).

Further, in industries with a high share of specialized assets firm specific information is expected to play a greater role in investment decisions. If the relation between governance and comovement is due to information acquisition, the governance effect would be strongest in industries with more specialized assets. Empirically, reliance on industry specific rather than firm specific assets is captured by the intensity of resale markets for equipment, *Used_Capex*. It is defined as the fraction of expenditures on used capital assets in total capital expenditures (Kessides, 1990). A high share of used capital expenditures indicates active resale markets and low asset specificity. The data is obtained from the 1992 Annual Survey of Manufacturers conducted for US firms.

Finally, we use industry variation in the length of the investment cycle to further dissect the relation between corporate governance and comovement. Different industries have different investment cycles, e.g., pharmaceuticals, construction, and transportation industries have longer investment cycles whereas food, communications, film, and retail industries have shorter investment cycles. In industries with longer investment cycles, because of higher switching costs, imitation of other firms' investment can be more costly. Therefore, the effect of governance on comovement is expected to be stronger in industries with shorter investment cycles. For instance, if our shirking explanation holds, weak

governance will lead to more comovement in short investment cycle industries. Similarly to Khan and Watts (2007), we use the ratio of depreciation to total assets, *Depr_Assets*, to proxy empirically for the length of the industry investment cycle. Depreciation is decreasing in investment cycle length. The variable is defined at the two-digit SIC level on the basis of depreciation for US firms contained in Compustat Industrial Annual.

Additional tests of information acquisition: R&D activity

Additionally, we conduct tests of R&D behavior to provide further evidence of the link between corporate governance and information acquisition activity. Research and development activity enables firms to create and evaluate new products and investment opportunities, thus increasing the amount of firm specific information. First, we examine the extent of industry R&D activity measured as the proportion of firms undertaking research and development expenditures in a given year, *Proportion_RD*. The second measure captures the average ratio of research and development expenditure to total assets in a given industry, *Average_RD*. Although the level and incidence of research and development activity is a useful proxy for information gathering, a small handful of firms can be responsible for most R&D spending. Therefore, our third measure is the concentration of R&D activity, *Concentr_RD*, defined as the Herfindahl index of the ratio of R&D to total assets for a given industry.

Determinants of performance

The final part of our analysis deals with the impact of comovement in investment on performance at the firm, industry and country level. Our main measure of firm operating performance is profitability defined as the ratio of EBITDA to total assets for US firms and operating income to total assets for the international sample. At the industry level, industry

average of firm operating performance is used. At the country level, we examine growth in total factor productivity constructed similarly to John, Litov, and Yeung (2008) and King and Levine (1993) and growth in real GDP per capita.

Performance regressions include the following controls: growth opportunities (sales growth), size (total assets), asset tangibility (ratio of property, plants, and equipment to total assets), volatility (standard deviation of excess stock returns), analyst coverage, industry investment conditions (dummy for increase in industry investment), product market share (firm's share of industry sales), corporate governance, and ownership incentives. Country growth regressions control for financial development (the ratio of market capitalization to GDP), ownership concentration, property rights protection, initial income, macroeconomic volatility, education (log of years of schooling; Barro and Lee, 1993), country medians of firm level variables, and a country level proxy for risk taking (country mean of time-series variability in firm ROA).

Predictors of investment comovement in the first stage of performance or growth regressions include: product market concentration measured as sales-based Herfindahl index; comovement in ROA and in market-to-book; number of firms in the industry (country); country medians of comovement.

Since standard errors may be correlated across firms and time periods within a given country, we employ heteroskedasticity robust standard errors with clustering by country in regressions that use international data unless noted otherwise. For the US sample, heteroskedasticity robust standard errors with clustering by industry are used in industry tests and robust standard errors with clustering by firm are used in firm level regressions.

4. Results

Comovement in investment: industry analysis (international evidence)

Our first test of comovement in investment uses industry level data and is presented in Table 2. The index of investment comovement in the industry was defined in Equation (1). We examine how investment comovement is related to industry median governance quality and to time-invariant country level measures of anti-director rights and protection from self-dealing transactions. Country level indices of shareholder rights serve as a more exogenous measure of manager-shareholder conflicts. Since the three variables are highly correlated, we include them individually. Following Equation (2), regressions include controls describing firms in the industry and inherent similarities among them as well as year effects and the number of firms.

[Table 2]

We find support for Hypothesis 1a: firm investments comove more when managers are more entrenched. Holding other factors constant, the index of comovement decreases by a quarter of a standard deviation in response to a one standard deviation increase in median governance score (Column I). Coefficients on the measures of anti-director rights and provisions against self-dealing are statistically significant and have a similar order of magnitude (Columns II and III). The results continue to hold when the dependent variable is replaced by the index of comovement in total investment defined as the sum of investment and R&D expenditure (Column IV).

Other variables besides corporate governance are found to affect comovement. Comovement is negatively related to firm size. The observed size effect may reflect steep costs of gathering information and higher information asymmetries that appear to deter

smaller firms from pursuing idiosyncratic investment choices. Comovement is increasing in asset tangibility. Investments in industries with a high fraction of tangible assets comove more, indicating that firms in such mature industries share important common trends. This suggests that a high level of intangible assets increases the value of firm specific information and thus lowers comovement. Industry concentration enters with a positive coefficient (significant in three specifications out of five). Firms in more competitive industries are confronted with the need to research idiosyncratic investment opportunities to secure a competitive advantage. The number of firms is included as a control but does not enter significantly (not reported).

Two-stage least squares specification is estimated for robustness in Column V. In the first stage we predict governance with English legal origin and median governance quality computed across all countries for a given industry grouping. Countries with UK legal origin are expected to favor stronger shareholder rights (La Porta et al., 1998). The two variables are expected to affect comovement only through corporate governance. Consistent with the results in Columns I-IV, corporate governance has a negative and statistically significant effect on investment comovement in the 2SLS specification.

Comovement in investment: firm level analysis (international evidence)

The industry level index of investment comovement used in Table 2 was constructed by aggregating firm level comovement decisions. We proceed to examine an individual firm's propensity to comove with other firms in the industry. Following Equation (3), we regress firm investment change on industry investment change; industry investment change interacted with corporate governance and other predictors of comovement; and a set of controls. In this specification, the degree of comovement is captured by the sensitivity of firm

investment changes to industry investment changes. We include country, industry and year effects, and a control for the number of firms. The results are reported in Table 3.

[Table 3]

We observe from Columns I-III that firm investment changes are highly sensitive to industry investment changes (approximately 0.90). Corporate governance quality decreases a firm's propensity to follow industry investment changes. An increase in the governance score by one standard deviation decreases the coefficient of comovement by 0.25-0.30. The result continues to hold after other determinants of the propensity to comove are included in the regression. The evidence is consistent with the findings reported in Table 2. Stricter monitoring encourages managers to comove less, as predicted by Hypothesis 1a.

We also find that firms facing more information asymmetries comove more. A firm's propensity to comove with the industry investment trend is decreasing in the level of analyst coverage (significant in three specifications out of five). An increase in analyst coverage by one standard deviation decreases the coefficient of comovement by approximately 0.08-0.09. The result continues to hold if we replace the log of the number of analysts with a measure of analyst coverage scaled by firm size (not reported). With analysts mitigating information asymmetries, the markets are able to observe managerial performance and project quality more accurately. As a result, managers tend to invest more often on the basis of idiosyncratic information about firm investment opportunities.

Other variables are also found to affect comovement. As expected, firms facing similar shocks to investment opportunities exhibit more comovement in investment decisions. A one standard deviation increase in the measure of comovement in market-to-book raises the coefficient of comovement in investment by 0.26, holding other factors

constant. Further, firm investment decisions are more synchronous in industries with correlated cash flows. An increase in the index of comovement in cash flows by one standard deviation increases the coefficient of investment comovement by 0.03-0.05. Firms with more tangible assets are more likely to comove. Publicly available industry information may be more useful for firms with tangible assets in place. The specialized nature of intangible assets increases the role of firm specific information in investment decisions. An increase in asset tangibility by one standard deviation raises the propensity to comove by about 0.09.

As a robustness check, in Column IV we use industry averages (computed excluding the sample firm) instead of industry medians to measure industry level investment changes. The corporate governance interaction term retains its magnitude and significance. The analyst following effect becomes insignificant.

The evidence presented in Tables 2 and 3 is consistent with an increase in comovement and a decrease in firm specific information acquisition in the presence of agency conflicts. In Columns V and VI of Table 3, we use variation in industry technology that affects the relative costs of information acquisition and imitation to further examine the interpretation of our result. First, we explore differences in information technology intensity. Firm specific information acquisition is of greater importance for IT-intensive industries. We find that the negative effect of corporate governance on comovement is stronger for industries with high IT intensity. Second, we use variation in industry asset specificity. Asset specificity is decreasing in the fraction of expenditures on used capital. High asset specificity is expected to increase the relevance of firm specific information acquisition for investment decisions. We find more comovement and a stronger effect of monitoring on comovement in industries with high asset specificity. Third, in Column VI we use a proxy for investment

cycle length to capture ease of imitation. Investment cycle length is decreasing in the ratio of depreciation to assets. Steep costs of abandoning projects thwart imitation in industries with long investment cycles. The cost of following other firms instead of acquiring firm specific information is expected to be lower in industries with short investment cycles. The effect of corporate governance on comovement is stronger in industries with short investment cycles. Additional evidence in Columns V-VI further supports the role of information acquisition in explaining the link between agency conflicts and investment comovement proposed in Hypothesis 1a.

So far, industry and firm level results support the information acquisition hypothesis (Hypothesis 1a).

Performance implications of investment comovement (international evidence)

In Table 4, we turn to the performance effects of comovement in investment. Comovement is not necessarily distortionary. For instance, firms can invest efficiently in a correlated fashion. With high costs of information acquisition, imitation of the incumbent or reliance on aggregate industry information may actually improve performance. All of our specifications include country and year fixed effects, while firm-level regressions also control for industry dummies.

Our first set of tests focuses on industry operating performance (Columns I-III). Industry performance is decreasing in the index of comovement in investment. An increase in the index of comovement by one standard deviation lowers average industry operating performance by 2.6% (half a standard deviation), holding other factors constant. The evidence is consistent with an adverse effect of investment comovement on performance, after controlling for other factors. The result is robust to the inclusion of additional controls

that can explain performance (industry investment increase, governance quality, analyst following). Other predictors of performance include the presence of growth opportunities, small size, and a high fraction of tangible assets. To control for the possibility that an underlying industry downturn causes both performance declines and synchronous investment cuts, we include a dummy for an increase in industry investment. The comovement finding is unaffected (Column III).

[Table 4]

The implications of comovement for firm performance are analyzed in Columns IV-V. Firm performance is regressed on lagged three-year average of synchronicity in firm and industry investment changes. We include standard controls for investment opportunities (growth of sales), asset size and tangibility, and volatility of cash flows. We also account for analyst coverage and industry investment change for robustness.

We find that past propensity to comove has a negative effect on firm operating performance. The results are economically and statistically significant. Holding other factors constant, an increase in past synchronicity by one standard deviation (0.3) reduces current profitability on average by 3.8%. It is also possible that product market power causes firms to act in an idiosyncratic manner and to remain profitable. To rule out this explanation, we include the firm's share of industry sales. The comovement effect retains its sign and significance (Column V).

Industry level and firm level evidence is consistent with negative effects of high investment comovement on performance (Hypothesis 2).

US evidence

The results reported so far were obtained in a sample of international firms. It has

enabled us to exploit variation in country level protections of shareholder rights that are exogenous to an individual industry. Despite the inclusion of a number of control variables, firms and industries in the cross-country sample are likely to exhibit substantial heterogeneity. Also, the meaning of the variables may vary across countries. Hence, we replicate the main comovement tests in a sample of US firms. An advantage of this investigation is the availability of more refined data and several alternative measures of firm level corporate governance, monitoring and incentives. We are also able to extend our sample period to incorporate more time-series variation in corporate governance, comovement, and performance at the firm and industry level. As a caveat, the results obtained in the US sample will be conditional on strong legal protection of investor rights and disperse share ownership.

Determinants of US firms' propensity to comove are analyzed in Table 5. The Gompers, Ishii, and Metrick (2003) index of anti-takeover defenses, public pension fund stake in the firm, and board independence variables are interacted with industry investment change. The regressions include firm fixed effects, year fixed effects, and the number of firms.

[Table 5]

In Columns I-III, the public pension fund and board independence interaction terms enter with significant negative coefficients. Note that the G index interaction term is positive because higher values of the variable reflect more managerial entrenchment through charter provisions and bylaws. The effects are economically significant. An increase in the proportion of independent directors by 20% (approximately one standard deviation) decreases the propensity to comove by 0.24. Public pension funds are known for their

activism in corporate governance matters. A one percent increase in the public pension fund stake decreases the propensity to comove by 0.12. An increase in the G index by one standard deviation increases the sensitivity of a firm's investment decisions to industry investment changes by 0.19-0.24. Hence, heightened job security actually raises the relation between firm investment and general industry trends, rather than mitigating it as the career concerns argument suggests. More extensive analyst coverage decreases the propensity for comovement.

In addition to the index of anti-takeover defenses included in the firm charter and bylaws, we use a more exogenous measure of corporate governance derived from anti-takeover laws in the state of the firm's incorporation (Column VI). All else given, an increase in the index of antitakeover laws by one standard deviation increases the propensity to comove by 0.38.

As a robustness check, we redefine industry investment changes. In Column IV, we replace the industry median with the industry average change in investment (computed excluding the sample firm). The results remain qualitatively similar. In Column V, we repeat the regression using the average change in the investment of industry leaders as the benchmark. Arguably, leaders' investment decisions contain the most information and are therefore most likely to be imitated. The leaders are firms in the top tercile of product market share computed on the basis of net sales. The test helps us examine the nature of public information used by comoving firms. The propensity of other firms to comove with the industry leaders is decreasing in the intensity of monitoring by pension fund blockholders and increasing in the G index. Poorly monitored firms appear to rely more on information inferred from observable behavior of industry leaders in their investment decisions.

Findings for the industry index of comovement in investment are reported in Table 6 (Columns I-III). Since this analysis is conducted on the US sample, we include industry and year effects, as well as a control for the number of firms. The main results obtained using international data continue to hold for US firms. The presence of public pension fund monitoring and independent boards reduces comovement in investment. For robustness two-stage least squares is used in Column III. Comovement is decreasing in board independence. Industries with more tangible assets and smaller firms exhibit more comovement.

[Table 6]

In the preceding tests we examined the residual effect of corporate governance on comovement after controlling for observable disparities in firm characteristics and industry structure. In Columns IV-VI of Table 6, we perform a more direct test of information gathering activity using US data on firm research and development expenditures. The dependent variables are the proportion of firms engaged in research and development in a given industry, the average ratio of R&D expenditure to total assets, and the Herfindahl index of R&D concentration. The variables are defined at the three-digit SIC level for industries with at least some firms reporting positive R&D. (In an unreported specification, we include industries with zero average R&D, which does not affect the result.)

Industries with independent boards exhibit higher levels of R&D activity. A one standard deviation increase in board independence translates into an increase in the proportion of R&D firms by 0.22 standard deviations (Column IV) and an increase in average R&D by 0.15 standard deviations (Column V). However, a high average level of R&D spending could also be observed in industries where a few firms actively acquire information while the rest of the firms imitate. Therefore, we also look at the dispersion of

R&D activity. Board independence increases the dispersion of R&D spending across firms in the industry. A 20% increase in board independence decreases the Herfindahl index of R&D by 9.4 (out of 100). We also note that R&D-based measures likely understate the true level of information gathering activity. Every period the manager has to acquire information about new as well as existing projects whereas research and development spending focuses primarily on new product lines.

The relation between high investment comovement and operating performance of US firms and industries is examined in Table 7. The effect of comovement on industry performance is examined in Columns I-III. Average industry profitability declines by 1.5-2.4% in response to a one standard deviation increase in investment comovement, all else given. In Columns IV and V we find that past comovement also has a negative effect on firm level profitability (1.0-1.1% decline in response to a one standard deviation increase in past synchronicity).

[Table 7]

US evidence in Table 7 is similar to the findings for the international sample. Among the controls that enter significantly are growth opportunities, small size, and in some specifications a high fraction of tangible assets, low volatility, high product market share, strong equity incentives, and an increase in industry investment.

Country level analysis

Country level comovement regressions are presented in Table 8. The dependent variable is the index of comovement in investment defined following Equation (1). Country random effects and year controls are included.

[Table 8]

International differences in investor rights help explain cross-country variation in investment comovement. Shareholder rights protections and protections against self-dealing significantly decrease the incidence of comovement in investment. In Column I, an increase in the index of anti-director rights by one standard deviation reduces comovement roughly by a third of a standard deviation. Comovement in investment is also decreasing in the rule of law and the quality of property rights protection and increasing in the risk of expropriation⁵.

Disclosure standards do not enter significantly. It is possible that disclosure standards improve the quality of public information and make relying on it more attractive, which could offset the predicted effect.

Ownership concentration may also affect investment comovement. In countries with weak investor protection, a dominant insider (family) is often able to amass significant control rights across a network of firms through pyramidal structures and cross holdings (Morck, Wolfenzon, and Yeung, 2005; Stulz, 2005). Then multiple firms' investments are driven by the same controlling owner, which may lead to increased comovement. The ownership concentration effect is not significant. In Columns III and VI, we use an alternative measure of ownership concentration obtained from Fogel (2006). Ownership concentration remains insignificant, but our key results continue to hold. A possible reason is that the alignment effect of concentrated ownership is offset by the entrenchment effect.

To control for other factors driving comovement, we include indexes of comovement in cash flows and investment opportunities, product market concentration, country medians of firm size and asset tangibility, as well as macroeconomic volatility. For robustness we

⁵ The definition of the comovement index may lead to censoring, so out-of-range predictions are a potential concern. We find very few censored values in our data. Fitted values from the panel data regressions are almost always within range (with the exception of some specifications in which one or two fitted values are out of range, but all are less than one decimal point away from the lower bound, 0.5). For robustness, in an unreported check we estimate panel data Tobit specifications and find that the coefficients of interest retain their signs and significance.

repeat the analysis without the US observations (Columns II and IV). Observations characterized by significant macroeconomic shocks and economic crises are eliminated in Columns III and VI (similarly to John, Litov, and Yeung, 2008)⁶. The index of comovement in total investment that includes R&D spending is used in Columns IV-VI. The main results retain their significance and magnitude after the various robustness checks.

Prior findings in Tables 4 and 7 revealed a negative effect of high investment comovement on operating performance at the firm and industry level. However, imitation of investment decisions of other firms or pooling of value relevant investment information could be desirable for productivity and growth in countries with high information acquisition costs and weak shareholder rights. In Table 9, we analyze the effect of comovement on country growth in productivity and in real GDP per capita to examine this possibility. Country-years with major macroeconomic shocks are excluded.

[Table 9]

Holding other variables constant, comovement has a significant negative effect on growth. An increase in comovement by one standard deviation decreases productivity growth by an average of 1.5%. We perform several robustness checks, such as adding controls for rule of law, the threat of government expropriation, protection from self-dealing, and country proxies for risk taking. The sample is limited to non-US observations in Column III. We supplement our results on comovement in investment with results on comovement in investment combined with R&D (Columns IV and VI) and replicate the total factor productivity growth analyses using growth in real GDP per capita (Columns V, VI, and VII). The results continue to hold. Country level growth evidence lends further support to the

⁶ The excluded country years are as follows. 1997: Argentina, Brazil, Hong Kong, Korea, Malaysia, Singapore, Thailand; 1998-1999: Indonesia; 2000-2001: Turkey.

argument that high comovement in investment can have adverse effects.

5. Conclusion

This paper has documented the propensity of firms to comove in their investment decisions, identified the determinants of comovement in investment, and examined the performance implications of investment comovement.

First, we investigate the role of agency costs and monitoring for corporate investment comovement. The shirking hypothesis suggests that managers avoid privately costly effort needed to acquire firm specific information. Instead they base their investments on the publicly available industry level information and inference from observable actions of other firms. Low intensity of monitoring exacerbates shirking and increases comovement. The alternative argument suggests that a lack of monitoring allows managers to pursue idiosyncratic projects with high private benefits and reduces potential career concerns, removing any incentive to comove with other firms. Our empirical evidence supports the hypothesis about shirking of information acquisition effort. We find that firms with stronger corporate governance mechanisms comove more, all else given. Protection of shareholder rights and provisions against self-dealing transactions also incentivize managers to make informed investment decisions and comove less.

In addition, expropriation of private investors by the government decreases expected firm gains from information acquisition and induces more comovement. Further, when information asymmetries prevent investors from accurately observing the quality of idiosyncratic investments, managers tend to forgo private information and comove more. Finally, firms also comove when they are faced with similar investment opportunity sets, correlated cash flows, low asset specificity, and concentrated product markets.

Besides examining the patterns and causes of correlated investment behavior, we analyze the implications of comovement for performance. Private information acquisition allows managers to value projects more accurately and to identify idiosyncratic investment opportunities with higher expected cash flows. Therefore, performance should decline if managers do not use private information. However, if firms are making efficient investment choices in a correlated manner or if costs of information acquisition exceed gains, high comovement need not be detrimental for performance. Empirically, we find that comovement has a strong negative effect on firm and industry profitability, holding other factors constant. At the country level, high comovement adversely affects productivity growth.

In this work, we have examined the determinants of comovement in investment behavior. One of the issues open for future research is modeling the simultaneous acquisition of information by investors and managers. The information acquisition choices of managers and investors can interact. For instance, increased information acquisition by investors can mitigate information asymmetry and induce more private information acquisition by the manager. On the other hand, if the manager relies primarily on public information in investment decisions, the incentive of shareholders to acquire information about the firm is weakened, resulting in less informative stock returns.

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Table 1. Summary statistics and correlations

The international sample includes Compustat Global firms with non-missing S&P Transparency and Disclosure governance data (1998-2002), excluding firms in financial and utilities industries (SIC codes 6000-6999 and 4949-4999).

ΔI is change in investment (capital expenditure divided by total assets). *Gov* is the sum of S&P Transparency and Disclosure shareholder rights and board quality scores, divided by 100. *Analysts* is log of the number of one-year-ahead analyst earnings forecasts (I/B/E/S). *Tangibility* is property, plants and equipment divided by total assets. *MB* is market-to-book ratio (total assets plus market value of equity minus book value of equity divided by total assets). *Lag_MB* is previous year's market-to-book. *Asset_Size* is log of total assets. *ROA* is operating income divided by total assets. *Sales_Gr* is growth in net sales. *Sales_Share* is the share of a firm's net sales in industry sales. *Volatility* is the standard deviation of stock return (Compustat Global Issues). *Comov(x)*, the index of comovement in x , is defined at the two-digit SIC level as the higher of the number of firms with increases in x and the number of firms with decreases in x , divided by the total number of firms. *Comov(I)* is the index of comovement in investment (capital expenditure divided by total assets). *Comov(I+RD)* is the index of comovement in the sum of investment and R&D. *Comov(MB)* is the index of comovement in market-to-book. *Comov(ROA)* is the index of comovement in ROA. *Synch(x)*, synchronicity in x , is the average value (over three years prior to the sample year) of a dummy variable that equals 1 if firm x and two-digit SIC industry x changed in the same direction and 0 otherwise. *Synch(I)* is synchronicity in investment. *Synch(ROA)* is synchronicity in ROA. *Synch(MB)* is synchronicity in market-to-book. *IndProfit* is average industry ratio of operating income to total assets, defined at the two-digit SIC level, weighted by market value or total assets. *Ind_Concentr* is the Herfindahl index of industry concentration defined at the two-digit SIC level based on net sales. *English legal origin* equals 1 if the country has English legal origin; 0 otherwise (La Porta et al., 1998).

The US sample includes Compustat Industrial Annual firms with non-missing corporate governance, compensation, and segment data (1995-2004), excluding firms in financial and utilities industries (SIC codes 6000-6999 and 4949-4999), and firms with total assets below 20 mln. The variables are defined similarly to the variables for the international sample, except as outlined below. In the construction of *Comov(I)*, *Comov(MB)*, *Comov(ROA)*, *Ind_Concentr*, *IndProfit*, *Synch(I)*, *Synch(ROA)*, and *Synch(MB)* we use three-digit SIC industry groupings. *ROA* is EBITDA divided by total assets. *Volatility* is the standard deviation of excess return (CRSP). *Proportion_RD* is the proportion of firms with positive R&D in a three-digit SIC industry. *Average_RD* is the average ratio of R&D to total assets in a three-digit SIC industry. *Concentr_RD* is the Herfindahl index of industry concentration defined at the three-digit SIC level based on R&D. *Proportion_RD*, *Average_RD*, and *Concentr_RD* are restricted to industries with positive *Proportion_RD*. *High_Tech* equals 1 for firms in the following two-digit SIC industries: 28, 35, 36, 38, 73, 87; 0 otherwise. *Ind_HistTakeovThreat* is the industry median of the fraction of M&A related delistings in the year the firm first appeared in CRSP. *G_Index* is the index of takeover defenses from the firm charter and bylaws, rescaled to [0,1] (Gompers, Ishii, and Metrick, 2003; IRRC Governance); gap years are filled in using adjacent years following Cremers and Nair (2005). *AntitakeovLaws* is the index of state anti-takeover laws (business combination, control share acquisition, fair price, antigreenmail, cashout, and director's duties), rescaled to [0,1] (IRRC Governance). *Stake_PPF* is the largest percentage stake of a public pension fund shareholder in the firm defined following Cremers and Nair (2005) (CDA Spectrum 13f filings). *Board_Indep* is the fraction of independent directors on the board (IRRC Directors); year 1995 is filled in using year 1996. *Equity_Incentives* is the incentive ratio (the effect of a one percent increase in the market value of equity on hypothetical total compensation computed following Bergstresser and Philippon (2006) as the ratio of oneptct to the sum of oneptct, salary and bonus, where oneptct is share price divided by 100, times the sum of shares and stock options held by the CEO). *Num_Segments* is log of one plus the number of a firm's business segments (Compustat Segments).

Country level variables are based on the international sample described above. *Comov(I)* is constructed at the country level, as described above. The following variables are also used. *Income* is log of GDP per capita (World Development Indicators). *Macro_Volatility* is the log of standard deviation of GDP per capita. *Anti_Self_Dealing* and *Anti_Dir_Rights* are country indexes of private enforcement against self-dealing and anti-director rights, respectively, rescaled to [0,1] (Djankov et al., 2008). *Rule_Law* and *Disclosure_Standards* are country indexes of rule of law and disclosure standards, respectively, rescaled to [0,1] (La Porta et al., 1998). *Property_Rights* is the average of the La Porta et al. (1998) measures of rule of law, low risk of expropriation, control over corruption, and low risk of repudiation of contracts by the government, rescaled to [0,1]. *Own_Concentr* is the average percentage of common shares owned by the three largest shareholders in the 10 largest nonfinancial, privately owned domestic firms in a given country (La Porta et al., 1998). *Own_Concentr (II)* is the fraction of firms that are majority-controlled by wealthy families in 1996, based on the largest ten domestically owned firms (value-weighted) from Fogel (2006). *Growth_TFP* is TFP growth constructed following John, Litov, and Yeung (2008) (World Development Indicators). *Growth_GDP* is growth in real GDP per capita (World Development Indicators). *Schooling* is log of total years of schooling (Barro and Lee, 1993). *Market_Cap* is stock market capitalization divided by GDP (World Development Indicators). *Initial_Income* is log of GNP per capita (La Porta et al., 1998). *Risk* is the country mean of time-series variability in firm ROA.

<i>International sample</i>	Obs	Mean	Med	Std	(cont'd)	Obs	Mean	Med	Std
ΔI	938	-0.037	0.000	2.384	Comov(I)	307	0.649	0.623	0.121
Gov	938	1.068	1.125	0.253	Comov(I+RD)	307	0.607	0.591	0.080
Analysts	938	2.152	2.601	1.147	Comov(MB)	307	0.693	0.667	0.128
Tangibility	838	0.309	0.272	0.190	Comov(ROA)	307	0.631	0.619	0.093
Lag_MB	938	1.484	0.739	1.945	Ind_Concentr	307	0.242	0.194	0.178
Asset_Size	938	8.544	8.618	1.199	English legal origin	307	0.635	1.000	0.482
ROA	838	0.091	0.087	0.077	IndProfit(mkt.val.-wt.)	307	0.093	0.093	0.053
Sales_Gr	838	0.014	0.013	0.223	IndProfit(asset-wt.)	307	0.080	0.084	0.048
Volatility	838	0.133	0.111	0.086					
Synch(I)	838	0.636	0.667	0.302					
Synch(ROA)	838	0.624	0.667	0.295					
Synch(MB)	838	0.671	0.667	0.282					
Sales_Share	838	0.169	0.081	0.212					
<i>US sample</i>	Obs	Mean	Med	Std	(cont'd)	Obs	Mean	Med	Std
ΔI	8048	0.006	0.002	0.049	Comov(I)	1084	0.622	0.600	0.094
Stake_PPF	8048	1.115	0.761	1.411	Comov(MB)	1084	0.677	0.667	0.122
Board_Indep	8048	0.626	0.643	0.181	Comov(ROA)	1084	0.637	0.615	0.104
G_Index	8048	0.450	0.444	0.147	Ind_Concentr	1084	0.208	0.189	0.112
G_Index (#)	8048	9.096	9.000	2.654	Ind_HistTakeovThreat	1084	0.003	0.003	0.001
AntitakeovLaws	8048	0.275	0.167	0.202	IndProfit(mkt.val.-wt.)	1084	0.157	0.153	0.059
AntitakeovLaws (#)	8048	1.650	1.000	1.214	IndProfit(asset-wt.)	1084	0.147	0.144	0.053
Analysts	8048	2.396	2.485	0.718	Average_RD	814	0.025	0.011	0.041
Equity_Incentives	8048	0.242	0.154	0.237	Concentr_RD	814	0.409	0.262	0.354
Tangibility	8048	0.302	0.242	0.218	Proportion_RD	814	0.434	0.370	0.325
Lag_MB	8048	2.275	1.706	1.941	High_Tech	814	0.394	0.000	0.489
Asset_Size	8048	7.267	7.085	1.480					
Num_Segments	7289	2.361	2.000	1.632					
ROA	7570	0.143	0.145	0.111					
Sales_Gr	7570	0.119	0.084	0.297					
Volatility	7570	0.117	0.101	0.073					
Synch(I)	7570	0.657	0.667	0.276					
Synch(ROA)	7570	0.630	0.667	0.287					
Synch(MB)	7570	0.670	0.667	0.276					
Sales_Share	7570	0.027	0.007	0.057					
<i>Country sample</i>	Obs	Mean	Med	Std	(cont'd)	Obs	Mean	Med	Std
Comov(I)	285	0.610	0.586	0.094	Growth_TFP	285	0.014	0.016	0.027
Comov(I+RD)	285	0.610	0.584	0.095	Growth_GDP	285	0.022	0.023	0.025
Anti_Dir_Rights	285	0.602	0.667	0.314	Macro_Volatility	285	6.740	7.226	1.184
Anti_Self_Dealing	285	0.421	0.351	0.300	Initial_Income	285	9.305	9.87	1.155
Rule_Law	285	0.731	0.809	0.295	Schooling	285	1.960	2.061	0.358
Risk_Exp	285	0.753	0.878	0.259	Market_Cap	285	0.916	0.691	0.633
Property_Rights	285	0.722	0.848	0.260	Risk	285	-2.771	-2.77	0.428
Disclosure_Standards	285	0.625	0.600	0.194					
Own_Concentr	285	0.475	0.449	0.273					
Own_Concentr (II)	276	0.441	0.453	0.173					

Table 2. Determinants of comovement in investment: industry analysis

The sample includes Compustat Global firms with non-missing S&P Transparency and Disclosure governance data (1998-2002), excluding firms in financial and utilities industries (SIC codes 6000-6999 and 4949-4999).

Comov(x), the index of comovement in *x*, is defined at the two-digit SIC level as the higher of the number of firms with increases in *x* and the number of firms with decreases in *x*, divided by the total number of firms. *Comov(I)* is the index of comovement in investment (capital expenditure divided by total assets). *Comov(I+RD)* is the index of comovement in the sum of investment and R&D. *Gov* is the sum of shareholder rights and board quality scores, divided by 100 (S&P Transparency and Disclosure). *Anti_Self_Dealing* and *Anti_Dir_Rights* are country indexes of private enforcement against self-dealing and anti-director rights, respectively, rescaled to [0,1] (Djankov et al., 2008). *Analysts* is log of the number of one-year-ahead analyst earnings forecasts (I/B/E/S). *Comov(MB)* is the index of comovement in market-to-book (total assets plus market value of equity minus book value of equity divided by total assets). *Comov(ROA)* is the index of comovement in ROA (operating income divided by total assets). *Ind_Concentr* is the Herfindahl index of industry concentration defined at the two-digit SIC level based on net sales. *Tangibility* is property, plants and equipment divided by total assets. *Asset_Size* is log of total assets. Two-digit SIC industry medians of firm level variables are used.

Two-stage least squares is used in Column V. *Gov* is predicted in the first stage with English legal origin (La Porta et al., 1998) and industry median of *Gov* (computed across all countries at the two-digit SIC industry level). The intercept, country random effects, year effects, and the number of firms are included but not reported. Robust t-statistics with clustering by country are italicized. t-statistics (in Columns I-IV – robust t-statistics with clustering by country) are italicized.

	I	II	III	IV	V
	Comov(I)	Comov(I)	Comov(I)	Comov(I+RD)	Comov(I), 2SLS
Gov	-0.124 **				-0.319 **
	<i>-1.97</i>				<i>-2.48</i>
Anti_Self_Dealing		-0.122 ***			
		<i>-2.97</i>			
Anti_Dir_Rights			-0.086 **	-0.086 **	
			<i>-2.25</i>	<i>-2.36</i>	
Analysts	0.016				0.033
	<i>0.89</i>				<i>1.44</i>
Comov(MB)	-0.058	-0.025	-0.025	0.010	-0.028
	<i>-0.48</i>	<i>-0.22</i>	<i>-0.23</i>	<i>0.09</i>	<i>-0.31</i>
Comov(ROA)	0.012	0.005	0.015	-0.008	0.007
	<i>0.09</i>	<i>0.04</i>	<i>0.12</i>	<i>-0.07</i>	<i>0.06</i>
Ind_Concentr	0.129 **	0.095 *	0.113 **	0.110	0.117
	<i>2.54</i>	<i>1.66</i>	<i>2.07</i>	<i>1.63</i>	<i>1.59</i>
Tangibility	0.167 ***	0.202 ***	0.183 ***	0.138 **	0.188 ***
	<i>3.43</i>	<i>3.42</i>	<i>3.44</i>	<i>2.29</i>	<i>2.67</i>
Asset_Size	-0.037 ***	-0.040 ***	-0.040 ***	-0.027 *	-0.053 ***
	<i>-2.58</i>	<i>-3.32</i>	<i>-3.51</i>	<i>-1.81</i>	<i>-3.53</i>
Obs.	307	307	307	307	307
R ² (within)	0.104	0.097	0.090	0.102	0.102
R ² (between)	0.390	0.352	0.555	0.266	0.155

*** significant at 1%; ** significant at 5%; * significant at 10%

Table 3. Determinants of comovement in investment: firm level analysis

The sample includes Compustat Global firms with non-missing S&P Transparency and Disclosure governance data (1998-2002), excluding firms in financial and utilities industries (SIC codes 6000-6999 and 4949-4999).

ΔI is change in investment (capital expenditure divided by total assets). In Columns I-III and V-VI, ΔI_{IND} is median industry investment change defined at the two-digit SIC level. In Column IV, ΔI_{IND} is average industry investment change computed excluding the sample firm, defined at the two-digit SIC level. Gov is the sum of S&P Transparency and Disclosure shareholder rights and board quality scores, divided by 100. $Ind_IT_Intensity$ is the percent of new capital expenditure on computers and peripheral data processing equipment in new machinery and equipment expenditures defined at the two-digit SIC level using US manufacturing data (1992 Census of Manufacturers). Ind_Used_Capex is the percent of used capital expenditures in total capital expenditures defined at the two-digit SIC level using US manufacturing data (1992 Annual Survey of Manufacturers). Ind_Depr_Assets is the ratio of depreciation and amortization to total assets defined at the two-digit SIC level using Compustat Industrial Annual. $Analysts$ is log of the number of one-year-ahead analyst earnings forecasts (I/B/E/S). $Comov(x)$, the index of comovement in x , is defined at the two-digit SIC level as the higher of the number of firms with increases in x and the number of firms with decreases in x , divided by the total number of firms. $Comov(MB)$ is the index of comovement in market-to-book (total assets plus market value of equity minus book value of equity divided by total assets). $Comov(ROA)$ is the index of comovement in ROA (operating income divided by total assets). $Tangibility$ is property, plants and equipment divided by total assets. Lag_MB is one-year lag of market-to-book ratio. Lag_ROA is one-year lag of operating income divided by total assets. $Asset_Size$ is log of total assets.

The intercept, country fixed effects, Fama and French (1997) industry dummies, year effects, and the number of firms are included but not reported. Robust t-statistics with clustering by country are italicized.

	I	II	III	IV	V	VI
	ΔI	ΔI	ΔI	ΔI	ΔI	ΔI
ΔI_{IND}	0.894 *** <i>59.13</i>	0.906 *** <i>77.76</i>	0.925 *** <i>73.20</i>	0.061 <i>0.80</i>	0.227 <i>0.76</i>	0.132 <i>0.22</i>
$\Delta I_{IND} * Gov$	-1.070 *** <i>-9.70</i>	-0.921 *** <i>-10.30</i>	-1.177 *** <i>-14.16</i>	-1.281 *** <i>-11.12</i>	-1.265 *** <i>-3.47</i>	-0.909 *** <i>-7.35</i>
$\Delta I_{IND} * Gov * Ind_IT_Intensity$					-0.023 *** <i>-3.63</i>	
$\Delta I_{IND} * Gov * Ind_Used_Capex$					0.136 ** <i>2.11</i>	
$\Delta I_{IND} * Gov * Ind_Depr_Assets$						-0.057 *** <i>-2.90</i>
$\Delta I_{IND} * Analysts$		-0.082 ** <i>-2.51</i>	-0.078 ** <i>-2.32</i>	-0.060 <i>-1.38</i>	-0.052 <i>-0.66</i>	-0.090 ** <i>-2.47</i>
$\Delta I_{IND} * Comov(MB)$	2.031 *** <i>8.68</i>	2.076 *** <i>8.43</i>	1.992 *** <i>9.66</i>	2.345 *** <i>16.11</i>	2.118 *** <i>4.13</i>	2.092 *** <i>7.98</i>
$\Delta I_{IND} * Comov(ROA)$	0.367 *** <i>3.71</i>	0.466 *** <i>5.13</i>	0.528 *** <i>6.84</i>	0.147 <i>0.82</i>	6.183 <i>0.71</i>	0.783 *** <i>5.61</i>
$\Delta I_{IND} * Tangibility$			0.493 *** <i>7.89</i>	0.260 ** <i>2.63</i>	0.940 *** <i>3.75</i>	0.601 *** <i>14.98</i>
$\Delta I_{IND} * IT_Intensity$					-0.020 <i>-0.26</i>	
$\Delta I_{IND} * Ind_Used_Capex$					0.795 ** <i>2.25</i>	
$\Delta I_{IND} * Ind_Depr_Assets$						0.174 <i>1.19</i>
Gov	0.329 <i>1.10</i>	0.343 <i>1.14</i>	0.383 <i>1.19</i>	0.329 <i>1.07</i>	0.435 <i>0.95</i>	0.393 <i>1.15</i>
Analysts		-0.029 <i>-0.86</i>	-0.027 <i>-0.84</i>	0.002 <i>0.08</i>	-0.026 <i>-0.46</i>	-0.023 <i>-0.79</i>
Tangibility			0.401 <i>0.87</i>	0.866 <i>0.97</i>	0.539 <i>0.74</i>	0.394 <i>0.86</i>
Lag_MB	0.089 <i>0.30</i>	0.105 <i>0.33</i>	0.067 <i>0.22</i>	0.195 * <i>1.80</i>	-0.184 <i>-0.50</i>	0.111 <i>0.34</i>
Lag_ROA	0.155 ** <i>2.33</i>	0.170 ** <i>2.32</i>	0.172 ** <i>2.23</i>	0.172 <i>0.41</i>	0.293 ** <i>2.11</i>	0.172 ** <i>2.21</i>
Asset_Size	-0.031 <i>-0.50</i>	-0.023 <i>-0.39</i>	-0.036 <i>-0.53</i>	-0.034 <i>-0.44</i>	-0.049 <i>-0.51</i>	-0.030 <i>-0.46</i>
Obs.	938	938	938	938	585	938
R ² (within)	0.121	0.122	0.126	0.084	0.139	0.129
R ² (between)	0.184	0.155	0.156	0.060	0.045	0.120

*** significant at 1%; ** significant at 5%; * significant at 10%

Table 4. Comovement in investment and operating performance

The sample includes Compustat Global firms with non-missing S&P Transparency and Disclosure governance data (1998-2002), excluding firms in financial and utilities industries (SIC codes 6000-6999 and 4949-4999).

IndProfit is average industry ratio of operating income to total assets (weighted by market value in Columns I and III and by total assets in Column II), defined at the two-digit SIC level. *Profitability* is operating income divided by total assets. *Comov(I)*, the index of comovement in investment (capital expenditure divided by total assets), is defined at the two-digit SIC level as the higher of the number of firms with increases in investment and the number of firms with decreases in investment, divided by the total number of firms. *Synch(I)*, synchronicity in investment, is the average value (over three years prior to the sample year) of a dummy variable that equals 1 if firm investment and two-digit SIC industry investment changed in the same direction and 0 otherwise. *Sales_Gr* is growth in net sales. *Asset_Size* is log of total assets. *Tangibility* is property, plants and equipment divided by total assets. *Volatility* is the standard deviation of stock return (Compustat Global Issues). *Gov* is the sum of S&P Transparency and Disclosure shareholder rights and board quality scores, divided by 100. *Analysts* is log of the number of one-year-ahead analyst earnings forecasts (I/B/E/S). $D(\Delta I_{IND} > 0)$ equals 1 if industry investment has increased; 0 otherwise. *Sales_Share* is the share of a firm's net sales in industry sales. Two-digit SIC industry medians of firm level variables are used in Columns I-III.

Two stage least squares is used. *Comov(I)* is predicted in the first stage with *Ind_Concentr* (Herfindahl index of industry concentration defined at the two-digit SIC level based on net sales); *Comov(MB)* (industry index of comovement in the market-to-book ratio defined as total assets plus market value of equity minus book value of equity, divided by total assets); *Comov(ROA)* (industry index of comovement in operating income divided by total assets); country average of *Comov(I)*; and number of firms. *Synch(I)* is predicted in the first stage with *Ind_Concentr*; *Synch(MB)* (synchronicity in market-to-book); *Synch(ROA)* (synchronicity in operating income divided by total assets); industry average of *Synch(I)*; and number of firms. The intercept, country fixed effects, Fama and French (1997) industry dummies (in Columns IV-V), and year effects are included but not reported. Robust t-statistics with clustering by country are italicized.

	I	II	III	IV	V
	IndProfit	IndProfit	IndProfit	Profitability	Profitability
Comov(I)	-0.223 *** <i>-3.33</i>	-0.209 *** <i>-3.53</i>	-0.224 *** <i>-3.24</i>		
Synch(I)				-0.128 ** <i>-2.46</i>	-0.126 ** <i>-2.42</i>
Sales_Gr	0.081 <i>1.54</i>	0.137 * <i>1.96</i>	0.090 <i>1.67</i>	0.073 *** <i>5.23</i>	0.072 *** <i>5.22</i>
Asset_Size	-0.017 * <i>-1.78</i>	-0.017 <i>-1.70</i>	-0.020 * <i>-1.98</i>	-0.020 *** <i>-5.08</i>	-0.022 *** <i>-5.35</i>
Tangibility	0.071 ** <i>2.63</i>	0.077 ** <i>2.72</i>	0.070 ** <i>2.38</i>	0.047 *** <i>3.00</i>	0.046 ** <i>2.77</i>
Volatility	-0.135 <i>-0.88</i>	-0.291 <i>-1.53</i>	-0.157 <i>-1.09</i>	-0.188 *** <i>-3.89</i>	-0.191 *** <i>-3.54</i>
Gov			-0.068 <i>-1.71</i>		-0.033 <i>-1.70</i>
Analysts			0.011 <i>1.50</i>		0.004 <i>1.44</i>
D($\Delta I_{IND} > 0$)			0.004 <i>0.51</i>		0.008 <i>1.27</i>
Sales_Share					0.017 <i>0.58</i>
Obs.	307	307	307	838	838

*** significant at 1%; ** significant at 5%; * significant at 10%

Table 5. Determinants of comovement in investment: US firms

The sample includes Compustat Industrial Annual firms with non-missing corporate governance, compensation, and segment data (1995-2004), excluding firms in financial and utilities industries (SIC codes 6000-6999 and 4949-4999), and firms with total assets below 20 mln.

ΔI is change in investment (capital expenditure divided by total assets). In Columns I-III and VI, ΔI_{IND} is median industry investment change, defined at the three-digit SIC level. In Column IV, ΔI_{IND} is average industry investment change computed excluding the sample firm, defined at the three-digit SIC level. In Column V, ΔI_{IND} is average investment change of industry leaders defined as the top tercile of firms in a three-digit SIC industry by sales share; industry leaders are excluded from the regression. G_Index is the index of takeover defenses from the firm charter and bylaws, rescaled to [0,1] (Gompers, Ishii, and Metrick, 2003; IRRC Governance); gap years are filled in using adjacent years following Cremers and Nair (2005). $AntitakeovLaws$ is the index of state anti-takeover laws (business combination, control share acquisition, fair price, antigreenmail, cashout, and director's duties), rescaled to [0,1] (IRRC Governance). $Stake_PPF$ is the largest percentage stake of a public pension fund shareholder in the firm defined following Cremers and Nair (2005) (CDA Spectrum 13f filings). $Board_Indep$ is the fraction of independent directors on the board (IRRC Directors); year 1995 is filled in using year 1996. $Analysts$ is log of the number of one-year-ahead analyst earnings forecasts (I/B/E/S). $Comov(x)$, the index of comovement in x , is defined at the three-digit SIC level as the higher of the number of firms with increases in x and the number of firms with decreases in x , divided by the total number of firms. $Comov(MB)$ is the index of comovement in market-to-book (total assets plus market value of equity minus book value of equity divided by total assets). $Comov(ROA)$ is the index of comovement in EBITDA divided by total assets. $Tangibility$ is property, plants and equipment divided by total assets. $Equity_Incentives$ the incentive ratio (the effect of a one percent increase in the market value of equity on hypothetical total compensation computed following Bergstresser and Philippon (2006) as the ratio of onepct to the sum of onepct, salary and bonus, where onepct is share price divided by 100, times the sum of shares and stock options held by the CEO). $Num_Segments$ is log of one plus the number of the firm's business segments (Compustat Segments). Lag_MB is one-year lag of market-to-book ratio. Lag_ROA is one-year lag of EBITDA divided by total assets. $Asset_Size$ is log of total assets.

The intercept, firm fixed effects, year effects, and the number of firms are included but not reported. Robust t-statistics with clustering by firm are italicized.

	I	II	III	IV	V	VI
	ΔI	ΔI	ΔI	ΔI	ΔI	ΔI
ΔI_{IND}	2.434 *** 3.30	2.142 *** 2.71	2.545 ** 2.55	0.581 1.54	-0.489 -1.07	2.066 *** 2.66
$\Delta I_{IND} * Stake_PPF$	-0.122 ** -2.25	-0.112 ** -2.07	-0.120 ** -2.05	-0.062 ** -2.04	-0.052 ** -2.21	-0.122 ** -2.01
$\Delta I_{IND} * Board_Indep$	-1.218 ** -2.50	-1.097 ** -2.25	-1.480 *** -2.70	-0.529 * -1.87	0.414 1.18	-0.847 * -1.81
$\Delta I_{IND} * G_Index$	1.575 *** 6.29	1.576 *** 6.31	1.318 *** 3.75	0.227 ** 1.97	0.992 *** 3.12	
$\Delta I_{IND} * AntitakeovLaws$						1.870 *** 6.29
$\Delta I_{IND} * Analysts$	-0.293 ** -2.53	-0.310 *** -2.59	-0.312 ** -2.27	-0.103 -1.33	0.094 1.26	-0.250 ** -2.19
$\Delta I_{IND} * Comov(MB)$	-0.329 -0.54	-0.316 -0.52	-0.960 -1.40	0.225 0.61	-0.320 -0.91	-0.334 -0.56
$\Delta I_{IND} * Comov(ROA)$	-0.713 -1.00	-0.596 -0.83	-0.396 -0.47	-0.061 -0.14	-0.188 -0.42	-0.638 -0.88
$\Delta I_{IND} * Tangibility$	0.585 1.58	0.659 * 1.66	0.925 ** 2.15	0.951 *** 3.99	0.817 *** 3.36	0.860 ** 2.16
$\Delta I_{IND} * Equity_Incentives$		0.631 1.16	0.625 1.02	0.058 0.22		0.466 0.83
$\Delta I_{IND} * Num_Segments$			0.064 1.34			
Stake_PPF	-2.1E-04 -0.38	-2.2E-04 -0.40	-2.4E-04 -0.41	-9.3E-05 -0.17	-6.4E-05 -0.10	-2.5E-04 -0.46
Board_Indep	0.012 * 1.72	0.011 1.63	0.010 1.40	0.013 * 1.75	0.015 1.60	0.011 1.56
G_Index	-0.014 -0.95	-0.014 -0.93	-0.008 -0.50	-0.010 -0.62	-0.021 -0.77	
AntitakeovLaws						-0.011 -0.94
Analysts	-0.006 *** -3.13	-0.006 *** -3.08	-0.005 ** -2.46	-0.007 *** -3.53	-0.007 *** -3.26	-0.007 *** -3.33
Tangibility	0.002 0.10	0.001 0.07	0.006 0.33	-0.005 -0.29	-0.008 -0.39	0.002 0.12
Equity_Incentives		0.001 0.16	-0.002 -0.37	0.003 0.56		0.001 0.21
Num_Segments			-0.001 -0.99			
Lag_MB	0.005 *** 6.29	0.004 *** 6.25	0.004 *** 6.89	0.005 *** 6.44	0.005 *** 6.07	0.004 *** 6.31
Lag_ROA	0.064 *** 5.39	0.064 *** 5.41	0.071 *** 5.94	0.074 *** 5.90	0.090 *** 5.45	0.065 *** 5.45
Asset_Size	0.008 *** 3.44	0.008 *** 3.50	0.007 *** 2.99	0.009 *** 4.04	0.014 *** 3.85	0.008 *** 3.58
Obs.	8048	8048	7289	7981	6054	8048
R ² (within)	0.177	0.178	0.177	0.124	0.085	0.170
R ² (between)	0.119	0.122	0.116	0.054	0.065	0.090

*** significant at 1%; ** significant at 5%; * significant at 10%

Table 6. Determinants of comovement in investment: US industries

The sample includes Compustat Industrial Annual firms with non-missing corporate governance, compensation, and segment data (1995-2004), excluding firms in financial and utilities industries (SIC codes 6000-6999 and 4949-4999), and firms with total assets below 20 mln.

Comov(x), the index of comovement in *x*, is defined at the three-digit SIC level as the higher of the number of firms with increases in *x* and the number of firms with decreases in *x*, divided by the total number of firms. *Comov(I)* is the index of comovement in investment (capital expenditure divided by total assets). *Proportion_RD* is the proportion of firms with positive R&D in a three-digit SIC industry. *Average_RD* is the average ratio of R&D to total assets in a three-digit SIC industry. *Concentr_RD* is the Herfindahl index of industry concentration defined at the three-digit SIC level based on R&D. *Proportion_RD*, *Average_RD*, and *Concentr_RD* are restricted to industries with positive *Proportion_RD*. *Stake_PPF* is the largest percentage stake of a public pension fund shareholder in the firm defined following Cremers and Nair (2005) (CDA Spectrum 13f filings). *Board_Indep* is the fraction of independent directors on the board (IRRC Directors); year 1995 is filled in using year 1996. *G_Index* is the index of takeover defenses in the firm charter and bylaws, rescaled to [0,1] (Gompers, Ishii, and Metrick, 2003; IRRC Governance); gap years are filled in using adjacent years following Cremers and Nair (2005). *AntitakeovLaws* is the index of state anti-takeover laws (business combination, control share acquisition, fair price, antigreenmail, cashout, and director's duties), rescaled to [0,1] (IRRC Governance). *Analysts* is log of the number of one-year-ahead analyst earnings forecasts (I/B/E/S). *Comov(MB)* is the index of comovement in market-to-book (total assets plus market value of equity minus book value of equity divided by total assets). *Comov(ROA)* is the index of comovement in EBITDA divided by total assets. *Ind_Concentr* is the Herfindahl index of industry concentration defined at the three-digit SIC level based on net sales. *Tangibility* is property, plants and equipment divided by total assets. *Asset_Size* is log of total assets. *Equity_Incentives* is the incentive ratio (the effect of a one percent increase in the market value of equity on hypothetical total compensation computed following Bergstresser and Philippon (2006) as the ratio of onept to the sum of onept, salary and bonus, where onept is share price divided by 100, times the sum of shares and stock options held by the CEO). *Num_Segments* is log of one plus the number of the firm's business segments (Compustat Segments). *High_Tech* is equal to 1 for firms in the following two-digit SIC industries: 28, 35, 36, 38, 73, 87; 0 otherwise. Three-digit SIC industry medians of firm level variables are used.

Column III uses two-stage least squares. *Stake_PPF*, *Board_Indep* and *Equity_Incentives* are predicted in the first stage with two-digit SIC industry medians; three-digit SIC industry median of *Hist_Takeover_Threat* (fraction of M&A related delistings in the year the firm originally appeared in CRSP). The intercept, Fama and French (1997) industry dummies, year effects, and the number of firms are included but not reported. Robust t-statistics with clustering at the three-digit SIC level are italicized.

	I		II		III		IV		V		VI	
	Comov(I)		Comov(I)		Comov(I), 2SLS		Proportion_RD		Average_RD		Concentr_RD	
Stake_PPF	-0.086	***	-0.087	***	-0.080		-0.025		4.3E-04		0.068	
	<i>-2.95</i>		<i>-2.96</i>		<i>-0.69</i>		<i>-0.67</i>		<i>0.09</i>		<i>1.15</i>	
Board_Indep	-0.170	**	-0.170	**	-0.254	**	0.405	***	0.035	**	-0.471	***
	<i>-2.36</i>		<i>-2.36</i>		<i>-2.21</i>		<i>4.04</i>		<i>2.01</i>		<i>-3.65</i>	
G_Index	-0.032		-0.026				0.196		0.005		-0.138	
	<i>-0.35</i>		<i>-0.29</i>				<i>1.50</i>		<i>0.31</i>		<i>-0.63</i>	
AntitakeovLaws					-0.050							
					<i>-1.03</i>							
Analysts	-0.021		-0.022		-0.022		0.064	***	0.013	***	-0.064	
	<i>-1.54</i>		<i>-1.53</i>		<i>-1.30</i>		<i>2.65</i>		<i>3.40</i>		<i>-1.63</i>	
Comov(MB)	-0.038		-0.039		-0.042						0.065	
	<i>-0.88</i>		<i>-0.89</i>		<i>-0.91</i>						<i>0.99</i>	
Comov(ROA)	0.068		0.069		0.065						0.148	**
	<i>1.24</i>		<i>1.24</i>		<i>1.16</i>						<i>2.00</i>	
Ind_Concentr			-0.035		-0.044						0.066	
			<i>-0.48</i>		<i>-0.59</i>						<i>0.45</i>	
Tangibility	0.118	*	0.117	*	0.118	*	-0.322	**	-0.016		0.511	**
	<i>1.74</i>		<i>1.72</i>		<i>1.81</i>		<i>-2.40</i>		<i>-1.05</i>		<i>2.09</i>	
Asset_Size	-0.053	**	-0.053	**	-0.056	***	-0.005		-0.008	**	0.006	
	<i>-4.95</i>		<i>-4.65</i>		<i>-4.99</i>		<i>-0.21</i>		<i>-2.18</i>		<i>0.16</i>	
Equity_Incentives					0.091		0.118		0.012		-0.177	
					<i>0.87</i>		<i>1.43</i>		<i>1.25</i>		<i>-1.29</i>	
Num_Segments			-0.002				-0.005					
			<i>-0.25</i>				<i>-0.35</i>					
High_Tech							0.165	**	0.022	**		
							<i>2.13</i>		<i>2.04</i>			
Obs.	1084		1084		1084		814		814		814	
R ²	0.199		0.199		0.192		0.852		0.791		0.694	
Adj. R ²	0.155		0.154		0.146		0.841		0.776		0.671	

*** significant at 1%; ** significant at 5%; * significant at 10%

Table 7. Comovement in investment and operating performance: US evidence

The sample includes Compustat Industrial Annual firms with non-missing corporate governance, compensation, and segment data (1995-2004), excluding firms in financial and utilities industries (SIC codes 6000-6999 and 4949-4999), and firms with total assets below 20 mln.

IndProfit is average industry ratio of EBITDA to total assets (weighted by market value in Columns I and III and by total assets in Column II), defined at the three-digit SIC level. *Profitability* is EBITDA divided by total assets. *Comov(I)*, the index of comovement in investment (capital expenditure divided by total assets), is defined at the three-digit SIC level as the higher of the number of firms with increases in investment and the number of firms with decreases in investment, divided by the total number of firms. *Synch(I)*, synchronicity in investment, is the average value (over three years prior to the sample year) of a dummy variable that equals 1 if firm investment and three-digit SIC industry investment changed in the same direction and 0 otherwise.

Sales_Gr is growth in net sales. *Asset_Size* is log of total assets. *Tangibility* is property, plants and equipment divided by total assets. *Volatility* is the standard deviation of stock return (CRSP). *Analysts* is log of the number of one-year-ahead analyst earnings forecasts (I/B/E/S). *Board_Indep* is the fraction of independent directors on the board (IRRC Directors); year 1995 is filled in using year 1996. *Equity_Incentives* is the incentive ratio (the effect of a one percent increase in the market value of equity on hypothetical total compensation computed following Bergstresser and Philippon (2006) as the ratio of onept to the sum of onept, salary and bonus, where onept is share price divided by 100, times the sum of shares and stock options held by the CEO). *D($\Delta I_{IND} > 0$)* equals 1 if industry investment has increased, 0 otherwise. *Sales_Share* is the share of a firm's net sales in industry sales. Three-digit SIC industry medians of firm level variables are used in Columns I-III.

Two stage least squares is used. *Comov(I)* is predicted in the first stage with *Ind_Concentr* (Herfindahl index of industry concentration defined at the three-digit SIC level based on net sales); *Comov(MB)* (industry index of comovement in the market-to-book ratio defined as total assets plus market value of equity minus book value of equity, divided by total assets); *Comov(ROA)* (industry index of comovement in EBITDA divided by total assets); and number of firms. *Synch(I)* is predicted in the first stage with *Ind_Concentr*; *Synch(MB)* (synchronicity in market-to-book); *Synch(ROA)* (synchronicity in EBITDA divided by total assets); industry average of *Synch(I)*; and number of firms. The intercept, Fama and French (1997) industry dummies (in Columns I-III), firm fixed effects (in Columns IV-V), and year effects are included but not reported. Robust t-statistics with clustering by industry (Columns I-III) and by firm (in Columns IV-V) are italicized.

	I		II		III		IV		V	
	IndProfit		IndProfit		IndProfit		Profitability		Profitability	
Comov(I)	-0.242	**	-0.145	**	-0.232	**				
	<i>-2.51</i>		<i>-1.99</i>		<i>-2.23</i>					
Synch(I)							-0.038	**	-0.039	**
							<i>-1.97</i>		<i>-1.96</i>	
Sales_Gr	0.072	***	0.067	***	0.071	***	0.062	***	0.061	***
	<i>3.06</i>		<i>2.95</i>		<i>3.18</i>		<i>6.80</i>		<i>6.66</i>	
Asset_Size	-0.025	***	-0.021	***	-0.025	***	-0.018	***	-0.020	***
	<i>-3.91</i>		<i>-4.06</i>		<i>-4.16</i>		<i>-2.92</i>		<i>-3.11</i>	
Tangibility	0.061	*	0.067	**	0.061	*	-0.004		-0.002	
	<i>1.76</i>		<i>2.38</i>		<i>1.80</i>		<i>-0.13</i>		<i>-0.06</i>	
Volatility	-0.174		-0.152		-0.171		-0.093	***	-0.093	***
	<i>-1.46</i>		<i>-1.49</i>		<i>-1.45</i>		<i>-2.85</i>		<i>-2.92</i>	
Analysts					0.003		0.020	***	0.019	***
					<i>0.29</i>		<i>4.79</i>		<i>4.66</i>	
Board_Indep					0.017				0.007	
					<i>0.49</i>				<i>0.71</i>	
Equity_Incentives					-0.011				0.030	***
					<i>-0.34</i>				<i>3.07</i>	
D($\Delta I_{IND} > 0$)					0.007				0.004	**
					<i>1.46</i>				<i>2.36</i>	
Sales_Share									0.129	***
									<i>2.67</i>	
Obs.	1084		1084		1084		7570		7570	

*** significant at 1%; ** significant at 5%; * significant at 10%

Table 8. Country differences in investment comovement

The sample includes Compustat Global firms for 1994-2004, excluding financial and utilities firms (SIC codes 6000-6999 and 4949-4999) and countries with fewer than ten annual observations. Columns II and IV exclude US observations. Columns III and VI exclude country-years with major macroeconomic shocks (1997: Argentina, Brazil, Hong Kong, Korea, Malaysia, Singapore, Thailand; 1998-1999: Indonesia; 2000-2001: Turkey).

$Comov(x)$, the index of comovement in x , is defined at the country level as the higher of the number of firms with increases in x and the number of firms with decreases in x , divided by the total number of firms. $Comov(I)$ is the index of comovement in investment (capital expenditure divided by total assets). $Comov(I+RD)$ is the index of comovement in the sum of investment and R&D. *Anti_Self_Dealing* and *Anti_Dir_Rights* are country indexes of private enforcement against self-dealing and anti-director rights, respectively, rescaled to [0,1] (Djankov et al., 2008). *Rule_Law*, *Risk_Exp* and *Disclosure_Standards* are country indexes of rule of law, lower risk of expropriation, and disclosure standards, respectively, rescaled to [0,1] (La Porta et al., 1998). *Property_Rights* is the average of the La Porta et al. (1998) measures of rule of law, low risk of expropriation, control over corruption, and low risk of repudiation of contracts by the government, rescaled to [0,1]. *Own_Concentr* is the average percentage of common shares owned by the three largest shareholders in the 10 largest nonfinancial, privately owned domestic firms in a given country (La Porta et al., 1998). *Own_Concentr (II)* is the fraction of firms that are majority-controlled by wealthy families in 1996, based on the largest ten domestically owned firms (value-weighted) from Fogel (2006). $Comov(MB)$ is the index of comovement in market-to-book (total assets plus market value of equity minus book value of equity divided by total assets). $Comov(ROA)$ is the index of comovement in ROA (operating income divided by total assets). *Concentr* is the country Herfindahl index of concentration based on net sales. *Tangibility* is property, plants and equipment divided by total assets. Country medians of firm level variables are used. *Asset_Size* is log of total assets. *Macro_Volatility* is log of standard deviation of GDP per capita.

The intercept, country random effects, and year effects are included but not reported. Robust t-statistics with clustering by country are italicized.

	I		II		III		IV		V		VI	
	Comov(I)		Comov(I)		Comov(I)		Comov(I+RD)		Comov(I+RD)		Comov(I+RD)	
Anti_Dir_Rights	-0.093	***			-0.062	***	-0.098	***			-0.066	***
	<i>-3.96</i>				<i>-3.37</i>		<i>-4.26</i>				<i>-3.60</i>	
Anti_Self_Dealing			-0.054	**					-0.057	***		
			<i>-2.49</i>						<i>-2.79</i>			
Rule_Law	-0.135	***					-0.132	***				
	<i>-3.25</i>						<i>-3.36</i>					
Risk_Exp					-0.144	***					-0.145	***
					<i>-2.890</i>						<i>-2.910</i>	
Property_Rights			-0.208	***					-0.206	***		
			<i>-3.64</i>						<i>-3.74</i>			
Disclosure_Standards	0.002						0.005					
	<i>0.03</i>						<i>0.11</i>					
Own_Concentr	0.019		-0.001				0.018		-0.003			
	<i>0.65</i>		<i>-0.05</i>				<i>0.59</i>		<i>-0.10</i>			
Own_Concentr (II)					0.005						0.005	
					<i>0.11</i>						<i>0.12</i>	
Comov(MB)	0.120	***	0.121	***	0.109	***	0.118	***	0.119	**	0.104	***
	<i>2.68</i>		<i>2.59</i>		<i>2.80</i>		<i>2.61</i>		<i>2.52</i>		<i>2.57</i>	
Comov(ROA)	0.128	*	0.147	**	0.182	**	0.122		0.150	**	0.178	**
	<i>1.67</i>		<i>1.99</i>		<i>2.54</i>		<i>1.63</i>		<i>2.07</i>		<i>2.44</i>	
Concentr	0.149		0.134		0.172		0.116		0.116		0.135	
	<i>0.61</i>		<i>0.25</i>		<i>0.64</i>		<i>0.49</i>		<i>0.44</i>		<i>0.51</i>	
Tangibility	0.351	***	0.231	***	0.273	***	0.364	***	0.245	***	0.282	***
	<i>5.65</i>		<i>3.95</i>		<i>3.95</i>		<i>6.06</i>		<i>4.27</i>		<i>4.24</i>	
Asset_Size	-0.014		-0.012		-0.009		-0.012		-0.011		-0.008	
	<i>-1.43</i>		<i>-1.18</i>		<i>-0.94</i>		<i>-1.31</i>		<i>-1.13</i>		<i>-0.85</i>	
Macro_Volatility	0.024	**	0.038	***	0.021	**	0.024	**	0.039	***	0.022	**
	<i>2.23</i>		<i>3.13</i>		<i>2.41</i>		<i>2.30</i>		<i>3.20</i>		<i>2.45</i>	
Obs.	285		275		269		285		275		269	
R ² (within)	0.191		0.204		0.206		0.213		0.226		0.234	
R ² (between)	0.650		0.616		0.631		0.656		0.620		0.629	

*** significant at 1%; ** significant at 5%; * significant at 10%

Table 9. Effects of investment comovement on growth

The sample includes Compustat Global firms for 1994-2004, excluding financial and utilities firms (SIC codes 6000-6999 and 4949-4999), countries with fewer than ten annual observations, and country-years with major macroeconomic shocks (1997: Argentina, Brazil, Hong Kong, Korea, Malaysia, Singapore, Thailand; 1998-1999: Indonesia; 2000-2001: Turkey). Column III excludes US observations. *Productivity Growth* is growth in total factor productivity constructed following John, Litov, and Yeung (2008) (World Development Indicators). *Economic Growth* is growth in real GDP per capita (World Development Indicators). *Comov(x)*, the index of comovement in *x*, is defined at the country level as the higher of the number of firms with increases in *x* and the number of firms with decreases in *x*, divided by the total number of firms. *Comov(I)* is the index of comovement in investment (capital expenditure divided by total assets). *Comov(I+RD)* is the index of comovement in the sum of investment and R&D. *Sales_Gr* is previous year's growth in net sales. *Asset_Size* is log of total assets. *Tangibility* is property, plants and equipment divided by total assets. Country medians of firm level variables are used. *Risk* is the country average of time-series variability in firm operating income divided by total assets. *Macro_Volatility* is log of standard deviation of GDP per capita. *Schooling* is log of total years of schooling (Barro and Lee, 1993). *Market_Cap* is the share of stock market capitalization in GDP (World Development Indicators), averaged over available observations. *Initial_Income* is log of GNP per capita (La Porta et al., 1998). *Rule_Law* and *Risk_Exp* are country indexes of rule of law and low risk of expropriation, respectively, rescaled to [0,1] (La Porta et al., 1998). *Anti_Self_Dealing* is country index of private enforcement against self-dealing, rescaled to [0,1] (Djankov et al., 2008). *Own_Concentr* is the average percentage of common shares owned by the three largest shareholders in the 10 largest nonfinancial, privately owned domestic firms in a given country (La Porta et al., 1998). Two stage least squares is used. *Comov(I)* and *Comov(I+RD)* are predicted in the first stage with *Concentr* (country Herfindahl index of concentration based on net sales); *Comov(MB)* (country index of comovement in the market-to-book ratio defined as total assets plus market value of equity minus book value of equity, divided by total assets); *Comov(ROA)* (country index of comovement in operating income divided by total assets); and number of firms in the country. The intercept and year effects are included but not reported. Robust t-statistics with clustering by country are italicized.

	I	II	III	IV	V	VI	VII
	Productivity Growth	Productivity Growth	Productivity Growth	Productivity Growth	Economic Growth	Economic Growth	Economic Growth
Comov(I)	-0.146 ** -2.23	-0.177 ** -2.38	-0.161 ** -2.27		-0.118 ** -2.09		-0.168 ** -2.09
Comov(I+RD)				-0.143 ** -2.18		-0.115 ** -2.04	
Sales_Gr	0.030 1.35	0.034 1.48	0.034 1.47	0.029 1.26	0.051 ** 2.43	0.050 2.37	0.055 ** 2.58
Asset_Size	-0.003 -1.19	-0.003 -1.04	-0.004 -1.41	-0.003 -1.11	-0.003 -1.37	-0.003 -1.27	-0.003 -1.11
Tangibility	0.076 ** 2.41	0.071 ** 2.29	0.083 ** 2.35	0.077 ** 2.39	0.048 ** 2.06	0.048 * 2.02	0.047 * 1.99
Macro_Volatility	0.016 *** 2.96	0.019 *** 3.06	0.016 *** 2.86	0.016 *** 2.92	0.013 *** 4.42	0.013 *** 4.45	0.017 *** 4.11
Initial_Income	-0.013 ** -2.54	-0.009 * -1.71	-0.012 ** -2.19	-0.012 ** -2.49	-0.013 *** -3.93	-0.013 *** -3.90	-0.009 ** -2.25
Schooling	-0.010 -1.01	-0.018 -1.38	-0.012 -1.10	-0.010 -0.97	-0.007 -1.13	-0.006 -1.10	-0.016 -1.55
Own_Concentr	0.003 0.47	0.010 1.39	0.001 0.13	0.004 0.51	-0.001 -0.11	-2.8E-04 -0.05	0.010 1.48
Market_Cap	-0.003 -1.34	-0.005 -1.23	-0.004 -1.47	-0.003 -1.27	-0.003 -1.67	-0.002 -1.58	-0.003 -0.85
Risk_Exp		-0.033 -1.69					-0.010 -1.68
Rule_Law							0.001 0.34
Anti_Self_Dealing							-0.008 -0.92
Risk		0.003 0.61					
Obs.	278	278	268	278	278	278	278

*** significant at 1%; ** significant at 5%; * significant at 10%