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CORPORATE GOVERNANCE AND INVESTMENT: EVIDENCE FROM RUSSIAN UNLISTED FIRMS

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This paper investigates how corporate governance of unlisted firms in an emerging market economy affects financing constraints, measured by the sensitivity of investment to cash flow. We develop two original corporate governance indices based on a large-scale survey of Russian enterprises – one for shareholder protection and one for transparency. We estimate standard investment regressions where the cash flow variable is interacted with our corporate governance indices and variables capturing the ownership structure. The central result is that better shareholder protection diminishes the cash flow sensitivity of investment, particularly in firms with an outside controlling owner and in firms with low managerial ownership. In contrast, more transparency exacerbates financing constraints in some cases. We address the problem of the endogeneity of corporate governance by using fixed-effects regressions and a novel instrumental variable based on particular legal provisions for corporate governance in Russia depending on the number of shareholders.

Keywords: corporate governance, shareholder protection, transparency, financing constraints, ownership structure.

JEL codes: G31, G32, G34

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1. Introduction

Restricted access to external finance in the form of bank loans, bond and equity issues, has been identified as one of the main impediments to firm growth, especially in emerging markets. In their review of large enterprise surveys, Dethier et al. (2011) rank the cost of finance and access to finance among the most important constraints faced by firms in developing countries. Emerging markets and their financial systems are particularly affected by informational and agency problems that may force firms to forego profitable investment projects. In this paper, we ask whether a good system of corporate governance can potentially overcome such problems and improve access to external funds.

The investigation of the relation between corporate governance and access to external finance has mostly focused on the legal framework for investor protection (e.g., La Porta et al., 1997, McLean et al, 2012). Less is known about the effect of voluntary corporate governance arrangements at the firm level on the tightness of financing constraints. [1] By studying firm-level data on a single country (Russia) with uniform investor protection laws we intend to shed more light on this question.[2]

Our measure of financing constraints is the sensitivity of corporate investment to internally generated funds (operating cash flows), going back to Fazzari et al. (1988). The argument is that asymmetric information and agency problems in capital markets drive a wedge between the cost of internal and external capital. The investment expenditure of a firm that can raise external capital only at a higher cost would then depend more on the availability of internal funds. While not unchallenged in the literature, the investment sensitivity to cash flows continues to be one of the main measures of financing constraints of the literature, and it has received particular empirical support for firms in emerging markets. [3]

This paper investigates the effect of the quality of corporate governance on the investment sensitivity to cash flow for a sample of unlisted companies.[4] Unlisted firms typically represent a very large part of both developed and emerging market economies. Asker et al. (2015) report that non-listed firms in the US account for 69 percent of private sector employment and 59 percent of sales. Brav (2009) calculates that unlisted firms account for 60 percent of the total assets of firms registered in the UK.[5] In many emerging markets, these numbers are likely to be even higher since their stock markets are less developed. We calculate for Russia that about 75 percent of total assets and 81 percent of sales come from unlisted firms.[6]

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[1] The paper by Francis et al. (2013) first addressed this question using a broad index of the quality of corporate governance.

[2] The relevant laws of investor protection in Russia, such as the Law on Joint Stock Companies and security market laws, are federal laws. President Putin abolished elections of regional governors in 2004, and we did not find any evidence of regional variation in enforcement on these laws for the time after that.

[3] See the discussion in Section 2.1.

[4] We use the term "unlisted" instead of "private" to avoid confusion with private firms in the sense of not state-owned. Also, our sample firms are open joint-stock companies with transferable shares, which, however, are not traded at a stock exchange.

[5] The numbers for the US are for the year 2010 (employment) and 2007 (sales), the number for the UK (assets) is for 2002.

[6] We compute these numbers by summing total assets and sales for the list of the 200 largest listed companies (by market capitalization) published by the Expert rating agency and dividing by total assets and sales of the universe of Russian companies in the Bureau van Dijk Ruslana database, for which this data is available, in 2006. Even among the 200 largest listed companies, many are traded only infrequently.

Nevertheless, unlisted firms have received far less attention in the corporate governance literature than listed firms, mainly due to data limitations. Zhong (2015), a notable exception in this respect, argues that internal governance mechanisms might be even more important than in listed firms because unlisted firms provide less information to the public, cannot be taken over without the consent of their controlling owners, and are subject to fewer regulations. Also, unlisted firms are often smaller and research has shown that smaller firms face more financing constraints (Beck and Demirgüç-Kunt, 2006, Beck et al., 2008). In short, external discipline imposed on unlisted firms is weaker and asymmetric information problems are likely to be more severe.

Bank loans are the main source of external finance for unlisted firms.[7] Indices of corporate governance measure to a large extent how well minority shareholders are protected. Why would the protection of minority shareholders be relevant to creditors? In countries with weak investor protection, the main agency problem is the expropriation of the firm's resources by controlling shareholders. Such practices would be even more relevant in bad times (Johnson et al., 2000), and might lead to bankruptcy in extreme cases.[8] Thus, creditor and minority shareholder interests would be largely aligned.[9] In addition, with good corporate governance, banks might save on monitoring costs.

Russia provides a good testing ground for the effect of corporate governance on investment decisions. Russia is well known for persistent corporate governance problems, such as non-transparent ownership structures, transfer pricing within corporate groups, boards with little real power, and the tunnelling of cash flows through related-party transactions by dominant shareholders. Improvements in corporate governance might have a large effect in such an environment. Indeed, it has been shown that corporate governance and investor protection are substitutes in terms of their effect on firm performance at a medium level of development (Doidge et al., 2007; Durnev and Kim, 2005; Klapper and Love, 2004; Bruno and Claessens, 2010). A similar result is obtained by Francis et al. (2013) with respect to the effect of corporate governance on the cash flow sensitivity of investment: using data from 14 emerging markets, the authors show that firm-level governance becomes more important when country-level investor protection is relatively weak.

During the decade after the 1998 default, the Russian economy grew at an average annual rate of 7 percent. The need to invest in new productive capacities led major Russian firms to search for access to Western debt and equity markets. This provided them with a strong incentive to improve their corporate governance standards. By the mid-2000s, country-level investor protection had improved to a degree such that efforts to improve governance at the firm level were no longer prohibitively expensive.

Our data on corporate governance comes from two rounds of a large-scale enterprise survey among Russian manufacturing firms in 2005 and 2006. The governance-related questions were

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[7] In our sample of unlisted firms, only about 1 percent of cash inflows from financing activities are from equity issues, and about 1 percent from bond issues. 98 percent come from bank loans and other credit.

[8] An example is the bankruptcy of Parmalat in 2003 where both minority shareholders and creditors were expropriated by the controlling shareholders as the result of an excessive debt burden to finance acquisitions, diversion of corporate funds and accounting manipulations (Enriques and Volpin, 2007).

[9] An exception would be a situation close to bankruptcy where the asset substitution problem arises. This would have to be addressed by loan covenants and is largely unrelated to corporate governance.

included in a regular business survey, which guaranteed a high level of trust to the surveying institution and a high response rate. We matched these data with accounting information and did numerous cross-checks which confirmed the accuracy of the data to a large extent.[10] Detailed data on corporate governance has been generally scarce for emerging markets and even more so for Russia.[11] Our research should be relevant also for the period after the survey given that Russia has not conducted any major reforms of corporate law since then. It should also be relevant for other emerging markets with similar levels of investor protection and concentrated ownership structures.

The paper makes a number of further contributions in addition to focusing on governance at the firm level and on unlisted firms. First, based on our survey data, we develop two separate corporate governance indices, one for shareholder protection and one for transparency and disclosure. The choice of indicators in our two indices goes back to the experience of widespread corporate governance abuses in the 1990s and the beginning of the 2000s in Russia. The components of our index differ markedly from indices used in the literature for developed countries, such as the G-index of Gompers, Ishii and Metrick (2003), which focuses on anti-takeover measures. Such an index would not be relevant in our case for two reasons: because most of such provisions would be illegal under Russian corporate law, and because many of our sample firms have a controlling shareholder and are not exposed to the threat of takeover.

Second, we account for the fact that corporate governance arrangements may work differently depending on whether a company's ownership is highly concentrated or whether control is shared between various large and small shareholders. For example, in the case of shared control, the board might have important functions for joint decision making and monitoring while under a dominating shareholder the role of the board might be limited. A competing hypothesis would be that large shareholders need to commit to abstaining from self-dealing in order to receive external finance. Proper board procedures and composition, as well as other shareholder protection measures, may serve for this purpose. To test for such effects, we include interaction terms of our corporate governance indices and a measure of ownership concentration. We also include the interactions with managerial ownership to study the effects of possible managerial entrenchment.

Third, we address the possible endogeneity of corporate governance in two ways. First, our survey data exhibits some time variation (there are two annual observations for a subset of firms) so we can use fixed-effects regressions, controlling for time-invariant unobserved factors. This removes much of the omitted variable bias, one possible source of endogeneity. Endogeneity can also result from reverse causality, namely an effect of investment and financing constraints on corporate governance. Therefore, in a second approach, we use an instrumental variable based on the legal requirements of corporate governance in Russia which depend on the number of shareholders. For example, firms with 50 or more shareholders are required to establish a board

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[10] See the Data appendix for details.

[11] Black et al. (2014) use survey data for Brazil, India, Korea, and Turkey. Their data for Russia is based on several indices with different methodologies and small samples, so it cannot be compared with the other country indices. Most other studies (e.g. Durnev and Kim (2005), Klapper and Love (2004) and Francis et al. (2013)) use data from Credit Lyonnais Securities Asia, which was collected in 2000 and has relatively small sample sizes for each country. Several time series of corporate governance data for Russia studied by Black et al. (2006b) have been discontinued or cover small samples only. The only alternative reliable data source for corporate governance in Russia for a larger sample of firms after 2000 is the S&P Transparency and Disclosure score, used for example by Black et al. (2006b), Banerjee et al. (2016) and Black and Muravyev (2016). This index is, however, limited to issues of information disclosure and to the largest listed firms.

of directors and to keep the share registry with an independent registrar. After controlling for ownership concentration and firm size, the number of shareholders is unlikely to have a direct effect on a firm's investment policy. This approach is similar to Black et al. (2006a), who study corporate governance and firm value of Korean firms and use an asset size dummy as instrument. Asset size around a certain threshold matters in their context because the law requires the presence of outside directors on the board and board committees if the asset value of a firm exceeds that threshold. We know of no other studies that have found suitable instruments for broad corporate governance indices.

Our main results are as follows. We find positive cash flow sensitivity of investment and a positive effect of sales growth, our proxy for investment opportunities, if no ownership and corporate governance variables are included. When cash flows are interacted with the shareholder protection index, cash flow sensitivity remains positive and significant, and the interaction term has a negative sign, i.e. better shareholder protection lowers the cash flow sensitivity of investment. Neither majority ownership by a private outside shareholder nor majority ownership by the firm's management has an effect on the cash flow sensitivity *per se*.

We then investigate whether the effect of shareholder protection differs between firms with a single outside (non-government) majority owner and firms with less concentrated ownership. The estimations show that the mitigating effect of shareholder protection on cash flow sensitivity comes entirely from firms with concentrated ownership. This is consistent with the hypothesis that large shareholders can reduce the relative costs of external funds compared to internally generated cash flows, if they commit to abstaining from self-dealing. Shareholder protection, including proper board procedures and composition, is a suitable device to signal such commitment. This might be part of a reputation mechanism that has been stressed as important alternative governance mechanism in the case of China by Allen et al. (2005). However, this line of reasoning does not seem to apply to firms that are dominated by insiders. Here, shareholder protection lowers cash flow sensitivity only in firms without a majority ownership by the firm's managers.

There are no significant effects for state ownership or association with business groups. Consequently we do not find evidence for the existence of internal capital markets or the granting by government of easy access to funds. We should note, however, that the number of companies with majority state ownership is quite small in our sample.

Transparency and disclosure turn out *not* to have a general alleviating effect on financing constraints. We provide some evidence that transparency might actually be harmful and increase cash flow sensitivity for companies that are at risk of hostile takeovers. In Russia, such takeovers typically do not take the form of a regulated market for corporate control but rather as corporate raiding, often with the involvement of law enforcement agencies on the side of the raiders. For the whole sample, and for the sub-sample of companies not exposed to such risk, transparency *increases* cash flow sensitivity only in firms with a large outside owner. A possible explanation is that publishing more information does not serve as a credible commitment device for large shareholders to abstain from self-dealing. Rather, transparency might help to expose such self-dealing to the public and make banks more reluctant to provide funding.

We present a number of robustness checks—fixed effects estimation which removes a part of possible omitted variable problems; Tobit regressions as investment is censored at zero for about 30 percent of the sample; governance indices constructed as the first principal component; and regressions with the actual ownership stakes of the largest outside owner and company insiders. By and large, they confirm and sometimes even reinforce our results.

Instrumental variable regressions with four indicator variables for the size of the shareholder base (the number of shareholders) as instruments confirm only some of the interaction effects of the instrumented governance indices with cash flows and ownership. However, tests for endogeneity cannot reject the null hypothesis of the exogeneity of the governance index in most specifications. This means that we can rely on our baseline results without instrumental variables.

To summarize, corporate governance affects the cash flow sensitivity of corporate investment in important ways. The size and direction of this impact, however, depends crucially on the presence of a large shareholder and the extent of managerial ownership. In other words, both ownership structure and corporate governance need to be considered jointly in assessing their impact on the cash flow sensitivity of investment. In addition, issues related to shareholder protection and to transparency have very different effects in our data. Their aggregation into a single corporate governance index might be misleading.

The remainder of the paper is structured as follows. Section 2 reviews the literature. Section 3 describes the sample, our corporate governance index, and presents descriptive statistics of other relevant variables. Section 4 explains the estimation methodology. Section 5 presents and discusses the results. Section 6 concludes. Figures and tables can be found in Appendix A. Appendix B contains a description of the data collection process and definitions of the variables.

2. Related Literature

In this section, we briefly summarize the literature on the validity of the cash flow sensitivity of investment as a measure of financing constraints and on the question how the relation between investment and cash flow is shaped by country and firm characteristics reflecting various capital market imperfections, in particular investor protection and ownership structure. We further refer to the literature on the relation between corporate governance and firm value which has also contributed to the measurement of corporate governance and briefly review the development of corporate governance in Russia.

2.1. The cash-flow sensitivity of investment as a measure of financing constraints

The role of financing constraints in corporate investment has attracted much interest in the contemporary finance literature. The idea to assess the impact of financing constraints on corporate investment by comparing the sensitivity of investment to cash flow across sub-samples of firms goes back to the seminal paper of Fazzari et al. (1988). The authors form sub-samples based on proxies for financing constraints, such as the propensity to pay dividends and show that more constrained firms have higher cash flow – investment sensitivities. Similarly, Hoshi et al.

(1991) form subsamples based on the varying access of firms to internal capital markets and find lower cash flow sensitivity for firms with better access.

There is a debate to what extent cash flow sensitivity measures financing constraints. Kaplan and Zingales (1997) show theoretically that there is not necessarily a monotonic relationship between cash flow sensitivity and financing constraints. They also analyze the sample of 49 low-dividend firms of Fazzari et al. (1998) and form sub-samples based on explicit statements from firms about problems in access to capital in their annual reports. The authors find that less constrained firms have *higher* investment – cash flow sensitivity.

On the theoretical side, Bond and Söderbom (2013) show that in a standard dynamic investment model with adjustment costs and financing constraints (a cost premium for external finance), the sensitivity of investment to cash flows increases monotonically with financing constraints, once one controls for investment opportunities. On the empirical side, Allayanis and Mozumdar (2004) point out that financial distress should be distinguished from financing constraints and argue that when cash flows are negative, investment will be insensitive to small changes in cash flows. The authors find that the Kaplan and Zingales (1997) results are due to such negative cash flow observations and are sensitive to a small number of re-classifications of firms in the sample. This is consistent with the findings of Cleary et al. (2007) who provide a theory of and evidence for investment being U-shaped as a function of internal funds, i.e. firms with strongly negative internal funds exhibit a *decrease* in investment when these funds increase, while firms with positive internal funds show the expected positive relationship with investment.[12]

Mulier et al. (2016) provide further evidence that differences in cash flow sensitivities reflect differences in the tightness of financing constraints using data for unlisted firms from six European countries including the Czech Republic and Hungary, two transition economies. Their index of financing constraints based on firm age, size, average cash flows and average leverage ratio, is positively related to the cost of debt, to the use of alternative sources of financing such as trade credit, and negatively related to investment levels. The authors show that cash flow sensitivity is higher for firms that rank high in terms of the index of financing constraints. Finally, Cull et al. (2015), using a sample of Chinese firms, find that firms which indicate in a survey that they perceive themselves to be financially constrained do indeed exhibit higher cash flow sensitivity of investment.

2.2. The Cash-flow sensitivity of investment, investor protection, and corporate governance

McLean et al. (2012) study how the sensitivity of investment to Tobin's *q* and cash flows depends on the strength of countries' investor protection laws. They find that stronger investor protection increases sensitivity of investment to Tobin's *q* and decreases cash flow sensitivity. The authors also show that higher country-level coefficients for *q* sensitivity and lower cash flow sensitivity predict higher revenue, productivity, and profit growth over a five-year horizon. These results are consistent with cash flow sensitivity measuring financing constraints and thus investor protection leading to better firm-level resource allocation, and they are not consistent

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[12] Lyandres (2007) generate that such non-monotonicity in the investment-cash flow relation in a model where firms can choose the timing of the investment.

with cash flows measuring growth opportunities.[13] A related literature has shown also that financial development reduces the cash flow sensitivity of investment at the country level (Becker and Sivadasan, 2010) and at the regional level in a developing country context (O'Toole and Newman, 2015).

In an earlier study, Lins et al. (2005) ask whether non-US firms list their shares on US stock exchanges to overcome indirect barriers to capital access. The authors show that the cash flow sensitivity of investment decreases significantly following a US listing for emerging market firms, but not so for firms from developed markets. Furthermore, actual access to external capital markets improves after the listing, and it does so more strongly for emerging market firms.

Francis et al. (2013) study the impact of both investor protection and corporate governance on investment-cash flow sensitivities in 14 emerging markets. They find that both reduce the dependence of firms on internally generated funds. Corporate governance has a greater impact in countries with weaker investor protection indicating the substitutability between firm-level and country-level governance measures. This is the closest study to ours in that it considers the impact of firm-level governance on the cash flow sensitivity of investment. Nevertheless, there are several differences. Our study is on one country, controlling almost perfectly for the legal environment, and our corporate governance index has been adapted to the specific problems in corporate governance in Russia. Our data is more recent, has a time dimension and shows more cross-sectional variation within the country.[14] We also consider the interaction of corporate governance and ownership structure in their impact on cash flow sensitivity. Finally, particular legal provisions in Russian corporate law allow us to construct an instrumental variable that affects shareholder protection but not investment directly.

2.3. The cash-flow sensitivity of investment and ownership

Several papers have studied the interaction of cash flow sensitivity with ownership structure. Hadlock (1998) finds a nonlinear relationship between managerial ownership and cash flow sensitivity for US firms, with a strong initial increase at low levels of insider shareholdings and a decrease at higher levels. These tests allow the author to distinguish the implications of two theories that predict that investment is sensitive to cash flow: The free cash flow theory of Jensen (1986) states that managers tend to overinvest internal funds on unprofitable projects. In contrast, the asymmetric information theory as formulated by Myers and Majluf (1984), predicts that firms underinvest compared to the symmetric information case since external funds are expensive. Internally generated cash flows permit the firm to invest in at least some profitable projects.

Managerial ownership is a device to align the interests of managers and shareholders. According to the free cash flow theory, better alignment should lead to less overspending on investment and therefore to less cash flow sensitivity. In the asymmetric information framework, higher managerial ownership would lead managers to internalize more of the mispricing of external funds, therefore using less of them and making investment more dependent on internally generated cash flows.

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[13] The idea that, due to measurement error in the proxy for investment opportunities, cash flows might also reflect growth opportunities goes back to Poterba's comment on the work of Fazzari et al. (1988), see Poterba (1988).
[14] The number of firms in Francis et al. (2013) ranges between 9 and 66 per country.

Hadlock's (1998) evidence is generally supportive of the asymmetric information theory. Wei and Zhang (2008) study ownership concentration in East Asian economies and distinguish between large shareholders' cash flow rights and voting rights. The difference between the two provides a measure of the entrenchment effects of large shareholders and allows for a more direct test of the two theories outlined above. The authors find that cash flow sensitivity decreases with the cash flow rights of the largest shareholders but increases with the degree of divergence between cash flow and voting rights. They interpret the results as being consistent with the free cash flow hypothesis. Pindado et al. (2011) find that family-controlled firms in Europe have lower cash flow sensitivity, in particular those with no divergence between cash flow and voting rights and firms managed by family members. These papers show that ownership structure is an important feature shaping the investment–cash flow relationship.

In a recent paper, Cull et al. (2015) study the impact of state ownership and CEO appointment by government agencies on the cash flow sensitivity of investment in Chinese firms. They find that investment is insensitive to cash flows in state-owned firms and less sensitive in firms with government-appointed CEOs than in firms unrelated to the government. Government connections are also likely to play a role in the investment process in Russia, so we also include tests for the role of government ownership in our study. Firth et al. (2012) study Chinese listed firms and find a U-shaped relation between internal funds and investment, similar to Cleary et al. (2007). Moreover, the authors find evidence for the hypothesis that the non-profit objectives of the government induce overinvestment, especially when investment opportunities are poor. Chen et al. (2014) has added to this line of research that the quality of regional government lowers the investment sensitivity to cash flows in China.

Finally, Gugler and Peev (2010) study investment–cash flow sensitivities in transition countries over the period 1993–2003. They find that cash flow sensitivities decline over time. This finding can hardly be explained if cash flows were measuring investment opportunities since it would mean that they become a poorer proxy of investment opportunities over time. The authors also find negative cash flow sensitivities for state-owned firms in the early years of transition. This is interpreted as evidence of a soft budget constraint, i.e. the access of state-owned firms to funds from the government and state-owned banks.

2.4. Corporate governance and firm value

We also build on the large body of literature which studies the impact of corporate governance on firm value. Studies by Gompers et al. (2003), Durnev and Kim (2005), Black et al. (2006a), Black et al. (2006b), Klapper and Love (2004), and several other papers show that in various countries better corporate governance is associated with a firm's higher market value. This literature has developed a number of approaches in the construction of meaningful indices of the quality of corporate governance. Black et al. (2014) argue that governance indices have to be adapted to local norms and institutions.

2.5. Russian corporate governance

Private firms, share ownership, financial markets, and corporate law and regulations emerged in Russia only at the beginning of the 1990s, after the privatization of state owned enterprises.[15] Back then, under conditions of severe economic crisis, a weak state and poor law enforcement, violations of the basic rights of shareholders were common (Black et al. 2000, Shleifer and Vishny, 1997). Controlling shareholders and managers used a variety of illegal or semi-legal practices (including preventing non-controlling shareholders from participating at general shareholder meetings, forging shareholders registries, fraudulent bankruptcy) in order to dilute the shares of minority shareholders or strip assets from the company. Minority shareholders had virtually no way to protect their rights which led to a rapidly growing ownership concentration. Accordingly, Black (2001) finds large valuation discounts for Russian firms compared to Western companies and that these discounts are strongly negatively correlated with an index of corporate governance.[16] Around the beginning of the 2000s, control over most companies had been consolidated in the hands of large shareholders. Controlling shareholders now needed funds to restructure their companies and to acquire new assets, so they became interested in improved corporate governance.

Enikopolov and Stepanov (2013) single out the main features of Russian corporate governance: large private benefits of control, underdeveloped capital markets, a high degree of ownership concentration, and weak protection of property rights. While these features are shared by many emerging markets, the role of the government is more specific to Russia: not only has the government been increasingly present as the owner of large companies since the beginning of the 2000s but corporate raiding under involvement of state officials has also become a major threat to the security of property rights in Russia.

3. Sample, Data and Descriptive Statistics

3.1. Data and sample

The data on corporate governance practices and ownership comes from two rounds of a survey of Russian industrial firms in 2005 and 2006. The survey was conducted by the Business Surveys Laboratory of the Moscow Institute for the Economy in Transition (IET, now the Gaidar Institute for Economic Policy). The institute runs a monthly business survey whose respondents are top managers of about 1200 industrial enterprises. The rate of response to IET surveys is usually between 65 and 80 percent, which is exceptionally high for enterprise surveys in Russia and is due to the established long-term relations with firms. The questions on corporate governance and ownership that we use in this paper were included in two rounds of the survey, in 2005 and 2006. For a first account of the survey data, see Lazareva et al. (2008).

The initial sample of the IET business survey is representative of the population of Russian medium and large manufacturing enterprises (extraction industries and services sectors are not included). It covers about 20 percent of employment in manufacturing; sample firms are located in most Russian regions. Similar questions on corporate governance from an earlier survey with

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[15] For the evolution of the Russian corporate governance system, see the surveys by Lazareva et al. (2007) and Enikolopov and Stepanov (2013).

[16] In a follow-up study, Black et al. (2006b) with a larger sample of firms and time series data for various corporate governance indices, corporate governance is still found to be strongly correlated with market valuation.

the same sample have been used by Guriev et al. (2003) to construct a corporate governance index and to analyze its impact on the volume of investment.

Information on unlisted firms is often scarce. In Russia, the non-transparency of ownership structures and the widespread use of nominal owners often render official ownership data uninformative. Information on corporate governance practices is often difficult or even impossible to obtain unless requested directly from managers of a company. All this calls for the use of survey data.

The usual disadvantage of using survey data is the risk of non-response or biased responses to sensitive questions. However, all survey respondents were guaranteed that the information they provided would remain confidential. In addition, the fact that the same panel of firms was regularly surveyed on various issues for more than ten years allowed the establishment of a confidential relationship between firms and the surveying institution.

The survey includes a number of questions on corporate governance, in particular, questions on the board of directors, its structure and practices, and relations with shareholders. Another group of questions was related to transparency: the use of international accounting standards, independent audits, and public disclosure of different types of information about the firm. Firms were also asked about their ownership structure (the share and type of the largest shareholder, the shares of minority owners and the state, the total number of shareholders), association with a business group, and friendly and hostile takeovers. As a result, we have unique data on corporate governance practices and ownership for a relatively large sample of Russian medium and large industrial firms.

We complement the survey data with detailed financial data from annual balance sheets, profit and loss and cash flow statements using the Bureau van Dijk Ruslana database and, in some cases, Interfax SPARK (Professional Market and Company Analysis System) and SKRIN (System of Complex Information Disclosure), two Russian providers of company information.[17] We use the quarterly reports to the Russian financial markets regulator and SPARK Interfax to extract the exact number of shareholders, and checked the legal form of firms and the ownership information in those cases where survey answers were missing. If only one or two components needed to construct one of the corporate governance indices were missing, and quarterly reports contained this information, we added the answers to our data. Random consistency checks between survey information and data from official reports have made us confident in the reliability of the obtained data. More details on the data collection and the cleaning procedures are given in Appendix B.1.

As shown in Table 1, we start with a sample of 936 firms that we were able to identify and to match to our complementary data sources. Russian corporate law distinguishes between open and closed joint-stock companies. In the latter, shares cannot be sold without the consent of other owners; formal corporate governance mechanisms are generally less important and legal requirements on information disclosure are lower. For comparability, we concentrate on open

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[17] Accounting data follows the Russian Accounting standards that in spite of several reforms that should make them more similar to IFRS, still exhibit differences in the valuation of fixed assets, inventories and reserves, for example and precludes consolidation of subsidiaries. We believe that for the accounting items that we use in this paper, such as cash flows, total assets and total debt, these differences are less relevant than for accounting profits, which we do not use. Other published work that uses Russian accounting data includes Chernykh (2011), Guriev and Rachinsky (2005), Iwasaki (2008), Mironov (2015), Muravyev et al. (2014), among others.

joint-stock companies. 697 firms took this legal form in at least one of the two years. Almost all of these firms (670) are not traded on a stock exchange. Out of these, 493 have ownership data and enough information to construct at least one of our corporate governance indices in either 2005 or 2006. Full financial statements including cash flow statements were available for 311 companies in at least one of the two years.

Figure 1 provides the distribution across five broad industries for the sample of unlisted open joint-stock companies (670 firms) and the approximate estimation sample with non-missing cash flow, corporate governance and ownership information (311 firms). The industry composition changes little due to sample attrition; the weight of the firms in the textile industry shrinks somewhat and the weight of metallurgy, manufacture of machinery, equipment and vehicles increases by four percentage points.

Figure 2 repeats this comparison for firm size in terms of the number of employees. As expected, the reporting of accounting, corporate governance and ownership data is better in larger firms so that their weight slightly increases in the estimation sample compared to the original sample.

3.2.   The corporate governance indices

The set of corporate governance mechanisms that are relevant for investment and firm performance depend strongly on the institutions and the degree of financial market development in each country (Black et al., 2014). Therefore, indices for developed market economies established in the corporate governance literature cannot easily be applied in emerging market countries. For example, the G-index of Gompers et al., (2003), originally developed for a sample of US firms, is based on firm- and state-level anti-takeover provisions. Most anti-takeover provisions are illegal under Russian corporate law and are of negligible importance in Russia with its underdeveloped market for corporate control. In contrast, far more basic violations of shareholder rights have frequently been observed. For example, shareholders did not always receive an invitation with the agenda for shareholder meetings, or share registries were kept by the management inside the firm and not by an independent registrar. Falsifying share registries and the arbitrary exclusion of shareholders by company insiders was a device for the redistribution of property in Russia in the 1990s. In addition, the disclosure requirements are generally much lower for Russian companies compared to those in the US. Our indices reflect these particular corporate governance violations, as well as basic indicators of board compositions and procedures.

Corporate governance data for emerging market countries is generally scarce. Durnev and Kim (2005), Klapper and Love (2004), and Francis et al. (2013) cover emerging market firms in their samples and use the CLSA index based on a questionnaire completed by Credit Lyonnais analysts. The governance information was collected in 2000 and covers the largest firms in each country, on average about 25 firms per country. Black et al. (2014) compare larger samples for Brazil, India, Korea, Russia, and Turkey. Their Russia sample combines six indices from different sources and with different methodology and cannot easily be compared to the others. We are not aware of other surveys of Russian firms on a broader set of corporate governance issues and of a reasonable sample size to allow for econometric analysis.

Our indices of corporate governance contain information on two basic dimensions of corporate governance—shareholder protection (including board composition and procedures) and

transparency. They are based on questions that one of the authors of this paper and other experts in the field considered the most relevant for Russia. A subset of the questions has been tested in an earlier round of the survey; see Guriev et al. (2003). Some questions ask about elements of corporate governance that are mandatory according to Russian law. Due to imperfect enforcement there may still be differences across firms.

Our two corporate governance indices, the shareholder protection index (SPI) and the transparency and disclosure index (TDI), are the sums of a number of indicator variables based on answers to survey questions. Each indicator takes the value of one if the answer is positive and zero otherwise. Specifically, the SPI combines the answers to the questions of whether the company:

1. has a shareholder (investor relations) department,
2. supplies the agenda of general shareholder meetings to all shareholders,
3. commissions an independent registrar to keep the shareholder registry,
4. has independent directors on its board of directors,
5. has formal board committees (audit, remuneration, nomination),
6. has more than 50 percent outside (non-executive) directors on its board,
7. has held more than six board meetings during the past year.

The corporate law at the time required companies to send a notice about a general shareholder meeting to all shareholders in advance and that this notice should contain agenda of the meeting (item 2). Companies with more than 50 shareholders need to have an independent registrar (item 3). Also, companies with 50 or more shareholders need to establish a board of directors. However, no provisions are made for the composition of the board, its committees or the number of meetings.

The TDI is the sum of the following indicator variables where each of them takes value one if the company publishes:

1. financial accounts according to international accounting standards (US GAAP, IAS),
2. an annual report,
3. annual financial statements,
4. quarterly reports to the financial markets regulator,
5. lists of related parties,
6. lists of beneficial owners,
7. data on the compensation of board members,
8. data on the compensation of the top management; plus
9. an indicator variable that takes value one if the company's annual reports are reviewed by an independent auditor.

Russian corporate law requires open joint stock companies to publicly disclose its annual report and annual financial statements (items 2 and 3). It also requires an independent audit for annual reports (item 9). According to the requirements by financial regulator at the time, companies should disclose lists of related parties (item 5) and their annual reports should contain information on the compensation of top managers and board members (items 7 and 8). The quarterly report (item 4) is a mandatory disclosure document for open joint-stock companies

(and other companies issuing public debt). It has to be filed to the financial markets regulator but does not necessarily have to be published by the firm.

Descriptive statistics on the two indices are presented in Table 2. All descriptive statistics refer to unlisted open joint-stock companies. The mean value for the SPI is 3.8 and 3.6 in 2005 and 2006 respectively, with a maximum of 7. The TDI takes mean values of 4.1 and 3.8 in 2005 and 2006, with a maximum of 9. The difference in index values, calculated for companies that participated in both survey rounds, is close to zero on average for the SPI and slightly negative for the TDI. Distributions of the index values in the two years and for the change from 2005 to 2006 are plotted in Figure 3 to Figure 6 of Appendix A. Despite little change in index values on average, more than 60 percent of the firms experienced some change in the index between the two years.

Table 3 shows the mean values for the index components. On many questions, there is reasonable variation in the answers across firms. However, for some questions, answers are close to unanimous. For example, most companies respond that they supply the agenda of general meetings to shareholders, but very few companies have formal board committees. Among the items of the TDI, the vast majority of firms publish annual reports and have an independent auditor but very few companies use international accounting standards or publish data on the compensation of top managers and beneficial owners.

3.3. Descriptive statistics on ownership and accounting variables

Table 4 displays data on the ownership structure of sample firms. These data confirm the substantial concentration of ownership in Russian firms. The average stake of the largest non-government outside blockholder in a firm is 39 percent in 2006. In almost 40 percent of the firms the largest shareholder has a majority stake. Our figures are based on direct ownership. (It is unlikely that respondents reported the ultimate shareholders in case of ownership pyramids.) Actual ownership concentration based on ultimate ownership might actually be even higher since ownership in Russia by large shareholders is often disguised behind several companies with the same owners, often registered at offshore locations (Chernykh, 2008).

Top managers collectively own about 20 percent of the shares on average, and they own more than 50 percent of the shares in 19 percent of the firms. In our investigation of the effect of corporate governance on investment, we distinguish firms by their degree of ownership concentration and by the degree of managerial (insider) ownership. The government is present as an owner in our sample firms, but holds only an average share of about 10 percent in 2006, and is a majority owner in only 8 percent of the firms. Almost 30 percent of firms in our sample are members of a business group. We control for the group membership in our empirical analysis.

Our ownership variables exhibit some time variation, so that we can use them in fixed-effects regressions. Out of 474 firms that have data on the stake of the largest non-government outside shareholders in both years, 6 percent had a majority shareholder of this type in 2005 but not in 2006 and 10 percent had none in 2005 but had one in 2006. Of the 464 firms with data on managerial ownership in both years, 5 percent were dominated by managers in 2005 but not in 2006 and 6 percent became insider-dominated in 2006.

Table 5 reports statistics on the number of shareholders, which serves as an instrument for the SPI. Thirty-two percent of firms have more than 1000 shareholders, and 16 percent of firms have fewer than 50 shareholders.

Descriptive statistics on the other variables used in the regressions, in particular investment and cash flows, both normalized by total assets, are given in Table 6. Here we report numbers for firm-years, i.e. combine the data for 2005 and 2006. The median firm invests only 1 percent of total assets and has an operating cash flow of 0.7 percent of assets. In order to reduce the effect of outliers, we winsorize all ratios (i.e. all variables in the table except the logarithm of sales) at 2 percent of each tail of their distributions. There are less observations for cash flows since we hand-collected this data only for companies with data on corporate governance and ownership, and complete cash flow statements were not available for all firms.

4. Methodology

In the empirical framework of Fazzari et al. (1988), which has been adopted broadly since then to study firms' investment decisions, investment is modelled as a linear function of cash flows and a measure of investment opportunities. Given that our sample consists of non-traded firms, we use sales growth as a proxy for investment opportunities instead of the usual Tobin's q. Several authors have added measures of the ownership structure of firms (e.g. Hadlock, 1998 and Wei and Zhang, 2008) and investor protection (McLean et al., 2012), and corporate governance (Francis et al., 2013) to this model. We include corporate governance indices and ownership variables at the same time and add a double and triple interactions of cash flows, the corporate governance index, and ownership. This captures the differential effect of the quality of corporate governance in firms with high vs. low ownership concentration and in insider vs. outsider-dominated firms.

Our specification is as follows:

$$\frac{I_{i,t}}{A_{i,t-1}} = \alpha_i + \beta_1 \frac{CF_{i,t}}{A_{i,t-1}} + \beta_2 CG_{i,t} + \beta_3 OWN_{i,t} + \beta_4 \frac{CF_{i,t}}{A_{i,t-1}} \times CG_{i,t} + \beta_5 \frac{CF_{i,t}}{A_{i,t-1}} \times OWN_{i,t}$$

$$+ \beta_6 \frac{CF_{i,t}}{A_{i,t-1}} \times CG_{i,t} \times OWN_{i,t} + \beta_7 X_{i,t} + \varepsilon_{i,t} \tag{1}$$

where I is investment, A is total assets, CF is cash flow, CG is an index for corporate governance (either the SPI or the TDI), OWN is a binary variable for either the largest non-government outside owner or the top management of the company owning more than 50 percent of the shares. Thus, the two ownership variables stand for ownership concentration and dominance of insiders among the owners, respectively. X is a vector of control variables including sales growth, our proxy for investment opportunities, leverage, the natural logarithm of sales as a proxy of firm size, and two binary variables for the association with a business group and majority state ownership[18] and a set of industry-year dummies for four major industries. The sample includes all unlisted open joint-stock companies. In the models with the SPI we exclude a small number of firms with just one shareholder. In this case, our measures of shareholder

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[18] We do not include the interaction of state ownership with corporate governance and cash flows since there are only slightly more than 30 firm-years with majority state ownership in the regression sample.

protection would be clearly meaningless. We keep those firms in the models with the TDI because different degrees of transparency can still matter in the investment process for firms with one shareholder.

In each regression, we include one of the two corporate governance indices and one of the two ownership measures. For about 38 percent of the firm-years we have a dominant outside shareholder and about 18 percent are dominated by insiders. This introduces a negative correlation between the two indicator variables, which amounts to -0.36. The two corporate governance indices have a correlation of 0.21. Even though the sample size is not small, there are not enough observations to include all four variables with all their interactions simultaneously.

Investment and cash flows are normalized by total assets at the beginning of the year. These ratios and leverage have been winsorized at 2 percent in both tails in order to limit the effects of outliers.

The model is estimated using panel data methods, with a small time dimension of two years. Our baseline model is the estimation of equation (1) with a random-effects panel estimator, with robust standard errors. Breusch-Pagan Lagrange multiplier tests show that the absence of random effects is clearly rejected in all reported specifications. We also estimate fixed-effects models for comparison but Hausman tests do not reject that firm-level effects are adequately modeled by random effects in most specifications.[19]

We start with a model without ownership and corporate governance variables (i.e. we set β_2 to β_6 equal to zero), followed by a model with ownership and corporate governance but without any interactions (β_4 to β_6 equal to zero). In a third specification, we add the interaction of corporate governance with cash flows and ownership with cash flows (β_6 is still set to zero). In a fourth specification, we estimate the full model. For all robustness checks, we only report the last two specifications.

We conduct several robustness checks. We estimate Tobit models, which take into account the fact that investment is effectively a censored variable in our sample. About 30 percent of the sample observations for investment equal zero. We also report estimations with our two corporate governance indices constructed as the first principal component instead of the simple sum of the individual index components. Furthermore, we use actual ownership shares instead of indicator variables for the ownership stake of the largest non-government outside owners and top managers. We also try alternative cash flow measures. While the standard approach is to use cash flows from operations, one can also argue that revenues from investment activities (from the sale of assets or securities, received dividends and interest or the repayment of loans to other organizations), and cash holdings represent internally generated funds that can be used for investment.

Most studies of corporate governance and performance are plagued with problems of endogeneity that render any claims about the causal effect of governance on investment or

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[19] Other studies that have no time variation in their governance indices (McLean et al., 2012) and ownership variables (Wei and Zhang, 2008) include only interaction terms with the time-invariant corporate governance or ownership variables. However, we cannot exclude a direct effect of the quality of corporate governance and ownership structure on investment. Given that we observe some time variation in these variables we can also include them without interaction in addition to the interaction terms.

performance problematic.[20] For example, firms with good performance might adopt good governance practices (reverse causation) or firms might choose governance practices optimally and hence there is no effect on performance to be expected. We therefore apply an instrumental variable estimator to control for possible endogeneity. In order to construct the instrument, we exploit a requirement in Russian corporate law, according to which firms with more than 50 shareholders must keep their shareholder register with an independent registrar, and firms with at least 50 shareholders need to establish a board of directors, while firms with a smaller number of shareholders can leave all board functions with the general shareholder meeting. Also, firms with more than 1,000 shareholders need to have at least 7, and firms with more than 10,000 shareholders need to have at least 9 board members. Apart from these legal requirements related to our SPI, we argue that the number of shareholders is a good instrument for the SPI since it creates a need for a functioning board to overcome free-rider problems in monitoring the company management. The relation to the transparency index is less clear, however. At the same time, the number of shareholders is unlikely to have a direct effect on corporate investment once we control for the size of the firm and the presence of a controlling shareholder. The only paper that we are aware of that presents a convincing instrument for corporate governance is Black et al. (2006a). The authors use Korean data and legal requirements on corporate governance depending on the asset value of a firm.

We use four indicator variables for the number of shareholders as instruments, namely for 1-49, 50-199, 200-499 and 500-999 shareholders, in order to account for a possible non-linear relationship between our indices and the number of shareholders. (The firms with 1000 shareholders or more form the base group.) Since our corporate governance indices appear also in interaction terms with ownership and cash flows, we also use the interactions of ownership and cash flows with each of the four indicator variables for the number of shareholders as instruments. We report the results of Durbin-Wu-Hausman tests on the exogeneity of our corporate governance indices assuming the validity of the instruments based on the number of shareholders.

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[20] See Roberts and Whited (2013) and Wintoki et al. (2012) for discussion and possible solutions.

5. Results

5.1. Baseline Results

Table 7 presents our basic regression results for a panel of two years corresponding to the two rounds of the enterprise survey. Panel A shows specifications described in the previous section for the SPI. Panel B shows the same set of regressions for the TDI. Specifications (2) to (4) of each panel include a dummy variable for ownership concentration (equal to one if the stake of the largest outside shareholder is greater than 50 percent), while specifications (5) to (7) include a dummy variable for insider-dominated firms (equal to one if the top managers of the company owns more than 50 percent).

The first specification shows a positive effect of cash flows on corporate investment (significant at the one percent level) and a positive effect of sales growth, our measures of investment opportunities (significant at the 10 percent level). The coefficients are 0.06 and 0.017 respectively. Both are sizable economically: A one standard deviation increase in the cash flow to asset ratio is associated with an increase of (0.06 x 18.26 =) 1.1 percentage points in the investment to assets ratio.[21] At the median level of the investment ratio of 1.3 this corresponds to an 85 percent increase. The effect of a one standard deviation increase in sales growth is about half of that (42 percent). In all other specifications, the proxy variable for investment opportunities, sales growth, is insignificant. This is at odds with investment efficiency: firms with quickly growing sales revenues do not invest more than others. Introducing the SPI and one of the ownership variables in specifications (2) and (5) without interactions does not significantly change the cash flow coefficient. The two additional variables do not have a direct effect on investment.

Specifications (3) and (6) show that shareholder protection lowers the cash flow sensitivity of investment. This is our first central result, which confirms earlier results in cross-country studies for investor protection and corporate governance indices (McLean et al., 2012 and Francis et al., 2013). We interpret this finding to mean that firms with better shareholder protection are better able to attract external funding for their investment and thus have to rely less on internally generated funds. Our two variables for ownership concentration and dominant insider owners do not affect the cash flow sensitivity of investment. This is in contrast with Hadlock (1998) and Wei and Zhang (2008). It is possible that both over- and underinvestment problems are present in Russian firms and that therefore no direct effect of ownership on cash flow sensitivity can be observed. However, we are lacking data on the wedge between voting and cash flow rights, which these authors have found to increase cash flow sensitivity. So we are unable to distinguish between the incentive and the entrenchment effects of large shareholders and large managerial ownership stakes.

Specification (4) allows the evaluation of the differential effects of better shareholder protection in firms with and without concentrated ownership. To start with, when shareholder protection equals zero, the cash flow coefficient is insignificant in firms with dispersed ownership and positive in firms with concentrated ownership. The coefficient for the latter is 0.083 + 0.369 =

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[21] Recall that descriptive statistics for means and standard deviations are given in Table 6.

0.452, which is about seven times the effect of the baseline specification (1).[22] But this relatively large cash flow sensitivity is reduced by higher levels of shareholder protection. A one-unit increase in the SPI lowers cash flow sensitivity by 0.007 + 0.085 = 0.092.[23] Thus, shareholder protection at a level of five in the index (one unit higher than the mean) lowers cash flow sensitivity approximately to zero. In other words, dominant outside shareholders (other than the government) expose firms to more financing constraints but, by committing to better shareholder protection standards, they can alleviate or even remove these constraints. It seems that the characteristics of a board of directors associated with better shareholder protection, investor relations departments, and independent share registrars alleviate the agency problems between minority and majority shareholders that are most severe in firms with concentrated ownership. There is no significant cash flow sensitivity in firms without a dominant outside shareholder, and this sensitivity is unaffected by shareholder protection for these firms. These results show that it is crucial to consider proxies of corporate governance and ownership concentration jointly in the analysis of cash flow sensitivity of investment.

Specification (7) shows the different nature of the interaction between ownership and shareholder protection when we include an indicator for majority ownership by top managers. Firms without such majority owners exhibit positive cash flow sensitivity (0.314 in the absence of shareholder protection), which is lowered by better shareholder protection. An SPI of 5 brings cash flow sensitivity approximately down to zero in these firms. This group of firms includes ones with a single outside majority owner, for which we found a similar effect previously, but it also includes state-controlled firms and firms without a single dominant owner. Firms dominated by insiders, in contrast, exhibit no cash flow sensitivity *per se*, and this sensitivity is unaffected by the level of shareholder protection. It is possible that the strong incentives for value maximization by managers with large ownership stakes convince financial intermediaries to provide investment funding to such firms.

We do not find significant results by introducing interactions of cash flows with corporate governance and majority state ownership (the number of such firms is too small) nor with firms membership of business groups. Thus, we do not find evidence of internal capital markets in Russian business groups that would affect the cash flow sensitivity of investment. As for state ownership, one might expect state ownership to lower investment – cash flow sensitivities due to an implicit state guarantee and thus better access to external capital. However, as Firth et al. (2012) point out, the non-profit objectives of the government may also increase cash flow sensitivities of investment, especially if investment opportunities are poor. The absence of an influence of state ownership in our analysis might be due to these two effects offsetting each other.

We next estimate the same specifications with our second corporate governance index reflecting the degree of transparency and disclosure. In Panel B of Table 7 we find stark differences when compared to the previous results for shareholder protection. Looking at specifications (3) and (6), we find no evidence that transparency has a general alleviating effect on financing constraints as we found for the SPI. A possible explanation is that transparency is a double-edged sword in the context of an environment of weak protection of property rights such as in

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[22] A Wald test shows that the sum of the two coefficients, CF and CF × Outblock50 in Table 7, specification (4), is significantly different from zero at the 5 percent level.

[23] The sum of these two coefficients is significantly different from zero at the 5 percent level.

Russia. Transparency, while useful to lower informational asymmetries with investors, may also expose firms to raiding attacks from rivals who often use connections to law enforcement agencies (Rochlitz, 2014). We can find some supporting evidence based on our enterprise survey. We construct an indicator variable taking value of one if a company has been exposed to attempted or successful hostile takeovers or perceive a risk of such a takeover in the near future. [24] For 21 percent of the firm-years this indicator equals one in our sample. In Table 8 we tabulate results for subsamples based on this indicator.[25] We find that, for companies that have been exposed to hostile takeover risk, transparency increases cash flow sensitivity. For firms not exposed to hostile takeover risk, such an effect is limited to firms with concentrated ownership. Specification (4) of Table 7, Panel B shows the latter result for the full sample: transparency *increases* cash flow sensitivity in firms with a large outside owner. A possible explanation is that publishing more information does not serve as a commitment device for large shareholders to abstain from self-dealing but rather may help to expose such self-dealing to the public.

5.2.   Robustness checks

In the following robustness checks we report only specifications with interaction effects. In each table we present four specifications corresponding to specifications (3), (4), (6), and (7) of Table 7. Table 9 presents results for fixed-effects regressions. By and large, they confirm our results from the random effects models even though the fixed effects results rely only on those companies that enter the regression sample with observations for two years.[26] Hausman tests do not give a clear picture as to whether fixed or random effects specifications should be preferred. In four out of eight tabulated regression models they reject the null hypothesis that firm-level effects are adequately modelled as random effects and in four models they do not reject it.

Table 10 presents results from random effects Tobit regressions. Given that about 30 percent of the sample exhibits zero investment, this model properly accounts for the censored nature of our dependent variable. The results are qualitatively very similar to the linear random effects models.[27] A new effect appears in the model with the TDI and managerial ownership (Panel B, specification (4)). Transparency now increases cash flow sensitivity for all firms, whether insider-dominated or not.[28]

In most of the empirical literature measuring corporate governance with indices, simple sums of the relevant indicators are used to construct them (e.g., Gompers et al., 2003; Klapper and Love, 2004; Black et al., 2006a). While this is our preferred approach since we have no particular reason to weight any of the index components more than others, some components might

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[24] We create an indicator variable for hostile takeover risk if the company answers with "yes" to at least one of the following four questions: 1. If there was a change of a large shareholder in the previous two years, was it due to a hostile takeover? 2. Was the arrival a new large shareholder accompanied by court proceedings? 3. Was there any unsuccessful attempt of a hostile takeover in the previous two years? 4. Is there a threat of a hostile takeover in the near future? The regression sample for this group consists of 63 companies, while 212 companies are not exposed to hostile takeover (we included all companies in this group if they answered three of the four questions with "no" and did not answer at most one question. The limited number of companies in the first group does not allow us to run panel regressions with random effects, so our comparison is based on coefficients of pooled OLS regressions. Tabulated results are available upon request.

[25] Due to the small number of observations in the subsample of firms exposed to risk of hostile takeover, we cannot run random variables regression and use pooled OLS regressions instead. However, for the larger subsample of firms not exposed to such risk, the coefficients and p-values for pooled OLS and random effects regressions are very similar.

[26] The tables report the number of observations for the full sample. Stata follows this convention since the singleton observations are still used to estimate the constant and the overall R^2.

[27] Stata does not provide for an option to estimate panel Tobit models with robust standard errors so we present results for regular standard errors.

[28] This coefficient is also positive and significant in a linear random effects model without robust standard errors.

contribute more to the variability of the index.[29] Thus, we consider the use of the first principal component of each of the two corporate governance indices, which is a linear combination which captures as much as possible of the variation in the original index components. Again, the results of our models with the first principal component of the two indices in Table 11 confirm our initial results by and large. One difference is that the differential effect of shareholder protection in firms with and without concentrated ownership is not significant here.

Our binary ownership variables for the largest non-government outside owner and the company insiders may not fully capture the effect of the different degree of ownership concentration and insider ownership. We therefore redo our regressions with the actual ownership shares of the largest non-government outside owner, the share of top managers, and also for state ownership as a control variable. The results in Table 12 again confirm our baseline results. In specification (3) there is an additional negative effect of managerial ownership on cash flow sensitivity.

We also used alternative measures of cash flows, adding either investment revenues, cash holdings at the beginning of the year or both to operating cash flows. Results are again largely similar, and we do not report them in tables.

Cleary et al. (2007) found evidence for a U-shaped relation between cash flows and investment by including a squared cash flow term into the investment equation. We find evidence of a U-shape (a positive significant coefficient of squared cash flows). However, it becomes insignificant when we include interaction terms with ownership and our corporate governance proxies. Since our main focus is on these interaction effects we concentrate on the linear relationship.

McLean et al. (2012) also study the effect of cash flows, ownership, and corporate governance on equity and debt issues. This addresses one of the criticisms of investment—cash flow regressions, namely, that cash flows may proxy for investment opportunities. Equity issues are extremely rare in our sample. However, we find that (operating) cash flows negatively affect the amount of new loans and financial cash flows.[30] If cash flows proxy for investment opportunities it would be unlikely that they would be associated with less new debt. Finally, we also find a positive cash flow sensitivity of cash holdings (Almeida et al., 2004). However, both the sensitivity of debt finance (new loans and financial cash flows) and cash holdings to cash flows are unaffected by our measures of corporate governance and ownership structure.[31]

5.3.   Instrumental Variable Results

One of the contributions of this paper is the use of a proper instrument for our measures of corporate governance. We argued earlier that the number of shareholders is a good candidate for an instrument since it is directly related to corporate governance but unlikely to have a direct effect on investment, and cash flow sensitivity in particular. The first-stage regressions of our two corporate governance indices on four dummy variables for the number of shareholders are displayed in Table 13. The legal provisions for establishing a board of directors and having an independent share registrar for companies with 50 and more shareholders directly affect our SPI.

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[29] Table 3 shows that some of the survey questions underlying our indices are answered almost unanimously by the respondents.
[30] Financial cash flows are new loans minus repayments and other financial expenditures. Both new loans and financial cash flows are divided by total assets at the beginning of the year.
[31] The regression results for debt finance and cash holdings are available upon request.

Therefore, it is not surprising that the coefficient of dummy variable for 1 to 49 shareholders is negative and highly significant. Also, companies with 200 to 499 shareholders have significantly lower shareholder protection indices than companies with 1000 plus shareholders. All four dummy variables are jointly significant at the one percent level, which gives an indication of the strength of this instrument. They are not jointly significant, however, for the TDI. We will therefore interpret the instrumental variable results for this index with caution. We also instrument the interactions of the corporate governance indices with the ownership variables and cash flows but do not report first-stage regressions to save space.

The second-stage results of our instrumental variable regressions are shown in Table 14. We focus on the regressions with SPI in Panel A where we have a strong set of instruments. The point estimates for the interaction of SPI and cash flows in specification (1) and for the triple interaction of SPI, cash flows, and ownership concentration are actually lower than in our random effects regressions without instruments. However, they are not statistically significant. The only significant effect is the mitigating effect of SPI on cash flow sensitivity for firms that are not dominated by insiders (specification (4)).

Next, we run endogeneity tests after all estimations in order to see whether we need the instrumental variable approach. A condition for these tests is to have a valid instrument. As we argued above, we believe that the number of shareholders provides for such an instrument for the SPI (but not for the TDI). Endogeneity tests are available only for pooled OLS regressions and their instrumental variable counterpart and fixed effects. Given that our instruments are static in nature we cannot run fixed-effects regressions and therefore report results for pooled OLS with robust standard errors. We base our inference on a variant of the Durbin-Wu-Hausman test that allows for robust standard errors (see Cameron and Trivedi, 2005, p. 276). The tests show that we cannot reject the null hypothesis of exogeneity for any of the four specifications involving the SPI, and just for one out of four specifications involving the TDI. This is reassuring since we can neglect endogeneity and rely on our baseline results without the use of instruments.

6. Conclusion

We have presented evidence on the effect of corporate governance on a measure of financing constraints, the cash flow sensitivity of investment, in Russia, an important emerging market. Our measures of corporate governance are based on two rounds of a large enterprise survey conducted in 2005 and 2006 in Russian industrial firms, most of which are not listed on a stock exchange. We find that better shareholder protection reduces the cash flow sensitivity of investment. In particular it does so in firms with a large (non-government) outside owner and in firms that are not dominated by company insiders. Transparency does not have a mitigating effect on cash flow sensitivity in our sample. In contrast, in an environment of weak protection of property rights, transparency can actually exacerbate financing constraints. Our results also show that it is important to consider both corporate governance and ownership structure simultaneously when estimating their effect on cash flow sensitivity, and possibly also other outcome variables.

Our baseline regressions use random effects models and are broadly confirmed in fixed effects regressions exploiting only the sub-sample of companies which responded in both rounds of the

enterprise survey. We introduce a novel instrument based on legal requirements for corporate governance centered on the number of shareholders. Durbin-Wu-Hausman endogeneity tests cannot reject the exogeneity of our governance variables in most specifications. We conclude that our results are not significantly affected by endogeneity concerns.

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APPENDIX

A   Figures and Tables

Figure 1
Industry distribution in the initial sample of unlisted joint-stock companies and the estimation sample
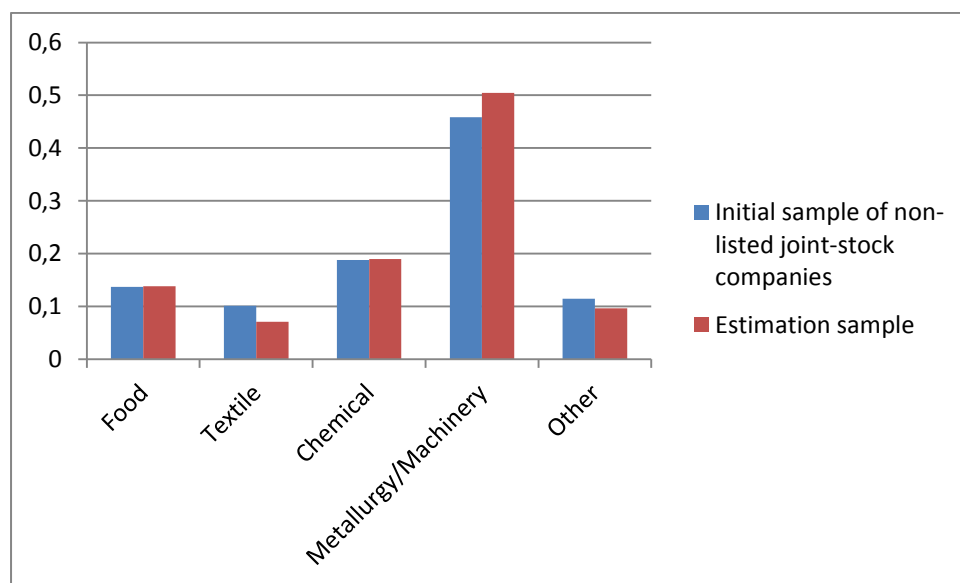
Figure 2
Size distribution in the initial sample of unlisted joint-stock companies and the estimation sample (in terms of the number of employees)
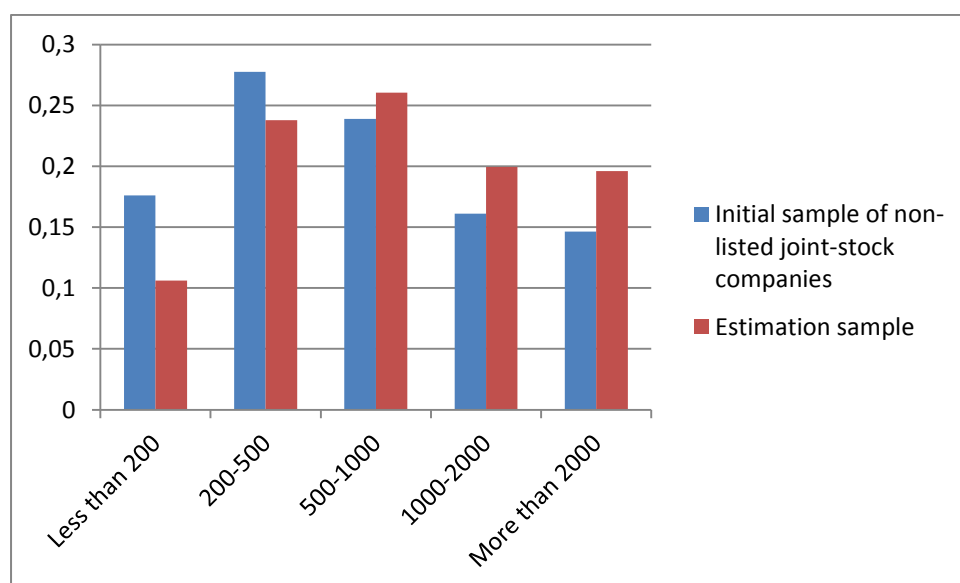
Figure 3
Distribution of the shareholder protection index (SPI)
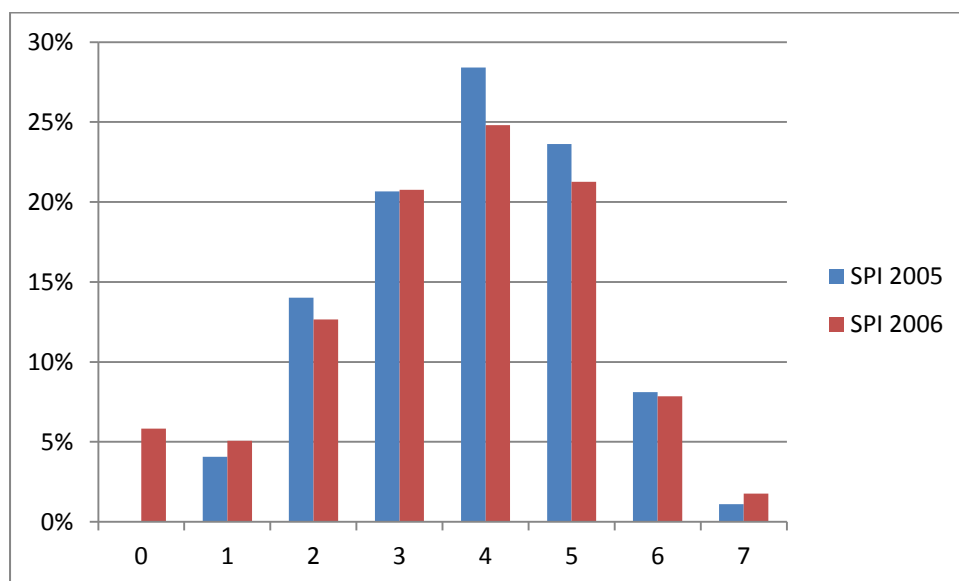
Note: Based on 271 observations for 2005 and 395 observations for 2006.

Figure 4
Distribution of the transparency and disclosure index (TDI)
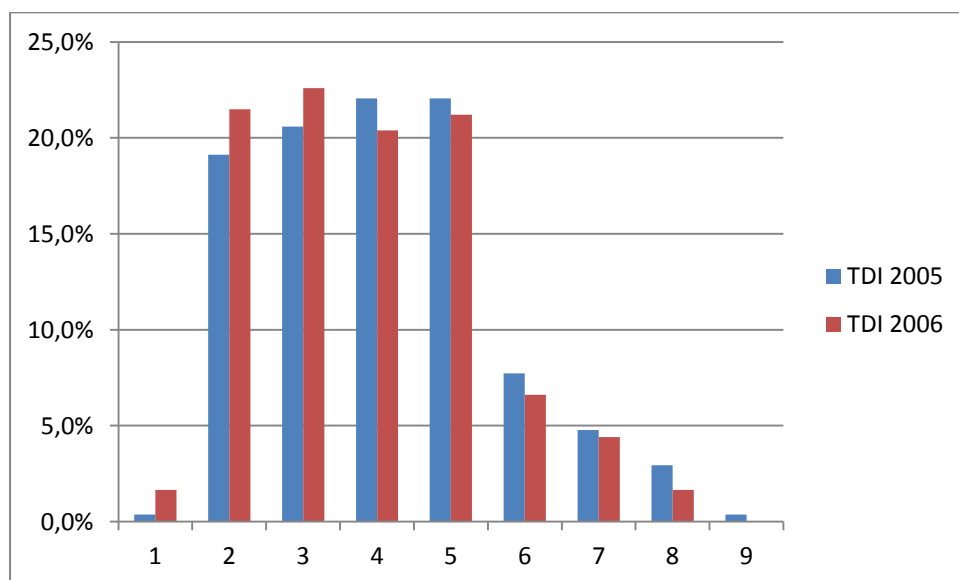
Note: Based on 272 observations for 2005 and 363 observations for 2006.

Figure 5
Distribution of difference in SPI between 2006 and 2005
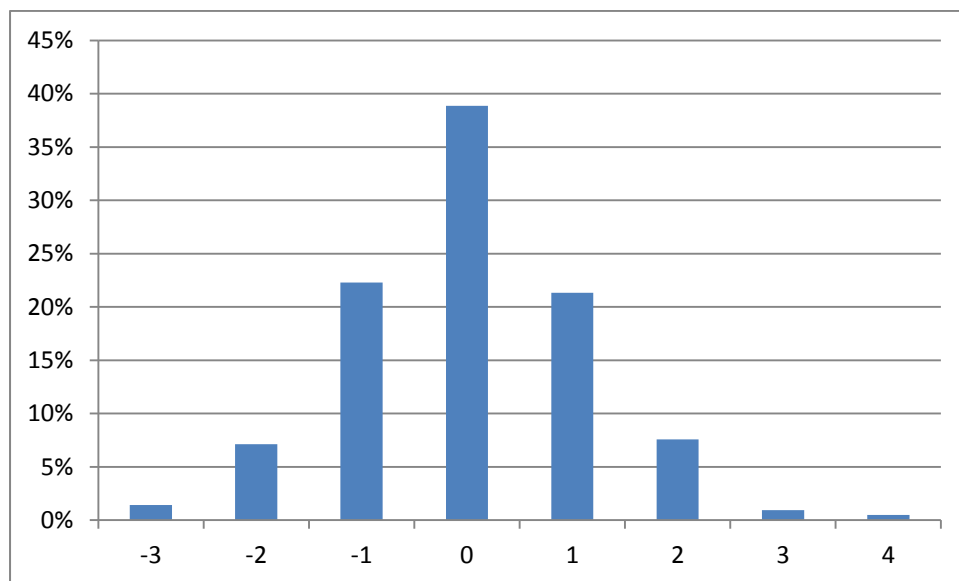
Note: Based on 211 observations, for which SPI is available in both years.

Figure 6
Distribution of difference in TDI between 2006 and 2005
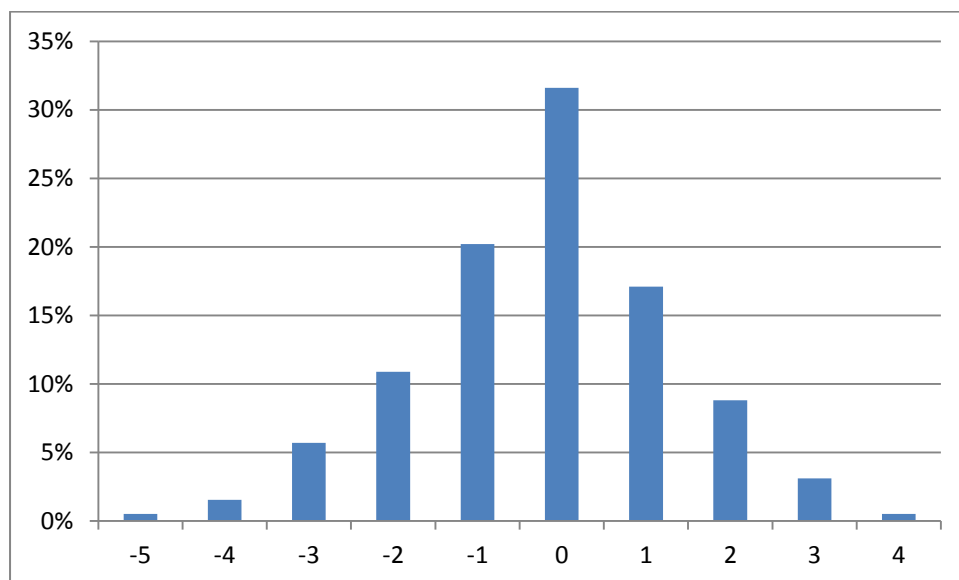
Note: Based on 193 observations, for which TDI is available in both years.

Table 1
Sample size

Number of firms in the survey that could be identified	936
of which open joint stock companies *	697
of which unlisted firms *	670
of which with non-missing data for at least one of the corporate governance indices (SPI or TDI) *	522
of which with non-missing ownership data *	493
of which with cash flow data *	311
of which with data for year	
2005	205
2006	260
2005 and 2006	154

* in 2005 or 2006

Table 2
Two indices of corporate governance: SPI and TDI

	2005			2006			Difference (2006–2005)		
	Mean	Std. dev.	*N*	Mean	Std. dev.	*N*	Mean	Std. dev.	*N*
SPI (SPI)	3.82	1.33	270	3.59	1.61	389	0.01	1.15	209
Transparency and Disclosure Index (TDI)	4.06	1.59	271	3.84	1.54	359	-0.22	1.55	188

Note: The maximum possible value for SPI is 7, for TDI 9. The difference is given for the set of companies, which participated in both survey rounds.

Table 3
Components of the two corporate governance indices

Panel A: SPI	2005		2006		Difference	
	%	N	%	N	%	N
Percent of firms that:						
have a shareholder (investor relations) department	40.9%	411	41.2%	488	3.6%	335
supply the agenda of a general shareholders meeting to all shareholders	88.3%	411	86.4%	487	-0.9%	335
commission an independent registrar to keep the shareholders' registry	82.2%	411	81.7%	487	2.4%	337
have independent directors on their board of directors	39.5%	413	41.3%	555	2.8%	399
have formal board committees (audit, remuneration, nomination)	5.9%	437	7.2%	556	2.4%	418
have more than 50 percent outside (non-executive) directors on their board	60.1%	401	54.6%	526	-1.1%	350
hold more than six board meetings per year	54.8%	299	44.3%	456	-5.7%	244

Panel B: TDI	2005		2006		Difference	
	%	N	%	N	%	N
Percent of firms that publicly disclose:						
annual reports	88.0%	333	87.8%	417	2.9%	241
annual financial statements	64.0%	333	63.8%	417	-4.6%	241
quarterly reports	52.0%	333	47.2%	417	-5.0%	241
list of related parties	57.1%	333	53.0%	417	-2.1%	241
list of all beneficial shareholders	12.0%	333	10.3%	417	0.0%	241
data on compensation of board members	14.4%	333	11.0%	417	-2.9%	241
data on compensation of the top management	9.9%	333	7.7%	417	-2.1%	241
Percent of firms that:						
get their annual report audited by an independent auditor	96.1%	463	94.0%	520	0.0%	384
use international accounting standards (US GAAP or IAS)	8.9%	405	8.2%	465	0.6%	317

Note: Differences between 2006 and 2005 are given for the subset of companies, which participated in both survey rounds.

Table 4
Ownership structure and association with a business group in 2006

	2005		2006		Difference	
	%	N	%	N	%	N
Share held by the largest outside private owner	38.1%	433	39.1%	498	3.1%	366
Fraction of firms where the largest outside private owner holds more than 50%	36.5%	433	39.6%	498	3.8%	366
Share held by top managers of firms	18.5%	426	20.3%	492	0.2%	356
Fraction of firms where top managers hold more than 50%	17.1%	426	19.1%	492	0.3%	356
Share of state ownership	9.5%	429	9.8%	507	-0.8%	371
Fraction of firms where the state holds more than 50%	6.5%	429	7.9%	507	-0.5%	371
Fraction of firms that are members of business groups	28.8%	434	29.3%	563	0.8%	399

Table 5
Number of shareholders

Number of shareholders	Percent of firms
1 to 49	16.3%
50 to 199	15.7%
200 to 499	17.9%
500 to 999	18.3%
1000 or more	31.8%
N	535

Note: N=535. The number of shareholders is given for the year 2006.

Table 6
Descriptive statistics for investment and financial variables

	Mean	Standard deviation	25th percentile	Median	75th percentile	Number of observations
Investment to assets	4.4	7.3	0.0	1.3	5.4	1014
Operating cash flow to assets	-0.2	18.3	-7.1	0.7	8.6	622
Sales (log)	12.4	1.8	11.,5	12.5	13.5	1049
Leverage	58.8	37.9	32.1	54.2	77.4	1052
Sales growth (deflated by CPI)	7.8	32.0	-9.0	4.7	19.6	1034
Loans to assets	49.7	60.2	0.1	28.9	74.5	619
Change in cash balance	0.9	3.8	-0.3	0.1	1.3	1027

Note: We report summary statistics for firm-year observations. All variables except sales are winsorized at 2% on each tail of the distribution.

Table 7
Baseline investment model: random effects panel regressions

The table displays results of random effects panel regressions with robust standard errors. The dependent variable is investment divided by total assets at the beginning of the year. Panel A includes the SPI; panel B includes the TDI. We run a first regression without corporate governance and ownership variables, specification (1), which is identical in the two panels. Specifications (2) to (4) of each panel include a dummy variable equal to one if the stake of the largest outside shareholder is greater than 50 percent, while specifications (5) to (7) include a dummy variable equal to one if the top managers of the company own more than 50 percent. Each model also contains a set of industry-year dummy variables, for which we do not report the coefficients.

Panel A: SPI

Dependent variable: Investment to assets	(1)		(2)		(3)		(4)	
Cash flow to assets (=CF)	0.060***	(2.61)	0.056**	(2.04)	0.249***	(2.60)	0.083	(0.93)
SPI			-0.226	(-0.71)	-0.214	(-0.73)	-0.451	(-1.53)
Largest outside stake > 50 (=Outblock50)			0.963	(1.23)	1.010	(1.22)	-0.535	(-0.19)
CF × SPI					-0.051**	(-2.02)	-0.007	(-0.34)
CF × Outblock50					0.018	(0.38)	0.369*	(1.78)
Outblock50 × SPI							0.364	(0.60)
CF × Outblock50 × SPI							-0.085*	(-1.91)
State > 50			-0.413	(-0.45)	-0.457	(-0.51)	-0.400	(-0.44)
Business group			-1.011	(-1.01)	-0.871	(-0.86)	-1.033	(-1.05)
Sales (log)	1.193***	(6.36)	1.142***	(4.10)	1.106***	(4.21)	1.226***	(4.75)
Leverage	-0.008	(-0.89)	-0.011	(-0.97)	-0.011	(-1.04)	-0.009	(-0.89)
Sales growth	0.017*	(1.85)	0.007	(0.74)	0.002	(0.18)	0.003	(0.34)
Constant	-11.433***	(-4.62)	-9.303***	(-2.93)	-8.871***	(-2.80)	-9.419***	(-3.16)
N	593		381		381		381	
Overall R^2 (%)	15.6		14.6		17.5		19.0	

	(5)		(6)		(7)	
Cash flow to assets (=CF)	0.053*	(1.91)	0.285***	(2.92)	0.314***	(3.13)
SPI	-0.270	(-0.82)	-0.247	(-0.83)	-0.344	(-1.03)
Managers' stake > 50 (=Mgt50)	-0.660	(-0.79)	-0.351	(-0.43)	-2.279	(-1.07)
CF × SPI			-0.054**	(-2.24)	-0.062**	(-2.47)
CF × Mgt50			-0.068	(-1.59)	-0.273*	(-1.67)
Mgt50 × SPI					0.576	(1.02)
CF × Mgt50 × SPI					0.061	(1.41)
State > 50	-0.744	(-0.79)	-0.761	(-0.82)	-0.734	(-0.78)
Business group	-0.799	(-0.81)	-0.519	(-0.52)	-0.559	(-0.57)
Sales (log)	1.238***	(4.32)	1.211***	(4.49)	1.230***	(4.57)
Leverage	-0.008	(-0.63)	-0.007	(-0.65)	-0.008	(-0.76)
Sales growth	0.006	(0.61)	0.001	(0.09)	0.002	(0.19)
Constant	-10.240***	(-3.09)	-10.062***	(-3.04)	-9.890***	(-2.87)
N	380		380		380	
Overall R^2 (%)	13.4		17.1		18.8	

Panel B: TDI

Dependent variable: Investment to assets	(1)		(2)		(3)		(4)	
Cash flow to assets (=CF)	0.060***	(2.61)	0.057**	(2.28)	-0.003	(-0.04)	0.117**	(2.00)
TDI			-0.112	(-0.52)	-0.085	(-0.40)	-0.049	(-0.23)
Largest outside stake > 50 (Outblock50)			0.584	(0.72)	0.445	(0.59)	0.578	(0.27)
CF × TDI					0.015	(1.02)	-0.016	(-1.56)
CF × Outblock50					0.001	(0.03)	-0.289***	(-2.59)
Outblock50 × TDI							-0.060	(-0.13)
CF × Outblock50 × TDI							0.074***	(2.84)
State > 50			-0.850	(-0.87)	-0.805	(-0.80)	-0.851	(-0.86)
Business group			-1.215	(-1.21)	-1.166	(-1.18)	-1.194	(-1.26)
Sales (log)	1.193***	(6.36)	1.433***	(4.87)	1.401***	(4.82)	1.377***	(4.87)
Leverage	-0.008	(-0.89)	-0.008	(-0.86)	-0.007	(-0.81)	-0.006	(-0.66)
Sales growth	0.017*	(1.85)	0.001	(0.14)	0.003	(0.27)	-0.001	(-0.12)
Constant	-11.433***	(-4.62)	-13.117***	(-3.81)	-12.792***	(-3.76)	-12.692***	(-3.79)
N	593		353		353		353	
Overall R^2 (%)	15.6		17.8		18.9		21.1	

	(5)		(6)		(7)	
Cash flow to assets (=CF)	0.057**	(2.26)	-0.011	(-0.17)	-0.050	(-0.66)
TDI	-0.197	(-0.90)	-0.167	(-0.74)	-0.158	(-0.60)
Managers' stake > 50 (Mgt50)	-0.514	(-0.54)	-0.513	(-0.55)	0.384	(0.12)
CF × TDI			0.018	(1.18)	0.027	(1.56)
CF × Mgt50			-0.008	(-0.15)	0.197	(1.19)
Mgt50 × TDI					-0.178	(-0.25)
CF × Mgt50 × TDI					-0.052	(-1.60)
State > 50	-1.260	(-1.27)	-1.154	(-1.15)	-1.109	(-1.09)
Business group	-1.315	(-1.39)	-1.324	(-1.42)	-1.299	(-1.40)
Sales (log)	1.530***	(5.12)	1.494***	(5.03)	1.463***	(5.08)
Leverage	-0.007	(-0.70)	-0.006	(-0.65)	-0.006	(-0.64)
Sales growth	0.001	(0.06)	0.002	(0.23)	0.003	(0.29)
Constant	-13.662***	(-3.91)	-13.317***	(-3.83)	-12.955***	(-3.81)
N	354		354		354	
Overall R^2 (%)	17.0		18.3		18.9	

z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8
Regressions for subsamples with and without perceived risk of hostile takeover

The table displays results of pooled OLS regressions with robust standard errors. The dependent variable is investment divided by total assets at the beginning of the year. Specifications (1) and (2) correspond to specifications (3) and (4) in Panel B of Table 7, respectively. Each specification is estimated for a sample of firms which report to be exposed to the risk of hostile takeover and for a sample of firms which is not. Each model also contains a set of industry-year dummy variables, for which we do not report the coefficients.

Dependent variable: Investment to assets	(1) Takeover risk = 1		(1) Takeover risk = 0		(2) Takeover risk = 1		(2) Takeover risk = 0	
Cash flow to assets (=CF)	-0.365***	(-2.81)	0.051	(0.58)	-0.393**	(-2.44)	0.174**	(2.02)
TDI	-0.035	(-0.06)	0.043	(0.13)	0.159	(0.21)	0.049	(0.15)
Largest outside stake > 50 (Outblock50)	0.470	(0.40)	0.939	(0.86)	3.009	(0.69)	0.738	(0.22)
CF × TDI	0.086***	(2.71)	0.019	(1.03)	0.092**	(2.30)	-0.011	(-0.71)
CF × Outblock50	0.039	(0.64)	-0.051	(-0.93)	0.136	(0.50)	-0.365**	(-2.49)
Outblock50 × TDI					-0.588	(-0.58)	0.029	(0.04)
CF × Outblock50 × TDI					-0.025	(-0.38)	0.078**	(2.19)
State > 50	0.775	(0.42)	-0.375	(-0.21)	0.978	(0.54)	-0.477	(-0.27)
Business group	-0.916	(-0.60)	-2.086	(-1.62)	-1.100	(-0.75)	-1.958	(-1.59)
Sales (log)	1.169***	(3.04)	1.950***	(4.86)	1.145***	(2.75)	1.901***	(5.04)
Leverage	-0.014	(-0.82)	-0.011	(-0.79)	-0.013	(-0.67)	-0.008	(-0.58)
Sales growth	-0.010	(-0.41)	0.019	(1.18)	-0.014	(-0.57)	0.012	(0.94)
Constant	-9.615**	(-2.08)	-19.562***	(-4.34)	-10.118**	(-2.12)	-19.024***	(-4.31)
N	63		212		63		212	
R^2 (%)	0.307		0.293		0.315		0.321	

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9
Fixed effects panel regressions

The table displays results of fixed effects panel regressions of the baseline investment model with robust standard errors. Panel A includes the SPI; panel B includes the TDI. Specifications (1) and (2) of each panel include a dummy variable equal to one if the stake of the largest outside shareholder is greater than 50 percent, while specifications (3) and (4) include a dummy variable equal to one if the top managers of the company own more than 50 percent. The four specifications correspond to specifications (3), (4), (6), and (7) in Table 7, respectively. Each model also contains a set of industry-year dummy variables, for which we do not report the coefficients.

Panel A: SPI								
Dependent variable: Investment to assets	(1)		(2)		(3)		(4)	
Cash flow to assets (=CF)	0.251***	(2.74)	0.072	(1.02)	0.285***	(2.68)	0.290**	(2.54)
SPI	-0.429	(-0.97)	-0.379	(-0.87)	-0.341	(-0.74)	-0.351	(-0.71)
Largest outside stake > 50 (=Outblock50)	-1.344	(-1.48)	-0.076	(-0.02)				
Managers' stake > 50 (=Mgt50)					0.067	(0.07)	-0.540	(-0.22)
CF × SPI	-0.064**	(-2.58)	-0.018	(-1.06)	-0.056**	(-2.43)	-0.058**	(-2.29)
CF × Outblock50	0.059	(1.04)	0.410	(1.59)				
CF × Mgt50					-0.076*	(-1.82)	-0.129	(-1.12)
Outblock50 × SPI			-0.216	(-0.21)				
Mgt50 × SPI							0.169	(0.31)
CF × Outblock50 × SPI			-0.083	(-1.62)				
CF × Mgt50 × SPI							0.016	(0.57)
State > 50	-0.840*	(-1.83)	-0.619	(-1.04)	-0.113	(-0.19)	-0.130	(-0.21)
Business group	-0.804	(-0.76)	-1.308	(-1.09)	-0.878	(-0.67)	-0.905	(-0.69)
Sales (log)	-0.032	(-0.02)	0.416	(0.37)	1.952	(0.87)	1.839	(0.82)
Leverage	-0.037	(-0.96)	-0.022	(-0.61)	-0.016	(-0.37)	-0.015	(-0.35)
Sales growth	-0.010	(-0.82)	-0.008	(-0.68)	-0.027	(-1.42)	-0.026	(-1.34)
Constant	8.302	(0.39)	1.772	(0.12)	-18.818	(-0.65)	-17.362	(-0.59)
N	381		381		380		380	
Overall R^2 (%)	2.8		6.1		13.0		13.4	

Panel B: TDI

Dependent variable: Investment to assets	(1)		(2)		(3)		(4)	
Cash flow to assets (=CF)	0.061	*(1.01)*	0.131**	*(2.26)*	0.082	*(1.21)*	0.072	*(0.86)*
TDI	-0.346	*(-1.00)*	-0.112	*(-0.42)*	-0.238	*(-0.67)*	-0.079	*(-0.20)*
Largest outside stake > 50 (=Outblock50)	-0.583	*(-0.43)*	1.284	*(0.40)*				
Managers' stake > 50 (=Mgt50)					-2.856*	*(-1.81)*	2.665	*(0.51)*
CF × TDI	-0.009	*(-0.78)*	-0.029***	*(-2.81)*	-0.007	*(-0.62)*	-0.004	*(-0.24)*
CF × Outblock50	-0.013	*(-0.27)*	-0.208*	*(-1.70)*				
CF × Mgt50					-0.050	*(-1.10)*	0.038	*(0.23)*
Outblock50 × TDI			-0.474	*(-0.70)*				
Mgt50 × TDI							-1.110	*(-1.01)*
CF × Outblock50 × TDI			0.058**	*(2.20)*				
CF × Mgt50 × TDI							-0.020	*(-0.63)*
State > 50	-0.110	*(-0.24)*	0.119	*(0.28)*	0.209	*(0.42)*	0.281	*(0.47)*
Business group	-0.317	*(-0.20)*	0.477	*(0.24)*	-0.928	*(-1.09)*	-0.906	*(-1.05)*
Sales (log)	3.928	*(1.44)*	3.684	*(1.52)*	6.967**	*(2.23)*	6.757**	*(2.06)*
Leverage	0.052	*(0.95)*	0.046	*(1.01)*	0.055	*(0.97)*	0.054	*(0.91)*
Sales growth	-0.037*	*(-1.80)*	-0.038*	*(-1.94)*	-0.054**	*(-2.17)*	-0.056**	*(-2.11)*
Constant	-47.000	*(-1.28)*	-44.778	*(-1.39)*	-85.718**	*(-2.05)*	-83.826*	*(-1.91)*
N	353		353		354		354	
Overall R^2 (%)	8.5		10.2		9.9		10.1	

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10
Tobit model

The table displays results of a panel Tobit model with random effects for the baseline investment model (without robust standard errors). The structure of the table follows the one of Table 9.

Panel A: SPI								
Dependent variable: Investment to assets	(1)		(2)		(3)		(4)	
Cash flow to assets (=CF)	0.318***	(5.14)	0.129	(1.51)	0.330***	(5.15)	0.347***	(5.26)
SPI	-0.245	(-0.71)	-0.484	(-1.12)	-0.325	(-0.92)	-0.441	(-1.17)
Largest outside stake > 50 (=Outblock50)	1.326	(1.30)	0.225	(0.08)				
Managers' stake > 50 (=Mgt50)					-1.098	(-0.85)	-3.650	(-1.12)
CF × SPI	-0.060***	(-4.24)	-0.013	(-0.60)	-0.063***	(-4.46)	-0.068***	(-4.65)
CF × Outblock50	-0.011	(-0.26)	0.354***	(2.80)				
CF × Mgt50					-0.047	(-0.95)	-0.231	(-1.58)
Outblock50 × SPI			0.237	(0.36)				
Mgt50 × SPI							0.785	(0.93)
CF × Outblock50 × SPI			-0.086***	(-3.03)				
CF × Mgt50 × SPI							0.053	(1.39)
State > 50	-0.351	(-0.18)	-0.264	(-0.14)	-0.846	(-0.44)	-0.807	(-0.42)
Business group	-0.708	(-0.58)	-0.847	(-0.70)	-0.341	(-0.29)	-0.348	(-0.29)
Sales (log)	1.965***	(5.38)	2.089***	(5.70)	2.110***	(5.66)	2.117***	(5.74)
Leverage	-0.020	(-1.18)	-0.018	(-1.05)	-0.017	(-0.96)	-0.019	(-1.09)
Sales growth	-0.003	(-0.25)	-0.002	(-0.15)	-0.006	(-0.45)	-0.006	(-0.43)
Constant	-21.095***	(-4.46)	-21.733***	(-4.52)	-22.467***	(-4.62)	-22.029***	(-4.56)
sigma_u	7.011***	(13.57)	7.072***	(14.02)	7.112***	(13.74)	7.002***	(13.46)
sigma_e	4.131***	(12.24)	3.946***	(12.26)	4.229***	(12.58)	4.254***	(12.48)
N	381		381		380		380	
Akaike IC	2083.3		2078.4		2085.8		2086.7	

Panel B: TDI

Dependent variable: Investment to assets	(1)		(2)		(3)		(4)	
Cash flow to assets (=CF)	0.012	*(0.20)*	0.144**	*(2.06)*	-0.013	*(-0.23)*	-0.052	*(-0.88)*
TDI	-0.053	*(-0.21)*	-0.031	*(-0.10)*	-0.150	*(-0.58)*	-0.188	*(-0.68)*
Largest outside stake > 50 (=Outblock50)	0.708	*(0.76)*	0.401	*(0.18)*				
Managers' stake > 50 (=Mgt50)					-1.034	*(-0.84)*	-1.309	*(-0.42)*
CF × TDI	0.015	*(1.18)*	-0.020	*(-1.27)*	0.019	*(1.54)*	0.029**	*(2.09)*
CF × Outblock50	-0.011	*(-0.26)*	-0.305***	*(-3.04)*				
CF × Mgt50					0.006	*(0.12)*	0.214	*(1.56)*
Outblock50 × TDI			0.039	*(0.08)*				
Mgt50 × TDI							0.100	*(0.15)*
CF × Outblock50 × TDI			0.076***	*(3.24)*				
CF × Mgt50 × TDI							-0.052	*(-1.63)*
State > 50	-1.123	*(-0.57)*	-1.190	*(-0.62)*	-1.656	*(-0.82)*	-1.620	*(-0.81)*
Business group	-1.192	*(-1.07)*	-1.222	*(-1.11)*	-1.304	*(-1.19)*	-1.262	*(-1.16)*
Sales (log)	2.366***	*(6.77)*	2.305***	*(6.65)*	2.494***	*(7.02)*	2.457***	*(6.94)*
Leverage	-0.025	*(-1.46)*	-0.024	*(-1.44)*	-0.025	*(-1.43)*	-0.025	*(-1.43)*
Sales growth	0.003	*(0.21)*	-0.001	*(-0.05)*	0.001	*(0.08)*	0.001	*(0.08)*
Constant	-25.719***	*(-5.63)*	-25.009***	*(-5.53)*	-26.479***	*(-5.62)*	-25.863***	*(-5.49)*
sigma_u	5.717***	*(11.07)*	5.718***	*(11.53)*	5.891***	*(11.33)*	5.874***	*(11.24)*
sigma_e	4.336***	*(11.79)*	4.178***	*(11.88)*	4.473***	*(12.03)*	4.435***	*(11.84)*
N	353		353		354		354	
Akaike IC	1933.5		1927.3		1956.7		1958.0	

z statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11

Baseline investment model, random effects panel regressions with the first principal component of each of the two corporate governance indices

The table displays results of the basic investment model with random effects with governance indices given by their first principal component instead of the simple sum of the individual components. The structure of the table follows the one of Table 9.

Panel A: SPI, first principal component (SPI_PC1)								
Dependent variable: Investment to assets	(1)		(2)		(3)		(4)	
Cash flow to assets (=CF)	0.083***	(2.97)	0.060**	(2.01)	0.094***	(3.61)	0.096***	(3.71)
SPI_PC1	-0.237	(-0.72)	-0.595*	(-1.87)	-0.264	(-0.81)	-0.292	(-0.81)
Largest outside stake > 50 (=Outblock50)	1.053	(1.27)	0.524	(0.57)				
Managers' stake > 50 (=Mgt50)					-0.322	(-0.40)	-0.313	(-0.37)
CF × SPI_PC1	-0.060**	(-2.29)	-0.021	(-0.99)	-0.063**	(-2.45)	-0.071**	(-2.54)
CF × Outblock50	0.003	(0.06)	0.059	(0.91)				
CF × Mgt50					-0.044	(-1.03)	-0.056	(-1.19)
Outblock50 × SPI_PC1			0.633	(1.03)				
Mgt50 × SPI_PC1							0.296	(0.54)
CF × Outblock50 × SPI_PC1			-0.076	(-1.54)				
CF × Mgt50 × SPI_PC1							0.053	(1.46)
State > 50	-0.401	(-0.44)	-0.531	(-0.58)	-0.705	(-0.76)	-0.681	(-0.72)
Business group	-0.917	(-0.92)	-0.973	(-0.99)	-0.576	(-0.59)	-0.632	(-0.65)
Sales (log)	1.123***	(4.23)	1.230***	(4.62)	1.227***	(4.49)	1.241***	(4.57)
Leverage	-0.013	(-1.19)	-0.012	(-1.12)	-0.009	(-0.78)	-0.009	(-0.83)
Sales growth	0.000	(0.04)	0.001	(0.15)	-0.001	(-0.11)	-0.000	(-0.02)
Constant	-9.857***	(-3.01)	-10.905***	(-3.32)	-11.183***	(-3.29)	-11.361***	(-3.36)
N	381		381		380		380	
Overall R^2 (%)	18.0		19.3		17.2		18.3	

Panel B: TDI, first principal component (TDI_PC1)

Dependent variable: Investment to assets	(1)		(2)		(3)		(4)	
Cash flow to assets (=CF)	0.056[*]	*(1.88)*	0.059[**]	*(2.05)*	0.059[**]	*(2.11)*	0.056[**]	*(2.06)*
TDI_PC1	-0.055	*(-0.26)*	-0.070	*(-0.32)*	-0.131	*(-0.61)*	-0.136	*(-0.53)*
Largest outside stake > 50 (=Outblock50)	0.478	*(0.63)*	0.347	*(0.47)*				
Managers' stake > 50 (=Mgt50)					-0.499	*(-0.54)*	-0.452	*(-0.47)*
CF × TDI_PC1	0.011	*(0.69)*	-0.014	*(-1.38)*	0.013	*(0.81)*	0.023	*(1.22)*
CF × Outblock50	0.001	*(0.02)*	-0.001	*(-0.02)*				
CF × Mgt50					-0.012	*(-0.21)*	-0.002	*(-0.03)*
Outblock50 × TDI_PC1			-0.137	*(-0.31)*				
Mgt50 × TDI_PC1							-0.049	*(-0.07)*
CF × Outblock50 × TDI_PC1			0.080[**]	*(2.34)*				
CF × Mgt50 × TDI_PC1							-0.046	*(-1.48)*
State > 50	-0.859	*(-0.86)*	-0.821	*(-0.84)*	-1.242	*(-1.24)*	-1.221	*(-1.20)*
Business group	-1.197	*(-1.20)*	-1.172	*(-1.24)*	-1.352	*(-1.43)*	-1.331	*(-1.42)*
Sales (log)	1.411[***]	*(4.82)*	1.358[***]	*(4.75)*	1.507[***]	*(5.02)*	1.481[***]	*(5.06)*
Leverage	-0.007	*(-0.78)*	-0.005	*(-0.51)*	-0.006	*(-0.61)*	-0.006	*(-0.56)*
Sales growth	0.003	*(0.24)*	-0.001	*(-0.13)*	0.002	*(0.21)*	0.004	*(0.32)*
Constant	-13.299[***]	*(-3.76)*	-12.708[***]	*(-3.67)*	-14.186[***]	*(-3.86)*	-13.880[***]	*(-3.89)*
N	353		353		354		354	
Overall R^2 (%)	18.6		20.6		17.9		18.9	

z statistics in parentheses
[*] $p < 0.10$, [**] $p < 0.05$, [***] $p < 0.01$

Table 12

Baseline investment model, random effects panel regressions with the ownership variables given by the stakes of the largest outside owner and top managers, respectively

The table displays results of the basic investment model with random effects with the ownership variables given by the actual stakes of the largest outside owner and top managers, respectively, instead of dummy variables equal to one if those stakes exceed 50 percent. The structure of the table follows the one of Table 9.

Panel A: SPI

Dependent variable: Investment to assets	(1)		(2)		(3)		(4)	
Cash flow to assets (=CF)	0.226**	(2.41)	-0.011	(-0.13)	0.303***	(2.99)	0.347***	(3.14)
SPI	-0.218	(-0.75)	-0.165	(-0.48)	-0.278	(-0.93)	-0.419	(-1.12)
Largest outside stake (=Out_Stake)	2.346*	(1.76)	4.102	(1.03)				
Managers' stake (=Mgt_Stake)					-1.575	(-1.09)	-4.007	(-1.25)
CF × SPI	-0.054**	(-2.23)	0.007	(0.34)	-0.056**	(-2.33)	-0.068**	(-2.54)
CF × Out_Stake	0.101	(1.50)	0.591**	(2.35)				
CF × Mgt_Stake					-0.127**	(-2.14)	-0.448**	(-2.20)
Out_Stake × SPI			-0.431	(-0.46)				
Mgt_Stake × SPI							0.659	(0.78)
CF × Out_Stake × SPI			-0.121**	(-2.23)				
CF × Mgt_Stake × SPI							0.094*	(1.73)
State > 50	-2.325	(-1.55)	-2.103	(-1.37)	-3.479**	(-2.09)	-3.478**	(-2.08)
Business group	-1.072	(-1.11)	-1.223	(-1.27)	-0.704	(-0.71)	-0.762	(-0.77)
Sales (log)	1.025***	(3.97)	1.130***	(4.57)	1.171***	(4.40)	1.191***	(4.43)
Leverage	-0.012	(-1.05)	-0.011	(-1.01)	-0.008	(-0.71)	-0.008	(-0.71)
Sales growth	0.002	(0.20)	0.004	(0.47)	0.001	(0.07)	0.001	(0.13)
Constant	-7.916**	(-2.52)	-9.407***	(-3.05)	-8.628***	(-2.58)	-8.278**	(-2.35)
N	381		381		380		380	
Overall R^2 (%)	18.7		21.2		18.1		18.9	

Panel B: TDI

Dependent variable: Investment to assets	(1)		(2)		(3)		(4)	
Cash flow to assets (=CF)	-0.043	(-0.63)	0.108[*]	(1.74)	0.002	(0.03)	-0.044	(-0.55)
TDI	-0.131	(-0.63)	0.054	(0.18)	-0.197	(-0.88)	-0.244	(-0.83)
Largest outside stake (=Out_Stake)	2.364	(1.64)	4.245	(1.07)				
Managers' stake (=Mgt_Stake)					-2.225	(-1.59)	-2.605	(-0.67)
CF × TDI	0.013	(0.99)	-0.022[*]	(-1.75)	0.016	(1.08)	0.028	(1.53)
CF × Out_Stake	0.108[*]	(1.89)	-0.266	(-1.54)				
CF × Mgt_Stake					-0.055	(-0.93)	0.241	(1.19)
Out_Stake × TDI			-0.524	(-0.63)				
Mgt_Stake × TDI							0.224	(0.23)
CF × Out_Stake × TDI			0.088[**]	(2.16)				
CF × Mgt_Stake × TDI							-0.078[*]	(-1.71)
State > 50	-1.823	(-1.05)	-2.306	(-1.36)	-3.592[**]	(-2.10)	-3.512[**]	(-2.03)
Business group	-1.682	(-1.61)	-1.489	(-1.51)	-1.594[*]	(-1.65)	-1.526	(-1.58)
Sales (log)	1.390[***]	(4.91)	1.364[***]	(4.84)	1.483[***]	(5.06)	1.475[***]	(5.10)
Leverage	-0.008	(-0.92)	-0.008	(-0.86)	-0.008	(-0.82)	-0.007	(-0.70)
Sales growth	0.002	(0.25)	-0.002	(-0.19)	0.002	(0.18)	0.001	(0.09)
Constant	-12.737[***]	(-3.81)	-13.042[***]	(-3.61)	-12.208[***]	(-3.60)	-12.015[***]	(-3.51)
N	353		353		354		354	
Overall R^2 (%)	19.9		21.6		18.9		19.6	

t statistics in parentheses
[*] $p < 0.10$, [**] $p < 0.05$, [***] $p < 0.01$

Table 13
Instrumental variable regression, first stage

The table displays results of panel regressions with random effects of the two corporate governance indices on the variables on four dummy variables for the number of shareholders (the omitted group are firms with 1000 or more shareholders), ownership variables, and control variables. These estimations are part of the first-stage regressions using instrumental variables of the baseline investment model. (Results for the cross terms involving the corporate governance indices, ownership, and cash flows are not displayed.) The dependent variable in specifications (1) and (2) is the SPI. The dependent variable in specifications (3) and (4) is the TDI. Each model also contains a set of industry-year dummy variables, for which we do not report the coefficients. The results of Chi2 tests for joint significance of the four dummy variables for the number of shareholders are reported in the last two lines of the table (test statistic and the corresponding p-value).

	(1) SPI		(2) SPI		(3) TDI		(4) TDI	
1 to 49 shareholders	-1.190***	(-5.07)	-1.199***	(-5.11)	-0.393	(-1.17)	-0.437	(-1.28)
50 to 199 shareholders	-0.254	(-1.11)	-0.206	(-0.89)	-0.192	(-0.76)	-0.308	(-1.21)
200 to 499 shareholders	-0.550***	(-2.90)	-0.457**	(-2.38)	-0.382*	(-1.81)	-0.399*	(-1.77)
500 to 999 shareholders	-0.208	(-1.14)	-0.215	(-1.18)	-0.128	(-0.52)	-0.231	(-0.93)
Largest outside stake > 50	-0.095	(-0.68)			-0.037	(-0.21)		
Managers' stake > 50			-0.187	(-1.11)			0.294	(1.39)
State > 50	-0.050	(-0.22)	-0.034	(-0.15)	-0.331	(-1.33)	-0.261	(-1.07)
Business group	0.440***	(2.72)	0.415***	(2.65)	0.406**	(2.09)	0.472**	(2.45)
Sales (log)	0.119***	(2.69)	0.116***	(2.64)	0.022	(0.39)	0.004	(0.06)
Leverage	-0.004*	(-1.82)	-0.003*	(-1.73)	-0.006**	(-2.45)	-0.006**	(-2.31)
Sales growth	0.002	(1.17)	0.002	(0.96)	0.001	(0.44)	0.002	(0.62)
Constant	3.084***	(5.04)	3.098***	(5.04)	4.523***	(6.01)	4.671***	(6.11)
N	530		526		480		476	
Overall R^2 (%)	18.1		19.6		7.3		7.1	
Chi2 test for joint significance	29.27	(0.00)	28.75	(0.00)	3.63	(45.85)	3.59	(46.46)

t statistics in parentheses, except for the Chi2 tests where number in parenthesis indicate p-values (in %)
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 14
Instrumental variable regression, second stage

The table displays results of instrumental variable panel regressions with random effects with four dummy variables for the number of shareholders as instruments for the two corporate governance indices. (In addition, the interaction of the four dummy variables for the number of shareholders with cash flows and ownership serve as instruments for the interactions of the corporate governance indices with cash flows and ownership.)

Panel A: SPI								
Dependent variable: Investment to assets	(1)		(2)		(3)		(4)	
Cash flow to assets (=CF)	0.366	*(1.21)*	0.046	*(0.27)*	0.656	*(1.64)*	0.288***	*(2.77)*
SPI	-3.215*	*(-1.69)*	-1.728	*(-1.44)*	-4.045*	*(-1.78)*	-0.139	*(-0.12)*
Largest outside stake > 50 (=Outblock50)	1.384	*(1.43)*	-8.454	*(-0.95)*				
Managers' stake > 50 (=Mgt50)					-1.597	*(-1.05)*	12.257	*(0.88)*
CF × SPI	-0.078	*(-0.94)*	0.004	*(0.10)*	-0.144	*(-1.50)*	-0.053**	*(-2.18)*
CF × Outblock50	0.014	*(0.18)*	0.200	*(0.87)*				
CF × Mgt50					-0.096	*(-1.11)*	-0.185	*(-0.64)*
Outblock50 × SPI			2.293	*(1.05)*				
Mgt50 × SPI							-3.547	*(-0.90)*
CF × Outblock50 × SPI			-0.050	*(-0.88)*				
CF × Mgt50 × SPI							0.035	*(0.41)*
State > 50	0.313	*(0.18)*	-0.211	*(-0.14)*	-0.258	*(-0.14)*	-0.711	*(-0.46)*
Business group	0.623	*(0.42)*	-0.857	*(-0.71)*	1.712	*(0.97)*	-0.303	*(-0.27)*
Sales (log)	1.551***	*(3.78)*	1.310***	*(3.82)*	1.730***	*(3.68)*	1.170***	*(3.49)*
Leverage	-0.017	*(-1.13)*	-0.010	*(-0.69)*	-0.013	*(-0.81)*	-0.011	*(-0.78)*
Sales growth	0.009	*(0.59)*	0.005	*(0.45)*	0.004	*(0.25)*	0.009	*(0.76)*
Constant	-1.825	*(-0.30)*	-5.123	*(-0.98)*	-0.204	*(-0.03)*	-9.714**	*(-2.09)*
N	376		376		375		373	
Overall R^2 (%)	8.9		16.1		8.3		12.2	
Durbin-Wu-Hausman exogeneity tests Score Chi^2 Regression F								

Panel B: TDI

Dependent variable: Investment to assets	(1)		(2)		(3)		(4)	
Cash flow to assets (=CF)	0.173	*(0.99)*	0.252	*(1.22)*	0.125	*(0.61)*	-0.212	*(-1.58)*
TDI	0.275	*(0.13)*	-2.343	*(-0.98)*	-1.578	*(-0.60)*	-1.293	*(-1.01)*
Largest outside stake > 50 (=Outblock50)	0.806	*(0.92)*	0.295	*(0.02)*				
Managers' stake > 50 (=Mgt50)					0.152	*(0.14)*	-10.342	*(-1.05)*
CF × TDI	-0.024	*(-0.58)*	-0.060	*(-1.11)*	-0.016	*(-0.32)*	0.066[**]	*(2.02)*
CF × Outblock50	-0.019	*(-0.40)*	-0.858[***]	*(-2.99)*				
CF × Mgt50					0.015	*(0.31)*	0.236	*(0.69)*
Outblock50 × TDI			-0.142	*(-0.04)*				
Mgt50 × TDI							2.502	*(1.06)*
CF × Outblock50 × TDI			0.232[***]	*(3.13)*				
CF × Mgt50 × TDI							-0.058	*(-0.69)*
State > 50	-0.826	*(-0.48)*	-1.642	*(-0.79)*	-1.578	*(-0.84)*	-1.142	*(-0.66)*
Business group	-1.395	*(-1.22)*	-0.477	*(-0.36)*	-0.624	*(-0.43)*	-0.456	*(-0.42)*
Sales (log)	1.430[***]	*(4.89)*	1.387[***]	*(3.15)*	1.536[***]	*(5.19)*	1.294[***]	*(4.34)*
Leverage	-0.007	*(-0.40)*	-0.018	*(-0.77)*	-0.016	*(-0.73)*	-0.009	*(-0.54)*
Sales growth	0.005	*(0.38)*	-0.005	*(-0.29)*	0.010	*(0.78)*	0.012	*(0.94)*
Constant	-14.960	*(-1.57)*	-1.741	*(-0.18)*	-7.384	*(-0.59)*	-5.993	*(-0.89)*
N	346		346		347		344	
Overall R^2 (%)	15.0		9.0		10.7		14.4	
Durbin-Wu-Hausman exogeneity tests Score Chi^2 Regression F								

t statistics in parentheses, except for the Durbin-Wu-Hausman test where the number in parentheses are p-values (in %).

[*] $p < 0.10$, [**] $p < 0.05$, [***] $p < 0.01$

B   Data appendix

B.1   Data sources and checks

The main source of information are two rounds of the survey of Russian industrial enterprises in 2005 and 2006 described in the text. Accounting data is obtained from the Bureau van Dijk Ruslana database based on data of the Federal State Statistics Service of Russia (Rosstat). An additional source of accounting and other information are two databases for financial disclosure of Russian companies: SKRIN (System of Complex Information Disclosure) and SPARK (Professional Market and Company Analysis System, maintained by the Russian news agency Interfax). Apart from financial statements, they contain quarterly reports of companies to the Federal Service of the Security Markets (FSSM), the Russian financial markets regulator at the time, and annual reports to shareholders.

The vast majority of companies that participated in the survey can be identified and matched to data from the public data sources mentioned, based on their OKPO identifier (National Classifier of Enterprises and Organizations). In some cases, the surveying institution did not update these identifiers if companies went through restructuring. We then search for companies with similar names, with the same address and phone number, industry, legal form, and number of employees that have been registered before 2005 in the SPARK database. If we find a company that clearly coincides on these dimensions with the survey data we assign its identifier to the sample firm.

Some missing accounting data is added from financial reports stored in SKRIN and SPARK. In particular, not all items of the cash flow statement are available in Ruslana since they did not have to be reported to Rosstat at that time. In order to compute our cash flow measures we code this data manually from companies' financial reports available in SKRIN or in the quarterly reports. We check that operating, investment and financial cash flows equal the sum of their elements and that cash holdings at the beginning of the year plus the three cash flow components yield cash holdings at the end of the year.

Quarterly reports and information directly provided in SPARK and SKRIN are used to complement the survey information on ownership and some items of our corporate governance index. In particular, ownership stakes of managers, the largest outside owner, the government and minority owners are imputed from this source if they are missing. We also check the available survey data if the sum of ownership shares exceeded 100. Data on some of the components of the SPI and the TDI is imputed if no more than two items were missing in the data to construct each of the two indices. These components include the proportion of external members of the board of directors, the number of meetings of the board in a given year, independence of the registrar and auditor (by comparing the list of their owners and of affiliated firms with owners, managers and board members of the sample firm) and the existence of formal board committees. Index components that required some judgment of the respondent are not imputed (for example, the independence of directors).

Data on the listing status, legal form and the number of shareholders of firms is verified and added where missing, using information in SPARK and quarterly reports. Since the listing status was an important variable in order to exclude listed firms, particular attention was needed. What we mean by "listed" is listing and trading at a stock exchange. Several respondents answered that their companies are listed when they had only a listing with the RTS Board, a platform for over-the-counter trade of shares with mostly infrequent trading. We qualified these companies as unlisted. Legal form was important since we only included open joint-stock companies in order to have a homogenous sample in terms of legal requirements for shareholder protection and disclosure.

B.2 Variable definitions

Investment is the ratio of capital expenditure divided by total assets at the beginning of the year. Outliers are trimmed by winsorizing at 2% on each tail of the distribution.

Cash flows are computed by the direct method. The simpler indirect method cannot be applied since depreciation and amortization are not consistently reported under Russian accounting standards. Our main variable, consistent with most of the literature, is *operating cash flows*. According to the direct method, it is the sum of cash revenues from sales, other cash revenues, minus cash expenses for purchased goods and services, cash paid to employees, dividends and interest payments, taxes duties, and other cash expenses. We employ three alternate measures of internally generated funds, namely operating cash flows plus investment revenues (operating cash flows plus proceeds from the sale of fixed assets and other non-current assets, securities, and other financial investments, received dividends and interest and proceeds from repayment of loans to other organizations), operating cash flows plus cash holdings at the beginning of the year, and operating cash flows plus cash holdings at the beginning of the year plus investment revenues. All four variables are normalized by total assets at the beginning of the year.

Sales is sales revenues in thousands of roubles. We use the natural logarithm of sales in the regressions.

Leverage equals long-term and short-term loans and credit divided by total assets. Winsorized at 2% on each tail of the distribution.

Sales growth is the growth rate of sales revenues deflated by CPI. Winsorized at 2% on each tail of the distribution.

Industry: We control for five large industries, based on the first two digits of the Russian industry classification (OKVED), namely food industry (15–16), light industry (17–19), chemical industry (23–26), metallurgy, manufacture of machinery, equipment and vehicles (27–35), and other industries including agriculture, mining, wood, paper, other production, and utilities.

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