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ABSTRACT

There is increasing evidence that broad measures of firm-level corporate governance predict higher share prices. However, almost all prior work relies on cross-sectional data. This work leaves open the possibility that endogeneity or omitted firm-level variables explain the observed correlations. We address the second possibility by offering time-series evidence from Russia for 1999-present, exploiting a number of available governance indices. We find an economically important and statistically strong correlation between governance and market value in OLS with firm clusters and in firm random effects and firm fixed effects regressions. We also find significant differences in the predictive power of different indices, and in the components of these indices. How one measures governance matters.

Key words: Russia, corporate governance, corporate governance index, law and finance, firm valuation, disclosure, emerging markets

JEL classification: G32, G34

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1. Introduction

There is evidence that broad measures of firm-level corporate governance predict higher share prices in emerging markets. This evidence comes from both single-country studies (Black, 2001 on Russia; Black, Jang and Kim, 2006 on Korea; Gompers, Ishii and Metrick, 2003 on the U.S.) and multicountry studies (Durnev and Kim, 2005; Klapper and Love, 2004). However, most prior work relies on cross-sectional data. This leaves open the possibility that endogeneity or bias due to omitted firm-level variables explain the observed correlations. Here, we address the omitted variable bias issue by offering time-series evidence from Russia for 1999-2004. We find an economically important and statistically strong correlation between governance and market value in OLS with firm clusters and in firm random effects and firm fixed effects regressions. This work strengthens the case for a causal association between governance and firm market value, by ruling out some (though not all) of the non-causal explanations for this association.

Russia is an especially suitable laboratory for studying the effect of firm-level governance on firm value. It combines a fair sized capital market, including many large, formerly state-owned enterprises that were privatized during the 1990s, with notably bad governance at both firm and country levels. Russian governance has improved substantially since 1999 (the beginning of our sample period). Many leading Russian companies now seek external finance in international financial markets, prompting them to improve their corporate governance. Likely not coincidentally, Russian share prices have soared during this same period. While Russia's real GDP grew at about 5% during this period, Russia's stock market delivered average annual price increases of around 50%.

Yet most Russian companies remain undervalued relative to their western competitors. For example, Gazprom, the world's largest oil and gas company based on reserves, had a market capitalization in October 2005 of only about \$1 per barrel of proven reserves, compared to \$18 for major Western oil companies such as Exxon Mobil and Royal Dutch Shell (Economist, 2005). Part of this discount reflects domestic Russian energy price controls; part reflects political risk (as Russia's de facto expropriation of Yukos reminds us); but much reflects firm-level governance. In particular, within Russian oil and gas

companies, Black (2001) finds a strong cross-sectional correlation in 1999 between governance and the market value of oil and gas companies per barrel of reserves.

The improvements in Russian governance since 1999 create a natural experiment that lets us test the relationship between corporate governance and market value using a sample with significant variation both between companies and over time. In effect, our research exploits the out-of-equilibrium nature of Russian corporate governance, due to Russia's continuing transition to a market economy and its recovery from a 1998 financial crisis.

Russia also provides us with time-series data on governance not available elsewhere. The importance of governance to Russian investors has spawned a number of efforts to measure the governance of Russian firms. The Brunswick Warburg investment bank has rated governance since 1999; the Troika Dialog investment bank has done so since 2000, and Standard and Poor's has published disclosure ratings since 2002 and, for a limited number of firms, overall corporate governance ratings since 2001. Two nonprofit organizations also rate firm governance: the Institute for Corporate Law and Governance (ICLG) since 2001 and the Russian Institute of Directors (RID) since 2004. Our study exploits these measures. We present results for each measure and for an overall measure that aggregates information from each.

The availability of a number of different indices, covering similar firms over a similar time period, lets us assess the predictive power of different approaches to measuring governance. How one measures governance matters. We find significant results for our overall measure, but also differences in the predictive power of different indices. The Brunswick Warburg, Troika Dialog, and ICLG measures are strong in all specifications. In contrast, the Standard and Poor's measures are significant in OLS but insignificant with firm fixed effects. The RID measure is insignificant in all specifications. At the subindex level, the strength of the overall indices comes primarily from a subset, sometimes a small subset, of the governance components included in the overall index. For example, transfer pricing is important, and there is moderate evidence that financial disclosure is important. But once we control for financial disclosure, other types of disclosure are not important.

Our results are economically as well as statistically strong. For our overall governance

measure, we estimate that, with firm fixed effects, a two standard deviation change in governance predicts a 0.12 increase. A worst-to-best change in governance predicts a 0.40 change in $\ln(\text{Tobin's } q)$, or about 60% of a one standard deviation of $\ln(\text{Tobin's } q)$. The coefficient on our aggregate measure of governance is smaller with firm fixed effects than in cross-section (.06 versus .17), suggesting that firm fixed effects are important. In robustness checks, we obtain consistent results with market/book and market/sales as alternate measures of firm value.

Share prices are the trading prices for minority shares. Our study cannot show whether higher share prices reflect higher value for all shareholders, lower private benefits enjoyed by controlling shareholders, or some of both. Put differently, we cannot test whether we have found an out-of-equilibrium situation, in which firms can increase firm value through governance changes, or an equilibrium situation in which firm value is maximized and gains to outside shareholders come at controlling shareholders' expense. However, the voluntary governance improvements by a number of firms during the period of our study suggest that the initial situation was out-of-equilibrium, and that the gains to minority shareholders were only partly offset by reduced opportunities for self-dealing by insiders.

This paper is organized as follows. Section 2 reviews prior literature on the connection between firm-level governance and firm value or performance. Section 3 describes our data sources and how we construct our governance index. Section 4 covers methodology. Section 5 presents our main results. Section 6 presents results for subindices. Section 7 concludes.

2. Literature Review: New Steps in This Paper

This paper addresses whether firm-level variation in overall firm-level corporate governance practices predicts firms' market values. A large literature studies the link between *specific aspects* of corporate governance (such as audit committee, independent directors, and takeover defenses, and minority shareholder protections) and firms' market value or performance. A separate large literature explores the connection between country-level rules affecting corporate governance and firm behavior and the strengths of securities

markets. Morck, Wolfenzon and Yeung (2005) provide a recent review. Work on whether *firm-level variation in overall corporate governance* predicts firms' market value or performance is more limited.

Several studies find a connection between a measure of governance and share price in a single country. Related papers studying emerging markets include Black (2001) (Russia); Black, Jang and Kim (2006) (Korea); Black, Kim, Jang and Park (2005) (Korea). Another strand of this literature finds similar results on a cross-country basis (Durnev and Kim, 2005; Klapper and Love, 2004). The positive share price reaction to cross-listing (e.g., Doidge, Karolyi and Stulz, 2004b) also suggests that governance can predict share price. At the same time, efforts to understand the economic logic behind firms' governance choices have produced mixed results. There is a large role for compliance with country norms (Doidge, Karolyi and Stulz, 2004a) and for idiosyncratic choice (Black, Jang and Kim, 2005). While we focus here on emerging markets, related U.S. work includes Gompers, Ishii and Metrick (2003), Core, Guay and Rusticus (2005), and Gillan, Hartzell and Starks (2003).

Most of the studies of firm-level governance have two important limitations. Except for concurrent work in Korea by Black, Kim, Jang and Park (2005), all employ cross-sectional econometric approaches. Outside the U.S. panel data has not been available. In the U.S., Gompers, Ishii and Metrick (2003) and Gillan, Hartzell and Starks (2003) have panel data, but report that governance changes too slowly to make a firm fixed effects approach feasible. Moreover, the cross-country studies have available only limited control variables. These limitations raise the potential for omitted variable bias, in which omitted economic variables predict both governance and market value, leading to a spurious correlation between the two.

A second problem with existing studies is the potential for the link between a governance index and share prices to reflect endogeneity, in which higher-valued firms choose better governance, rather than the other way around. Most studies, ours included, lack a good instrument to address this issue (Black, Jang and Kim (2006) is an exception).

There are two related studies of Russian corporate governance. Black (2001) studies a small sample of 21 firms in 1999, with very limited control variables, but reports a strong correlation between a corporate governance index (the Brunswick index described below)

and the market value of Russian firms, as a percentage of their theoretical market value if priced at Western multiples (as estimated by Troika Dialog). He finds a correlation between $\ln(\text{market value/theoretical value})$ and governance of $r = 0.90$, and a worst to best governance change (from Gazprom and subsidiaries of Yukos at the low end to Vimpelcom at the high end) predicts a factor of 700 change in market value. Goetzmann, Spiegel and Ukhov (2002) study governance explanations for the price differences between Russian preferred and common shares; their results are consistent with a sharp improvement in Russian corporate governance since 1999.

This paper undertakes a further investigation of Russian corporate governance, and seeks to address the first gap in the prior literature -- the potential for omitted variable bias to explain the cross-sectional association between an overall governance measure and a measure of firm value. We use governance indices over the time period for 1999-2004 -- a period of rapid improvement in Russian corporate governance -- and verify that the link between an overall governance index and firm value is both economically and statistically significant across pooled OLS (with firm clusters), firm random effects, and firm fixed effects models. The random and fixed effects approaches address omitted variable bias arising from unobserved heterogeneity that is firm-specific and time-invariant. They also let us address time-invariant sources of endogeneity. In addition, we employ a reasonably extensive set of control variables, which can address some of the potential sources of time-varying firm-level heterogeneity. Our results thus rule out some (though not all) of the non-causal explanations for the observed relationship between governance and firm market value.

A second advance of this study draws on the existence of multiple governance indices, covering an often overlapping set of firms in the same country over roughly the same time period. This lets us investigate which aspects of governance predict firms' market value. We find that the indices vary substantially in emphasis (see Table 1) and ability to predict firm market values. The variability in predictive power extends to the subindices which make up each index.

3. Data

3.1. Governance data

Russian market participants well understand the importance of governance in valuing Russian firms. They have demanded governance information, and a variety of sources have responded. There are currently six available corporate governance indices, from five different providers: two major investment banks, one ranking agency (which produces two different products); and two nonprofit Russian organizations. Table 1 summarizes the available corporate governance indices, the periods they cover, the subindices they use, and the weights given to each subindex. We do not include 2005 rankings in this study because we cannot yet match it with financial data.

Governance rankings are produced with a lag between data collection and publication. The ICLG index specifies the date as of which the rankings were compiled. The other indices do not. To match the effective dates of other rankings with financial and share price data, we assumed that a ranking published in the first half of quarter t relates back to quarter $t-1$. Thus, we treat a report issued on Feb. 1, 2003 (in the first half of the 1st quarter of 2003) as relating back to the fourth quarter of 2002, but treat a report issued on March 1, 2003 (in the second half of this quarter) as relating to the current quarter (1st quarter of 2003), and so on. Indices are produced with different frequencies: quarterly, semi-annual or annual. We construct our panel data with quarterly frequency.

Brunswick UBS Warburg is a well known international investment company with strong interest in Russia. Its research department was the first to measure corporate governance in Russian companies, beginning in 1999 and continuing through the end of 2002. Black (2001) used their initial 1999 rankings, and found that they strongly predict firms' market values. Brunswick advised us that they have not abandoned their rankings effort, but their most recent published report was in early 2003 and relates back to the 4th quarter of

2002). Brunswick reports an overall governance score, which is the sum of the scores on 8 subindices, for transparency, share dilution risk, asset transfer and transfer pricing risk, merger and restructuring risk, bankruptcy risk, ownership restrictions, corporate governance initiatives, and registrar risk.

Some of these "governance" elements may seem odd from a Western perspective, but make sense within Russia. Consider bankruptcy risk, for example. In Russia, a bankruptcy filing, often by a fully solvent company, is a common means through which controlling shareholders squeeze out minority shareholders for minimal consideration; it is also a favored means for a hostile takeover, in which an outsider uses the bankruptcy process to acquire a controlling stake and squeeze out the former controlling owners. A controlling shareholder can use a merger or restructuring for similar purposes. Registrar risk involves the risk that the share registrar (whose records are the only official proof of ownership) will lose or freeze ownership if so requested by someone with influence (either a controlling shareholder or an outsider seeking to acquire control). Transfer pricing is a common means for siphoning most or all profits out of a public company into an offshore affiliate that is wholly owned by the firm's controlling shareholders. Share dilution through a large private offering of shares to the controlling shareholder or its (often undisclosed) affiliates at a fraction of true value was a major risk prior to 2002, when most firms did not provide preemptive rights (these rights became legally required in 2002).

Troika Dialog is Russia's largest and oldest investment bank. Its research department began to measure corporate governance in 2000 and has continued to do so since, roughly annually. It reports scores on five measures: ownership structure and transparency; oversight and control structure; management and investor relations; corporate conduct; and information disclosure and financial discipline. We weight these subindices equally to produce an overall governance index.

The Institute of Corporate Law and Governance is a nonprofit institute, launched in 2000 to develop an investor protection system and upgrade the corporate governance culture in Russia. Its principal founder, Dmitri Vasiliev, was the first Chairman of the Russian Federal Commission for the Securities Market and is known for his active campaign for investor rights in Russia. The details of the ICLG corporate governance assessment are not publicly disclosed, but it includes components for information disclosure, ownership structure, board of directors and management structure, shareholder rights, expropriation risk, and corporate governance history. The index is understood to draw in part on the OECD principles of Corporate Governance (OECD, 1999, 2004). ICLG produced quarterly rankings from 2000 through 2004.

Standard and Poor's (S&P) is a leading international leading rating agency. It provides a variety of credit and other rankings worldwide. In some countries, including Russia, it provides "transparency and disclosure" rankings for major firms based on public disclosure documents, plus governance rankings for individual firms which pay S&P to rate their overall governance and provide a corporate governance score. The S&P Disclosure index covers a set of large public companies chosen by S&P. S&P evaluates their public documents for 89 potential disclosures. In contrast, the S&P Governance rankings are not regular, and become publicly available only if a company hire S&P to prepare them and then chooses to reveal its ranking.

The Russian Institute of Directors (RID) is a nonprofit entity founded in 2001 by a group of major Russian companies with the goal of improving Russian corporate governance and making investments in Russian companies more attractive. In 2004 RID produced its first corporate governance ranking, prepared in cooperation with the Russian financial rating agency Expert. The ranking was based partly on public information and partly on a survey of Russian companies and public information. However, RID provides no details on how it

constructed its index. The RID index covers substantially more companies than the other indices. Of the 104 covered companies, 50 are not covered by any other index. The RID index, unlike the the six available indices, has no significant predictive power in any of our three main specifications (pooled OLS with firm clusters; firm random effects, and firm fixed effects).

Each governance index uses a separate scale. In some, better governance leads to a higher score; in others, better governance produces a lower score. To make the different indices comparable, we convert them to a standard normal distribution (mean 0 and standard deviation of 1), with higher scores indicating better governance.

We use these standardized rankings to construct two principal aggregate indices. In building an aggregate index, we confront two problems. First, in some cases, more than one source ranks the same company in the same quarter. We addressed this overlap in two different ways. In the first, we averaged the available rankings of each company in each quarter. We call this our “quarter-averaged” index. As an alternate procedure, which makes fuller use of the available ranking information at the cost of overweighting some firm-quarters, we constructed a “pooled” index, which contains all available rankings for each company. The pooled index can contain more than one ranking for one company in a single quarter, while the “quarter-averaged” ranking will have a single value for each company in each quarter. In regressions with the pooled index, we use dummy variables for each index. We obtain similar results from both approaches.

A second problem is that different indices cover different companies. Thus, an average score of 0 on the Brunswick index might be an above (or below) average score on another index, simply because the two indices cover different firms.

Given the lack of predictive power of the RID index, we also construct aggregate quarter-averaged and pooled indices that exclude RID. We obtain generally similar results

but, not surprisingly, somewhat larger coefficients and t-statistics with these "no RID" indices.

Overall, we have 848 firm-quarter-index observations for the pooled index and 581 firm-quarter observations for the quarter-averaged index, covering 114 firms for which we have the basic financial and stock price data needed to compute Tobin's q. However, we drop to 105 firms when we require the data needed for our control variables. Of these, 51 are covered only by RID; the remaining 54 are covered by one or more of the other five indices. Table 2 shows rankings availability and average governance scores for each index by quarter.

Figure 1 plots all individual rankings and the RTS (stock market) index. Individual indices are produced at irregular intervals and sometimes cover different firms at different dates. To generate continuous lines in this figure we employed linear interpolation to generate rankings for firm-quarters without a ranking for a particular index which fall in between two quarters with a ranking for the same firm on the same index.¹ All rankings except Troika increase over time.

On Figure 2 we plot two aggregated governance indices. This exercise presents three challenges: 1) rankings use different scales, 2) rankings are produced in different quarters (only several rankings overlap in some of the quarters) and 3) rankings cover somewhat different samples of firms. To address these challenges we use two approaches to ranking aggregation (which we employ mainly for the purposes of this figure). In the first approach, we use interpolated standardized governance rankings (as described above) and plot the average *change* in governance (which is important to control for the varying sample composition from quarter to quarter). In the second approach, instead of standardizing the

¹ Thus, if a firm was ranked in quarter t with score R_t and was next ranked in quarter $t+k$ with score R_{t+k} , we assign the firm a score in quarter $t+i$ (where $t < t+i < t+k$) using linear interpolation: $R_{t+i} = [(k-i)*R_t + i*R_{t+k}]/k$. We generate a combined interpolated quarter-averaged index, which we use in Figure 2, by average the interpolated scores across firms in each quarter.

individual rankings, we first interpolate them and then convert them to the Troika's scale² because Troika is the only ranking that overlaps with all other rankings both in terms of periods and the firms covered. Then we plot the average change in the converted rankings. Both approaches produce similar results – the average governance rankings are gradually increasing, in parallel with the RTS index.

3.2. Financial and Stock Market Data

We supplement our governance data with data on stock market performance and financial statements. We construct market value of stocks using data on all trades from Russian Trading System (RTS www.rts.ru). For each stock we calculate quarterly average price and capitalization. We obtain financial data from System of Complex Revelation of Information (SCRIN www.scrin.ru). It contains firm's quarterly income statements and balance sheets in Russian accounting standards.

Our sample is unbalanced panel with quarterly data. We include observation in the sample if in a quarter a firm has at least one corporate governance score; firm's stocks were traded at least once in the quarter; and we have financial data for this company in the quarter.

We classify firms in sectors by aggregating ISIC codes. Table 3 shows that most of our observations come from utilities, communication and extraction sectors; these three sectors represent almost 80% of our sample. Utilities include large energy producers and regional energy companies. Most of the firms in communication sectors are regional traditional communication companies, the rest are mobile communication companies. Extraction sector includes oil, gas, metals and coal extraction, refining companies and pipelines.

Our main dependent variable is Tobin's q, defined as Market value of assets / Book value of assets. Market value of assets is estimated as [market value of common stock +

² We run a linear regression of each individual rankings and Troika rankings and use the regression coefficients to convert individual rankings to Troika's scale.

market value of preferred stock + book value of debt]. In alternative specifications we also use market-to-sales and market-to-book ratios. To reduce the influence of outliers, we take logs of these dependent variables.³ Table 4 contains variable definitions for our dependent and control variables. Variables that contain extreme values are winsorized at the 1 and 99th percent level (these variables are indicated with the number 1 at the end of variable name in Table 4). Summary statistics are presented in Table 5. Panel A presents means, percentiles and standard deviations and Panel B presents correlation table.

In Figure 3 we present a scatter plot of our raw data: (log) Tobin Q and aggregate quarter-averaged governance index (stdall). The predicted values are obtained from a simple univariate regression of (log) Tobin Q on governance index, which produces the following coefficients (t-statistics obtained with firm-clustering in parenthesis):

$$\text{Ln(Tobin's q)} = 0.052 (0.58) + 0.136 (1.84) * \text{Quarter-averaged index}$$

There is a positive and significant (at 10%) relationship between Tobin's q and the quarter-averaged index.

4. Empirical Methodology

To study the effect of corporate governance on firm valuation and performance we use the basic model

$$Y_{it} = \alpha + \beta_1 Gov_{it} + \gamma X_{it} + e_{it}$$

Here Y_{it} is one of the performance measures, Gov_{it} is a governance rating, X_{it} is a vector of control variables and e_{it} is the error term. We use ln(Tobin's q) as our main measure of performance. In robustness tests, we obtain similar results with raw Tobin's q, ln(market/sales) (market value of assets/sales) and ln(market/book) (market value of common

³ Market/book ratio contains some extreme observations even after the log-transformation. We therefore drop the highest and lowest 1% of observations for this variable. Our results for market/book are somewhat weaker if we include outliers. Our results for Tobin's q and market/sales are similar with or without similar exclusion of outliers.

and preferred stock/book value of common and preferred stock). Since our data is in panel form, the error term is a composite error, given by $e_{it} = v_i + u_{it}$, where v_i is the unobserved firm-specific effect and u_{it} is idiosyncratic error. We estimate the regression model using several different assumptions about the composite error term.

The OLS estimation assumes that there is no correlation between Gov_{it} or X_{it} and the composite error term e_{it} , and is inconsistent if this assumption is violated. Even if this assumption holds, the composite errors will be serially correlated, due to the presence of v_i in each time period. We therefore use standard errors that are clustered at the firm-level, which allow for a unspecified correlation structure of the errors within each firm. The Breusch-Pagan Lagrangian multiplier test rejects the assumption that the variance of v_i is equal to zero, suggesting that firm-specific effects are important and the OLS results are therefore inefficient (even under the assumption of no correlation).

The random effects estimation provides efficient estimates under a more restrictive assumption that the unobserved firm-specific effect is uncorrelated with Gov_{it} or X_{it} . If, however, the firm-specific effects v_i are correlated with the governance or the X's, the results of the OLS and random effects are biased. The fixed effects estimator is consistent estimator under this assumption. We perform the Hausman test comparing fixed effects and random effects estimators and find that the test is not rejected for most of the individual governance rankings, but is rejected for the aggregate indices. Therefore, fixed effects model is the most appropriate model for our data.

In addition, both fixed and random effects require an assumption of strict exogeneity - i.e. the errors need to be uncorrelated with the past and future values of the right hand side variables (this is a more restrictive assumption than is needed for OLS estimation, see Wooldridge (2001)). In other words, this assumption does not allow for a likely possibility that the future values of governance rankings depend on the past values of valuation and

performance measures. In our future work we will attempt to relax this assumption.

The matrix X_{it} contains a set of control variables which have been shown to be important in predicting market performance.⁴ In our analysis we include the following control variables: the aggregate RTS market index (in logs) to control for economy-wide time-series variation in market values, firm size (measured by log of total assets), liquidity (measured by the log of the number of actual trades in a quarter), leverage (measured as book value of debt over book value of total assets), annual real sales growth as a control for firm growth opportunities, a measure of financial performance (net income over total assets), and an indicator variable equal to one if the firm is a part of MSCI index (as these firms are more likely to have more visibility). We also control for three main sectors – Communication, Utilities and Extraction industries, as these three industries together comprise about 80% of our sample. In addition, in some specifications we control for capital intensity, which maybe associated with both governance and performance (Klapper and Love, 2004). However, we have fewer observations for capital intensity and therefore we do not include it in our main specification. In robustness tests (section 4.2) we experiment with different specifications of control variables.

5. Principal Results

Table 6 reports our main pooled OLS results. All governance indices except RID have a significant positive coefficient. Brunswick, Troika, ICLG, and S&P Disclosure are significant at 1%, while S&P Governance, which has a much smaller sample size, is significant at 5%. The coefficient on the combined "quarter-average" index suggests that a change of one standard deviation (which is equal to one since the individual indices are standardized to $\sigma = 1$) implies a 17 points increase in $\ln(\text{Tobin's } q)$. The final column of

⁴ Black, Jang and Kim (2006), Durnev and Kim (2005), Klapper and Love (2004).

Table 6 adds $\ln(\text{capital intensity})$ as an additional control variable. This reduces the number of observations and slightly reduced the coefficient on the quarter-averaged index, but this index remains significant at 1%.

Many of the control variables are significant in predicting Tobin Q. We find that overall market index is significantly positive, and this result is even stronger in fixed effects and random effects regressions. Interestingly, the firm size is negative, suggesting that larger firms have lower valuations relative to their assets. Not surprisingly, more liquid firms have higher Tobin's q, suggesting that the market values reflect liquidity premium. The leverage results are strongly positive and somewhat puzzling. It could be that in Russia high leverage plays an informational role suggesting that the firm is "good enough" (or well-connected) to be able to obtain bank finance. Surprisingly, we find that sales growth is insignificantly related to valuation (and even negative in some cases). Note that our sales growth measure is annual sales growth (while the rest of our data are quarterly) and thus has less within firm variation.

We find that firms included in MSCI index (about 25% of our sample in terms of the number of observations), have higher valuations, consistent with the idea that they are more visible and enjoy better analyst coverage. MSCI index dummy is significant at 1% in random effects regressions (not reported).

Not surprisingly, firms that have better financial performance (measured by net income over total assets) have higher market valuations. Capital intensity is negative, suggesting that firms with more fixed capital (as a fraction of sales) have lower valuation. This is plausible because firms with more fixed capital are likely to have less intangible capital, and intangible capital is likely to be associated with higher market values.

We also find strong sector-specific effects: not surprisingly, firms in Extraction industries (oil & gas extraction, coal mining, metal mining and pipelines except natural gas)

have significantly higher valuations, while Utilities (electric, gas and sanitary services) have significantly lower valuations. These sector-specific effects are even more pronounced in the random effects estimation (not reported). This clearly reflects the peculiarities of Russian economy – the extractive, export oriented industries are booming, while the utilities have trouble collecting money for their services from the largely impoverished population. Firms in Communication industry have also lower valuations (since most of these firms are spin-offs of the previously state-owned telephone companies). The rest of industries (subsumed in the constant term) present a heterogeneous group of manufacturing and services.

Table 7 presents results for two alternative ways to aggregate different rankings. In the first method, referred to “quarter-averaged” aggregate index, we average all rankings available for each firm in the same quarter. In this specification, each firm is used once for each quarter that at least one ranking is available. In the second method, referred to as “pooled” aggregate index, we use all available data, which means that some firms will have duplicate observations for a single quarter, if this firm has more than one ranking. In this case all the control variables and the dependent variable are the same for these observations. The results are very similar in both cases. In the pooled regressions we also add dummy variables for each type of rankings. We find that firms ranked by RID have significantly lower average Tobin q. This is not surprising since RID ranking covers the widest sample of firms, while other rankings focus on the best of the market. This might explain why RID rankings are not significant in general. We also report the results for these aggregate indices without RID rankings and, not surprisingly, find that our results become stronger when we exclude the non-significant RID ranking.

Table 8 presents a summary of coefficient estimates for the corporate governance indices using the same model (with and without capital intensity) estimated by OLS, fixed effects and random effects. To save space we do not report all the other coefficients in these

regressions; thus each cell in this table corresponds to a separate regression. (We report OLS results for comparison; note that first column reproduces the governance coefficients reported in Table 6). We find that in general the results are robust for all three estimation methods. However, some individual indices lose some of their significance (S&P Governance index is insignificant in random and fixed effects and S&P Transparency and Disclosure index is insignificant in fixed effects) most likely because of lack of within firm variation in these indices. The index produced by RID is never significant. We also report the results of two aggregate indices –the quarter-averaged and the pooled regressions (described above) and we rerun these aggregate indices with and without RID rankings. Both aggregate indices produce similar results, significant at 1%, and exclusion of RID index in general makes the result stronger.

For our overall governance measure, we estimate that, with firm fixed effects, a two standard deviation change in governance predicts a 0.12 increase in $\ln(\text{Tobin's } q)$, which is about 20% of one standard deviation of $\ln(\text{Tobin's } q)$. A worst-to-best change in governance predicts a 0.40 change in $\ln(\text{Tobin's } q)$, or about 60% of a one standard deviation of $\ln(\text{Tobin's } q)$. The coefficient on our aggregate measure of governance is smaller with firm fixed effects than in cross-section (.06 versus .17), suggesting that firm fixed effects are important.

While our results are economically strong, the economic importance of governance falls well short of Black's (2001) prior study, in which a worst-to-best change in governance predicted a factor of 700 increase in market capitalization, as a fraction of hypothetical Western capitalization. This difference deserves explanation.

In hindsight, Black's prior study was conducted at a time when Russian corporate governance was at a low point -- with large variation between firms and a large fraction of firm value at stake through a firm's governance choices. The gap between actual market

capitalization and theoretical Western market capitalization has substantially narrowed since then, with the worst governed firms showing the largest gains. For example, Gazprom has gone from being valued at .002 of Western value (2.6 cents per barrel of reserves!) to being valued today at about .05 of Western value (\$1 per barrel of reserves). Lukoil has gone from being valued at .028 of Western value (\$0.36 per barrel of reserves) to being valued today at .13 of Western value (\$2.50 per barrel of reserves).

5.2. Robustness Tests

Here we test the robustness of our results to different specifications of dependent and independent variables. While we use (log) Tobin Q as our main performance measure, we also test two alternative measures: the Market-to-Sales (MTS) and Market-to-Book (MTB) measures of relative valuation. Table 9 reports the summary results (only the governance coefficients) for these two dependent variables, for OLS, random and fixed effects estimation. Again, each cell reports results from a separate regressions and all models include the same set of control variables as reported in Table 6, column 1.

We find the main results to be generally robust – both of the aggregate indices are significant at least at 5% or better in all the regressions. As before, excluding RID ranking makes the results stronger. The individual indices have varying significance levels, all except RID are significant in MTS regressions and fewer are significant in MTB regressions (S&P Transparency and Disclosure and Brunswick indices are not significant in MTB regressions). In general, the MTB results are less significant than Tobin Q or MTS results.

We also experimented with the various specifications for our control variables: we used year dummies instead of aggregate market index, and we also used a linear time trend (alone or in combination with the market index). The results were robust to these changes. We also used log of sales instead of log of total assets as a measure of size. This produced

even more significant results for MTS regressions, but less significant results for MTB regressions, the Tobin Q results were unaffected by this change. We tried different leverage measures (book value of debt over market value of assets, and book value of debt over book value of equity), and different performance measures (operating income to sales, and operating income to assets). Most of our results are robust to these various specifications (with the MTB results being the most sensitive to changes in specification, while Tobin Q results being the least sensitive). However, the overall picture remains largely unchanged – governance is significantly positively associated with different measures of firm valuation.

6. Results for Subindices

In this section we take a more detailed look into the subindices that comprise several of our indices. We lack data on subindices for RID and ICLG. Table 1 reports the details on the subindices that are used to construct the remaining four indices.

Often, different aspects of governance correlate with each other. Table 5C shows the correlations among the Brunswick, Troika, S&P Disclosure, and S&P Governance subindices. Some correlations are quite high, especially for the S&P indices. Thus, we cannot simply replace a full index with a subindex and run regression similar to the full index regressions we report in Table 8. This would introduce omitted variable bias, where the omitted variable is the remainder of the governance index being considered. For example, in these individual regressions (not shown), each Troika subindex and each S&P Disclosure subindex takes a positive and statistically significant coefficient in pooled OLS regressions with firm clusters.

Table 10 reports results from a tougher test: We include each subindex of a particular index (Brunswick, Troika, S&P Disclosure, or S&P Governance) as a separate independent variable in a single regression, with pooled OLS, firm random effects, and firm

fixed effects specifications. These regressions let us see which subindices are responsible for the predictive effect of the overall index.

The results are somewhat sensitive to the empirical model. Two subindices – Troika index, Information Disclosure and Financial Discipline subindex, and Brunswick index, Asset transfers and transfer pricing subindex- are significant or marginally significant in all three specifications. Transfer pricing risk is overall the most powerful indicator overall, especially in firm random effects and firm fixed effects regressions, where it has t-statistics of close to 6.

To unpack these two subindices, Troika's Information Disclosure and Financial Discipline subindex includes the following elements: Accounting standards (Russian vs. Western), Independence of External Auditor, Disclosure record with Russian securities regulators, presence of an ADR program, Registrar risk, and Dividend history. Most of these elements involve financial disclosure. The exceptions are Dividend history and Registrar risk. Registrar risk is likely not a key driver, because Brunswick has a separate subindex for Registrar risk, which is insignificant in all specifications. Thus, this subindex principally measures financial disclosure.

Brunswick's Asset transfers/Transfer pricing subindex includes two equally weighted subcategories: Controlling Shareholders, which assesses whether the controlling shareholder's recent track record on corporate governance, and Transfer Pricing, in which a firm is penalized for the presence of unclear trading environment and for use of offshore or affiliated trading companies.

Other sources of evidence on the important of disclosure provide generally but not uniformly positive signals on its importance. On the positive side, the Brunswick transparency subindex is positive and significant in firm random effects and firm fixed effects. The Troika ownership structure and transparency subindex (which includes ownership transparency) is significant or marginall significant with firm random effects and firm fixed

effects. On the mixed side, the S&P Disclosure index is significant in pooled OLS, but progressively weakens as we move to firm random effects and then to firm fixed effects (see Table 8). Table 10 shows that the power of S&P Disclosure index comes from the financial disclosure subindex, which shows the same pattern: strong in OLS, weaker but significant with firm random effects, and insignificant with firm fixed effects. Surprisingly, the financial transparency and information disclosure *subindex* of S&P Governance (which one would assume is related to the full S&P disclosure *index*) takes a *negative* coefficient, which is marginally significant with firm fixed effects. However, for S&P Governance, we have only 34 observations of 11 firms. With 10 control variables plus firm fixed effects, degrees of freedom are quite limited, and any results are therefore suspect.

Overall, the message is that only some subindices are important in predicting market valuation and that it matters how one measures governance. Asset transfer and transfer pricing risk is the most correlated with market valuations (as is confirmed by numerous stories and anecdotes in Russian media). Disclosure, especially financial disclosure may also be important.

7. Conclusion

Most studies of the connection between firm-level corporate governance and share prices are limited to cross-sectional data and simple OLS specifications. We study the connection between the firm-level governance of Russian firms and their market values over 1999-2004, a period of dramatic change in Russian corporate governance. The importance of corporate governance to investors in Russian firms has spawned no less than six different indices. We draw on all six here. A combined index is economically and statistically strong across all specifications: pooled OLS with firm clusters; firm random effects, and firm fixed effects; our results are also robust to choice of firm value variable (Tobin's q , market/sales ratio, or market/book ratio). This work strengthens the case for a causal association between firm-

level governance and firm market value, by ruling out some (though not all) of the non-causal explanations for this association.

The availability of different indices, covering similar firms over a similar time period, lets us assess the predictive power of different approaches to measuring governance. How one measures governance matters. The Brunswick, Troika,, and ICLG measures are strong in all specifications. The two S&P measures are significant in OLS but insignificant with firm fixed effects. The RID measure is insignificant in all specifications.

At the subindex level, the strength of the overall indices comes primarily from a subset, sometimes a small subset, of the governance components included in the overall index. For example, financial disclosure is important, but once we control for financial disclosure, other types of disclosure are not.

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Table 1: Corporate governance indices and subindices

Each governance index, the time period it covers, any available subindices, and the weights on each subindex. We convert each index to standardized form, with mean = 0, standard deviation =1, and higher scores indicating better governance. We also compute combined governance indices, as defined below. Brunswick changed its methodology after 1999. We recalculated the 1999 scores using its post-1999 methodology. Troika provides four subindices but no explicit weights; we assumed equal weighting. ICLG provides no information on the weights given to subindices. RID provides no information on subindices.

Corporate governance rankings and their categories	Subindex weights
Brunswick UBS Warburg (Brunswick)	2nd qtr 1999 -- 4th qtr 2002
Transparency	19.4%
Dilution	18.1%
Asset transfers / transfer pricing	13.9%
Mergers / restructuring	13.9%
Bankruptcy	16.7%
Ownership restrictions	4.2%
Corporate governance initiatives	12.5%
Registrar	1.4%
Troika Dialog (Troika)	3rd qtr 2000 -- 2nd qtr 2004
Ownership structure and transparency	20%
Oversight and control structure	20%
Management and investor relations	20%
Corporate conduct	20%
Information disclosure and financial discipline	20%
Institute of Corporate Law and Governance (ICLG)	1st qtr 2001 -- 1st qtr 2004
Information disclosure	NA
Ownership structure	NA
Board of directors and management structure	NA
Shareholder rights	NA
Expropriation risk	NA
Corporate governance history	NA
Standard and Poor's Corporate Governance (S&P Governance)	4th qtr 2000 -- 4th qtr 2004
Ownership structure and influence	25.0%
Financial stakeholder rights and relations	25.0%
Financial transparency and information disclosure	25.0%
Board structure and process	25.0%
S&P Transparency and Disclosure (S&P Disclosure)	4th qtr 2002 -- 4th qtr 2004
Ownership structure and investor relations	33.3%
Financial and operational information	33.3%
Board and management structure and process	33.3%
Russian Institute of Directors (RID)	2nd qtr 2004 -- 4th qtr 2004
No categories available	NA
Aggregate governance indices:	
Quarter averaged index: Union of all six indices. If two or more indices cover the same firm in the same quarter, we average the governance scores.	n = 581
Quarter averaged index (no RID). Union of all indices except RID. If two or more indices cover the same firm in the same quarter, we average the governance scores.	n = 506
Pooled index. Union of all six indices. If two or more indices cover the same firm in the same quarter, we treat these as separate observations.	n = 848
Pooled index (no RID). Union of all indices except RID. If two or more indices cover the same firm in the same quarter, we treat these as separate observations.	n = 714

Table 2. Corporate governance rankings availability and average standardized corporate governance scores by quarter and rankings.

Number of firms and average score in each period for the Brunswick, Troika, S&P Governance, S&P disclosure, ICLG, RID, and combined standardized indices. Indices are defined in Table 1. For each ranking we take average of normalized scores across firms in each quarter. Last columns corresponds to average of all indices.

year	quarter	Brunswick		Troika		ICLG		S&P Governance		S&P Disclosure		RID		combined indices		
		No. of obs.	mean	No. of obs.	mean	No. of obs.	mean	No. of obs.	mean	No. of obs.	mean	No. of obs.	mean	No. of obs		Quarter-averaged mean
														Pooled index	Quarter-averaged index	
1999	1	-		-		-		-		-		-		8	8	-0.59
	2	8	-0.59	-		-		-		-		-				
	3	-		-		-		-		-		-				
	4	-		-		-		-		-		-				
2000	1	13	-0.24	-		-		-		-		-		13	13	-0.24
	2	-		-		-		-		-		-				
	3	13	-0.19	14	0.06	-		-		-		-				
	4	13	-0.17	19	0.08	-		-		-		-				
2001	1	-		37	-0.15	20	-0.07	1	-1.26	-		-		58	37	-0.23
	2	-		-		-		1	-0.10	-		-				
	3	-		-		19	-0.41	-		-		-				
	4	14	-0.03	-		23	-0.40	1	0.01	-		-				
2002	1	-		-		24	-0.43	1	-0.80	-		-		25	24	-0.46
	2	15	0.33	39	-0.08	31	-0.18	1	0.36	-		-				
	3	-		-		22	-0.02	2	-0.33	-		-				
	4	23	0.40	-		23	0.01	2	-0.51	33	-0.42	-				
2003	1	-		-		23	0.05	3	-0.06	-		-		26	25	0.01
	2	-		-		23	-0.04	3	0.28	-		-				
	3	-		41	-0.09	21	-0.09	2	0.36	-		-				
	4	-		-		23	0.19	1	2.21	38	-0.05	-				
2004	1	-		-		23	0.31	4	0.07	-		-		27	25	0.27
	2	-		47	-0.10	-		4	0.27	-		100	-0.01			
	3	-		-		-		7	-0.80	-		-				
	4	-		-		-		1	0.36	38	0.29	34	0.68			
No. of Obs.		99		197		275		34		109		134		848	581	
No. of firms		24		55		33		11		44		104		114	114	

Table 3. Sample breakdown by sector.

Number of firm-quarters in our sample, divided into industry sectors.

Sector	Number of Observations	Percent of sample
Utilities	181	31.2%
Communication	148	25.5%
Extraction	127	21.9%
<i>Subtotal in these three sectors</i>	<i>456</i>	<i>78.6%</i>
Transportation Equipment	40	6.9%
Other Manufacturing	29	5.0%
Primary Metal Industries	28	4.8%
Transportation	20	3.4%
Services	7	1.2%
<i>Subtotal other sectors</i>	<i>124</i>	<i>21.4%</i>
<i>Total</i>	<i>580</i>	<i>100.0%</i>

Table 4. Definitions of Control Variables

Values are measured quarterly except as indicated. Balance sheet values are measured at the end of each quarter. Market values of shares for each quarter are the average value for that quarter.

Variable	Description
Ln(Tobin's q)	Log of [Market value of assets / Book value of assets]. Market value of assets is estimated as [market value of common stock + market value of preferred stock + book value of debt].
Ln(Market/Sales Ratio)	Log of [Market value of common stock + market value of preferred stock/Sales].
Ln(Market/Book Ratio)	Log of [Market value of common stock + market value of preferred stock/Book value of assets].
Ln(RTS Index)	Log of Russian Trading System (RTS) index at each quarter end.
Ln(Number of trades)	Log of the sum of number of trades of firm's common and proffered stock in the RTS during the quarter.
Ln(Assets)	Log of Book value of assets.
Leverage	[Book value of debt/Book value of assets], winsorized at 1% and 99%.
Ln(Capital Intensity)	[Book value of fixed assets/Book value of sales].
MSCI Index Dummy	1 if firm is included in the Morgan Stanley Capital International Index at July 2005 (we were not able to obtain historical data); 0 otherwise.
Sales Growth	Real annual growth rate of sales over the current year, winsorized at 1% and 99%.
Net Income to Assets	Net income over total assets, winsorized at 1% and 99%.
Index Dummies	Dummy variables, =1 for an observation with a particular governance index and 0 otherwise. Thus, Brunswick dummy =1 for observations with Brunswick as the governance index.

Table 5. Panel A. Summary Statistics

Based on all available observations for each variable.

	No. of obs.	Mean	Min	median	Max	Std. Dev.
Tobin's q	580	1.31	0.19	1.08	10.10	1.02
Ln(Tobin's q)	580	0.04	-1.65	0.08	2.31	0.68
Ln(Market/Sales)	608	0.39	-6.52	0.25	8.45	1.47
Ln(Market/Book)	591	0.25	-3.67	0.11	6.78	1.47
Brunswick	155	-0.01	-3.64	0.23	1.66	1.00
TROIKA	276	0.00	-2.05	0.02	2.10	1.00
S&P Governance	44	0.00	-1.84	0.01	2.21	1.00
S&P Disclosure	136	0.02	-2.04	-0.13	2.68	1.00
ICLG	328	0.00	-2.50	-0.03	3.19	1.00
RID	212	0.01	-2.76	0.40	2.50	1.00
Quarter-averaged index	833	-0.07	-3.64	-0.06	3.19	0.96
Ln(RTS)	833	5.96	4.83	6.22	6.62	0.50
Ln(Assets)	744	23.96	20.02	23.95	28.55	1.58
Log (No. of trades)	660	3.82	0.00	3.64	9.24	2.06
Ln(Leverage)	684	0.46	0.02	0.38	1.00	0.28
Sales Growth	761	0.07	-1.67	0.05	1.82	0.41
MSCI Index Dummy	833	0.26	0.00	0.00	1.00	0.44
Net Income/ Assets	698	0.05	-0.10	0.03	0.36	0.07
Ln(Capital Intensity)	629	-0.20	-5.30	0.08	2.94	1.38

Table 5. Panel B. Correlation coefficients for selected variables

Number of observations for each pair is reported underneath each correlation coefficient. Rankings data for individual indices (but not the aggregate quarter-averaged index) are linearly interpolated for missing firm-quarters; see notes to Figure 1 for details. * and **boldface** indicates significance at 5% level.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	
[1] Ln(Tobin's q)	1																		
	579																		
[2] Ln(Market-to-Sales)	0.6103*	1																	
	574	607																	
[3] Ln(Market-to-Book)	0.8438*	0.4958*	1																
	557	585	590																
[4] Brunswick	0.3190*	0.2593*	0.1309	1															
	156	158	145	230															
[5] TROIKA	0.3251*	0.4722*	0.2078*	0.6674*	1														
	429	455	444	181	551														
[6] S&P Governance	0.1437	0.6297*	0.0484	0.7702*	0.6218*	1													
	78	80	80	25	79	94													
[7] S&P Disclosure	0.4680*	0.4810*	0.3012*	0.5115*	0.6343*	0.5416*	1												
	257	258	259	25	236	67	303												
[8] ICLG	0.0133	0.2804*	-0.0036	0.4054*	0.5613*	0.6019*	0.6561*	1											
	276	284	277	121	310	44	138	330											
[9] RID	0.1952*	0.1465	0.126	.	0.4028*	-0.2055	0.5496*	.	1										
	139	142	138	0	48	18	62	0	218										
[10] Quarter-averaged index	0.1756*	0.3255*	0.1120*	0.8106*	0.7648*	0.8075*	0.7683*	0.9360*	0.8796*	1									
	579	607	590	230	551	94	303	330	218	833									
[11] Ln(RTS)	0.054	0.0598	0.0815*	0.3783*	-0.0132	0.2105*	0.2048*	0.0791	0.2742*	0.0847*	1								
	579	607	590	230	551	94	303	330	218	833	833								
[12] Ln(Assets)	0.1927*	0.2201*	0.2210*	-0.0249	0.1639*	0.0832	0.1165	0.0561	0.2763*	0.0947*	0.0352	1							
	579	607	590	185	488	81	266	309	177	700	700	700							
[13] Log (No. of trades)	0.3787*	0.4021*	0.3767*	0.0052	0.3152*	0.0804	0.3083*	-0.0416	0.2921*	0.1434*	-0.082251		1						
	562	587	569	174	472	80	270	300	157	659	659	631	659						
[14] Ln(Leverage)	0.5639*	0.0417	0.6993*	-0.0331	-0.1004*	-0.2985*	0.1081	-0.2554*	0.0572	-0.1131*	-0.0713	0.1253*	0.1504*	1					
	579	574	557	179	452	79	262	296	159	645	645	645	587	645					
[15] Sales Growth	0.0024	-0.0213	0.0251	0.1534*	0.1182*	0.1539	0.1490*	0.0745	0.1498*	0.1418*	-0.0238	-0.0695	0.0025	-0.0436	1				
	577	605	587	188	489	81	270	310	186	713	713	690	634	641	713				
[16] MSCI Index Dummy	0.3407*	0.3270*	0.3150*	0.0986	0.2888*	0.2791*	0.3373*	0.2080*	0.2025*	0.2240*	-0.1097*	0.4111*	0.5503*	0.1247*	0.1814*	1			
	579	607	590	230	551	94	303	330	218	833	833	700	659	645	713	833			
[17] Net Income/Assets	0.3308*	0.0234	0.2379*	0.1679*	0.1813*	-0.0477	0.1294*	0.076	-0.0108	0.0789*	-0.0168	0.1257*	0.2019*	-0.0452	0.1261*	0.2066*	1		
	565	591	569	181	464	81	261	302	160	656	656	656	595	626	652	656	656		
[18] Ln(Capital Intensity)	-0.4923*	0.0427	-0.3582*	-0.2195*	-0.1553*	-0.144	-0.1341*	0.0574	0.0701	-0.032	-0.0353	-0.1306*	-0.1205*	-0.2617*	0.0173	-0.0877*	-0.4064	1	
	513	544	528	136	423	79	254	273	161	599	599	599	543	567	595	599	581	599	

Table 5. Panel C. Correlation coefficients for subindices within each index.

Correlation coefficients are presented for the four rankings that we have data on subindices. Rankings data for individual subindices is not interpolated. **Boldface** indicates significance at 5% level.

Brunswick		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	S&P Disclosure				
[1]	Transparency	1.000								[1]	Ownership structure and investor relations	1.000		
[2]	Dilution	0.039	1.000							[2]	Financial and operational information	0.678	1.000	
[3]	Asset transfers / transfer pricing	0.204	0.075	1.000						[3]	Board and management structure and process	0.870	0.670	1.000
[4]	Mergers / restructuring	0.052	0.175	-0.040	1.000									
[5]	Bankruptcy	0.303	0.042	0.099	0.205	1.000								
[6]	Ownership restrictions	-0.155	-0.058	0.059	0.153	0.142	1.000							
[7]	Corporate governance initiatives	0.097	0.145	-0.198	-0.062	0.186	0.202	1.000						
[8]	Registrar	0.143	0.256	-0.143	0.034	0.218	-0.168	0.282	1.000					

Troika		[1]	[2]	[3]	[4]
[1]	Ownership structure and transparency	1.000			
[2]	Oversight and control structure	0.286	1.000		
[3]	Management and investor relations	0.301	-0.037	1.000	
[4]	Information disclosure and financial discipline	0.428	0.105	0.254	1.000

S&P Governance		[1]	[2]	[3]	[4]
[1]	Ownership structure and influence	1.000			
[2]	Financial stakeholder rights and relations	0.394	1.000		
[3]	Financial transparency and information disclosure	0.692	0.789	1.000	
[4]	Board structure and process	0.753	0.770	0.759	1.000

Table 6. OLS Results for Different Governance Measures

Ordinary least squares regressions of $\ln(\text{Tobin's } q)$ on different governance indices, with additional control variables as shown. Governance indices and other variables are defined in Tables 1 and 4. t -values, based on robust standard errors with firm clusters, are reported in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1% levels. Significant results (at 5% level or better) for principal variables are shown in **boldface**.

dependent variable	$\ln(\text{Tobin's } q)$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Brunswick	0.204*** [2.87]							
TROIKA		0.191*** [6.54]						
S&P Governance			0.099** [2.68]					
S&P Disclosure				0.240*** [3.43]				
ICLG					0.207*** [3.50]			
RID						0.108 [1.36]		
Quarter-averaged index							0.174*** [4.01]	0.147*** [3.28]
Ln(RTS index)	0.04 [0.28]	0.310*** [4.77]	0.270* [2.10]	0.203 [1.26]	0.234*** [3.16]	-1.969 [1.25]	0.198*** [3.88]	0.203*** [3.98]
Ln(Assets)	-0.131 [0.95]	-0.231*** [3.54]	-0.112 [1.52]	-0.162 [1.31]	-0.117** [2.22]	-0.195** [2.42]	-0.161*** [2.98]	-0.146** [2.34]
Ln(No. of trades)	0.130** [2.59]	0.092** [2.40]	-0.005 [0.20]	0.045 [0.59]	0.119*** [2.96]	0.164*** [3.03]	0.101*** [2.87]	0.105*** [2.67]
Ln(Leverage)	1.017*** [2.99]	1.043*** [5.79]	1.431*** [7.72]	0.748*** [3.15]	0.731*** [3.53]	0.773*** [4.90]	0.793*** [5.42]	0.764*** [5.67]
Sales Growth	-0.230* [1.96]	-0.200** [2.10]	-0.02 [0.24]	-0.019 [0.16]	-0.081 [0.64]	-0.163 [1.22]	-0.112 [1.45]	-0.127 [1.49]
MSCI Index Dummy	-0.089 [0.35]	0.213 [1.67]	0.474*** [6.81]	0.111 [0.67]	-0.091 [0.53]	0.267* [1.72]	0.105 [0.78]	0.104 [0.81]
Net Income/ Assets	1.54 [1.49]	1.537** [2.32]	0.712 [0.70]	1.880** [2.07]	1.216*** [2.85]	1.761** [2.27]	1.145** [2.31]	0.766 [1.32]
Ln(Capital Intensity)								-0.082** [2.31]
Sector: Communication	0.053 [0.27]	-0.158 [1.29]	-0.343*** [5.60]	-0.439** [2.22]	-0.013 [0.11]	-0.33 [1.65]	-0.128 [1.12]	-0.015 [0.10]
Sector: Utilities	-0.253 [1.17]	-0.315*** [2.78]	-0.503*** [3.93]	-0.469*** [2.76]	-0.680*** [5.41]	-0.408*** [2.92]	-0.485*** [4.82]	-0.383*** [3.35]
Sector: Extraction	0.25 [0.79]	0.387** [2.44]	0 [.]	0.273 [1.26]	0.443*** [3.58]	0.265 [1.33]	0.412*** [3.07]	0.363*** [2.85]
Constant	1.876 [0.67]	2.885** [2.29]	0.539 [0.35]	2.325 [0.82]	0.718 [0.69]	16.345 [1.61]	1.995* [1.73]	1.56 [1.18]
Number of Obs.	95	184	34	106	264	127	549	491
Number of firms	23	50	11	44	32	98	105	104
R-squared	0.68	0.76	0.90	0.68	0.82	0.55	0.69	0.70

Table 7. OLS results for combined governance measures

Ordinary least squares regressions of $\ln(\text{Tobin's } q)$ on different combined governance indices, with additional control variables as shown. Governance indices and other variables are defined in Tables 1 and 4. t -values, based on robust standard errors with firm clusters, are reported in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1% levels. Significant results (at 5% level or better) for principal variables are shown in **boldface**.

Pooled OLS (firm clusters)	ln(Tobin's q)			
	(1)	(2)	(3)	(4)
Quarter-averaged index	0.174*** [4.01]			
Quarter-averaged index (No RID)		0.207*** [5.14]		
Pooled index			0.164*** [4.57]	
Pooled index (No RID)				0.183*** [5.07]
Ln(RTS)	0.198*** [3.87]	0.256*** [4.33]	0.256*** [4.36]	0.254*** [4.21]
Ln(Assets)	-0.161*** [2.99]	-0.203*** [3.15]	-0.181*** [2.91]	-0.181*** [2.82]
Ln(No. of trades)	0.101*** [2.87]	0.099** [2.62]	0.100** [2.55]	0.095** [2.32]
Ln(Leverage)	0.793*** [5.42]	0.844*** [4.57]	0.803*** [5.20]	0.853*** [4.65]
Ln(Sales Growth)	-0.115 [1.51]	-0.154** [2.10]	-0.145* [1.97]	-0.141* [1.79]
MSCI Index Dummy	0.104 [0.77]	0.116 [0.87]	0.11 [0.76]	0.094 [0.63]
Ln(Net Income to Assets)	1.149** [2.32]	1.274** [2.34]	1.377*** [2.89]	1.371** [2.52]
Sector: Communication	-0.129 [1.13]	-0.218* [1.83]	-0.178 [1.60]	-0.177 [1.63]
Sector: Utilities	-0.485*** [4.82]	-0.485*** [4.33]	-0.487*** [4.98]	-0.486*** [4.53]
Sector: Extraction	0.412*** [3.08]	0.405*** [2.85]	0.382*** [2.68]	0.379** [2.56]
Constant	1.999* [1.74]	2.701** [2.09]	2.209* [1.71]	2.221* [1.71]
Index dummy: TROIKA			-0.027 [0.64]	-0.032 [0.73]
Index dummy: SPCG			-0.002 [0.02]	-0.008 [0.12]
Index dummy: S&P			-0.028 [0.56]	-0.03 [0.60]
Index dummy: ICLG			-0.052 [0.99]	-0.053 [0.97]
Index dummy: RID			-0.179** [2.28]	
Number of Observations	549	480	810	683
Number of firms	105	54	105	54
R-squared	0.69	0.73	0.70	0.73

Table 8. Summary Results for Ln(Tobin's q)

Coefficients on governance indices for ordinary least squares regressions, firm random effects, and firm fixed effects regressions of $\ln(\text{Tobin's } q)$ on different governance indices. Each cell gives the coefficient from a separate regression. Control variables are the same as in Table 6, except that (i) MSCI index dummy and sector dummies are omitted in firm fixed effects regressions; and (ii) only regressions (4-6) include $\ln(\text{capital intensity})$ as a control variable. Governance indices and other variables are defined in Tables 1 and 4. All regressions use robust standard errors; pooled OLS regressions use firm clusters. t - or z -values are reported in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1% levels. Significant results (at 5% level or better) are shown in **boldface**.

	(1)	(2)	(3)		(4)	(5)	(6)	
	Pooled OLS (firm clusters)	Firm Random Effects	Firm Fixed Effects	No. of obs.	Pooled OLS (firm clusters)	Firm Random Effects	Firm Fixed Effects	No. of obs
ln(capital intensity)		no				yes		
Brunswick	0.204*** [2.87]	0.252*** [3.28]	0.248*** [2.97]	95	0.271*** [2.93]	0.277*** [3.18]	0.209** [2.28]	68
TROIKA	0.191*** [6.54]	0.157*** [4.71]	0.138*** [3.74]	184	0.175*** [4.56]	0.149*** [3.91]	0.118** [2.57]	153
SPCG	0.099** [2.68]	0.099 [1.53]	0.048 [0.81]	34	0.072* [1.96]	0.072 [1.00]	0.06 [1.07]	32
S&P disclosure	0.240*** [3.43]	0.102** [2.03]	0.065 [1.09]	106	0.183** [2.21]	0.039 [0.80]	0.031 [0.56]	99
ICLG	0.207*** [3.50]	0.126*** [4.11]	0.112*** [3.48]	264	0.155*** [2.99]	0.096*** [3.36]	0.064** [2.28]	240
RID	0.108 [1.36]	0.009 [0.24]	-0.04 [0.96]	127	0.088 [1.08]	0.005 [0.15]	-0.04 [0.92]	126
Quarter-averaged index	0.174*** [4.01]	0.059*** [3.15]	0.060*** [3.11]	549	0.147*** [3.28]	0.044** [2.53]	0.044** [2.51]	491
Quarter-averaged index (no RID)	0.206*** [5.13]	0.081*** [4.02]	0.067*** [3.24]	480	0.180*** [4.17]	0.060*** [3.17]	0.044** [2.33]	423
Pooled index	0.164*** [4.57]	0.051*** [3.90]	0.052*** [4.12]	810	0.136*** [3.44]	0.034*** [2.88]	0.035*** [3.17]	683
Pooled index (no RID)	0.183*** [5.07]	0.072*** [4.85]	0.063*** [4.35]	718	0.155*** [4.02]	0.048*** [3.55]	0.039*** [3.00]	592

Table 9. Summary Results for Market/Book and Market/Sales

Coefficients on governance indices for ordinary least squares regressions, firm random effects, and firm fixed effects regressions of $\ln(\text{Tobin's } q)$ on different governance indices. Each cell gives the coefficient from a separate regression. Control variables are the same as in Table 7, except that MSCI index dummy and sector dummies are omitted in firm fixed effects regressions. Governance indices and other variables are defined in Tables 1 and 4. All regressions use robust standard errors; pooled OLS regressions use firm clusters. t - or z -values are reported in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1% levels. Significant results (at 5% level or better) are shown in **boldface**.

dep. variable	ln(market/book)				ln(market/sales)			
	No. of obs.	Pooled OLS (firm clusters)	Firm Random Effects	Firm Fixed Effects	No. of obs.	Pooled OLS (firm clusters)	Firm Random Effects	Firm Fixed Effects
Brunswick	95	0.480** [2.25]	0.674*** [2.84]	0.774*** [2.87]	87	0.013 [0.05]	0.277 [1.46]	0.243 [1.37]
TROIKA	184	0.606*** [3.72]	0.551*** [5.83]	0.527*** [5.10]	176	0.288** [2.37]	0.275*** [3.34]	0.239*** [3.18]
SPCG	34	0.586*** [4.37]	0.586*** [3.09]	0.351* [1.98]	34	0.268** [2.87]	0.162 [1.15]	0.268* [1.89]
S&P disclosure	106	0.685*** [3.18]	0.451*** [2.63]	0.295 [1.28]	106	0.173 [1.09]	0.062 [0.63]	0.042 [0.48]
ICLG	264	0.388** [2.64]	0.319*** [3.16]	0.290** [2.48]	255	0.270** [2.05]	0.103** [2.16]	0.106** [2.21]
RID	127	0.307 [1.32]	0.056 [0.72]	0.03 [0.36]	121	0.084 [0.66]	0.056 [0.73]	0.048 [0.76]
Quarter-averaged index	549	0.470*** [3.34]	0.180*** [2.79]	0.166** [2.41]	527	0.216** [2.07]	0.088** [2.35]	0.078** [2.13]
Quarter-averaged index (no RID)	480	0.571*** [3.94]	0.275*** [3.96]	0.236*** [3.24]	463	0.256** [2.28]	0.096** [2.44]	0.104*** [2.67]
Pooled index	810	0.136*** [3.44]	0.034*** [2.88]	0.035*** [3.17]	779	0.199** [2.02]	0.080*** [3.31]	0.073*** [2.85]
Pooled index (no RID)	683	0.155*** [4.02]	0.048*** [3.55]	0.039*** [3.00]	658	0.237** [2.27]	0.098*** [3.51]	0.106*** [3.66]

Table 10. Regressions with subindices

Coefficients on governance indices for pooled OLS, firm random effects, and firm fixed effects regressions of $\ln(\text{Tobin's } q)$ on sub indices of the Brunswick, Troika, S&P Disclosure, and S&P Governance indices. Control variables are the same as in Table 7, except that MSCI index dummy and sector dummies are omitted in firm fixed effects regressions. Governance indices and other variables are defined in Tables 1 and 4. All regressions use robust standard errors; pooled OLS regressions use firm clusters. t - or z -values are reported in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1% levels. Significant results (at 5% level or better) are shown in **boldface**.

dependent variable	Ln(Tobin's q)											
	Pooled OLS (firm clusters)				Firm Random Effects				Firm Fixed Effects			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Troika												
Ownership structure and transparency	0.066				0.088**				0.082*			
	[1.14]				[2.03]				[1.81]			
Oversight and control structure	0.098				0.021				0.033			
	[1.60]				[0.50]				[0.73]			
Management and investor relations	0.072				0.054				0.046			
	[1.55]				[1.37]				[1.14]			
Corporate conduct	-0.031				0.044				0.092**			
	[0.74]				[1.19]				[2.31]			
Information disclosure and financial discipline	0.186***				0.143***				0.096*			
	[3.56]				[3.07]				[1.87]			
Brunswick												
Transparency		0.012				0.043**				0.048**		
		[0.56]				[2.10]				[2.14]		
Dilution		-0.028				0.013				0.02		
		[1.28]				[0.77]				[1.21]		
Asset transfers / transfer pricing		0.079**				0.127***				0.148***		
		[2.59]				[5.62]				[5.92]		
Mergers / restructuring		0.003				-0.007				-0.005		
		[0.14]				[0.47]				[0.30]		
Bankruptcy		0.03				0.050*				0.063*		
		[0.94]				[1.79]				[1.83]		
Ownership restrictions		0.026				0.159				0.343**		
		[0.24]				[1.35]				[2.10]		
Corporate governance initiatives		0.060*				0.007				-0.028		
		[1.95]				[0.22]				[0.84]		
Registrar		0.351				0.044				0.121		
		[1.57]				[0.24]				[0.50]		
S&P Disclosure												
Ownership structure and investor relations			-0.006					0				0.006
			[1.24]					[0.07]				[1.32]
Financial and operational information			0.019***					0.006**				0.001
			[3.39]					[2.01]				[0.15]
Board and management structure and process			0					0				-0.002
			[0.07]					[0.02]				[0.54]
S&P Governance												
Ownership structure and influence				0.120**					0.120*			0.016
				[2.59]					[1.79]			[0.27]

Financial stakeholder rights and relations				-0.024 [0.27]					-0.024 [0.21]				0.049 [0.48]
Financial transparency and information disclosure				-0.025 [0.19]					-0.025 [0.26]				-0.195* [2.13]
Board structure and process				-0.003 [0.03]					-0.003 [0.03]				0.104 [0.94]
No. of observations	183	95	106	34	183	95	106	34	183	95	106	34	
No. of firms	50	23	44	11	50	23	44	11	50	23	44	11	
R-sq within					0.39	0.59	0.52	0.55	0.43	0.62	0.6	0.81	
R-sq between					0.77	0.62	0.65	0.98	0.31	0.27	0.11	0.1	
R-sq overall	0.77	0.76	0.73	0.91	0.72	0.62	0.66	0.91	0.23	0.31	0.11	0.28	

Figure 1: Corporate governance indices over time

Average interpolated standardized corporate governance scores for each governance index. All indices are standardized with mean =0; $\sigma = 1$, and positive scores indicating better governance. If a firm was ranked in quarter t with score R_t and next ranked in quarter $t+k$ with score R_{t+k} , we assign a score in quarter $t+i$ (for $t < t+i < t+k$) using linear interpolation: $R_{t+i} = [(k-i)*R_t + i*R_{t+k}]/k$. For each index, we then take average of interpolated standardized scores across firms in each quarter.

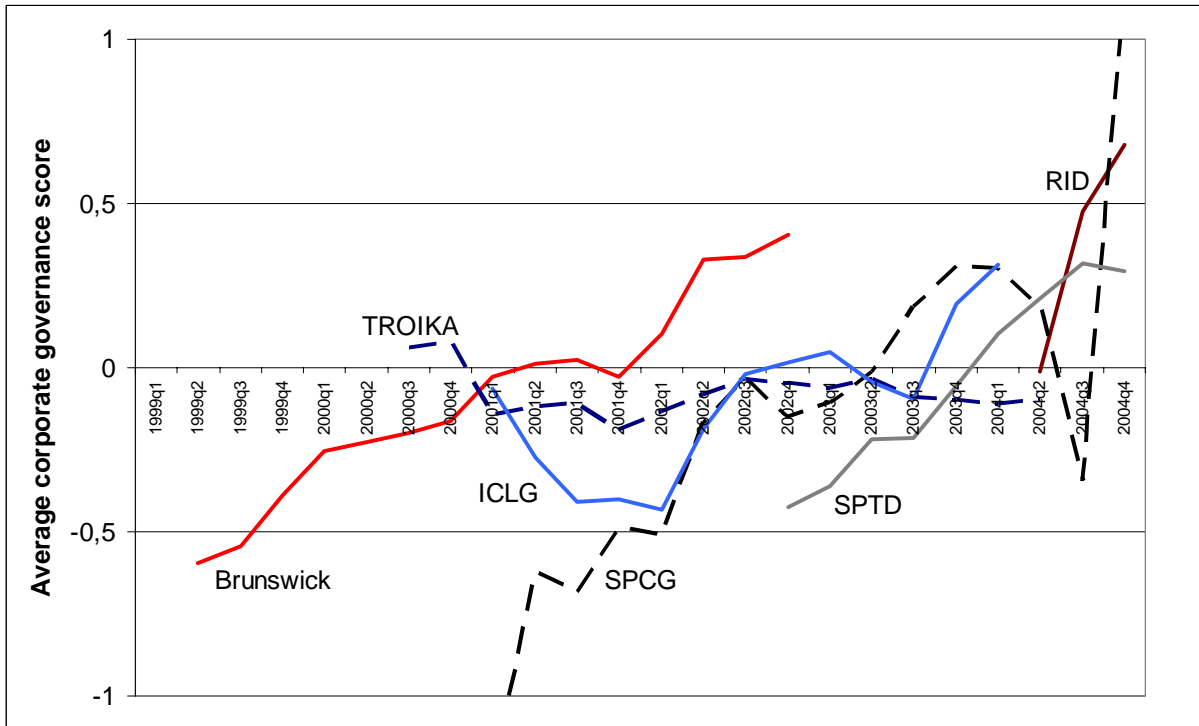


Figure 2: Average corporate governance growth

We calculate accumulated average corporate governance growth using two approaches. Under the first approach (red line) all rankings are standardized with zero mean and dispersion of one. Then we interpolate standardized scores using linear interpolation: if a firm was ranked in quarter t with score R_t and next time in quarter $t+k$ with score R_{t+k} , we assign score $R_{t+i} = [(k-i) R_t + i R_{t+k}] / k$ in quarter $t+i$. Under the second approach (blue line) we first interpolate original scores and then convert all rankings to Troika's scale using the fact that all rankings are correlated and Troika's ranking overlaps with all other rankings. The following steps are identical in both methods. For each firm we take average of all available rankings in a quarter, and calculate growth compared to previous quarter. Then we calculate average growth across firms and accumulated average growth. Shaded area corresponds to RTS index dynamics (right scale).

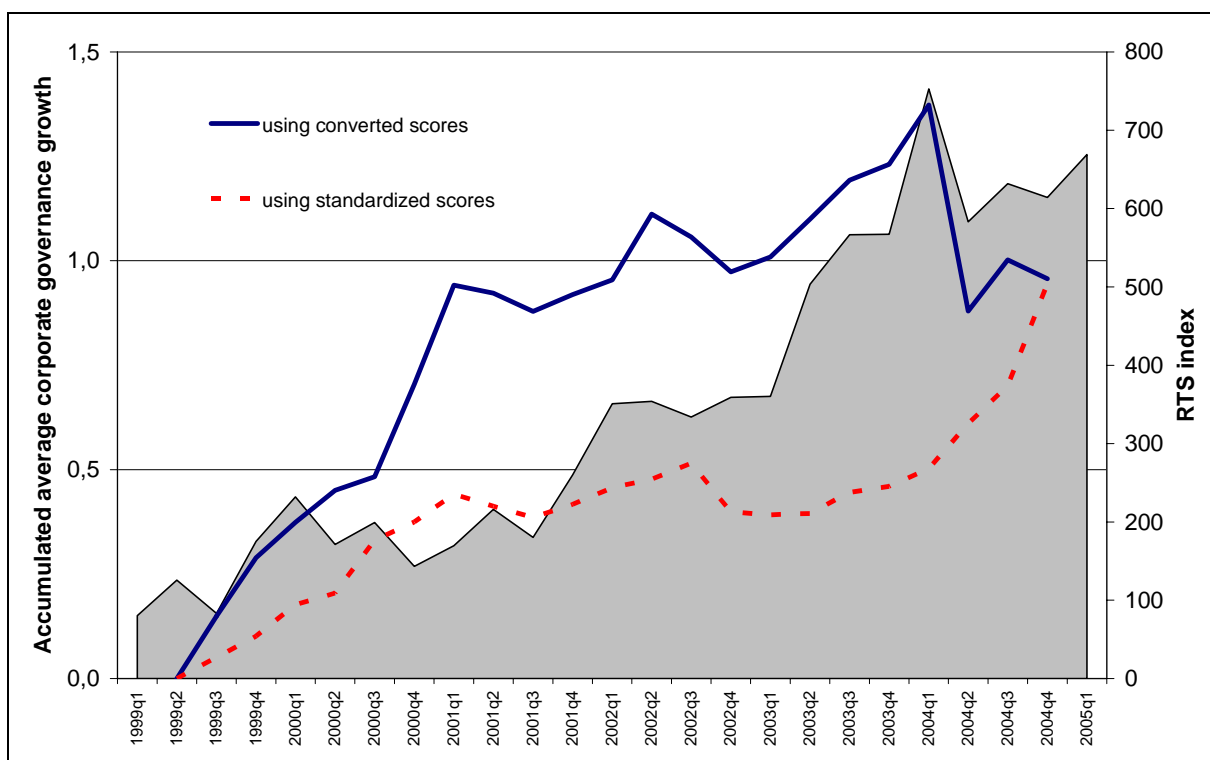


Figure 3. Scatter plot of (log) Tobin Q and aggregate governance index

The regression line is given by (t-statistics estimated with firm clusters in parenthesis):

$$\text{Ln(Tobin's } q) = 0.052 (0.58) + 0.136 (1.84) * (\text{quarter-averaged index})$$

