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"Global Financial Crisis, Ownership Change,
and Corporate Governance Evolution
Firm-Level Evidence from Russia"

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Global Financial Crisis, Ownership Change, and Corporate Governance Evolution*

Firm-Level Evidence from Russia

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Abstract: In this paper, using panel data of industrial firms obtained from unique questionnaire surveys conducted all over the Russian Federation in 2005 and 2009, we trace structural change in corporate governance systems before and after the global financial crisis and empirically examine their determinants. We found that, during this period, Russian firms improved the quality of corporate governance across the entire industrial sector. Furthermore, our empirical evidence strongly supports a hypothesis regarding the relationship between outside ownership and board composition as well as that concerning the impact of outside directorship on the audit system. Meanwhile, our estimation results also indicate the possibility that the global financial crisis has brought about asymmetric changes, in the sense that it enhanced the independence of corporate boards, while it deteriorated the independence of the audit system, thus, partially rejecting our prediction with respect to the disciplinary effect of the crisis on the corporate governance system.

JEL classification numbers: D22, G01, G34, M42, P34

Keywords: global financial crisis, ownership change, evolution of corporate governance, board composition, audit system, Russia

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1. Introduction

The economic shocks caused by the global financial crisis in 2008 were more severe in post-socialist emerging economies than in the US and Western Europe. In fact, as shown in **Figure 1**, the real GDP growth rates of the US and of the 15 European Union (EU) member countries were -2.8% and -4.5%, respectively, in the year 2009. Meanwhile, in the same year, Central and Eastern European countries and Russia recorded sizable negative growth rates of -6.1% and -7.8% respectively; the magnitude surpassed even the negative growth rate in Japan, which is regarded as one of the countries most strongly affected by economic fluctuations in the US and the EU.[1] This fact flatly refutes the so-called "decoupling theory," which says that emerging economies can be resilient from any economic deterioration in developed nations and, hence, the world economy will enjoy stable development driven by these growing markets. As a result, this historical event provided the impetus for researchers to direct their attention once again to the immaturity and vulnerability of the emerging economies.

In response to the above experience, Russian and foreign researchers have published several studies regarding how and to what extent the 2008 financial shock spread in Russia. Consequently, the whole picture regarding the damage to this country caused by this economic tragedy is growing increasingly clearer.[2] Iwasaki (2014a) is one of this series of research papers. It measured the exit rate of Russian industrial firms before and after the global financial crisis or, more specifically, during the period of 2005–2009 and conducted a survival analysis to identify factors that influenced the market exit. It found that the vast majority of exiting firms were forced to discontinue operation during the two years of 2008 and 2009. It is also verified that the quality of the corporate governance system observed in 2005 has a statistically robust and positive correlation with the subsequent survival probability. In this paper, we aim to tackle issues that present another side of the same coin dealt with in Iwasaki (2014a). Namely, we will examine what kind of changes occurred in the corporate governance system in surviving Russian firms and what factors caused these changes.

By achieving these research goals, we will make two contributions in the field of corporate finance and organizational economics. The first contribution will be to extensively describe time-series changes in the corporate governance system and empirically examine the

[1] Huang and Zheng (2012) classified the 2008 financial shock as the disturbing crisis, "which typically starts with a period of financial distress characterized by volatile fluctuations with a downward trend and follows by a sudden crash that may not necessarily mark the end of crisis" (p. 445).

[2] Representative research works of this kind include: Tabata (2009), Gaddy and Ickes (2010), Nefedova et al. (2010), Yakovlev et al. (2010), Kuznetsov et al. (2011), Osipian (2012), and Klapper et al. (2013).

relationship between this process of organizational evolution and various factors, including the ownership structure, taking Russian firms as a laboratory case. To date, several studies focusing on the evolution of corporate governance have been published. The majority of them, however, discussed basic principles of corporate governance and/or historical changes in national regulations.[3] In contrast, the number of studies that have reported diachronic changes in the corporate governance system using firm-level data has been extremely limited (Ezzine and Olivero, 2013; Black et al., 2014). Moreover, none of these few preceding studies has attempted to identify factors that drove that internal organizational evolution. In this paper, we will advance this undeveloped study area by conducting empirical analysis using a unique dataset of Russian industrial firms obtained from large-scale panel enterprise surveys conducted in 2005 and 2009.

This paper's second contribution will be to understand firm-level responses to an unprecedented macroeconomic shock such as the global financial crisis in 2008 from the viewpoint of its impact on the system of corporate governance. To the best of our knowledge, Chen (2014) is only preceding study to have tackled this issue in a straightforward manner.[4] Chen's paper compared the corporate governance system of Taiwanese listed companies during the three years (2005–2007) before the 2008 crisis with that during the three years ex post (2009–2011) and concluded that the global financial crisis had a disciplinary effect on Taiwanese corporate governance on the basis of its finding of the ex-post improvement.

As we will discuss later, we also predict that the global financial crisis has enhanced the independence of Russian firms' corporate governance bodies from top management; hence, we have no particular disagreement with the assertion of Chen (2014). However, the problem is that her empirical approach makes it impossible to separate companies that reformed their corporate governance system in response to the 2008 financial shock from other companies that did not. Therefore, Chen (2014) falls short of rigorously proving the corporate governance disciplinary effect of the crisis. In contrast, the 2009 follow-up survey, which was conducted in Russia by a team of Japanese researchers, included questionnaires designed to identify whether the surveyed firms drastically reformed their management and supervisory bodies and/or audit systems in response to the global financial crisis. Therefore, the survey results enable us to

[3] For instance, see Barca and Trento (1997), Redmond (2010), as well as Martynova and Renneboog (2011).

[4] Ezzine and Olivero (2013) is another study that discusses changes in the corporate governance system before and after the global financial crisis. This article, however, is designed to prove that companies with better corporate governance have better staying power in a crisis; thus, their empirical analysis does not aim to examine how the 2008 financial shock impacted the corporate governance system. Bekiaris et al. (2013) argue that the global financial crisis affected the audit system of Greek companies, but it fell short of quantitative analysis.

identify among the surveyed firms companies that actually took countermeasures against the crisis and to measure the genuine impact of the crisis on Russian corporate governance.

As Chen (2014) observed in Taiwan, we found that Russian firms improved the quality of corporate governance across the entire industrial sector before and after the global financial crisis. Moreover, empirical evidence in this paper strongly supports a hypothesis regarding the relationship between outside ownership and board composition as well as that concerning the impact of outside directorship on an audit system. Meanwhile, our estimation results also indicate the possibility that the 2008 crisis brought about asymmetric structural changes in the sense that it enhanced the independence of corporate boards, while it deteriorated the independence of the audit system and, accordingly, partially refutes our theoretical prediction with respect to the disciplinary effect of crisis on corporate governance.

The reminder of this paper is organized as follows: Section 2 describes structural changes in the ownership structure and corporate governance system in Russian firms before and after the global financial crisis. Section 3 presents our testable hypotheses, and Section 4 presents empirical analysis. Section 5 summarizes the major findings and concludes the paper.

2. Ownership Structure and Corporate Governance Systems in Russia before and after the Global Financial Crisis

In this section, we report the changes in the ownership structure and the system of corporate governance of Russian industrial firms before and after the global financial crisis. The underlying information was obtained from the enterprise questionnaire survey conducted in the first half of 2005 and a follow-up survey in the 4th quarter of 2009.

A joint Japanese-Russian research team consisting of staff members of the Institute of Economic Research, Hitotsubashi University (Tokyo), and the Institute for Industrial and Market Studies, Higher School of Economics (Moscow), administered the 2005 questionnaire survey. During the five months from February to June of that year, the research team dispatched professional interviewers from the Yuri Levada Analytical Center (the former USSR Public Opinion Poll Center of the Ministry of Labor) and its local branches to large and medium-sized industrial firms located in the 64 federal districts of Russia. Valid responses were received from the senior managers of 751 firms. The target companies were selected by the method of stratified sampling among joint-stock companies with 100 or more workers. The average number of workers in each surveyed company was 1,516 (median: 457). The total number of workers of the 751 surveyed firms was 1,138,609, which accounted for 8.0% of the average total workforce in the industrial sector through 2004, according to official statistics (Rosstat, 2005). Regarding the regional and sectoral composition of the surveyed firms, they formed a

representative sample of large and medium-sized Russian industrial firms.[5]

The follow-up survey was organized and performed by a team of Japanese researchers, again in cooperation with the Levada Center. In this survey, which took place between October and December of 2009, the Japanese research team confirmed whether the 751 firms surveyed in 2005 survived. Then, among surviving firms, we conducted a second questionnaire survey with almost the same questions used in 2005.

The survey results are summarized in **Figure 2**. As shown in this figure, among the 751 firms surveyed in 2005, the survival status of 741 firms was ascertained. Of these 741 firms, 637 firms (86.0%) survived without any drastic change in their company profile. As for the remaining 104 firms (14.0%), they had either completely disappeared, with their respective legal registrations having being terminated by the time of the survey, or had fallen into a virtual standstill, despite their existence as corporations.[6] We asked the 637 surviving firms to join our follow-up survey; 424 firms (or 66.6% of all surviving firms) accepted our request. The president (or CEO or general manager) and vice president accounted for 91.8% (389 persons) of the respondents. The remaining included 28 managers in charge of corporate governance issues (6.6%) and 7 board chairmen (1.7%). Valid responses were obtained from all of these 424 corporate executives. In the following part of this section, using a dataset of the surviving firms surveyed in 2009, we trace back structural changes in the ownership structure and corporate governance systems during the period from 2005–2009.

In the 2009 follow-up survey, we asked the surviving firms whether their ownership structure and corporate governance system had substantially changed during the past five years and, if so, whether and how such changes were related to the 2008 financial shock. Around 400 firms gave valid answers. As **Figure 3** shows, among the 390 surviving firms surveyed in 2009, 97 firms (24.9%) experienced a significant change in their ownership structure, including nine firms (2.3%) that reported such change had been triggered by the 2008 crisis. Similarly, 183 firms (45.3%) of the 404 surveyed firms recognized a drastic change in their management and supervisory bodies (the board of directors, in particular), including 20 firms (5.0%) reporting that such changes represented organizational reform as their countermeasure against the crisis. Furthermore, 139 firms (34.5%) of the 403 firms acknowledged a substantial change in their audit system, including 13 firms (3.2%) reporting that this change was closely related to the crisis. As seen from the above, more than a few Russian firms experienced great changes in their ownership structure and/or in their corporate governance system from 2005–2009, and it has been revealed that these changes were driven in part by the global financial crisis.

[5] For more details on the 2005 survey, see Dolgopyatova et al. (2009, Appendix).

[6] For more details on these 104 exit firms, see Iwasaki (2014a).

Nevertheless, the number of firms that took concrete action in response to the 2008 crisis is much smaller than expected.

Table 1 gives definitions of the variables used in the empirical analysis in this paper as well as descriptive statistics by data type. As shown in Panel (a) of **Table 1**, the structure of the board of directors and its relevant time-series change are identified using nine variables, from the outsideness of the board chairman (*BOALEA*) to the total number of worker representative directors (*WORDIR*) plus the first principal component score for these nine variables (*BODSCO*). Meanwhile, as indicated in Panel (b) of the same table, the structure of the audit system and its diachronic change are identified using nine variables, from the proportion of outside auditors (*AUDCOM*) to the total number of worker representative auditors (*WORAUD*) plus their first principal component score (*AUDSCO*).[7]

Figure 4 shows the direction of structural change in the corporate governance system of the surviving firms surveyed in 2009 using the above 20 variables. As seen from this figure, the probability of organizational change substantially differs, depending on the type of variables. More specifically, in terms of variables related to the board chairman, independent directors, worker representative directors, expert auditors and audit firms as well as total members of the audit committee (*AUDMEM*), more than half of the surviving firms surveyed in 2009 did not go through any changes during the period of 2005–2009. In contrast, in terms of variables related to outside directors, inside directors, outside auditors, worker representative auditors and inside auditors as well as the total number of board of director members (*BOAMEM*), a majority of the surviving firms experienced at least some change. As a result, the proportion of firms in which *BODSCO* increased exceeds by 8.2% those in which *BODSCO* decreased. The same holds true for *AUDSCO*, with the former exceeding the latter by 8.3%. Judging from the respective eigenvectors of the first principal components, higher principal component scores can be interpreted as representing strengthened organizational independence of the board of directors and the audit system from top management. Therefore, we can say that Russian firms that strengthened the independence of their corporate governance system during the five-year period before and after the global financial crisis slightly outnumbered those that lessened it.

Figure 5 illustrates time-series structural changes in the corporate governance system in a more detailed manner. Panels (a) and (b) of **Figure 5** show kernel density estimates of variables in the panel data for the years 2005 (green dashed line) and 2009 (red solid line), while Panels (c) and (d) of the same figure represent kernel density distributions of the difference data obtained by subtracting each value of the 2005 variables from the corresponding value of the 2009 variables. As shown in these graphs, the density distribution

[7] For the main results of the principal component analysis, see Supplement 1.

of the proportion of outside directors (*BOACOM*) and that of the proportion of independent directors (*BOAIND*) reveal a particularly substantial difference between the two years in the direction of strengthening the independence of the board of directors. As for the audit system, density distributions of the proportion of outside auditors (*AUDCOM*), the proportion of expert auditors (*AUDEXP*), the proportion of worker representative auditors (*AUDWOR*) as well as the total number of outside auditors (*OUTAUD*) indicate a similar tendency to that observed in the corporate boards. Consequently, a substantial change between 2005 and 2009 is also confirmed both in the distribution of *BODSCO* and *AUDSCO*. In this regard, however, as shown in the density distributions of the difference data, movements in the opposite direction are far from being weak; thus, we argue that Russian firms experienced complex structural changes in their corporate governance system.

Next, we examined whether the independence of corporate governance bodies improved in the entire industrial sector. **Table 2** gives the results. Here, using the means and the differences of the 2005 and 2009 data of the surviving firms surveyed in 2009, we performed a *t* test of the hypothesis that the independence of the corporate board and the audit system improved during the observation period.[8] As this table shows, the hypothesis is supported in the cases of variables related to outside directors and independent directors and those related to outside auditors and expert auditors as well as *AUDMEM* and *AUDSCO*. On the other hand, the *t* test cannot reject the null hypothesis in terms of the remaining 10 variables. These results correspond with the findings shown in **Figures 4** and **5**.

As indicated in Panel (c) of **Table 1**, we employed ownership shares of outside shareholders (*OWNOUT*) and a large management shareholder dummy (*MANSHA*) to grasp any changes in the ownership structure of Russian firms. According to **Figure 6**, which shows the kernel density estimates of these two ownership variables, the ownership share of outside shareholders increased during the period of 2005–2009, while the management teams of a certain number of firms lost the status of large shareholders. Namely, Russian firms as a whole have shifted their ownership structure to a more open one during the past five years.

Does a close relationship exist between a change in ownership structure and change in the corporate governance system observed in the surviving firms? How did companies that had been forced to deal with the global financial crisis reform their corporate boards and audit

[8] From this point of view, we tested the hypothesis that the respective total numbers and proportions of worker representative directors, inside directors, worker representative auditors, and inside auditors decreased during the observation period, while, in terms of the remaining variables, we tested the hypothesis that the value of the respective variables increased. As for the rationale for using the number of directors as an index for corporate governance independence, see Boone et al. (2007) and Linck et al. (2008).

systems? In the next section, we will present testable hypotheses for empirical analysis through theoretical considerations regarding factors that influence the structure of the corporate governance system of Russian firms and drive its evolution.

3. Hypothesis Development

In Russia, the corporate governance system of a joint-stock company is prescribed by the provisions of the Civil Code and the Federal Law on Joint-Stock Companies (Law on JSCs) and is supplemented by the Corporate Governance Code.[9] **Figure 7** illustrates the structure of the corporate governance system of Russian joint-stock companies.

According to Russian corporate law, the number and appointment of board members are determined exclusively by an ordinary resolution of a shareholder meeting (Law on JSCs, Art. 48(1), Para. 4). Nevertheless, there are strict legal requirements as to the minimum number of directors.[10] There is no statutory upper limit. The term of office for directors is one year (defined as the date of appointment to the date of the next annual shareholder meeting), and all director seats must be contested at a regular shareholder meeting (Art. 47(1)). Every shareholder who holds one-fiftieth or more of the total issued shares (2% or more voting equity) has a right to nominate directors (Art. 53(1)). Shareholders with one-tenth or more of the total issued shares also have the right to convene an extraordinary shareholder meeting and file a motion seeking the replacement of incumbent directors (Art. 55(1)). A board chairman is elected from among the directors approved at a shareholder meeting by a simple majority (Art. 76(1)).

The Law on JSCs prohibits the top manager (single executive organ in **Figure 7**) from serving as his company's chairman of the board. It also prevents members of the collective executive organ, consisting of senior managers, from accounting for one-fourth or more of the board membership (Law on JSCs, Art. 66(2)). The Law on JSCs, however, includes no provision preventing the board chairman from being elected from among inside directors.

[9] These provisions refer to Part I, Chapter 4 (Art. 96 to 104) of the Civil Code of November 30, 1994 (effective January 1, 1995), the Federal Law on Joint-Stock Companies of December 26, 1995 (effective January 1, 1996), and the resolution of the Federal Commission for the Securities Market (dated April 4, 2002) regarding the recommendation to adopt the Corporate Governance Code. This section was written while taking into account the laws and regulations that were in effect during the period of 2005–2009.

[10] More concretely, companies with fewer than 1,000 voting shareholders must have no fewer than 5 directors; those with 1,000 or more but fewer than 10,000 voting shareholders must have no fewer than 7 directors; and those with 10,000 or more voting shareholders must have no fewer than 9 directors (Law on JSCs, Art. 66(3)).

Moreover, neither the Civil Code nor the Law on JSCs contains any regulation regarding the number of outside directors and independent directors (Muravyev et al., 2014). The CG Code has a mandate that joint-stock companies should include in their articles of incorporation the provision that they have at least three independent directors who account for no less than one-fourth of the board membership (Section 2.2.3). However, the code has not had a significant effect because it is a government decree with no legal binding force. Accordingly, there are only a limited number of Russian companies that organize their board of directors in compliance with the code (Iwasaki, 2008, 2009). In other words, it is up to the discretion of Russian firms to determine the personnel attributes of their corporate boards.

Russian corporate law does not encourage companies with board committees, such as those established in the US and many European countries. Rather, as in Japan and Italy, it has adopted an institutional design in which an audit committee is established under the general shareholders as a statutory company body of corporate auditors (Civil Law, Art. 103 and Law on JSC, Art. 85). All joint-stock companies in Russia are required to establish an audit committee. The law does not regulate the number of members composing the audit committee. Appointing auditors is an exclusive right exercised at the general shareholder meeting; it is an ordinary matter of resolution that cannot be delegated to the board of directors or an executive body (Law on JSC, Art. 48(1)). As with board members, the auditor's term of office is one year; all auditor seats must be contested every year at a regular shareholder meeting (Art. 47(1)). There is no special provision concerning outside auditors. A shareholder who possesses 2% or more of the voting shares has the right to propose auditor candidates at a general shareholder meeting. Meanwhile, when no shareholder proposes an auditor candidate or the number of auditor candidates necessary for the resolution of the general shareholder meeting cannot be ensured, the Law on JSCs allows the board of directors to propose auditor candidates selected at their discretion at a general shareholder meeting.

Further, the Law on JSCs stipulates that the external auditor is approved (not "selected") at the general shareholder meeting, and the compensation for this duty is determined by the board of directors (Art. 86(2)). Although the Law on JSCs does not clearly specify who has the right to submit a proposal for the selection of an external auditor at the general shareholder meeting, it is obvious from this provision that the board of directors is delegated the right to pre-negotiate with external auditor nominees on behalf of the company. Therefore, it is presumed that the board of directors has such a power. In fact, in almost all cases that we investigated, the general shareholder meeting approved the external auditor based on a proposal of the board of directors (Iwasaki, 2014b); this is a daily practice in the Russian

business world.[11]

Figure 8 illustrates the decision-making mechanism of the corporate governance system in Russian firms based on the preceding information. As this figure indicates, there is no doubt that the general shareholder meeting is the primary avenue for deciding the board's composition. However, the organizational structure of the audit system is basically determined by the board of directors, as long as there is no serious conflict of interest between shareholders and board directors.

According to a series of earlier studies that examined the determinants of board composition (Coles et al., 2008; Linck et al., 2008; Lehn et al., 2009) and Iwasaki (2008, 2009), which conducted empirical analysis of Russian firms from the same perspective, shareholding by outside investors enhances the independence of the board of directors in their investing firm, as predicted by the principal-agent theory. This is true because outside shareholders, with the aim of maximizing their equity value, have a strong incentive to monitor and supervise top management of their company through the corporate board to prevent mismanagement and opportunistic behaviors by company officers. Static empirical results from these earlier studies can be applied to explain dynamic structural changes in board composition. In other words, we predict that an additional increase in ownership by outside shareholders will have the positive effect of further raising the board of directors' independence. These arguments lead us to the following hypothesis:

H_{1a}: Ownership by outside shareholders is positively correlated with the independence of the board of directors;

H_{1b}: Additional share acquisition by outside shareholders/investors enhances the independence of the board of directors.

As discussed above, the board of directors in a Russian joint-stock company has the legal authority to play an active role in the process of establishing the audit system. Moreover, outside directors, who are elected to incorporate outside shareholders' interests into corporate management, tend to seek much stricter standards of auditing and accounting, as compared to inside directors. This tendency is also bolstered by their personal motives for maintaining and enhancing their reputations as agents for the shareholders and for avoiding shareholder lawsuits due to their negligence of duty (Adams, 1997; Beasley and Petroni, 2001; Cotter and Silvester, 2003; Ruiz-Barbadillo et al., 2007). In fact, Iwasaki (2014b), along with the preceding studies, also strongly suggests that board composition is an effective predictor for the independence of the audit system in Russian firms. Based on these discussions and from

[11] See Iwasaki (2007) for the entire legal structure of the corporate governance system in Russian joint-stock companies.

the above-mentioned dynamic point of view, we propose the following hypothesis:

H_{2a}: The proportion of outside directors is positively correlated with the independence of the audit system;

H_{2b}: An additional increase in the proportion of outside directors further promotes the independence of the audit system.

It is inevitable that a management team will come into conflict with shareholders and/or outside directors regarding the allocation of management's discretionary power. As shown in **Figure 8**, and as repeatedly pointed out in previous studies, such as those by Hermalin and Weisbach (1998) and Boone et al. (2007), top managers use their bargaining power to resist any action that would strengthen the corporate governance system and limit management's decision-making authority. In Russia, it is well known that company presidents and other management executives tend to engage in fierce conflicts with outside shareholders and/or outside directors over the company's management policies (Filatotchev et al., 1999; Dolgopyatova et al., 2009). Accordingly, taking into account the fact that management teams of Russian firms are often large shareholders of their firms, we test the following hypothesis:

H_{3a}: The presence of a management team as a large shareholder is negatively correlated with the independence of the corporate governance system;

H_{3b}: The rise of a management team as a large shareholder undermines the independence of the corporate governance system in their own company.

As mentioned in the Introduction, Chen (2014) is the only previous study that directly addressed the issue of how the corporate governance system evolved during the global financial crisis. On the grounds of previous studies, including that of Perry and Shivdasani (2005), which reported that firms with a majority of outside directors on the board are more likely to initiate firm restructuring measures when company performance is poor, Chen (2014) predicted that "[a]fter coping with the rigorous business conditions during a financial crisis, increasing board independence after the financial crisis is a likely result," (p. 6) and empirically verified this hypothesis using data of 797 Taiwanese listed companies.

Meanwhile, Suvankulov and Ogucu (2012) examined the relationship between the corporate governance and firm performance of 177 Russian listed firms in the period of the global financial crisis. They detected a statistically significant and negative relationship between the corporate governance quality index in the year 2007 and a decline in stock prices and Tobin's Q during the 2008 crisis and concluded that Russian firms that have established a good corporate governance system could effectively prevent their business from worsening

during the crisis.[12]

The empirical finding of Suvankulov and Ogucu (2012) is highly conformable with the research outcomes of Iwasaki (2014a), which verified that the independence of corporate boards and audit systems has a robust and positive correlation with the survival probability of Russian firms during the period from 2005–2009. In this way, if better corporate governance was effective both for firm survival and the prevention of worsening firm performance during the crisis period, it is natural to predict that Russian firms that decided to reform their internal organizations in the wake of the 2008 financial shock are more likely to improve the independence of their corporate governance bodies. That is to say:

H_4: Both the board of directors and the audit system become more independent in a company that reforms the corporate governance system as a countermeasure against the global financial crisis.

As demonstrated in **Figure 8**, other factors related to firm organization and/or management activities are also likely to have a certain impact on the corporate governance system. For this reason, we controlled for these aspects when we empirically examined the above hypotheses. More specifically, we focused on the following five factors related to firm organization as potential determinants of the corporate governance system in Russian firms: (a) affiliation with a business group through stock ownership; (b) restrictions on ownership shares by the articles of incorporation; (c) choice of corporate form; (d) organizational legacy of former socialist firms; and (e) company size. We also gave attention to the following four factors related to management activities: (a) efficiency of management and production activities; (b) fund procurement from the capital market and financial institutions; (c) business internationalization; and (d) R&D/innovation intensity.

Points in the discussion regarding the impact of firm organization–related factors on the independence of corporate governance bodies include: (a) Russian firms that belong to a business group through stock ownership tend to have more independent corporate governance bodies than do so-called independent firms, *ceteris paribus*; (b) In cases where the articles of incorporation include a provision that stipulates a certain upper limit on shareholding, this provision discourages the appointment of outside directors by putting restraints on voices from outside shareholders; (c) Open joint-stock companies have stronger intentions to construct more open corporate governance systems, as compared to closed joint-stock companies and

[12] However, with regard to the relationship between corporate governance and stock prices/firm performance during the 2008 crisis, studies of developed economies and those of financial institutions do not necessarily report empirical findings similar to those of Suvankulov and Ogucu (2012). For instance, see Aebi et al. (2012), Erkens et al. (2012), and Gupta et al. (2013).

limited liability companies; (d) A company that originated from socialist enterprises, or more concretely, privatized companies and state-owned (municipal) companies or spin-off firms from privatized companies, has a strong tendency to form a closed internal organization as a result of the historical inertia in its organizational culture from the Soviet era and its privatization policies designed in favor of insiders; (e) It has been proven repeatedly in a number of preceding studies that the corporate governance system tends to be more independent with the expansion of company size.

In connection with the impact of management activity–related factors, the following arguments can be made: (a) Irrespective of the differences in countries and periods, many empirical studies have found that the pressure to supervise management executives is relaxed in well-performing companies; (b) Issuances of shares or bonds in the capital market and fund procurement from financial institutions inspire the relevant company to adopt an open corporate governance system that improves business transparency; (c) For the same reason, business internationalization has a similar effect to fund procurement; (d) On the other hand, R&D/innovation intensity tends to increase the need to evaluate management performance based on decision-making quality instead of financial performance because this kind of business activity carries technological uncertainty and high risk. Only in-house personnel are able to make this sort of performance evaluation. Accordingly, R&D/innovation intensity is negatively related to the independence of corporate governance bodies from management.

It is interesting to examine whether the arguments concerning the effect of firm organization and management activities on the corporate governance system could be reproduced or not during the 2008 global financial crisis.[13]

Table 3 summarizes our theoretical prediction based on the above discussions. In the next section, we empirically examine these hypotheses.

4. Empirical Analysis

In this section, we empirically examine our testable hypotheses presented in the previous section. First, Subsection 4.1 describes the empirical methodology. Then, Subsection 4.2 reports estimation results. Finally, in Subsection 4.3, we discuss the possible influence of omission bias caused by the dropping out of a percentage of the surviving companies from the

[13] Iwasaki (2008, 2009, 2014b) provides more detailed arguments about the effects of firm organization– and management activity–related factors. Moreover, referring to theoretical considerations and empirical results of the latest studies, including those of Monem (2013), Rizzotti and Greco (2013), Baldenius et al. (2014), Fraile and Fradejas (2014), and Hsu et al. (2015), is also valuable.

2009 follow-up survey on the estimation results.

4.1 Empirical Methodology

To test our hypotheses, we estimated a panel model and a difference model, both of which take the corporate governance structure as a dependent variable. Let us denote by y_{it} the corporate governance structure of the *i*-th firm in the year of *t*. Then, the panel model can be expressed in the following equation:

$$y_{it} = \mu + \sum_{j=1}^{n} \beta_j x_{ijt} + \sum_{k=1}^{m} \gamma_k z_{ik} + \varphi_l + \omega_i + \varepsilon_{it}, i = 1 \dots N, t = 2005, 2009, \quad (1)$$

where μ denotes a constant term; β and γ denote parameters to be estimated; x is a time-varying independent variable, and z is a time-invariant independent variable; φ and ω denote, respectively, the fixed effects of the industry to which the *i*-th firm belongs and the firm-level individual effect; ε is an error term.

Meanwhile, the difference model, which is designed to analyze structural changes between two different times $(\Delta y_{it} = y_{i2009} - y_{i2005})$ can be expressed in the following equation:

$$\Delta y_{it} = \sum_{j=1}^{n} \delta_j \Delta x_{ijt} + \Delta \varepsilon_{it}\,, \quad (2)$$

where δ represents a first-difference parameter to be estimated, while $\Delta x_{ijt} = x_{ij2009} - x_{ij2005}$, and $\Delta \varepsilon_{it} = \varepsilon_{i2009} - \varepsilon_{i2005}$. As Equation (2) indicates, the difference model excludes any time-invariant variables and fixed effects, namely z, φ, and ω, as well as the constant term μ.[14]

Into the left-hand side of the above regression equations, we introduced a total of 20 types of variables, from outsideness of the chairman of the board of directors (*BOALEA*) to the first principal component score for the audit system–related variables (*AUDSCO*) as described in Section 2. As defined in **Table 1**, *BOALEA* and audit firm attribute (*AUDFIR*) are ordinal variables, while 10 types of variables that represent the number of directors/auditors are count data. Accordingly, we applied an ordered probit estimator to the panel models when the former serves as the dependent variable and the Poisson estimator to the panel models that take the latter as the dependent variable. Additionally, for panel estimation of these ordered probit and Poisson models, we made a selection among the pooling estimator, the random-effects estimator, and the fixed-effects estimator in accordance with results from the Hausman test and the Breusch-Pagan test, in which estimates of a linear model are used. Furthermore, when the

[14] Needless to say, the difference model also removes unobservable time-invariant factors.

remaining eight continuous variables were utilized as a dependent variable, the estimator was selected from the pooling OLS, the linear random-effects estimator, and the linear fixed-effects panel estimator, in accordance with the model specification tests mentioned above. Meanwhile, we applied the OLS estimator to the difference model.

To test hypotheses $H_{1a/b}$, $H_{2a/b}$, and $H_{3a/b}$, we introduced, respectively, the ownership shares of outside shareholders (*OWNOUT*), the proportion of outside directors (*BOACOM*), and a large management shareholder dummy (*MANSHA*) into the right-hand side of the regression equations. To test hypothesis H_4, as shown in Panel (d) of **Table 1**, we used two global financial crisis–related variables consisting of a dummy for the firms that made significant changes in management and supervisory bodies in response to the crisis (*CRISIS_BOD*) and a dummy for the firms that made significant change in their audit system in response to the crisis (*CRISIS_AUD*).

As discussed in the previous section, we simultaneously controlled for other factors with respect to firm organization and management activities that may affect the corporate governance structure. More specifically, we employed six types of firm organization–related variables from a business group member dummy (*GROFIR*) to the average number of employees (*COMSIZ*) and another six types of management activity–related variables from labor productivity (*LABPRO*) to a dummy for the development of new products and services (*NEWPRO*) as defined in Panel (e) and (f), respectively, of **Table 1**.

GROFIR, a dummy for firms with upper limits on ownership shares (*LIMOWN*), and an open joint-stock company dummy (*OPECOM*) are introduced to capture the effects of affiliation with a business group, restrictions on ownership shares by the articles of incorporation, and establishment of an open joint-stock company as the corporate form, respectively. A dummy for privatized companies (*PRICOM*) and a dummy for spin-off firms from a state-owned (municipal) company or privatized company (*SPIOFF*) are used to examine the impact of the organizational legacy of former socialist firms. *COMSIZ* and *LABPRO* are used as proxies for company size and the efficiency of management and production activities, respectively. A dummy for firms that issued shares or bonds overseas or in the domestic stock exchange (*MARFIN*) and an ordinal variable of the use of bank credits and their average lending period (*BANCRE*) are employed to detect the effect of fund procurement from the capital market and financial institutions. The share of exports in total sales (*EXPSHA*) expresses the degree of business internationalization, and both R&D expenditure intensity (*R&DEXP*) and *NEWPRO* are utilized to control for R&D/innovation intensity.

For the empirical examination of the testable hypotheses in this paper, it is essential to perform regression analysis with appropriate consideration of a possible survival bias that

might be caused by the use of samples that were not forced to exit the market during the observation period. In order to deal with this problem, we used the panel data comprising not only the observations of the surveyed firms surviving in 2009, but also those of the exit firms in the year 2005 to estimate Equation (1). Meanwhile, with regard to Equation (2), the Heckman two-step estimation method was used. Specifically, we estimated a probit model of firm survival probability as the first step; then, in the second step, we added the inverse Mills ratio to the right-hand side of Equation (2) to control for the survival bias. If the coefficient of the inverse Mills ratio is statistically different from zero, a survival bias is judged to be present. In the following subsection, we report the survival bias test results together with those of the testable hypotheses.

4.2 Estimation Results

Panel (a) of **Table 4** shows estimation results of Equation (1) that take board of director–related variables as the dependent variables. As this panel shows, in eight of the 10 models, *OWNOUT* is estimated with statistical significance of 10% or less, and the signs of these significant coefficients are all in line with hypothesis H_{1a}. Thus, if other conditions are the same, a Russian firm with a larger ownership share of outside shareholders tends to organize its board of directors in which the *BOACOM*, the total number of board of director members (*BOAMEM*), the total number of outside directors (*OUTDIR*), and the total number of independent directors (*INDDIR*) are larger and, in contrast, in which the proportion of worker representative directors (*BOAWOR*), the total number of inside directors (*INSDIR*), and the *WORDIR* are smaller. As a result of these traits, there is a clear tendency that, Russian firms with more outside investors as shareholders have higher first principal component scores (*BODSCO*), which serves as a comprehensive index of the independence of a corporate board. Meanwhile, *MANSHA* shows a significant and negative estimate in the models with *BOALEA*, *BOACOM*, *OUTDIR*, *INDDIR*, and *BODSCO* as the dependent variables, while a significant and positive estimate in the model takes *INSDIR* in the left-hand side. These results, therefore, strongly support hypothesis H_{3a} in terms of the board of directors.

According to Panel (b) of **Table 4**, which reports estimation results of Equation (1) with an audit system–related variable serving as the dependent variable, *BOACOM* has a significant estimate in seven of the 10 models. In addition, this variable is positively related to the proportion of outside auditors (*AUDCOM*), *AUDFIR*, and the total number of outside auditors (*OUTAUD*) and negatively related to the proportion of worker representative auditors (*AUDWOR*), the total number of inside auditors (*INSAUD*), and the total number of worker representative auditors (*WORAUD*). On balance of these effects, *BOACOM* is positively correlated with the first principal component score (*AUDSCO*) at a 1% significance level. In

this sense, these estimation results strongly verify hypothesis H_{2a}. *MANSHA* is negatively correlated with *AUDCOM*, the total number of audit committee members (*AUDMEM*), *OUTAUD*, the total number of expert auditors (*EXPAUD*), as well as *AUDSCO* with statistical significance at the 10% level or less. These results, combined with the negative effect on the independence of the board of directors, empirically support hypothesis H_{3a}.

In contrast to the estimates of ownership variables and *BOACOM*, those of global financial crisis–related variables produced surprising results: In Panel (a) of **Table 4**, *CRISIS_BOD* shows a significant and positive coefficient in the model that employs *INDDIR* as the dependent variable, while it is significant and negative in the model with *WORDIR* in the left-hand side, suggesting that Russian firms that made significant changes in their management and supervisory bodies as countermeasures against the global financial crisis were more likely to appoint a larger number of independent directors and to set up the board of directors with a smaller number of worker representative directors, *ceteris paribus*. In this sense, the significance estimates of *CRISIS_BOD* correspond with hypothesis H_4.

On the other hand, in Panel (b) of **Table 4**, *CRISIS_AUD* is negatively correlated with *AUDCOM*, *OUTAUD*, *EXPAUD*, and *AUDSCO*; at the same time, it is positively related to *AUDWOR* and *WORAUD*. These results demonstrate the possibility that, in contradiction to hypothesis H_4, Russian firms that drastically reformed their audit systems in response to the 2008 financial shock have formed audit committees whose independence from management is relatively weak, as compared to other firms.[15] The estimation results of the panel models, however, cannot necessarily capture the direction of organizational changes in response to the crisis. Therefore, for the sake of more rigorous judgment of hypothesis H_4, we need to leave it to the estimation results of difference models.

Therefore, let us turn our attention to **Table 5**, which gives estimation results of Equation (2) based on the Heckman two-step estimation method.[16] In Panel (a) of this table, *OWNOUT* shows a significant and positive sign in the models that use *BOACOM*, *OUTDIR*, and *BODSCO* as the dependent variables, while it shows a significant and negative sign in the models with *INSDIR* and *WORDIR* on the left-hand side. Meanwhile, *MANSHA* is estimated to

[15] As shown in Supplement 2, the estimation results above are rarely different from the case in which we used only observations of the surviving firms surveyed in 2009.

[16] In the all models reported in **Table 5**, the first-step probit estimation of firm survival probability utilized ownership variables, firm organization–related variables, management activity–related variables, as well as dummies for industry fixed effects as independent variables. The rate of right discrimination reaches 83.42%. In addition, the Pearson goodness of fit test has accepted the null hypothesis that predicted values fit the distribution of observations (χ^2=368.94, p=0.334). Therefore, we evaluated that the inverse Mills ratio obtained from the first-step estimation is sufficiently capable of adjusting for possible survival bias.

be positively related to *INSDIR* and negatively related to *BOALEA*, *BOACOM*, *OUTDIR*, and *BODSCO*. These results strongly support hypotheses H_{1b} and H_{3b} in the sense that additional share acquisition by outside shareholders contributes to enhancing the independence of the corporate board, while the rise of a management team as a large shareholder has the opposite effect on board composition, as compared with outside shareholders.

Furthermore, Panel (b) of **Table 5** shows that *BOACOM* is significant and positively correlated with *AUDCOM* and *AUDSCO*, while it is negatively correlated with *AUDWOR*, *INSAUD*, and *WORAUD*. These results can be regarded as supporting evidence for hypothesis H_{2b}, which predicts that a marginal increase in the independence of a corporate board further promotes independence of the audit system. On the other hand, among the 10 types of audit system–related variables, *MANSHA* is significant and negatively related to *AUDFIR* alone; therefore, it is hard to say that our estimation results strongly support hypothesis H_{3b}.

With regard to the global financial crisis–related variables, their estimates of the difference models clearly exhibit asymmetric impacts on the board of directors and audit system, just like those of the panel models reported in **Table 4**. In fact, Panel (a) of **Table 5** shows that *CRISIS_BOD* is estimated with a significant and negative coefficient in models that introduce *BOAWOR* and *WORDIR* into the left-hand side, suggesting that a Russian firm that has reorganized its board of directors in the wake of the global financial crisis is more likely to have reduced worker representative directors by 1.045 people, on average, while their proportion to the board of directors declined by 13.2%.

On the other hand, Panel (b) of **Table 5** indicates that *CRISIS_AUD* is estimated to be negatively related to *AUDCOM* and *OUTAUD* and positively related to *AUDWOR*, with statistical significance at the 5% level. In other words, a Russian firm that embraced drastic reform in its audit system in response to the 2008 financial shock reduced outside auditors by 1.517 people, on average; as a result, they decreased their proportion to all auditors by 42.6%, while at the same time, the firm increased the proportion of worker representative auditors by 42.3%, or almost the same level but in the opposite direction. As a result, a significant and negative correlation is present between *CRISIS_AUD* and *AUDSCO*. This means that Russian firms that implemented significant changes in their audit systems to cope with the crisis are highly likely to have undermined the independence of their audit committees. In this sense, hypothesis H_4 is strongly rejected in the case of the audit system.

Furthermore, **Table 5** shows that the estimation results of the inverse Mills ratio are not statistically significant, except for the only model in which *BOAMEM* was used as the dependent variable. Therefore, it is reasonable to judge that survival bias has virtually no influence on our estimation results, or it is very minor.

Finally, based on estimation results of the control variables, we point out the following

seven features: First, a Russian firm that belongs to a business group has a more independent corporate governance system as compared to a so-called independent firm; this tendency is remarkable, especially as it relates to the audit system. Second, the independence of the board of directors has been substantially suppressed at firms that stipulate the upper limit on shareholding under their articles of incorporation and firms that adopted such articles of incorporation during the period of 2005–2009. Third, both the choice of an open joint-stock company as a legal form of incorporation and the transformation from a closed joint-stock company to an open joint-stock company are influential factors in promoting the formation of an independent corporate governance body.[17] Fourth, company size also has a positive impact on the independence of the corporate governance system. In this regard, however, as for the audit committee, the adverse effect is also observed in the sense that the company size tends to lower the proportion of expert auditors while, at the same time, raising both the total number of inside auditors and worker representative auditors. Fifth, as compared with bank credits, fund procurement from the capital market exerts a stronger effect of enhancing the independence of the audit system. Sixth, business internationalization is effective in causing the relevant company to employ a more desirable audit firm. Seventh, the estimation result of R&D expenditure intensity and that of the development of new products and services differ substantially in the sense that the former is positively correlated with the independence of the board of directors while the latter is negatively correlated with both the independence of the corporate board and the audit committee. In sum, these factors were also important for determining the Russian corporate governance system, even during the 2008 global financial crisis, as well as its ownership structure and the crisis shock.

4.3 Assessment of Omission Bias

As described above, in this paper, we conducted empirical analysis that explicitly dealt with survival bias that might be caused by using samples that survived the global financial crisis and confirmed its insignificant influence on the estimation results. However, as indicated in **Figure 2**, 33.4% of firms (213 of the 637 surviving firms) declined our request for the 2009 follow-up survey—a significant number. We cannot rule out the possibility that such an omission of samples might cause a certain bias in our estimation results. In particular, if the relation between the “dropouts” from the 2009 follow-up survey and a dependent variable is not independent, it could cause a serious bias in the relevant estimation results.

[17] Among the surviving firms surveyed in 2009, a very small number of firms transformed their corporate form from a closed joint-stock company to a limited liability company during the observation period. Nevertheless, we have not detected any influence from this organizational change on the independence of the corporate governance bodies.

In order to examine the possible influence of this problem, we first made a comparison of the surviving unsurveyed firms and the surveyed firms in 2009 on the basis of corresponding values as of 2005 for the dependent variables used in the empirical analysis. As Panels (a) and (b) of **Table 6** show, in terms of board of director–related variables and audit system–related variables, there are no statistically significant differences between the two groups of samples for 15 out of 18 variables. As for the remaining three variables, *AUDMEM*, *INSAUD*, and *WORAUD*, there are significant differences in a sense that the mean values of the unsurveyed firms exceed those of the 2009 surveyed firms. Nevertheless, the difference in each variable is below 1.0 and, thus, cannot be said to be substantially remarkable.

We also made the same comparison regarding ownership variables, firm organization–related variables, and management activity–related variables. As Panels (c), (d), and (e) of **Table 6** show, statistically significant differences are found in three variables, i.e., *LIMOWN*, *LABPRO*, and *EXPSHA*. The mean values of these three variables imply that, as compared to the 2009 surveyed firms, the unsurveyed firms are less likely to stipulate upper limits on ownership shares under their articles of incorporation, and that their labor productivity and share of exports in total sales tend to be higher than those of their counterparts. Nevertheless, as alike as are the board of director–related variables and the audit system–related variables, these differences are not particularly large.

To further examine this problem, we performed complementary regression analyses by replacing the observations of the exit firms with those of the 2009 unsurveyed firms and confirmed that the estimation results of the panel models are not much different from those in **Table 4**, and the inverse Mills ratios of the difference models are all insignificant. Taking into account the results from the univariate comparison in **Table 6** as well as the above complemental regression estimates, we inferred that the omission of samples, which resulted from the dropout of 213 surviving firms from the follow-up survey in 2009, does not bring any serious bias in the empirical evidence reported in this section.

5. Conclusions

In this paper, using a unique dataset of industrial firms obtained from enterprise panel surveys conducted across the Russian Federation in 2005 and 2009, we traced back structural changes in both the ownership and the corporate governance system before and after the global financial crisis; we empirically examined factors that affected the composition of the board of directors and the audit system and generated their diachronic evolution.

Our survey results revealed that many of the surviving firms throughout the period of 2005–2009 experienced stock acquisition by outside investors and, as a counteractive effect, the

proportion of firms in which management holds the status of a large shareholder to the entire surveyed firms declined slightly. We also confirmed that the surviving firms enhanced the independence of their corporate governance system from management, mainly by increasing the number of outside directors/auditors as an entire sampling group. In this sense, in the Russian industrial sector, the corporate governance quality has been improved before and after the 2008 financial shock, as observed by Chen (2014) in the case of Taiwanese listed companies. At the firm level, however, both improved cases and worsened cases mixed in large numbers; therefore, it is also true that structural changes in the Russian corporate governance system during the crisis period exhibited a high complexity.

The estimation results of the panel models strongly support both hypothesis H_{1a}, which suggests a positive relationship between ownership by outside shareholders and the independence of the board of directors, and hypothesis H_{2a}, which predicts a positive impact of outside directorship on the independence of the audit system. Moreover, the results from the first-difference regression estimation also provide supporting evidence for hypotheses H_{1b} and H_{2b}, which touch on dynamic changes in the corporate governance system. However, our prediction regarding the negative relationship between the presence of a management team as a large shareholder and the independence of the corporate governance bodies was only partially supported, in the sense that hypothesis H_{3b} cannot sufficiently explain time-series structural changes in the audit system. Moreover, the estimation results of the control variables are largely consistent with those in preceding studies on developed and developing economies and correspond well with results from the cross-sectional analysis conducted by Iwasaki (2008, 2009, 2014b), which utilized a dataset of Russian firms obtained from the 2005 survey.

As reported in the previous section, potential effects of survival bias and omission bias, which might be generated from our approach to empirically focus on the surviving firms surveyed in 2009, are considered to be minor, if any. Therefore, we conjecture that the generality of the empirical findings in this paper are sufficiently high, implying that theories in corporate finance and organizational economics based on studies of developed economies are effective for explaining and predicting behaviors and organizations of Russian firms.

Additionally, based on the results of the 2009 follow-up survey, we identified Russian firms that had drastically reformed their corporate governance system in the wake of the global financial crisis and then investigated structural changes in the board of directors and the audit system of these firms. Taking into account the empirical findings of Chen (2014), Suvankulov and Ogucu (2012), and Iwasaki (2014a), we proposed a hypothesis that predicts that both the board of directors and the audit system become more independent in a company that reformed its corporate governance system as a countermeasure against the 2008 crisis.

As reported in the previous section, the examination of this hypothesis, however, produced

unexpected results. We found that, in line with hypothesis H_4, in firms that decisively reformed their corporate governance bodies in response to the unprecedented macroeconomic shock, the total number of worker representative directors, the presence of which is regarded as harmful to efficient corporate management, significantly declined, as did their proportion to all board members; as a result, the presence of both management executives and outside directors is more likely to have strengthened the board. On the other hand, our estimation results also indicated that, in firms that substantially reformed their audit system to cope with the crisis, the total number of outside auditors and their proportion to all auditors declined, while, at the same time, the proportion of worker representative auditors increased and, as a consequence of these contrasting changes, the independence of the audit system declined remarkably.

The above findings imply that the global financial crisis brought about asymmetric structural changes in the board of directors and the audit systems of Russian firms. It is hardly understandable that Russian firms considerably undermined the independence of their audit committees as a counter-crisis measure. One of the possible interpretations is that, in the face of the crisis, Russian firms replaced some of their outside auditors with a corresponding number of worker representative auditors as part of their cost-reduction measures because both the search cost to discover competent auditors from outside and the labor cost to hire them were extremely high. Another interpretation is that these Russian firms might have expanded the discretionary power of management by weakening the independence of their audit committees in order to make decisions in a bold and speedy manner in response to managerial difficulties. Otherwise, the firms' behavior could also be interpreted as a measure to use illegal means, such as accounting fraud, to conceal losses and damages caused by the 2008 financial shock.

None of the interpretations above go much beyond speculation. Additional field studies and empirical analyses are required to further investigate this point. The ongoing conflict with the international community over Ukraine and the plunge in crude oil prices are again causing Russia economic hardship. It is likely that Russian firms will be affected as severely as they were during the 2008 financial crisis. From the perspective of the empirical questions remaining in this paper, the future actions of Russian firms merit further attention.

References

Adams, Mike (1997), Determinants of audit committee formation in the life insurance industry: New Zealand evidence, Journal of Business Research, 38:2, pp. 123-129.

Aebi, Vincent, Gabriele Sabato and Markus Schmid (2012), Risk management, corporate governance, and bank performance in the financial crisis, Journal of Banking and Finance, 36:12, pp. 3213-3226.

Baldenius, Tim, Nahum Melumad and Xiaojing Meng (2014), Board composition and CEO power, Journal of Financial Economics, 112:1, pp. 53-68.

Barca, Fabrizio and Sandro Trento (1997), State ownership and the evolution of Italian corporate governance, Industrial and Corporate Change, 6:3, pp. 533-559.

Beasley, Mark S. and Kathy R. Petroni (2001), Board independence and audit-firm type, Auditing: A Journal of Practice and Theory, 20:1, pp. 97-114.

Bekiaris, Michalis, Thanasis Efthymiou and Andreas G. Koutoupis (2013), Economic crisis impact on corporate governance and internal audit: the case of Greece, Corporate Ownership and Control, 11:1, pp. 55-64.

Black, Bernard S., Antonio Gledson de Carvalho and Joelson Oliveira Sampaio (2014), The evolution of corporate governance in Brazil, Emerging Markets Review, 20, pp. 176-195.

Boone, Audra L., Laura Casares Field, Jonathan M. Karpoff and Charu G. Raheja (2007), The determinants of corporate board size and composition: an empirical analysis, Journal of Financial Economics, 85: 1, pp. 66-101.

Chen, I-Ju (2014), Financial crisis and the dynamics of corporate governance: evidence from Taiwan's listed firms, International Review of Economics and Finance, 32, pp. 3-28.

Coles, Jeffrey L., Naveen D. Daniel and Lalitha Naveen (2008), Boards: dose one size fit all? Journal of Financial Economics, 87:2, pp. 329-356.

Cotter, Julie and Mark Silvester (2003), Board and monitoring committee independence, Abacus, 39:2, pp. 211-232.

Dolgopyatova, Tatiana, Ichiro Iwasaki and Andrei A. Yokovlev (eds.) (2009), Organization and development of Russian business: a firm-level analysis, Palgrave Macmillan, Basingstoke.

Erkens, David H., Mingyi Hung and Pedro Matos (2012), Corporate governance in the 2007–2008 financial crisis: evidence from financial institutions worldwide, Journal of Corporate Finance, 18:2, pp. 389-411.

Ezzine, Hanene and Bernard Olivero (2013), Evolution of corporate governance during the recent financial crisis, International Journal of Business and Financial Research, 7:1, pp. 85-99.

Filatotchev, Igor, Mike Wright and Michael Bleaney (1999), Privatization, insider control and managerial entrenchment in Russia, Economics of Transition, 7:2, pp. 481-504.

Fraile, Isabel Acero and Nuria Alcalde Fradejas (2014), Ownership structure and board composition in a high ownership concentration context, European Management Journal, 32:4, pp. 646-657.

Gaddy, Clifford G. and Barry W. Ickes (2010), Russia after the global financial crisis, Eurasian Geography and Economics, 51:3, pp. 281-311.

Gupta, Kartick, Chandrasekhar Krishnamurti and Alireza Tourani-Rad (2013), Is corporate governance relevant during the financial crisis? Journal of International Financial Markets, Institutions and Money, 23, pp. 85-110.

Hermalin, Benjamin E. and Michael S. Weisbach (1998), Endogenously chosen board of directors and their monitoring of the CEO, American Economic Review, 88:1, pp. 96-118.

Hsu, Wen-Yen Hsu, Carol Troy and Yenyu (Rebecca) Huang (2015), The determinants of auditor

choice and audit pricing among property-liability insurers, Journal of Accounting and Public Policy, 34:1, pp. 95-124.

Huang, Weihong and Huanhuan Zheng (2012), Financial crises and regime-dependent dynamics, Journal of Economic Behavior & Organization, 82:2/3, pp. 445-461.

Iwasaki, Ichiro (2007), Corporate law and governance mechanism in Russia, In: Dallago, Bruno and Ichiro Iwasaki (eds.), Corporate restructuring and governance in transition economies, Palgrave Macmillan, Basingstoke, pp. 213-249.

Iwasaki, Ichiro (2008), The determinants of board composition in a transforming economy: evidence from Russia, Journal of Corporate Finance, 14:5, pp. 532-549.

Iwasaki, Ichiro (2009), The structure of corporate boards, In: Dolgopyatova, Tatiana G., Ichiro Iwasaki and Andrei A. Yakovlev (eds.), Organization and development of Russian business: a firm-level analysis, Palgrave Macmillan: Basingstoke, pp. 89-121.

Iwasaki, Ichiro (2014a), Global financial crisis, corporate governance, and firm survival, the Russian experience, Journal of Comparative Economics, 42:1, pp. 178-211.

Iwasaki, Ichiro (2014b), What determines audit independence and expertise in Russia? firm-level evidence, Corporate Ownership and Control, 11:2, pp. 81-107.

Klapper, Leora, Annamaria Lusardi and Georgios A. Panos (2013), Financial literacy and its consequences: evidence from Russia during the financial crisis, Journal of Banking and Finance, 37:10, pp. 3904-3923.

Kuznetsov, Boris, Tatiana Dolgopyatova, Victoria Golikova, Ksenia Gonchar, Andrei Yakovlev and Yevgeny Yasin (2011), Russian manufacturing revisited: industrial enterprises at the start of the crisis, Post-Soviet Affairs, 27:4, pp. 366-386.

Lehn, Kenneth, Sukesh Patro and Mengxin Zhao (2009), Determinants of the size and structure of corporate boards: 1935-2000, Financial Management, 38:4, pp. 747-780.

Linck, James S., Jeffry M. Netter and Tina Yang (2008), The determinants of board structure, Journal of Financial Economics, 87:2, pp. 308-328.

Martynova, Maria and Luc Renneboog (2011), Evidence on the international evolution and convergence of corporate governance regulations, Journal of Corporate Finance, 17:5, pp. 1531-1557.

Monem, Reza M. (2013), Determinants of board structure: evidence from Australia, Journal of Contemporary Accounting and Economics, 9:1, pp. 33-49.

Muravyev, Alexander, Irina Berezinets and Yulia Ilina (2014), The structure of corporate boards and private benefits of control: evidence from the Russian stock exchange, International Review of Financial Analysis, 34, pp. 247-261.

Nefedova, Tat'yana G., Andrey I. Treyvish and Judith Pallot (2010), The "crisis" geography of contemporary Russia, Eurasian Geography and Economics, 51:2, pp. 203-217.

Osipian, Ararat L. (2012), Predatory raiding in Russia: institutions and property rights after the crisis, Journal of Economic Issues, 46:2, pp. 469-479.

Perry, Tod and Anli Shivdasani (2005), Do boards affect performance? evidence from corporate restructuring, Journal of Business, 78:4, pp. 1403-1432.

Redmond, William (2010), Evolution of corporate governance principles among U.S. firms, Journal of Economic Issues, 44:3, pp. 615-627.

Rizzotti, Davide and Angela M. Greco (2013), Determinants of board of statutory auditor and internal control committee diligence: a comparison between audit committee and the corresponding Italian committees, International Journal of Accounting, 48:1, pp. 84-110.

Ruiz-Barbadillo, Emiliano, Estíbaliz Biedma-López and Nieves Gómez-Aguilar (2007),

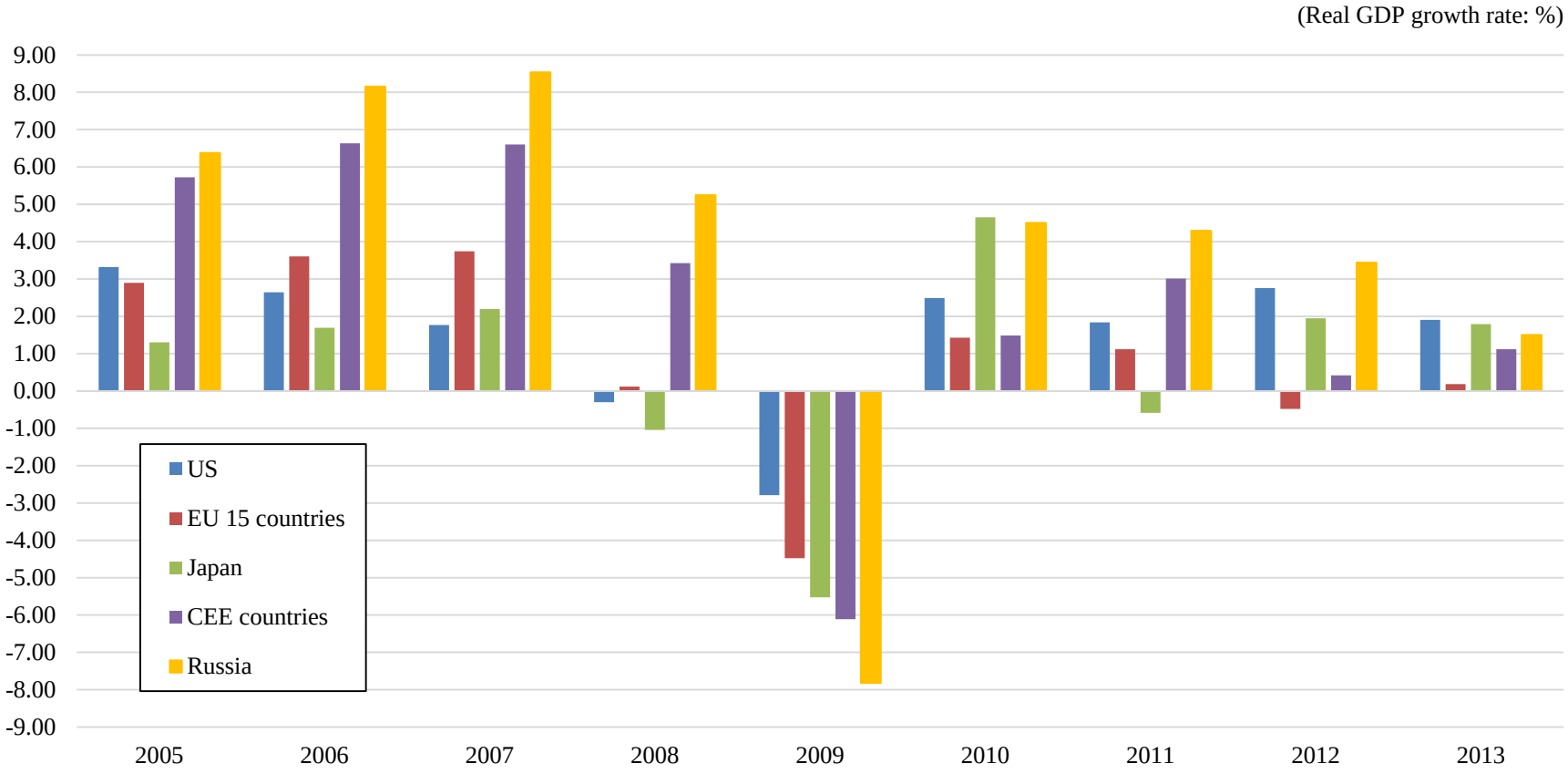
Managerial dominance and audit committee independence in Spanish corporate governance, Journal of Management and Governance, 11:4, pp. 311-352.

Suvankulov, Farrukh and Fatma Ogucu (2012), Have firms with better corporate governance fared better during the recent financial crisis in Russia? Applied Economics Letters, 19:8, pp. 769-773.

Tabata, Shinichiro (2009), The impact of global financial crisis on the mechanism of economic growth in Russia, Eurasian Geography and Economics, 50:6, pp. 682-698.

Yakovlev, Andrei, Yuri Simachev and Yuri Danilov (2010), The Russian corporation: patterns of behaviour during the crisis, Post-Communist Economies, 22:2, pp. 129-140.

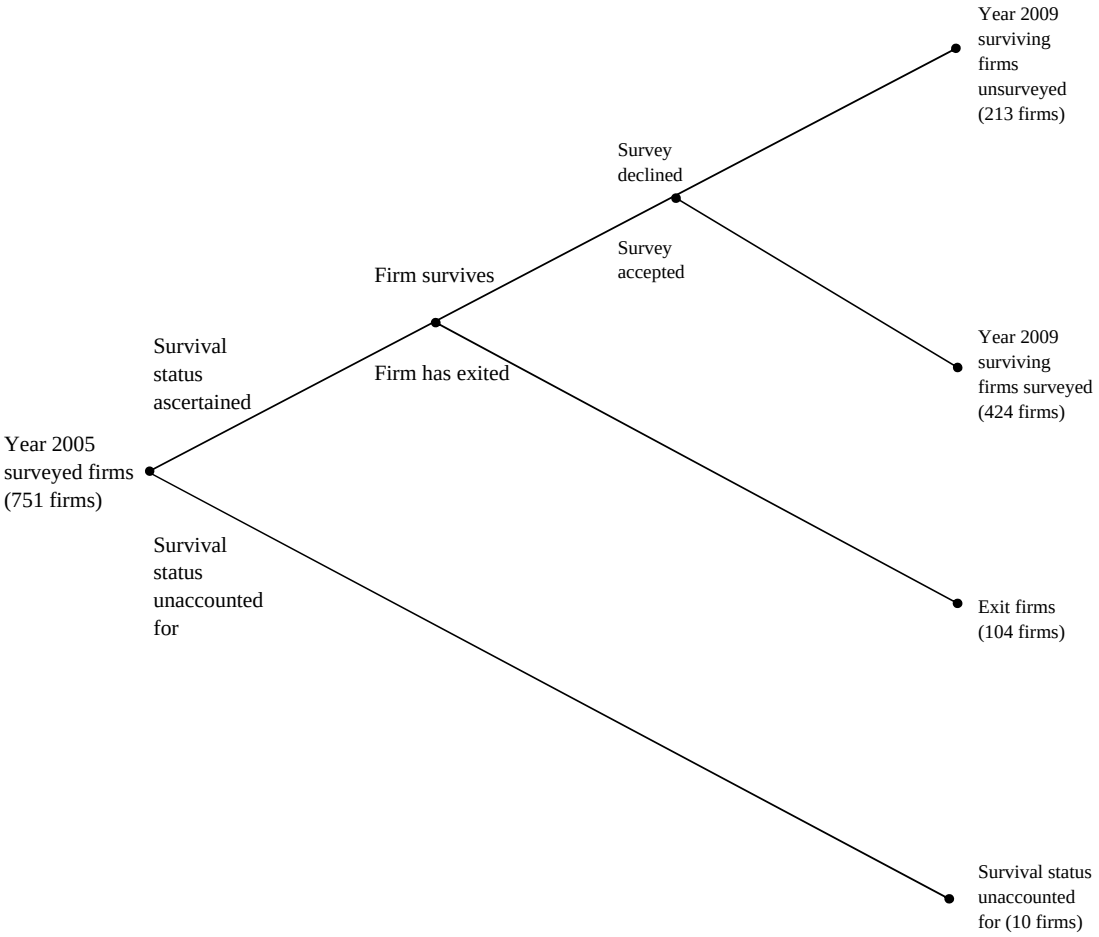
Figure 1. Macroeconomic dynamics before and after the global financial crisis in the US, EU15, Japan, Central and Eastern Europe, and Russia



Note: Figures for EU15 and CEE counries are simple averages of the real growth rate by country.

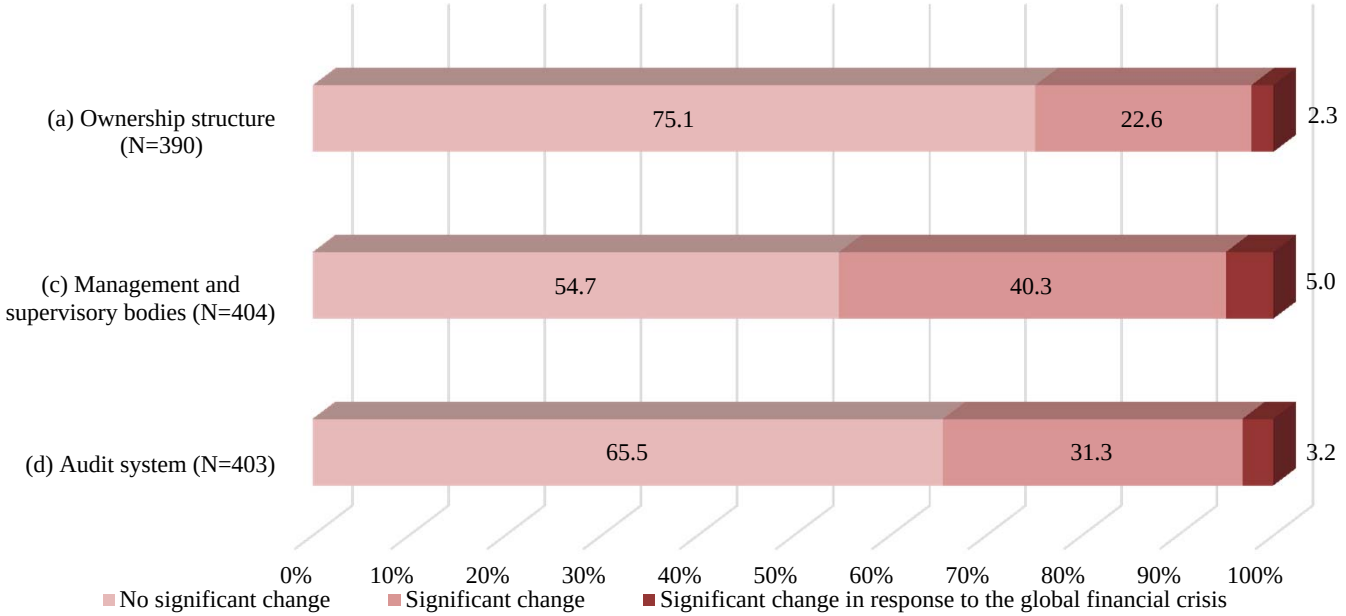
Source: Author's illustration based on the data derived from the UNCTAD website (http://unctad.org/en/Pages/Statistics.aspx)

Figure 2. Survival status of 751 industrial firms and 2009 survey results



Source: Author's illustration

Figure 3. Changes in owhership structure and corporate governance system during the period of 2005–2009



Source: Author's illustration

Table 1. Definitions and descriptive statistics of the variables used in the empirical analysis

Definitions of variables (variable names)	Descriptive statistics									
	Panel data [a]					Difference data [b]				
	Mean	S.D.	Median	Max.	Min.	Mean	S.D.	Median	Max.	Min.
(a) Board of director–related variables										
Outsideness of the chairman of the board of directors (*BOALEA*) [c]	0.784	0.870	0	2	0	-0.047	1.044	0	2	-2
Proportion of outside directors (*BOACOM*) [d]	0.487	0.352	0.545	1.000	0.000	0.034	0.389	0.000	1.000	-1.000
Proportion of independent directors (*BOAIND*) [d]	0.075	0.189	0.000	1.000	0.000	0.037	0.261	0.000	1.000	-1.000
Proportion of worker representative directors (*BOAWOR*) [d]	0.054	0.137	0.000	1.000	0.000	0.009	0.182	0.000	0.714	-1.000
Total number of board of director members (*BOAMEM*)	6.713	4.504	6	100	1	0.369	6.656	0	95	-17
Total number of outside directors (*OUTDIR*)	3.316	3.262	3	45	0	0.306	3.629	0	41	-8
Total number of independent directors (*INDDIR*)	0.467	1.172	0	10	0	0.248	1.607	0	10	-6
Total number of inside directors (*INSDIR*)	3.386	3.563	3	55	0	0.115	5.138	0	54	-10
Total number of worker representative directors (*WORDIR*)	0.463	1.992	0	40	0	0.264	2.770	0	40	-7
First principal component score for board of director–related variables (*BODSCO*) [e]	0.000	1.796	0.119	4.968	-13.734	0.064	2.192	0.055	5.918	-15.483
(b) Audit system–related variables										
Proportion of outside auditors (*AUDCOM*) [f]	0.433	0.403	0.333	1.000	0.000	0.042	0.493	0.000	1.000	-1.000
Proportion of expert auditors *(AUDEXP*) [f]	0.173	0.312	0.000	1.000	0.000	0.051	0.399	0.000	1.000	-1.000
Proportion of worker representative auditors (*AUDWOR*) [f]	0.508	0.413	0.500	1.000	0.000	-0.024	0.505	0.000	1.000	-1.000
Audit firm attribute (*AUDFIR*) [g]	0.347	0.576	0	2	0	0.009	0.662	0	2	-2
Total nummber of audit committee members (*AUDMEM*)	3.629	2.896	3	50	1	0.534	4.234	0	45	-9
Total number of outside auditors (*OUTAUD*)	1.609	2.265	1	40	0	0.498	3.128	0	37	-9
Total number of expert auditors (*EXPAUD*)	0.631	1.212	0	10	0	0.315	1.546	0	9	-5
Total number of inside auditors (*INSAUD*)	2.011	2.002	2	30	0	0.044	2.763	0	28	-6
Total number of worker representative auditors (*WORAUD*)	1.800	2.037	2	30	0	0.159	2.797	0	28	-6
First principal component score for the audit system–related variables (*AUDSCO*) [h]	0.000	2.164	-0.246	5.300	-9.759	0.326	2.582	0.000	7.062	-7.010
(c) Ownership variables										
Ownership share of outside shareholders (*OWNOUT*) [i]	1.931	2.108	1	5	0	0.187	2.208	0	5	-5
Large management shareholder dummy (*MANSHA*)	0.469	0.499	0	1	0	-0.065	0.564	0	1	-1
(d) Global financial crisis–related variables										
Dummy for the firms that made significant changes in management and supervisory bodies in response to the crisis (*CRISIS_BOD*)	0.021	0.145	0	1	0	0.050	0.217	0	1	0
Dummy for the firms that made significant changes in the audit system in response to the crisis (*CRISIS_AUD*)	0.014	0.117	0	1	0	0.032	0.177	0	1	0

Definitions of variables (variable names)	Descriptive statistics									
	Panel data [a]					Difference data [b]				
	Mean	S.D.	Median	Max.	Min.	Mean	S.D.	Median	Max.	Min.
(e) Firm organization–related variables										
Business group member dummy (*GROFIR*)	0.359	0.480	0	1	0	0.024	0.533	0	1	-1
Dummy for firms with upper limits on ownership shares (*LIMOWN*)	0.167	0.373	0	1	0	-0.038	0.434	0	1	-1
Open joint-stock company dummy (*OPECOM*)	0.668	0.471	1	1	0	0.005	0.606	0	1	-1
Dummy for privatized companies (*PRICOM*)	0.727	0.446	1	1	0	-	-	-	-	-
Dummy for spin-off firms from a state-owned (municipal) company or privatized company (*SPIOFF*)	0.106	0.308	0	1	0	-	-	-	-	-
Average number of employees (*COMSIZ*) [j]	6.295	1.237	6.109	10.891	2.708	-0.212	0.722	-0.161	3.143	-3.466
(f) Management activity–related variables										
Labor productivity (*LABPRO*) [k]	12.535	2.016	12.900	18.696	3.906	-0.192	2.498	0.443	7.672	-8.306
Dummy for firms that issued shares or bonds in overseas or domestic stock exchanges (*MARFIN*)	0.108	0.311	0	1	0	0.040	0.335	0	1	-1
Firms that used bank credit and their average lending period (*BANCRE*) [l]	2.604	1.526	3	5	0	0.186	1.769	0	5	-5
Share of exports in total sales (*EXPSHA*) [m]	0.874	1.187	0	5	0	-0.081	1.082	0	5	-4
R&D expenditure intensity (*R&DEXP*) [n]	0.847	0.842	1	2	0	-0.216	0.949	0	2	-2
Dummy for the development of new products and services (*NEWPRO*) [o]	0.581	0.494	1	1	0	-0.017	0.614	0	1	-1

Notes:

[a] The data comprises the 2009 surviving surveyed firms and the exit firms confirmed as indicated in Figure 2.

[b] The data comprises the 2009 surviving surveyed firms as indicated in Figure 2.

[c] An ordinal variable that assigns a value of 0 to a firm where the chairman of the board of directors has been appointed from the inside, a value of 1 to a firm where the chairman is a quasi-outsider appointed from those working in an affiliated business group or a business partner, and a value of 2 to a firm where the chairman has been appointed from the outside

[d] Proportion of the concerned directors to the total number of board of director members, with a range $0.00 \leq x \leq 1.00$ as a continuous variable

[e] Estimated using the nine board of director–related variables above. See Panel (a) in Supplement 1 for the major estimation results.

[f] Proportion of the concerned auditors to the total number of audit committee members, with a range $0.00 \leq x \leq 1.00$ as a continuous variable

[g] An ordinal variable that assigns a value of 0 to a firm that employs an indigenous Russian audit firm as its accounting auditor, a value of 1 to a firm that employs a non-indigenous Russian audit firm, and a value of 2 to a firm that employs an international audit firm

[h] Estimated using the above nine audit system–related variables. See Panel (b) in Supplement 1 for the major estimation results.

[i] Ownership share of outside institutional shareholders rated on the following 6-point scale: 0—0%; 1—10.0% or less; 2—10.1 to 25.0%; 3—25.1 to 50.0%; 4—50.1 to 75.0%; 5—75.1 to 100.0%

[j] The natural logarithm of average number of total employees each year

[k] The natural logarithm of the real sales per worker based on the 2005 price

[l] "Firms that used bank credits and their average lending period" fall under one of the following 6 categories: 0—Did not use any bank credits during the period from 2001–2004; 1—Used bank credits, and their average lending period was less than 3 months; 2—Used bank credits, and their average lending period ranged from 3 months to less than 6 months; 3—Used bank credits, and their average lending period ranged from 6 months to less than one year; 4—Used bank credits, and their average lending period ranged from one year to less than 3 years; 5—Used bank credits, and their average lending period was more than 3 years.

[m] "Share of exports in total sales" falls under one of the following 6 categories: 0—0%; 1—10% or less; 2—10.1 to 25.0%; 3—25.1 to 50.0%; 4—50.1 to 75.0%; 5—More than 75%.

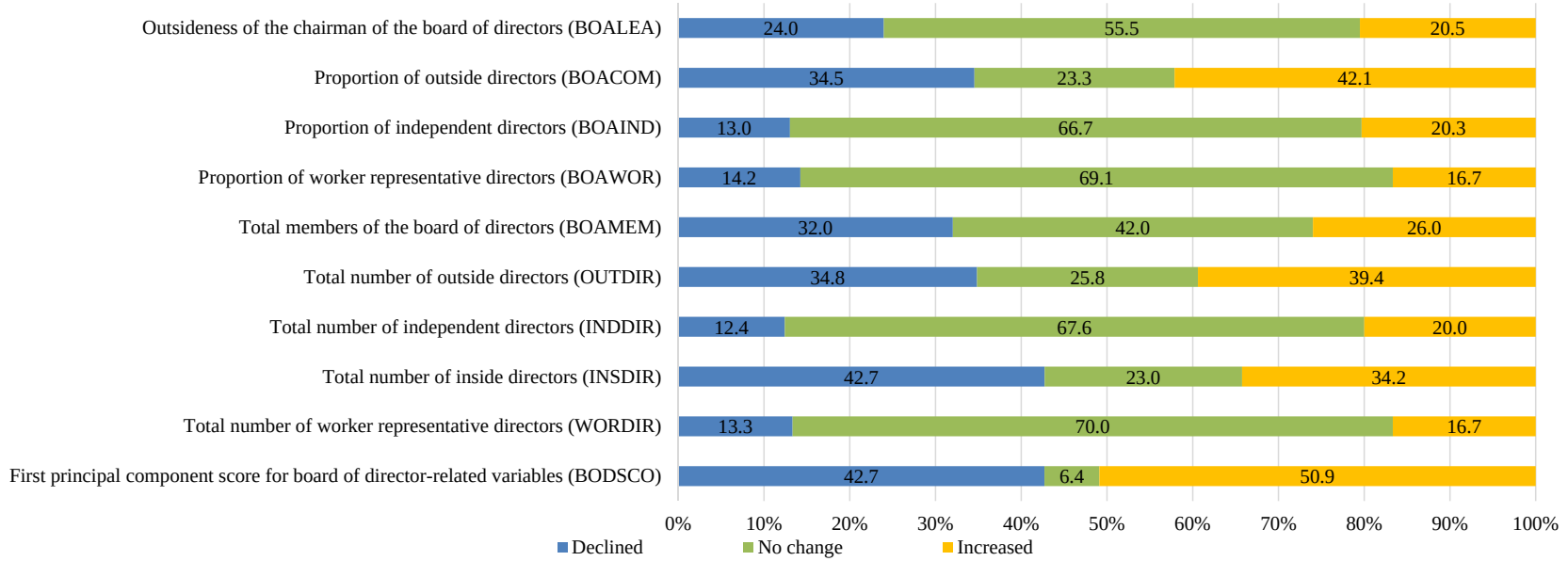
[n] Evaluation of the R&D expenditures during the last 4 years falls under one of the following three categories: 0—No record; 1—R&D expenditures remained flat or on the decline, and 2—R&D expenditures on the increase.

[o] Results in last 4 years

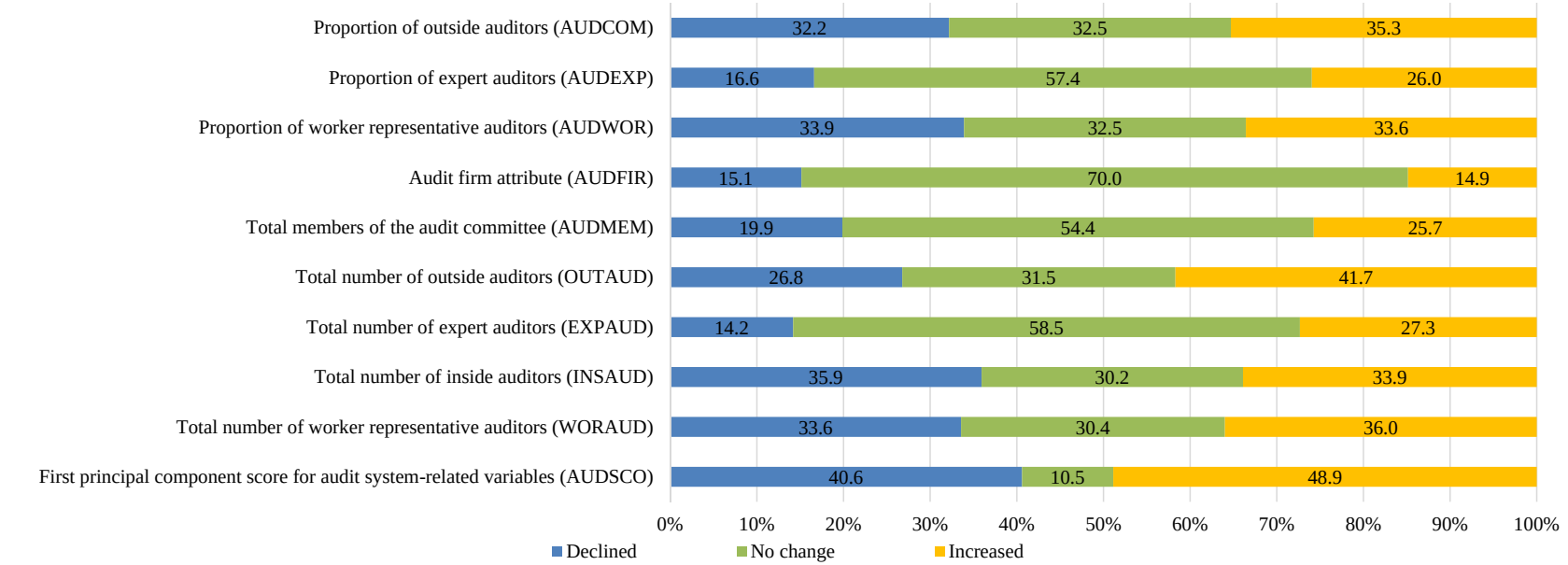
Source: 2005 and 2009 enterprise surveys

Figure 4. Direction of structural change in corporate governance systems during the period of 2005–2009

(a) Board of director–related variables



(b) Audit system–related variables

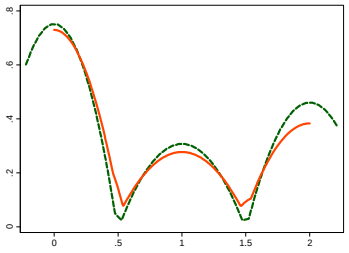


Note: This figure shows the changes in the 2009 surviving firms surveyed.
Source: Author's illustration

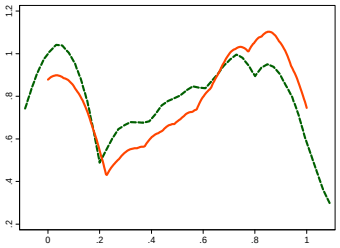
Figure 5. Structural change in corporate governance system: kernel density estimation [a]

(a) Panel data of board of director–related variables [b]

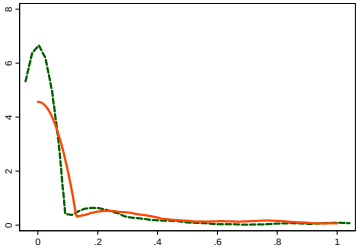
Outsideness of the chairman of the board of directors (*BOALEA*)



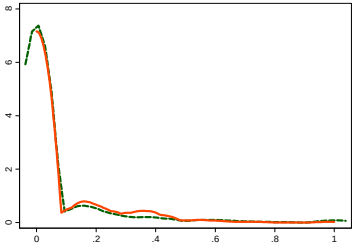
Proportion of outside directors (*BOACOM*)



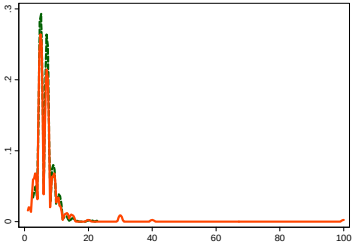
Proportion of independent directors (*BOAIND*)



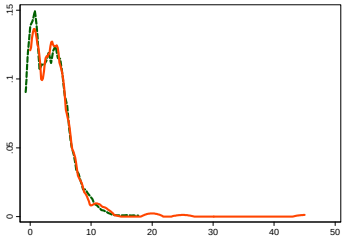
Proportion of worker representative directors (*BOAWOR*)



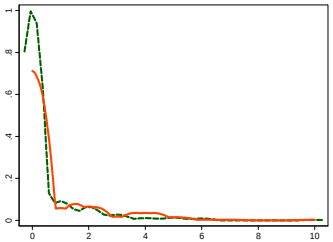
Total number of board of director members (*BOAMEM*)



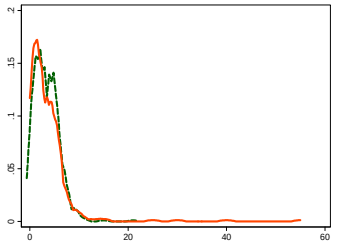
Total number of outside directors (*OUTDIR*)



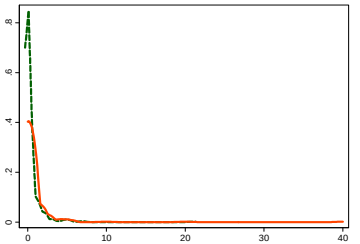
Total number of independent directors (*INDDIR*)



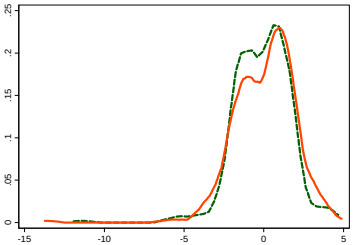
Total number of inside directors (*INSDIR*)



Total number of worker representative directors (*WORDIR*)

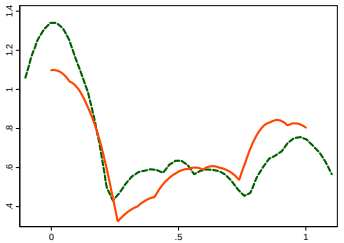


First principal component score for board of director–related variables (*BODSCO*)

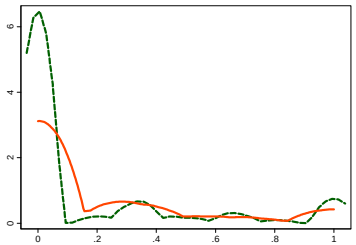


(b) Panel data of audit system–related variables [b]

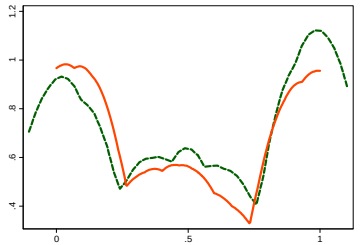
Proportion of outside auditors (*AUDCOM*)



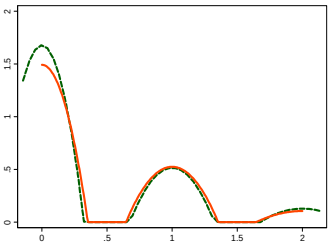
Proportion of expert auditors (*AUDEXP*)



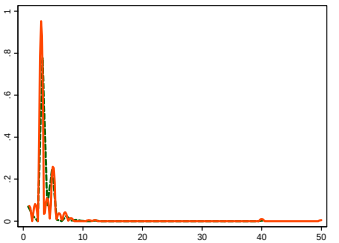
Proportion of worker representative auditors (*AUDWOR*)



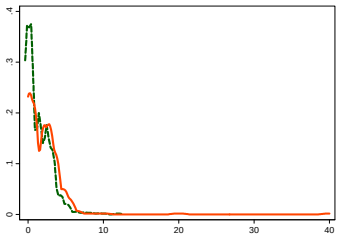
Audit firm attribute (*AUDFIR*)



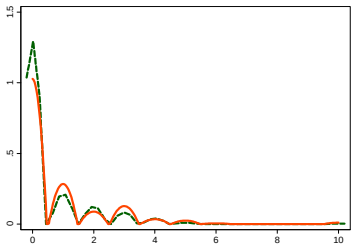
Total number of audit committee members (*AUDMEM*)



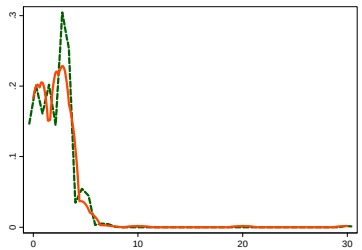
Total number of outside auditors (*OUTAUD*)



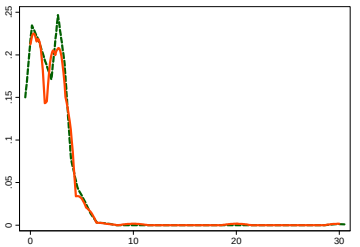
Total number of expert auditors (*EXPAUD*)



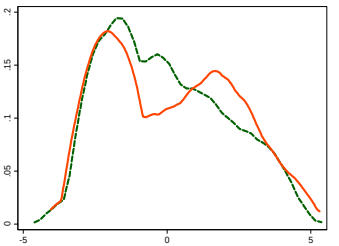
Total number of inside auditors (*INSAUD*)



Total number of worker representative auditors (*WORAUD*)

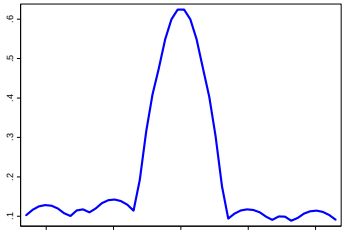


First principal component score for the audit system–related variables (*AUDSCO*)

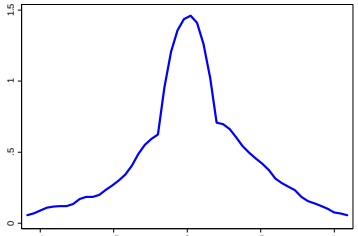


(c) Difference data of board of director–related variables

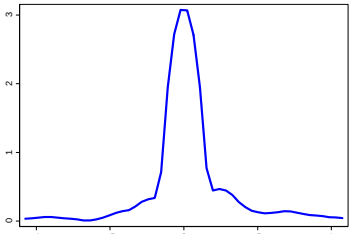
Outsideness of the chairman of the board of directors (*BOALEA*)



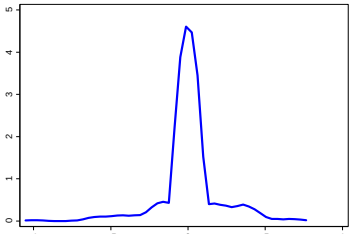
Proportion of outside directors (*BOACOM*)



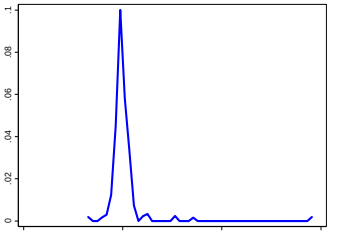
Proportion of independent directors (*BOAIND*)



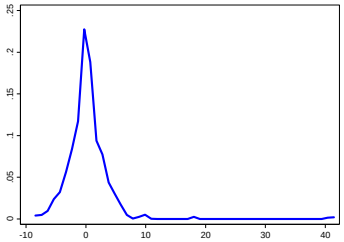
Proportion of worker representative directors (*BOAWOR*)



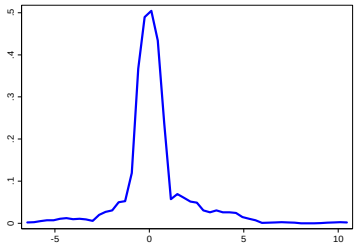
Total number of board of director members (*BOAMEM*)



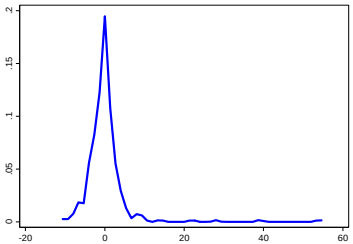
Total number of outside directors (*OUTDIR*)



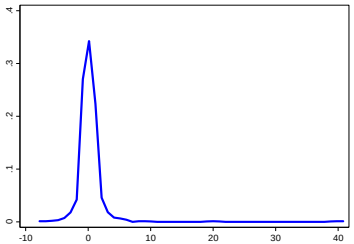
Total number of independent directors (*INDDIR*)



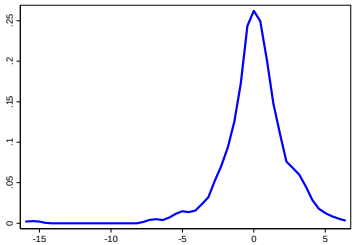
Total number of inside directors (*INSDIR*)



Total number of worker representative directors (*WORDIR*)

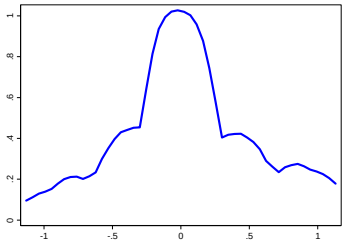


First principal component score for board of director–related variables (*BODSCO*)

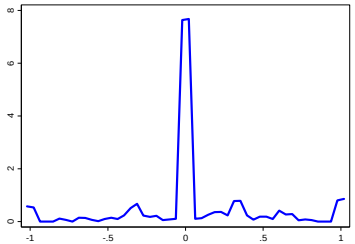


(d) Difference data of audit system–related variables

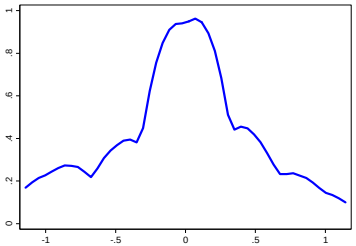
Proportion of outside auditors (*AUDCOM*)



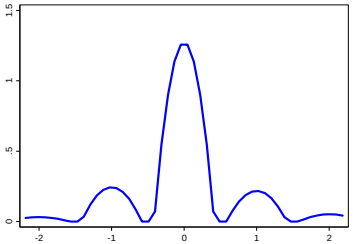
Proportion of expert auditors (*AUDEXP*)



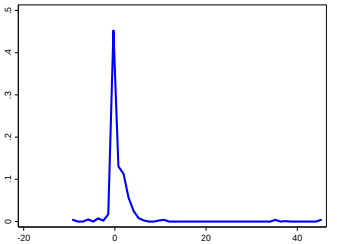
Proportion of worker representative auditors (*AUDWOR*)



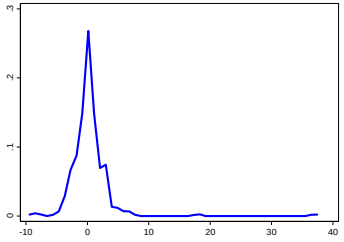
Audit firm attribute (*AUDFIR*)



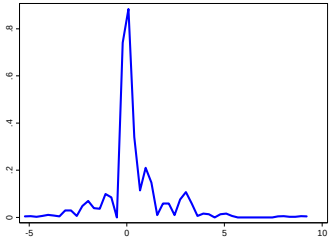
Total number of audit committee members (*AUDMEM*)



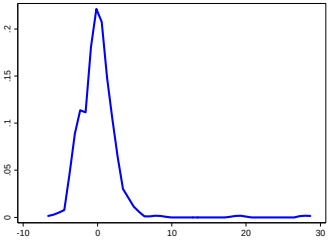
Total number of outside auditors (*OUTAUD*)



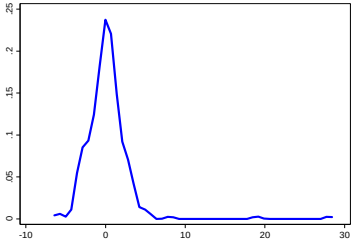
Total number of expert auditors (*EXPAUD*)



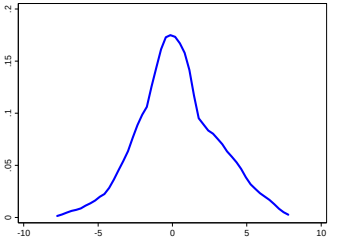
Total number of inside auditors (*INSAUD*)



Total number of worker representative auditors (*WORAUD*)



First principal component score for audit system–related variables (*AUDSCO*)



Notes:

[a] Vertical axis is estimated density. Holizontal axis is variable value.

[b] Green dashed line and red solid line show 2005 and 2009 data, respectively.

Source: Author's illustration

Table 2. Structural change in corporate governance systems during the period of 2005–2009

	(i) Mean of 2005 data of 2009 surviving firms surveyed	(ii) Mean of 2009 data of 2009 surviving firms surveyed	(iii) Mean of difference between 2005 and 2009 data of 2009 surviving firms surveyed (ii–i)	Univariate comparison (*t* test) [a]	
				Test I [b] (i/ii)	Test II [c] (iii)
(a) Board of director–related variables					
Outsideness of the chairman of the board of directors (*BOALEA*)	0.792	0.751	-0.047	-0.634	-0.807
Proportion of outside directors (*BOACOM*)	0.463	0.508	0.034	1.737 **	1.597 *
Proportion of independent directors (*BOAIND*)	0.061	0.091	0.037	2.186 **	2.543 ***
Proportion of worker representative directors (*BOAWOR*)	0.050	0.057	0.009	0.706	0.851
Total number of board of director members (*BOAMEM*)	6.549	6.945	0.369	1.154	1.008
Total number of outside directors (*OUTDIR*)	3.126	3.525	0.306	1.631 *	1.532 *
Total number of independent directors (*INDDIR*)	0.369	0.569	0.248	2.375 ***	2.809 ***
Total number of inside directors (*INSDIR*)	3.423	3.428	0.115	0.019	0.407
Total number of worker representative directors (*WORDIR*)	0.361	0.575	0.264	1.440	1.729
First principal component score for board of director–related variables (*BODSCO*)	-0.083	0.068	0.064	1.087	0.491
(b) Audit system–related variables					
Proportion of outside auditors (*AUDCOM*)	0.427	0.459	0.042	1.068	1.447 *
Proportion of expert auditors *(AUDEXP*)	0.167	0.189	0.051	0.941	2.156 **
Proportion of worker representative auditors (*AUDWOR*)	0.512	0.491	-0.024	-0.671	-0.805
Audit firm attribute (*AUDFIR*)	0.340	0.346	0.009	0.146	0.242
Total number of audit committee members (*AUDMEM*)	3.325	3.895	0.534	2.630 ***	2.211 **
Total number of outside auditors (*OUTAUD*)	1.370	1.887	0.498	3.006 ***	2.737 ***
Total number of expert auditors (*EXPAUD*)	0.511	0.768	0.315	2.814 ***	3.463 ***
Total number of inside auditors (*INSAUD*)	1.929	2.021	0.044	0.634	0.274
Total number of worker representative auditors (*WORAUD*)	1.698	1.859	0.159	1.077	0.968
First principal component score for audit system–related variables (*AUDSCO*)	-0.067	0.161	0.326	1.373 *	2.063 **

Notes:

[a] One-sided test. ***, **, and * denote statistical siginifinance at the 1%, 5%, and 10% levels, respectively.

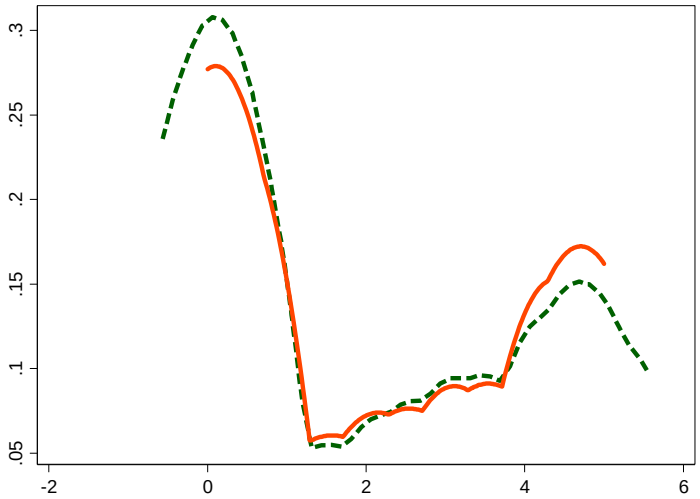
[b] Null hypothesis: The values in 2009 $\geqq$ the values in 2005 for variables *BOAWOR*, *INSDIR*, *WORDIR*, *AUDWOR*, *INSAUD*, and *WORAU*D. Otherwise, the values in 2009 $\leqq$ the values in 2005.

[c] Null hypothesis: The differences between 2005 and 2009 $\geqq$ 0 for variables *BOAWOR*, *INSDIR*, *WORDIR*, *AUDWOR*, *INSAUD*, and *WORAU*D. Otherwise, the differences between 2005 and 2009 $\leqq$ 0.

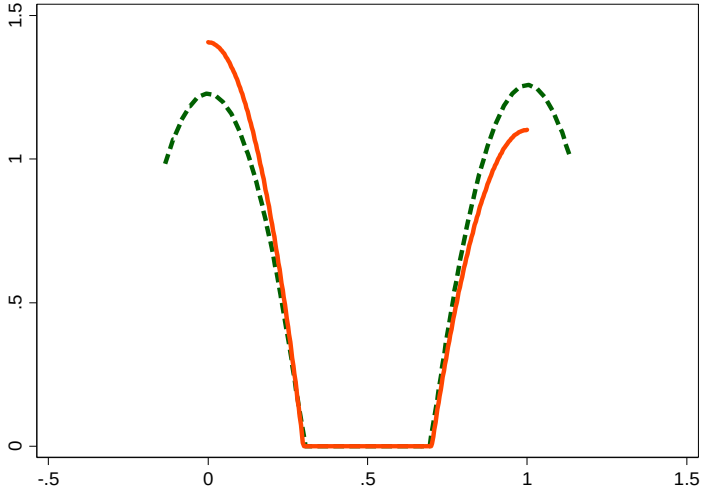
Source: Author's estimation. See Table 1 for definitions and descriptive statistics of the variables.

Figure 6. Ownership change: kernel density estimation [a]

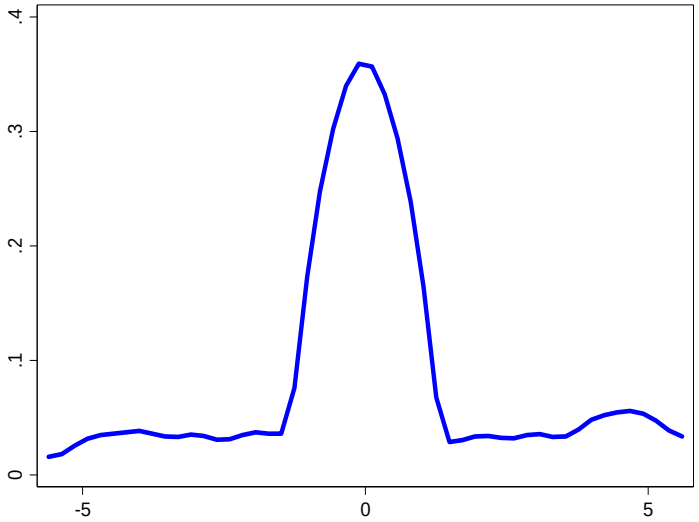
(a) Panel data of ownership share of outside shareholders (*OWNOUT*) [b]



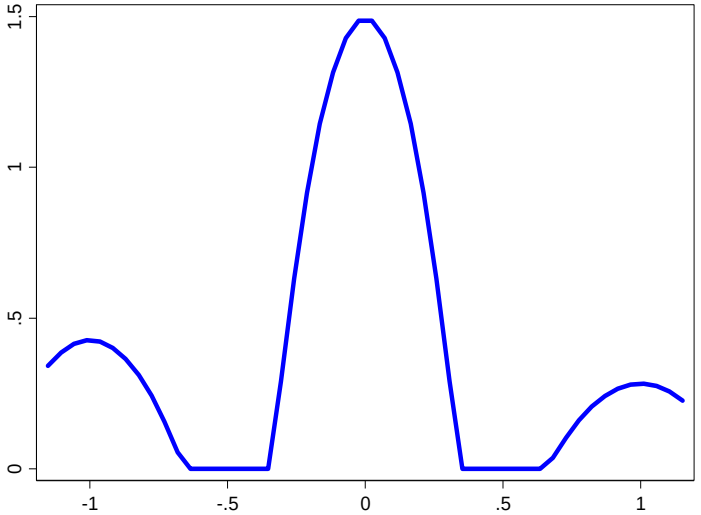
(b) Panel data of a large management shareholder dummy (*MANSHA*) [b]



(c) Difference data of ownership share of outside shareholders (*OWNOUT*)



(d) Difference data of a large management shareholder dummy (*MANSHA*)



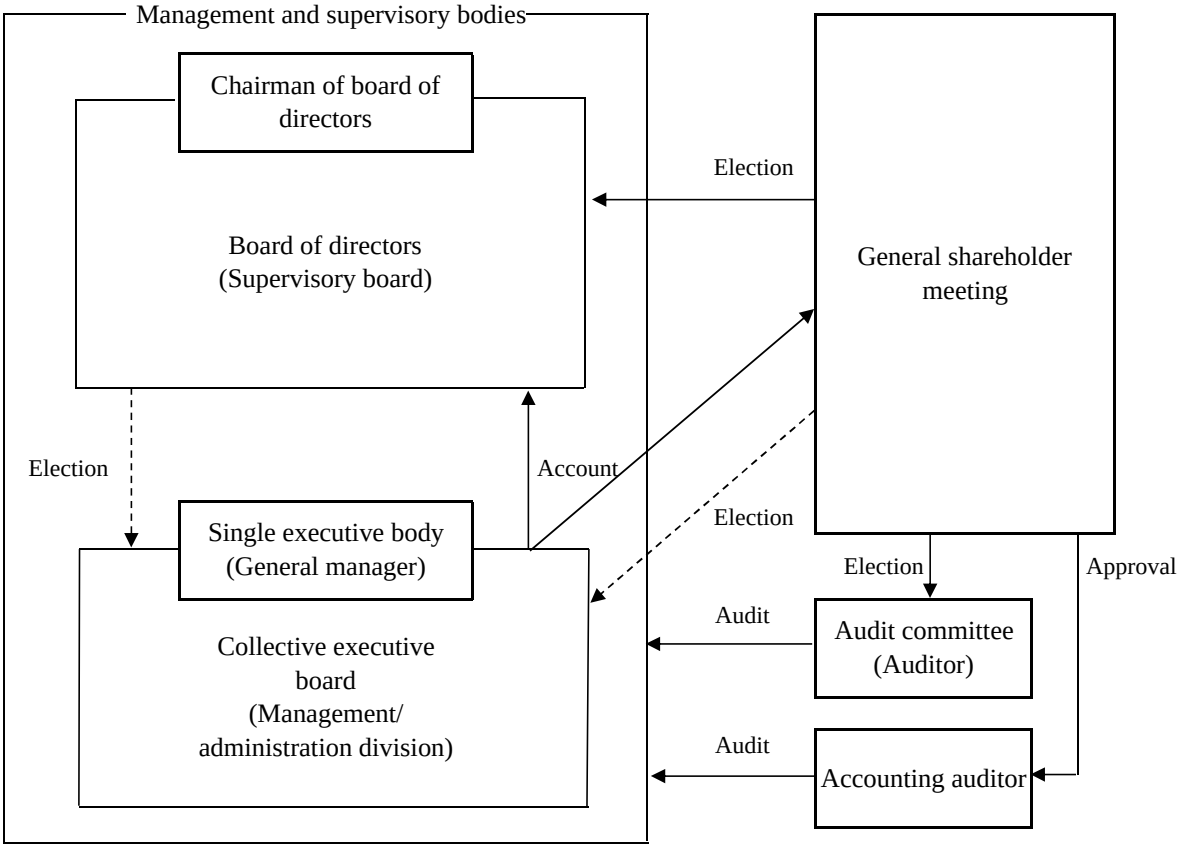
Notes:

[a] Vertical axis is the estimated density. Horizontal axis is the variable value.

[b] Green dashed line and red solid line show 2005 and 2009 data, respectively.

Source: Author's illustration

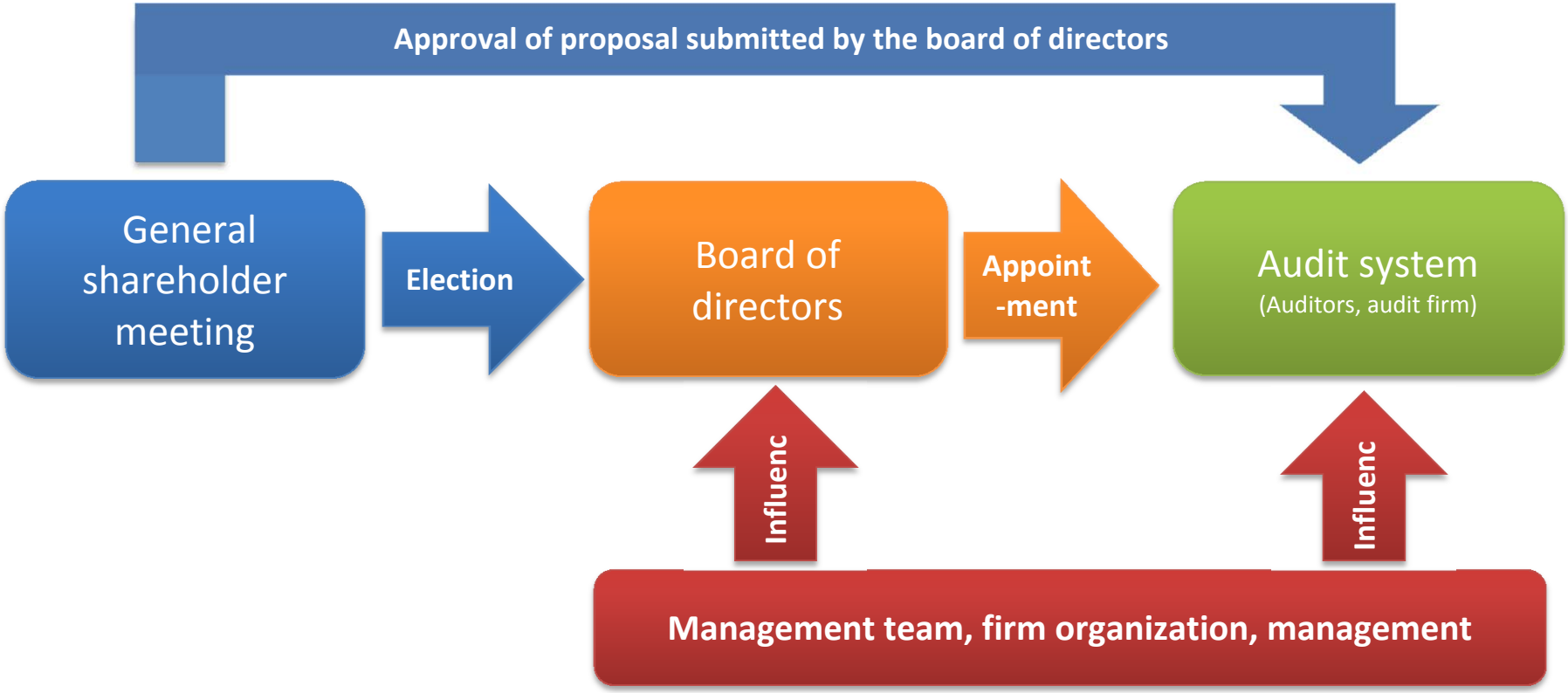
Figure 7. Corporate governance system of Russian joint-stock companies



Note: This figure illustrates the interrelationships among statutory company organs in a Russian joint-stock company, including a collective executive organ that can be established at the company's discretion in accordance with Federal Law on joint-stock companies. Alternate legal titles of company organs are shown in parentheses. The dashed lines denote that members of executive organs shall be elected at the general shareholders' meeting or by the board of directors in accordance with the articles of incorporation. The general shareholders' meeting approves a proposal from the board of directors concerning the election of the accounting auditor (audit firm).

Source: Iwasaki (2014, Figure 3, p. 183)

Figure 8. Decision-making mechanism of corporate governance systems in Russian firms



Source: Author's illustration

Table 3. Theoretical prediction of determinants of the independence of the board of directors and the audit system from management

	Board of directors	Audit system
Ownership by outside investors ($H_{1a/b}$)	+	
Proportion of outside directors ($H_{2a/b}$)		+
Presence of management team as a large shareholder ($H_{3a/b}$)	-	-
Reaction to the global financial crisis (H_4)	+	+
Affiliation with a business group through stock ownership	+	+
Restrictions on ownership of shares by the articles of incorporation	-	
Choice of an open joint-stock company as the corporate form	+	+
Organizational legacy of a socialist company	-	-
Company size	+	+
Efficiency of management and production activities	-	-
Fund procurement from the capital market and financial institutions	+	+
Business internationalization	+	+
R&D/innovation intensity	-	-

Note: This table summarizes theoretical predictions of the impact of potential factors on the independence of the board of directors and the audit system from management on the basis of the discussion in Section 3 of the paper. The sign '+' denotes a positive correlation between a given factor and the independece of the corporate governance system; '-' indicates a negative correlation.

Source: Compiled by the author

Table 4. Determinants of corporate governance system: panel data analysis

(a) Board of directors

Model	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Dependent variable	Outsideness of the chairman of the board of directors (*BOALEA*)	Proportion of outside directors (*BOACOM*)	Proportion of independent directors (*BOAIND*)	Proportion of worker representative directors (*BOAWOR*)	Total number of board of director members (*BOAMEM*)	Total number of outside directors (*OUTDIR*)	Total number of independent directors (*INDDIR*)	Total number of inside directors (*INSDIR*)	Total number of worker representative directors (*WORDIR*)	First principal component score for board of director–related variables (*BODSCO*)
Estimator[a]	OProbit RE	FE	OLS	RE	Poission RE	Poission RE	Poission	Poission RE	Poission RE	OLS
Ownership variables										
Ownership share of outside shareholders (*OWNOUT*)	0.040	0.036 ***	0.006	-0.005 **	0.013 *	0.082 ***	0.094 **	-0.058 ***	-0.142 ***	0.147 ***
	(0.03)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.04)	(0.01)	(0.05)	(0.03)
Large management shareholder dummy (*MANSHA*)	-0.611 ***	-0.237 ***	-0.018	0.013	0.024	-0.570 ***	-0.349 *	0.548 ***	0.272	-1.005 ***
	(0.13)	(0.06)	(0.02)	(0.01)	(0.03)	(0.07)	(0.20)	(0.06)	(0.22)	(0.14)
Global financial crisis–related variable										
Dummy for firms that made significant changes in management and supervisory bodies in response to the crisis (*CRISIS_BOD*)	-0.529	0.127	0.050	-0.014	-0.116	0.028	1.348 **	-0.331	-2.332 **	0.419
	(0.36)	(0.12)	(0.08)	(0.04)	(0.13)	(0.20)	(0.61)	(0.22)	(1.05)	(0.56)
Firm organization–related variables										
Dummy for business group members (*GROFIR*)	-0.034	-0.009	0.010	-0.015	-0.026	0.101	0.154	-0.144 **	-0.192	0.290 *
	(0.12)	(0.05)	(0.02)	(0.01)	(0.04)	(0.07)	(0.20)	(0.06)	(0.26)	(0.15)
Dummy for firms with upper limits on ownership shares (*LIMOWN*)	-0.287 *	-0.140 **	-0.007	0.010	0.009	-0.101	-0.140	0.131 *	0.618 **	-0.329 *
	(0.17)	(0.07)	(0.02)	(0.01)	(0.05)	(0.09)	(0.24)	(0.08)	(0.31)	(0.18)
Dummy for open joint-stock companies (*OPECOM*)	0.393 ***	0.030	0.022	0.005	0.054	0.209 ***	0.359 *	-0.087	0.309	0.268 **
	(0.13)	(0.05)	(0.02)	(0.01)	(0.03)	(0.07)	(0.21)	(0.06)	(0.22)	(0.13)
Dummy for privatized companies (*PRICOM*)	-0.180	droped	0.010	0.020	0.069	0.196 *	0.345	0.064	0.054	-0.042
	(0.17)		(0.02)	(0.01)	(0.05)	(0.11)	(0.35)	(0.08)	(0.37)	(0.18)
Dummy for spin-off firms from state-owned (municipal) companies or privatized companies (*SPIOFF*)	0.022	droped	0.003	0.028	-0.008	0.213	0.034	-0.140	-0.008	0.070
	(0.22)		(0.03)	(0.02)	(0.07)	(0.14)	(0.49)	(0.12)	(0.52)	(0.26)
Average number of employees (*COMSIZ*)	-0.004	0.040	0.001	-0.005	0.104 ***	0.151 ***	-0.026	0.032	-0.052	0.095
	(0.06)	(0.04)	(0.01)	(0.01)	(0.02)	(0.03)	(0.11)	(0.03)	(0.12)	(0.07)
Management activity–related variables										
Labor productivity (*LABPRO*)	0.036	0.006	-0.003	-0.003	-0.006	-0.027	-0.095 **	-0.008	-0.013	-0.012
	(0.03)	(0.01)	(0.01)	(0.00)	(0.01)	(0.02)	(0.04)	(0.02)	(0.06)	(0.04)
Dummy for firms that issued shares or bonds in the overseas or domestic stock exchange (*MARFIN*)	0.082	-0.025	-0.001	0.011	0.011	0.029	0.270	-0.174	0.504	0.197
	(0.20)	(0.09)	(0.02)	(0.01)	(0.06)	(0.10)	(0.37)	(0.11)	(0.39)	(0.21)
Firms that used bank credit and their average lending period (*BANCRE*)	0.009	0.002	0.002	0.000	0.007	-0.005	0.071	0.010	-0.023	0.011
	(0.04)	(0.02)	(0.01)	(0.00)	(0.01)	(0.02)	(0.07)	(0.02)	(0.07)	(0.05)
Share of exports in total sales (*EXPSHA*)	-0.038	0.040 *	-0.003	0.001	-0.017	0.041	-0.049	-0.051 *	-0.016	0.038
	(0.05)	(0.02)	(0.01)	(0.00)	(0.02)	(0.03)	(0.09)	(0.03)	(0.12)	(0.06)
R&D expenditure intensity (*R&DEXP*)	-0.012	0.044 *	0.002	-0.010	-0.024	0.000	0.186	-0.015	-0.355 ***	0.084
	(0.07)	(0.03)	(0.01)	(0.01)	(0.02)	(0.04)	(0.13)	(0.03)	(0.14)	(0.08)
Dummy for the development of new products and services (*NEWPRO*)	-0.093	-0.001	-0.019	0.005	-0.035	-0.122 *	-0.533 ***	0.055	0.121	-0.304 **
	(0.12)	(0.04)	(0.02)	(0.01)	(0.03)	(0.06)	(0.20)	(0.06)	(0.22)	(0.13)
Const.	-	0.502	0.084	0.107 *	1.200 ***	0.166	-0.193	1.041 ***	-0.171	-0.731
	(-)	(0.32)	(0.10)	(0.06)	(0.16)	(0.32)	(0.88)	(0.28)	(1.16)	(0.68)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	627	631	631	631	633	631	631	631	632	599
Hausman test[b]	16.06	31.99 ***	24.77	18.72	19.44	7.53	9.71	21.71	8.81	21.79
Breusch-Pagan test[c]	6.72 ***	6.82 ***	0.00	2.82 **	15.10 ***	12.63 ***	17.35 ***	15.51 ***	6.92 ***	5.01 **
R^2/Pseudo R^2	-	0.10	0.03	0.03	-	-	-	-	-	0.24
Wald test (χ^2)/F test[d]	57.94 ***	58.36 ***	1.32	38.74 **	123.66 ***	250.52 ***	41.36 ***	192.00 ***	43.16 ***	271.24 ***

(b) Audit system

Model	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]
Dependent variable	Proportion of outside auditors (*AUDCOM*)	Proportion of expert auditors (*AUDEXP*)	Proportion of worker representative auditors (*AUDWOR*)	Audit firm attribute (*AUDFIR*)	Total number of audit committee members (*AUDMEM*)	Total number of outside auditors (*OUTAUD*)	Total number of expert auditors (*EXPAUD*)	Total number of inside auditors (*INSAUD*)	Total number of worker representative auditors (*WORAUD*)	First principal component score for audit system–related variables (*AUDSCO*)
Estimator[a]	OLS	FE	RE	OProbit RE	Poission RE	Poission	Poission RE	Poission	Poission RE	RE
Board of director–related variable										
Proportion of outside directors (*BOACOM*)	0.367 ***	0.007	-0.327 ***	0.414 *	-0.019	0.898 ***	0.394	-0.627 ***	-0.637 ***	1.638 ***
	(0.05)	(0.07)	(0.06)	(0.24)	(0.07)	(0.15)	(0.24)	(0.10)	(0.12)	(0.28)
Ownership variable										
Large management shareholder dummy (*MANSHA*)	-0.086 **	-0.018	0.051	-0.152	-0.089 *	-0.286 ***	-0.373 **	0.063	0.001	-0.392 **
	(0.04)	(0.05)	(0.04)	(0.17)	(0.05)	(0.10)	(0.16)	(0.06)	(0.08)	(0.19)
Global financial crisis–related variable										
Dummy for firms that made significant changes in their audit system in response to the crisis (*CRISIS_AUD*)	-0.361 ***	-0.107	0.413 ***	0.273	-0.198	-1.235 **	-1.785 *	0.289	0.493 *	-1.976 ***
	(0.10)	(0.14)	(0.10)	(0.55)	(0.20)	(0.57)	(1.07)	(0.29)	(0.26)	(0.59)
Firm organization–related variables										
Dummy for business group members (*GROFIR*)	0.073 **	-0.032	-0.091 **	0.621 ***	0.009	0.183 **	0.181	-0.157 *	-0.221 ***	0.562 ***
	(0.04)	(0.05)	(0.04)	(0.16)	(0.05)	(0.08)	(0.16)	(0.09)	(0.08)	(0.19)
Dummy for open joint-stock companies (*OPECOM*)	-0.004	0.105 **	0.046	0.048	-0.011	0.008	0.372 **	-0.003	0.056	0.122
	(0.03)	(0.04)	(0.03)	(0.16)	(0.05)	(0.09)	(0.16)	(0.06)	(0.08)	(0.16)
Dummy for privatized companies (*PRICOM*)	-0.083 *	droped	0.081	0.277	0.038	-0.121	-0.527 **	0.167 *	0.168	-0.418
	(0.05)		(0.05)	(0.21)	(0.06)	(0.11)	(0.24)	(0.09)	(0.11)	(0.26)
Dummy for spin-off firms from state-owned (municipal) companies or privatized companies (*SPIOFF*)	-0.001	droped	0.011	0.440	-0.019	-0.035	-0.573 *	-0.026	0.009	-0.141
	(0.06)		(0.06)	(0.30)	(0.09)	(0.14)	(0.32)	(0.13)	(0.15)	(0.31)
Average number of employees (*COMSIZ*)	-0.002	-0.119 ***	-0.014	0.232 ***	0.103 ***	0.076 *	0.032	0.121 **	0.095 **	0.012
	(0.02)	(0.04)	(0.02)	(0.08)	(0.02)	(0.04)	(0.08)	(0.05)	(0.04)	(0.09)
Management activity–related variables										
Labor productivity (*LABPRO*)	0.000	-0.011	0.003	0.008	-0.035 ***	-0.039	-0.028	-0.044	-0.038 **	-0.005
	(0.01)	(0.01)	(0.01)	(0.04)	(0.01)	(0.03)	(0.04)	(0.04)	(0.02)	(0.05)
Dummy for firms that issued shares or bonds in the overseas or domestic stock exchange (*MARFIN*)	0.074	0.135 *	-0.046	0.608 ***	0.202 ***	0.286 **	0.602 **	0.095	0.125	0.460
	(0.05)	(0.07)	(0.05)	(0.23)	(0.07)	(0.12)	(0.24)	(0.15)	(0.13)	(0.31)
Firms that used bank credit and their average lending period (*BANCRE*)	0.008	0.026 *	0.002	-0.027	-0.003	0.018	0.100 *	-0.019	0.004	0.042
	(0.01)	(0.01)	(0.01)	(0.06)	(0.02)	(0.03)	(0.05)	(0.02)	(0.03)	(0.05)
Share of exports in total sales (*EXPSHA*)	-0.005	-0.039	0.005	0.119 *	0.008	0.012	0.065	0.004	0.008	-0.009
	(0.01)	(0.03)	(0.01)	(0.07)	(0.02)	(0.03)	(0.07)	(0.03)	(0.04)	(0.08)
R&D expenditure intensity (*R&DEXP*)	0.006	-0.001	-0.008	0.081	-0.019	0.031	-0.018	-0.042	-0.033	0.001
	(0.02)	(0.02)	(0.02)	(0.09)	(0.03)	(0.05)	(0.10)	(0.04)	(0.05)	(0.10)
Dummy for the development of new products and services (*NEWPRO*)	-0.044	0.077	0.053 *	-0.128	0.007	-0.121 *	0.102	0.089	0.129 *	-0.217
	(0.03)	(0.05)	(0.03)	(0.14)	(0.04)	(0.07)	(0.15)	(0.06)	(0.07)	(0.16)
Const.	0.317 **	0.088	0.618 ***	-	1.013 ***	-0.178	-1.189	0.648 *	0.526	-0.783
	(0.15)	(0.13)	(0.15)	(-)	(0.21)	(0.42)	(0.76)	(0.35)	(0.36)	(0.83)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	662	662	662	687	682	674	662	674	662	637
Hausman test[b]	16.62	30.93 **	19.26	21.8	25.86	16.5	25.23	3.47	2.74	16.54
Breusch-Pagan test[c]	2.18 *	2.8 **	6.14 ***	21.90 ***	2.69 *	1.06	3.34 **	0.51	1.89 *	2.61 *
R^2/Pseudo R^2	0.25	0.01	0.21	-	-	0.13	-	0.06	-	0.23
Wald test (χ^2)/F test[d]	270.18 ***	4.25 ***	196.20 ***	71.98 ***	98.26 ***	271.40 ***	63.81 ***	125.54 ***	100.62 ***	208.50 ***

Notes:

[a] OLS: Pooling OLS estimator; FE: Fixed-effects panel estimator; RE: Random-effects panel estimator; OProbit RE: Ordered probit random-effects panel estimator; Poission: Pooling Poisson estimator; Poission RE: Poisson random-effects panel estimator

[b] Null hypothesis: Random-effects estimation is effective and consistent.

[c] Null hypothesis: The variance of firm-individual effects is zero.

[d] Null hypothesis: All coefficients are zero.

[e] Robust standard errors (standard errors in the case of Poission panel estimation) are repoted in parentheses beneath the regression coefficients. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Author's estimation. See Table 1 for definitions and descriptive statistics of variables used in estimation.

Table 5. Determinants of corporate governance system: Heckman two-step estimation of difference model

(a) Board of directors

Model	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Dependent variable	Outsideness of the chairman of the board of directors (*BOALEA*)	Proportion of outside directors (*BOACOM*)	Proportion of independent directors (*BOAIND*)	Proportion of worker representative directors (*BOAWOR*)	Total number of board of director members (*BOAMEM*)	Total number of outside directors (*OUTDIR*)	Total number of independent directors (*INDDIR*)	Total number of inside directors (*INSDIR*)	Total number of worker representative directors (*WORDIR*)	First principal component score for board of director–related variables (*BODSCO*)
Ownership variables										
Ownership share of outside shareholders (*OWNOUT*)	0.036	0.035 ***	0.011	-0.009	-0.082	0.223 ***	0.055	-0.286 ***	-0.087 **	0.160 ***
	(0.03)	(0.01)	(0.01)	(0.01)	(0.07)	(0.07)	(0.05)	(0.08)	(0.03)	(0.06)
Large management shareholder dummy (*MANSHA*)	-0.264 *	-0.223 ***	-0.042	0.006	0.386	-1.412 ***	-0.195	1.879 ***	0.128	-1.043 ***
	(0.14)	(0.05)	(0.04)	(0.02)	(0.31)	(0.31)	(0.21)	(0.34)	(0.15)	(0.25)
Global financial crisis–related variable										
Dummy for firms that made significant changes in management and supervisory bodies in response to the crisis (*CRISIS_BOD*)	-0.104	0.111	0.049	-0.132 **	-0.823	-0.006	0.238	-1.085	-1.045 ***	0.221
	(0.36)	(0.11)	(0.08)	(0.06)	(0.70)	(0.72)	(0.49)	(0.79)	(0.34)	(0.64)
Firm organization–related variables										
Dummy for business group members (*GROFIR*)	-0.108	-0.021	0.010	-0.009	-0.171	-0.222	0.050	0.075	0.066	-0.066
	(0.15)	(0.05)	(0.04)	(0.03)	(0.32)	(0.32)	(0.22)	(0.36)	(0.15)	(0.26)
Dummy for firms with upper limits on ownership shares (*LIMOWN*)	-0.103	-0.157 **	-0.049	0.063 *	-0.294	-1.147 ***	-0.279	0.811 *	0.399 **	-1.122 ***
	(0.19)	(0.06)	(0.05)	(0.03)	(0.41)	(0.41)	(0.28)	(0.46)	(0.20)	(0.34)
Dummy for open joint-stock companies (*OPECOM*)	0.159	0.011	-0.013	0.014	0.101	0.010	-0.031	-0.076	0.077	-0.041
	(0.13)	(0.04)	(0.03)	(0.02)	(0.27)	(0.27)	(0.19)	(0.30)	(0.13)	(0.23)
Average number of employees (*COMSIZ*)	0.118	0.037	-0.022	0.003	0.293	0.442 *	-0.090	-0.096	-0.028	0.109
	(0.11)	(0.04)	(0.03)	(0.02)	(0.23)	(0.24)	(0.16)	(0.26)	(0.11)	(0.19)
Management activity–related variables										
Labor productivity (*LABPRO*)	0.046	0.010	-0.014	-0.005	-0.047	0.028	-0.088 *	-0.055	-0.011	-0.010
	(0.03)	(0.01)	(0.01)	(0.01)	(0.07)	(0.08)	(0.05)	(0.08)	(0.04)	(0.06)
Dummy for firms that issued shares or bonds in the overseas or domestic stock exchange (*MARFIN*)	-0.005	-0.045	-0.010	0.015	-0.422	-0.328	0.131	-0.173	0.148	-0.008
	(0.24)	(0.08)	(0.06)	(0.04)	(0.53)	(0.53)	(0.37)	(0.59)	(0.25)	(0.44)
Firms that used bank credit and their average lending period (*BANCRE*)	-0.046	0.0037	0.015	0.005	0.194 **	0.055	0.057	0.018	0.028	0.049
	(0.05)	(0.02)	(0.01)	(0.01)	(0.10)	(0.10)	(0.07)	(0.11)	(0.05)	(0.09)
Share of exports in total sales (*EXPSHA*)	0.080	0.032	-0.018	0.000	0.081	0.193	-0.119	-0.139	0.013	0.124
	(0.09)	(0.03)	(0.02)	(0.01)	(0.17)	(0.17)	(0.12)	(0.19)	(0.08)	(0.15)
R&D expenditure intensity (*R&DEXP*)	-0.104	0.041	0.046 **	-0.015	-0.068	0.274	0.332 ***	-0.316	-0.146 *	0.358 **
	(0.08)	(0.03)	(0.02)	(0.01)	(0.18)	(0.18)	(0.12)	(0.20)	(0.09)	(0.14)
Dummy for the development of new products and services (*NEWPRO*)	-0.018	0.003	-0.061 *	0.006	-0.041	0.108	-0.335 *	-0.191	0.032	-0.298
	(0.13)	(0.04)	(0.03)	(0.02)	(0.27)	(0.27)	(0.19)	(0.30)	(0.13)	(0.23)
Inverse Mills ratio	-0.174	0.028	0.064	0.025	-0.881 **	-0.094	0.442	-0.285	0.162	0.246
	(0.19)	(0.06)	(0.05)	(0.03)	(0.42)	(0.42)	(0.29)	(0.47)	(0.20)	(0.32)
N	271	276	276	276	277	276	276	276	276	253
N (uncensored observation)	203	208	208	208	209	208	208	208	208	185
Wald test (χ^2) [a]	13.75	49.21 ***	17.88	18.17	15.67	51.58 ***	17.62	57.59 ***	29.56 ***	48.72 ***

(b) Audit system

Model	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]
Dependent variable	Proportion of outside auditors (*AUDCOM*)	Proportion of expert auditors (*AUDEXP*)	Proportion of worker representative auditors (*AUDWOR*)	Audit firm attribute (*AUDFIR*)	Total number of audit committee members (*AUDMEM*)	Total number of outside auditors (*OUTAUD*)	Total number of expert auditors (*EXPAUD*)	Total number of inside auditors (*INSAUD*)	Total number of worker representative auditors (*WORAUD*)	First principal component score for audit system–related variables (*AUDSCO*)
Board of director–related variable										
Proportion of outside directors (*BOACOM*)	0.303 ***	0.004	-0.232 **	-0.033	-0.334	0.537	-0.133	-0.871 ***	-0.709 **	1.120 **
	(0.09)	(0.07)	(0.09)	(0.11)	(0.27)	(0.35)	(0.24)	(0.34)	(0.35)	(0.49)
Ownership variable										
Large management shareholder dummy (*MANSHA*)	-0.060	-0.037	0.015	-0.130 *	-0.268	-0.173	-0.198	-0.098	-0.197	-0.132
	(0.06)	(0.05)	(0.07)	(0.08)	(0.19)	(0.25)	(0.17)	(0.24)	(0.25)	(0.35)
Global financial crisis–related variable										
Dummy for firms that made significant changes in their audit system in response to the crisis (*CRISIS_AU*D)	-0.426 **	-0.115	0.423 **	0.166	-0.485	-1.517 **	-0.688	1.033	1.075	-2.038 **
	(0.18)	(0.14)	(0.19)	(0.23)	(0.57)	(0.71)	(0.48)	(0.70)	(0.70)	(0.97)
Firm organization–related variables										
Dummy for business group members (*GROFIR*)	0.064	-0.033	-0.048	0.214 ***	-0.439 **	-0.017	-0.112	-0.420 *	-0.368	0.251
	(0.06)	(0.05)	(0.07)	(0.08)	(0.19)	(0.24)	(0.17)	(0.24)	(0.24)	(0.34)
Dummy for open joint-stock companies (*OPECOM*)	-0.009	0.102 **	0.067	0.145 **	-0.119	0.090	0.277 *	-0.210	0.031	0.149
	(0.06)	(0.04)	(0.06)	(0.07)	(0.17)	(0.22)	(0.15)	(0.21)	(0.22)	(0.31)
Average number of employees (*COMSIZ*)	-0.032	-0.108 ***	0.027	0.178 ***	0.307 *	0.029	-0.170	0.274	0.230	-0.210
	(0.05)	(0.04)	(0.05)	(0.06)	(0.16)	(0.20)	(0.13)	(0.19)	(0.20)	(0.28)
Management activity–related variables										
Labor productivity (*LABPRO*)	-0.006	-0.009	0.002	-0.046 **	-0.026	-0.057	-0.046	0.028	0.024	-0.035
	(0.02)	(0.01)	(0.02)	(0.02)	(0.05)	(0.06)	(0.04)	(0.06)	(0.06)	(0.09)
Dummy for firms that issued shares or bonds in the overseas or domestic stock exchange (*MARFIN*)	0.056	0.149 *	-0.059	0.110	0.649 **	0.838 **	0.751 ***	-0.190	-0.034	0.518
	(0.11)	(0.08)	(0.11)	(0.12)	(0.32)	(0.41)	(0.28)	(0.40)	(0.41)	(0.58)
Firms that used bank credit and their average lending period (*BANCRE*)	-0.007	0.028 *	0.013	-0.010	0.088	0.021	0.069	0.072	0.081	-0.009
	(0.02)	(0.02)	(0.02)	(0.02)	(0.06)	(0.08)	(0.05)	(0.08)	(0.08)	(0.11)
Share of exports in total sales (*EXPSHA*)	-0.030	-0.023	0.019	0.077 *	-0.014	-0.132	-0.099	0.119	0.062	-0.231
	(0.04)	(0.03)	(0.04)	(0.04)	(0.11)	(0.14)	(0.10)	(0.14)	(0.14)	(0.20)
R&D expenditure intensity (*R&DEXP*)	-0.039	-0.001	0.028	0.033	0.100	-0.028	0.015	0.127	0.122	-0.185
	(0.04)	(0.03)	(0.04)	(0.05)	(0.11)	(0.14)	(0.09)	(0.14)	(0.14)	(0.20)
Dummy for the development of new products and services (*NEWPRO*)	-0.001	-0.098 **	0.059	-0.105	0.095	0.047	-0.281 *	0.046	0.239	-0.035
	(0.06)	(0.04)	(0.06)	(0.07)	(0.17)	(0.22)	(0.15)	(0.21)	(0.22)	(0.31)
Inverse Mills ratio	0.080	-0.007	-0.055	0.158	0.256	0.501	0.269	-0.254	-0.119	0.515
	(0.08)	(0.06)	(0.09)	(0.10)	(0.26)	(0.33)	(0.22)	(0.32)	(0.32)	(0.44)
N	265	265	265	278	273	269	265	269	265	251
N (uncensored observation)	197	197	198	210	205	201	197	201	197	183
Wald test (χ^2) [a]	24.56 **	27.51 ***	17.16	34.20 ***	23.99 **	15.50	25.75 **	19.33 *	15.36	16.61

Notes:

[a] Null hypothesis: All coefficients are zero.

[b] Robust standard errors are reported in parentheses beneath the regression coefficients. ***, **, and + denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Author's estimation. See Table 1 for definitions and descriptive statistics of variables used in estimation.

Table 6. Assesment of omission bias in the 2009 enterprise survey

Variables	2009 surviving unsurveyed firms		2009 surviving surveyed firms		Univariate comparison [a]		
	Mean of 2005 data	Median of 2005 data	Mean of 2005 data	Median of 2005 data	t test (*t* value)	Wilcoxon rank sum test (*z* value)	Proportion test (*z* value)
(a) Board of director–related variables							
Outsideness of the chairman of the board of directors (*BOALEA*)	0.843	1	0.792	0	0.660	0.792	-
Proportion of outside directors (*BOACOM*)	0.476	0.571	0.463	0.472	0.428	0.490	-
Proportion of independent directors (*BOAIND*)	0.057	0.000	0.061	0.000	-0.273	0.066	-
Proportion of worker representative directors (*BOAWOR*)	0.055	0.000	0.050	0.000	0.352	-0.367	-
Total number of board of director members (*BOAMEM*)	6.742	7	6.549	6	0.905	1.060	-
Total number of outside directors (*OUTDIR*)	3.492	3	3.126	3	1.421	0.947	-
Total number of independent directors (*INDDIR*)	0.459	0	0.369	0	0.925	0.232	-
Total number of inside directors (*INSDIR*)	3.249	3	3.423	3	-0.791	-0.361	-
Total number of worker representative directors (*WORDIR*)	0.337	0	0.361	0	-0.210	-0.309	-
(b) Audit system–related variables							
Proportion of outside auditors (*AUDCOM*)	0.374	0.292	0.427	0.333	-1.439	-1.615	-
Proportion of expert auditors *(AUDEXP*)	0.157	0.000	0.167	0.000	-0.330	-0.582	-
Proportion of worker representative auditors (*AUDWOR*)	0.565	0.667	0.512	0.500	1.406	1.507	-
Audit firm attribute (*AUDFIR*)	0.317	0	0.340	0	-0.466	-0.418	-
Total number of audit committee members (*AUDMEM*)	3.728	3	3.325	3	2.222 **	1.944 *	-
Total number of outside auditors (*OUTAUD*)	1.350	1	1.370	1	-0.138	-1.287	-
Total number of expert auditors (*EXPAUD*)	0.586	0	0.511	0	0.744	-0.310	-
Total number of inside auditors (*INSAUD*)	2.383	2	1.929	2	2.680 ***	2.031 **	-
Total number of worker representative auditors (*WORAUD*)	2.103	2	1.698	2	2.312 **	1.685 *	-

Variables	2009 surviving unsurveyed firms		2009 surviving surveyed firms		Univariate comparison [a]		
	Mean of 2005 data	Median of 2005 data	Mean of 2005 data	Median of 2005 data	t test (t value)	Wilcoxon rank sum test (z value)	Proportion test (z value)
(c) Ownership variables							
Ownership share of outside shareholders (*OWNOUT*)	1.706	0	1.851	1	-0.763	-0.715	-
Large management shareholder dummy (*MANSHA*)	0.498	0	0.506	1	-0.197	-0.197	-0.198
(d) Firm organization–related variables							
Dummy for business group members (*GROFIR*)	0.347	0	0.330	0	0.434	0.434	0.434
Dummy for firms with upper limits on ownership shares (*LIMOWN*)	0.065	0	0.189	0	-3.976 ***	-3.924 ***	-3.928 ***
Dummy for open joint-stock companies (*OPECOM*)	0.665	1	0.673	1	-0.199	-0.199	-0.199
Dummy for privatized companies (*PRICOM*)	0.718	1	0.745	1	-0.728	-0.728	-0.729
Dummy for spin-off firms from state-owned (municipal) companies or privatized companies (*SPIOFF*)	0.094	0	0.087	0	0.276	0.276	0.277
Average number of employees (*COMSIZ*)	6.470	6.215	6.420	6.117	0.507	1.137	-
(d) Management activity–related variables							
Labor productivity (*LABPRO*)	13.059	12.900	12.660	12.700	3.893 ***	3.803 ***	-
Dummy for firms that issued shares or bonds in the overseas or domestic stock exchange (*MARFIN*)	0.109	0	0.082	0	1.113	1.112	1.113
Firms that used bank credits and their average lending period (*BANCRE*)	2.534	3	2.520	3	0.115	0.183	-
Share of exports in total sales (*EXPSHA*)	1.118	1	0.938	1	1.716 *	1.349	-
R&D expenditure intensity (*R&DEXP*)	0.967	1	0.969	1	-0.027	-0.068	-
Dummy for the development of new products and services (*NEWPRO*)	0.652	1	0.588	1	1.560	1.558	1.560

Notes:

[a] Two-sided test. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively

Source: Author's estimation. See Table 1 for definitions and descriptive statistics of the variables.

Supplement 1. Principal component analysis of the composition of boards of directors and audit systems

(a) Board of director–related variables (*BODSCO*)

Eigenvalues of the correlation matrix				Eigenvectors and component loadings of the first component	
Component No.	Eigenvalue	Accounted for variance (%)	Cumulative percentage of total variance	Variables	Eigenvector
1	3.226	0.36	0.36	Outsideness of the chairman of the board of directors (*BOALEA*)	0.210
2	2.029	0.23	0.58	Proportion of outside directors (*BOACOM*)	0.466
3	1.507	0.17	0.75	Proportion of independent directors (*BOAIND*)	0.286
4	1.048	0.12	0.87	Proportion of worker representative directors (*BOAWOR*)	-0.324
5	0.819	0.09	0.96	Total number of board of director members (*BOAMEM*)	-0.092
6	0.220	0.02	0.98	Total number of outside directors (*OUTDIR*)	0.381
7	0.090	0.01	0.99	Total number of independent directors (*INDDIR*)	0.284
8	0.059	0.01	1.00	Total number of inside directors (*INSDIR*)	-0.457
9	0.000	0.00	1.00	Total number of worker representative directors (*WORDIR*)	-0.331

(b) Audit system–related variables (*AUDSCO*)

Eigenvalues of the correlation matrix				Eigenvectors and component loadings of the first component	
Component No.	Eigenvalue	Accounted for variance (%)	Cumulative percentage of total variance	Variables	Eigenvector
1	4.681	0.52	0.52	Proportion of outside auditors (*AUDCOM*)	0.430
2	1.843	0.20	0.72	Proportion of expert auditors *(AUDEXP*)	0.331
3	1.056	0.12	0.84	Proportion of worker representative auditors (*AUDWOR*)	-0.415
4	0.954	0.11	0.95	Audit firm attribute (*AUDFIR*)	0.071
5	0.242	0.03	0.98	Total number of audit committee members (*AUDMEM*)	-0.007
6	0.169	0.02	0.99	Total number of outside auditors (*OUTAUD*)	0.367
7	0.049	0.01	1.00	Total number of expert auditors (*EXPAUD*)	0.319
8	0.006	0.00	1.00	Total number of inside auditors (*INSAUD*)	-0.387
9	0.000	0.00	1.00	Total number of worker representative auditors (*WORAUD*)	-0.377

Note: See Table 1 for definitions and descriptive statistics of the variables used for estimation.

Supplement 2. Determinants of corporate governance system: panel data analysis using data from the year 2009 surviving firms surveyed

(a) Board of directors

Model	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Dependent variable	Outsideness of the chairman of the board of directors (*BOALEA*)	Proportion of outside directors (*BOACOM*)	Proportion of independent directors (*BOAIND*)	Proportion of worker representative directors (*BOAWOR*)	Total number of board of director members (*BOAMEM*)	Total number of outside directors (*OUTDIR*)	Total number of independent directors (*INDDIR*)	Total number of inside directors (*INSDIR*)	Total number of worker representative directors (*WORDIR*)	First principal component score for board of director–related variables (*BODSCO*) [a]
Estimator [b]	OProbit RE	FE	OLS	RE	Poisson RE	Poisson RE	Poisson	Poisson RE	Poisson RE	RE
Ownership variables										
Ownership share of outside shareholders (*OWNOUT*)	0.042	0.036 ***	0.008 *	-0.004	0.014 *	0.087 ***	0.092 *	-0.065 ***	-0.115 **	0.158 ***
	(0.03)	(0.01)	(0.00)	(0.00)	(0.01)	(0.02)	(0.05)	(0.01)	(0.05)	(0.03)
Large management shareholder dummy (*MANSHA*)	-0.635 ***	-0.237 ***	-0.019	0.010	0.046	-0.556 ***	-0.100	0.564 ***	0.349	-0.985 ***
	(0.13)	(0.06)	(0.02)	(0.01)	(0.04)	(0.07)	(0.23)	(0.06)	(0.23)	(0.15)
Global financial crisis–related variables										
Dummy for firms that made significant changes in management and supervisory bodies in response to the crisis (*CRISIS_BOD*)	-0.521	0.127	0.039	-0.019	-0.109	0.029	0.445	-0.325	-2.377 **	0.398
	(0.36)	(0.12)	(0.08)	(0.05)	(0.13)	(0.20)	(0.62)	(0.22)	(1.05)	(0.54)
Firm organization–related variables										
Dummy for business group members (*GROFIR*)	-0.006	-0.009	0.004	-0.013	-0.023	0.104	0.080	-0.162 **	-0.083	0.293 *
	(0.13)	(0.05)	(0.02)	(0.01)	(0.04)	(0.07)	(0.25)	(0.07)	(0.27)	(0.16)
Dummy for firms with upper limits on ownership shares (*LIMOWN*)	-0.248	-0.140 **	-0.018	0.011	0.017	-0.101	-0.110	0.148 *	0.552 *	-0.404 **
	(0.18)	(0.07)	(0.02)	(0.01)	(0.05)	(0.10)	(0.30)	(0.08)	(0.32)	(0.19)
Dummy for open joint-stock companies (*OPECOM*)	0.365 ***	0.030	0.021	0.005	0.043	0.216 ***	0.455 **	-0.106 *	0.230	0.270 *
	(0.14)	(0.05)	(0.02)	(0.01)	(0.04)	(0.07)	(0.23)	(0.06)	(0.23)	(0.15)
Dummy for privatized companies (*PRICOM*)	-0.196	droped	0.006	0.017	0.108 **	0.165	0.227	0.103	0.633	-0.129
	(0.19)		(0.02)	(0.01)	(0.05)	(0.11)	(0.34)	(0.09)	(0.41)	(0.19)
Dummy for spin-off firms from state-owned (municipal) companies or privatized companies (*SPIOFF*)	0.064	droped	0.014	0.037	0.049	0.234	0.202	-0.113	0.679	0.031
	(0.24)		(0.03)	(0.02)	(0.07)	(0.16)	(0.44)	(0.13)	(0.55)	(0.29)
Average number of employees (*COMSIZ*)	0.021	0.040	-0.001	-0.006	0.102 ***	0.157 ***	0.080	0.024	-0.133	0.103
	(0.06)	(0.04)	(0.01)	(0.01)	(0.02)	(0.04)	(0.10)	(0.03)	(0.13)	(0.08)
Management activity–related variables										
Labor productivity (*LABPRO*)	0.037	0.006	-0.003	-0.003	-0.010	-0.025	-0.079	-0.007	-0.073	-0.013
	(0.03)	(0.01)	(0.01)	(0.00)	(0.01)	(0.02)	(0.06)	(0.02)	(0.06)	(0.04)
Dummy for firms that issued shares or bonds in the overseas or domestic stock exchange (*MARFIN*)	0.037	-0.025	0.004	0.014	0.011	0.002	0.247	-0.137	0.508	0.154
	(0.21)	(0.09)	(0.03)	(0.02)	(0.06)	(0.11)	(0.29)	(0.11)	(0.40)	(0.23)
Firms that used bank credit and their average lending period (*BANCRE*)	-0.015	0.002	0.003	0.001	0.012	-0.005	0.001	0.010	0.050	0.007
	(0.04)	(0.02)	(0.01)	(0.00)	(0.01)	(0.02)	(0.08)	(0.02)	(0.08)	(0.05)
Share of exports in total sales (*EXPSHA*)	-0.012	0.040 *	-0.003	0.002	-0.020	0.038	-0.022	-0.049 *	0.049	0.034
	(0.06)	(0.02)	(0.01)	(0.01)	(0.02)	(0.03)	(0.09)	(0.03)	(0.12)	(0.07)
R&D expenditure intensity (*R&DEXP*)	0.004	0.044 *	0.003	-0.012 *	-0.035	0.015	-0.034	-0.047	-0.367 ***	0.146 *
	(0.08)	(0.03)	(0.01)	(0.01)	(0.02)	(0.04)	(0.14)	(0.04)	(0.14)	(0.08)
Dummy for the development of new products and services (*NEWPRO*)	-0.089	-0.001	-0.020	0.009	-0.014	-0.091	-0.290	0.048	0.317	-0.296 **
	(0.12)	(0.04)	(0.02)	(0.01)	(0.04)	(0.07)	(0.21)	(0.06)	(0.23)	(0.13)
Const.	-	0.500	0.094	0.109 *	1.197 ***	0.061	-0.962	1.086 ***	0.237	-0.723
	(-)	(0.32)	(0.10)	(0.06)	(0.17)	(0.34)	(1.23)	(0.29)	(1.17)	(0.71)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	563	567	567	567	568	567	567	567	567	536
Hausman test [c]	14.28	31.15 **	24.28	17.62	19.8	6.95	8.46	19.97	7.76	18.86
Breusch-Pagan test [d]	6.59 ***	6.83 ***	0.00	2.70 **	14.99 ***	11.91 ***	0.02	15.98 ***	7.96 ***	5.06 **
R^2/Pseudo R^2	-	0.09	0.03	0.04	-	-	0.07	-	-	0.22
Wald test (χ^2)/F test [e]	52.56 ***	58.13 ***	1.05	35.85 **	122.24 ***	211.62 ***	61.17 ***	174.23 ***	43.03 ***	213.93 ***

(b) Audit system

Model	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]
Dependent variable	Proportion of outside auditors (*AUDCOM*)	Proportion of expert auditors (*AUDEXP*)	Proportion of worker representative auditors (*AUDWOR*)	Audit firm attribute (*AUDFIR*)	Total number of audit committee members (*AUDMEM*)	Total number of outside auditors (*OUTAUD*)	Total number of expert auditors (*EXPAUD*)	Total number of inside auditors (*INSAUD*)	Total number of worker representative auditors (*WORAUD*)	First principal component score for audit system–related variables (*AUDSCO*) [a]
Estimator [b]	RE	FE	RE	OProbit RE	Poisson RE	Poisson	Poisson RE	Poisson	Poisson RE	RE
Board of director–related variable										
Proportion of outside directors (*BOACOM*)	0.396 ***	0.007	-0.355 ***	0.565 **	-0.045	0.900 ***	0.451 *	-0.697 ***	-0.723 ***	1.876 ***
	(0.06)	(0.07)	(0.06)	(0.26)	(0.08)	(0.16)	(0.25)	(0.11)	(0.13)	(0.31)
Ownership variable										
Large management shareholder dummy (*MANSHA*)	-0.064 *	-0.018	0.032	-0.088	-0.077	-0.213 **	-0.244	0.044	-0.019	-0.281
	(0.04)	(0.05)	(0.04)	(0.18)	(0.05)	(0.10)	(0.17)	(0.07)	(0.08)	(0.21)
Global financial crisis–related variable										
Dummy for firms that made significant changes in their audit system in response to the crisis (*CRISIS_AUD*)	0.349 ***	0.107	-0.397 ***	-0.292	0.177	1.182 **	1.765 *	-0.302	-0.493 *	1.994 ***
	(0.10)	(0.14)	(0.10)	(0.52)	(0.20)	(0.57)	(1.06)	(0.31)	(0.27)	(0.64)
Firm organization–related variables										
Dummy for business group members (*GROFIR*)	0.085 **	-0.032	-0.093 **	0.603 ***	0.004	0.202 **	0.152	-0.195 **	-0.244 ***	0.637 ***
	(0.04)	(0.05)	(0.04)	(0.17)	(0.05)	(0.08)	(0.16)	(0.09)	(0.09)	(0.21)
Dummy for open joint-stock companies (*OPECOM*)	-0.013	0.105 **	0.051	0.027	-0.024	-0.018	0.424 **	-0.007	0.046	0.120
	(0.03)	(0.04)	(0.04)	(0.17)	(0.05)	(0.09)	(0.17)	(0.07)	(0.08)	(0.19)
Dummy for privatized companies (*PRICOM*)	-0.091 *	droped	0.093 *	0.165	0.039	-0.116	-0.602 **	0.170	0.207 *	-0.502 *
	(0.05)		(0.05)	(0.23)	(0.07)	(0.12)	(0.24)	(0.11)	(0.12)	(0.29)
Dummy for spin-off firms from state-owned (municipal) companies or privatized companies (*SPIOFF*)	-0.018	droped	0.019	0.451	0.019	-0.017	-0.553	0.035	0.100	-0.219
	(0.07)		(0.07)	(0.35)	(0.09)	(0.15)	(0.34)	(0.15)	(0.18)	(0.37)
Average number of employees (*COMSIZ*)	-0.008	-0.119 ***	-0.010	0.249 ***	0.108 ***	0.074 *	0.033	0.139 **	0.112 ***	-0.014
	(0.02)	(0.04)	(0.02)	(0.09)	(0.02)	(0.04)	(0.08)	(0.06)	(0.04)	(0.10)
Management activity–related variables										
Labor productivity (*LABPRO*)	-0.001	-0.011	0.003	-0.003	-0.036 ***	-0.042	-0.022	-0.043	-0.034 *	-0.010
	(0.01)	(0.01)	(0.01)	(0.04)	(0.01)	(0.03)	(0.04)	(0.04)	(0.02)	(0.05)
Dummy for firms that issued shares or bonds in the overseas or domestic stock exchange (*MARFIN*)	0.057	0.135 *	-0.019	0.644 **	0.200 ***	0.240 *	0.671 ***	0.150	0.212	0.359
	(0.06)	(0.07)	(0.06)	(0.25)	(0.08)	(0.12)	(0.25)	(0.16)	(0.14)	(0.37)
Firms that used bank credit and their average lending period (*BANCRE*)	0.008	0.026 *	-0.001	-0.002	0.001	0.026	0.090	-0.021	0.000	0.046
	(0.01)	(0.01)	(0.01)	(0.06)	(0.02)	(0.03)	(0.06)	(0.02)	(0.03)	(0.06)
Share of exports in total sales (*EXPSHA*)	0.000	-0.039	0.000	0.116	0.011	0.022	0.065	0.000	-0.002	0.001
	(0.01)	(0.03)	(0.01)	(0.08)	(0.02)	(0.03)	(0.07)	(0.04)	(0.04)	(0.09)
R&D expenditure intensity (*R&DEXP*)	0.003	-0.001	0.003	0.008	-0.017	0.020	-0.001	-0.033	-0.009	-0.040
	(0.02)	(0.02)	(0.02)	(0.10)	(0.03)	(0.05)	(0.10)	(0.05)	(0.05)	(0.11)
Dummy for the development of new products and services (*NEWPRO*)	-0.034	0.077	0.044	-0.206	0.017	-0.091	0.145	0.080	0.117	-0.162
	(0.03)	(0.05)	(0.03)	(0.15)	(0.05)	(0.08)	(0.16)	(0.06)	(0.08)	(0.17)
Const.	0.352 **	0.986 ***	0.608 ***	-	0.956 ***	-0.235	-1.523 **	0.541	0.365	-0.722
	(0.16)	(0.33)	(0.15)	(-)	(0.21)	(0.43)	(0.77)	(0.34)	(0.39)	(0.89)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	586	586	586	607	605	597	586	597	586	561
Hausman test [c]	15.98	31.91 **	18.76	20.87	23.61	15.81	25.65	3.15	2.34	16.07
Breusch-Pagan test [d]	2.32 *	2.70 *	6.27 ***	21.00 ***	2.44 *	0.99	3.35 **	0.51	1.84 *	2.45 *
R^2/Pseudo R^2	0.25	0.01	0.20	-	-	0.13	-	0.07	-	0.23
Wald test (χ^2)/F test [e]	249.51 ***	4.23 ***	181.91 ***	64.35 ***	93.80 ***	243.90 ***	64.94 ***	121.73 ***	91.48 ***	187.16

Notes:

[a] Score obtained from principal component anaysis using data of surviving firms surveyed in 2009. Estimation results are not significantly different from those in Supplement 1.

[b] OLS: Pooling OLS estimator; FE: Fixed-effects panel estimator; RE: Random-effects panel estimator; OProbit RE: Ordered probit random-effects panel estimator; Poission: Pooling Poisson estimator; Poission RE: Poisson random-effects panel estimator

[c] Null hypothesis: Random-effects estimation is effective and consistent.

[d] Null hypothesis: The variance of firm-individual effects is zero.

[e] Null hypothesis: All coefficients are zero.

[f] Robust standard errors (standard errors in the case of Poission panel estimation) are reported in parentheses beneath the regression coefficients. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Author's estimation. See Table 1 for definitions and descriptive statistics of variables used in estimation.