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Governance, and Firm Survival:  
The Russian Experience**

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# Global Financial Crisis, Corporate Governance, and Firm Survival<sup>\*</sup>

## The Russian Experience

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**Abstract:** Using a unique dataset obtained from large-scale panel enterprise surveys conducted in 2005 and 2009, we clarify the survival status of Russian industrial firms before and after the global financial crisis and empirically examine the determinants of firm survival. The estimation of the Cox proportional hazard model provided evidence that the independence of company's governance bodies, their human resource abundance, and influence over corporate management are statistically significant factors affecting the survival probability of the surveyed firms. In particular, the board of directors and the audit committee are likely to play a vital role in reducing the potential exit risk. We also found that there is a significant difference in the viewpoints of economic logic for firm survival held by independent firms and group companies.

JEL classification numbers: D22, G01, G33, G34, P34

Key words: global financial crisis, firm survival, corporate governance, business group, Russia

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## 1. Introduction

The 2008 global financial crisis triggered by the US subprime loan problem struck not only developed economies but also Russia, which had been promoting economic integration with the world economy in pursuit of the shift from a planned system to a market economy. In fact, Russia experienced a negative real GDP growth rate of -7.8% the following year, 2009. This fall was the second largest after the devastating “transformational recession” (Kornai, 1994) that followed immediately after the collapse of the Soviet Union, exceeding the economic drop during the 1998 financial crisis. The Russian manufacturing industry, which is sensitive to global economic conditions, had shown signs of a change earlier in 2008. Then, in 2009, its value-added production rapidly shrank by 14.9% in real terms compared to the previous year. As a result, both the amount of total output and the number of employees in the industrial sector dropped sharply in 2009. Even after the subsequent V-shaped recovery, they failed to recover to the levels prior to the crisis in 2010. Furthermore, the global financial crisis is considered to have inflicted especially severe damage on large and medium-sized Russian firms during the period, given their close connection with the capital market. In fact, as shown in **Figure 1**, the RTS Index, a major stock price index in Russia, nosedived by 75.0% from the highest-ever 13,337.03 recorded on May 19, 2008, to 3,333.31 on October 24, 2008, in as little as five months.

Although it has been repeatedly pointed out that various institutional and non-institutional barriers hinder firm entry and exit in Russia (Broadman, 2000; Aidis and Adachi, 2007; Estrin and Prevezer, 2010), it is certain that the global financial crisis caused such serious damage to the Russian industry that an abnormally high number of firms were eliminated. In fact, as shown in **Figure 2**, the number of liquidated firms per 1,000 domestic companies increased from 2.8 on average from January to August 2008 to 3.7 from September 2008 to December 2010, demonstrating a sharp upward shift after September 2008.<sup>1</sup> Moreover, an urgent interview survey, in which Novosibirsk-based industrial firms were examined in early 2009, revealed that senior management in 14 of the 21 firms surveyed reported that they had difficulty or great difficulty in coping with the latest crisis (Koreli and Kombarov, 2010). Furthermore, according to a questionnaire survey of Russian manufacturing firms in 2009, one of four firms replied that it was facing a grave management problem

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<sup>1</sup> The difference between the two period averages is statistically significant at the 1% level ( $t=5.427, p=0.000$ ).

triggered by the 2008 crisis, and one of five firms replied that it was facing real danger of bankruptcy (Dolgopyatova, 2009).

This study examines the number for Russian firms forced to exit the market in the wake of the world economic shock and the characteristics of the firms that survived this historic adversity. More specifically, based on the results of a large-scale panel enterprise surveys conducted across Russia in 2005 and 2009, we clarify the five-year survival status of Russian industrial firms and empirically examine the determinants of firm survival. To the best of our knowledge, empirical studies concerning firm survival and/or exit from the market in post-socialist transition economies have been confined to the nine studies listed in **Table 1**, and, thus, transition studies have made only a small contribution to this field. In addition, Rinaldi (2008), the only one who examined the determinants of market exit in Russia using a firm-level dataset, limited his research to the footwear industry; therefore, the overall picture has not been explored.

The significance of our study lies in that it examines transition economies and also pays attention to the role of company's governance bodies as an influential factor of firm survivability. There is a vast amount of empirical literature in which the factors of a firm's failure and survival are investigated; the studies range from the pioneering work of Beaver (1966) and Altman (1968) to the latest work by de Figueiredo and Silverman (2012).<sup>2</sup> However, corporate governance has been examined in only a small number studies, and, in those, the focus was limited to ownership structure as a controlling factor, as in the transition studies listed in **Table 1**. In fact, the causality between the structures and functions of corporate governance bodies and firm survival is explicitly examined in only a few research works.<sup>3</sup> Furthermore, these few preceding studies focused exclusively on the board of directors and ignored other corporate organs.

In Russia, a joint-stock company is the most popular incorporated form among large and medium-sized firms. As illustrated in **Figure 3**, there are six corporate organs stipulated by law for this form of company: (a) the general shareholders' meeting, (b) the board of directors, (c) the audit committee, (d) the accounting auditor (i.e., audit

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<sup>2</sup> Santarelli and Vivarelli (2007) and Manjón-Antolín and Arauzo-Carod (2008) provide overviews and recent developments in this research field.

<sup>3</sup> They include Daily and Dalton (1994), Filatotchev and Toms (2003), Howton (2006), He (2008), Dowell et al. (2011), and Chancharat et al. (2012). Except for Chancharat et al. (2012) on the Australian IPO firms, all of these papers focus on either American or British firms.

firm), (e) the single executive body, and (f) the collective executive board (Iwasaki, 2007a).<sup>4</sup> Among these, a single executive body refers to a top manager (CEO, President, or General Director), while a collective executive board is a voluntary management body consisting of senior executives (Iwasaki, 2013a). The other corporate organs fulfill managerial supervision and advisory functions, as those in developed economies (Iwasaki, 2008; 2009b; 2013b). Accordingly, in this paper, we empirically examine the effects of these four governance bodies on the survival probability of Russian firms and provide new insights into the role of corporate governance.

In addition, in this paper, we compare companies that belong to a particular holding company group or another business group through stock ownership and independent firms that have no relationship with any business group in terms of their ownership structure, and we examine the differences in survival probability and its determinants between the two types of firms. We do this because, if Russian firms were not randomly assigned to business groups, there would be a statistically significant difference between group companies and independent firms in terms of the survival probability.

In Russia, the mass enterprise privatization in the early 1990s triggered the formation of a great number of “financial-industry groups” centering on large industrial companies and financial institutions, and this was followed by dynamic business integration among domestic firms. As a result, business groups have become a mega force in every industry and region across the country (Radygin, 2006). Compared to independent firms, these business groups are more aggressive in disciplining the management of affiliated companies and modernizing their organizations. As a result, it has been repeatedly documented that the management efficiency and productivity of group companies tend to exceed those of independent firms (Perotti and Gelfer, 2001; Avdasheva, 2005; Dolgopyatova et al., 2009). In addition, Russian business groups are widely recognized as “better practitioners of corporate governance” (Yakovlev et al., 2009). Taking these facts into account, it may be expected that the survival probability of group companies is higher than that of independent firms. Hereinafter, we call this prediction the “hypothesis of greater crisis resistance of business groups.”

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<sup>4</sup> The underlying laws are Part I, Chapter 4 (Art. 96 to 104) of the Civil Code of November 30, 1994 and the Federal Law on Joint-Stock Companies of December 26, 1995. In Russia, only a few joint-stock companies set up nominating, compensation, and audit committees under the board of directors. A broad range of Russian firms has adopted a governance structure similar to that used by Japanese and Italian firms. See Iwasaki (2009b) for more details.

In this regard, however, it is also plausible that the global financial crisis forced business groups to take strategic actions different from those in non-crisis period. Unlike an idiosyncratic economic shock that hits a particular group company, the 2008 crisis was an intense macroeconomic shock that destabilized entire business groups. It is not surprising that each business group has strengthened its restructuring intensity to protect the whole group from the unprecedented management crisis and that, on this occasion, affiliated firms in financial distress were forced to undergo drastic liquidation or integration.

As a background factor, Hoffman (2003) and Gorodnichenko and Grygorenko (2008), who studied aggressive mergers and acquisitions (M&A) by oligarchs, suggest that the target companies for M&A by Russian business groups include many of those whose management base and/or financial soundness remains weak despite their high potential, and, subsequently, the presence of these affiliated firms could have been a burden to the relevant business groups at the time of the worldwide market crash. In fact, the business groups represent main players in Russian M&A during the transition period (Volkov 2004; Radugin, 2009). Furthermore, Bertrand and Betschinger (2012), who empirically examined the impact of acquisitions initiated by Russian firms in the period from 1998 to 2008 on their operating performance, report that these deals tend to negatively affect the ex-post return on the assets of the acquirers. It is likely that this problem became more serious for Russian business groups affected by the crisis.

It is well-known that Korean business groups (*chaebols*) drastically changed their lenient management attitude to their poor-performing affiliated companies due to the Asian financial crisis in 1997 and, thereafter, carried out extensive organizational restructuring (Park and Kim, 2008; Lee et al., 2010). If Russian business groups had implemented defensive measures against the global financial crisis as aggressively as their Korean counterparts, it is likely that the exit rate of group companies would have been higher than that of independent firms during the period from 2005 to 2009. We call this prediction the “hypothesis of intensive crisis defense-type restructuring by business groups,” in contrast to the “hypothesis of greater crisis resistance of business groups” mentioned above. Examining the relevance of these two conflicting theoretical hypotheses concerning the survival probability of group companies is a significant research issue. We attempt to obtain a realistic picture of Russian business groups through empirical analysis of this subject.

To achieve the above goals, we conducted a survival analysis using the Cox proportional hazard model. Our estimation results provide evidence that the

independence of company's governance bodies, their human resource abundance, and influence over corporate management are statistically significant factors affecting the probability of the survival of the surveyed firms during the observation period. In particular, the board of directors and the audit committee are likely to play a vital role in reducing the potential exit risk. We also found that there is a significant difference in the viewpoints of economic logic for firm survival held by independent firms and group companies.

The remainder of this paper is organized as follows: Section 2 reports the survival status of Russian industrial firms during the observation from 2005 to 2009 based on the results of the enterprise surveys. Section 3 presents our testable hypotheses regarding the relationship between corporate governance and firm survival. Section 4 describes the empirical methodology, and Section 5 reports the estimation results. Section 6 summarizes the major findings and concludes the paper.

## **2. Survival of Russian Firms before and after the Global Financial Crisis**

In this section, we report the survival status of Russian industrial firms before and after the global financial crisis, or, more specifically, from 2005 to 2009. The underlying information was obtained from the enterprise questionnaire survey conducted in the first half of 2005 and its follow-up survey in the 4th quarter of 2009.

A Japan-Russia joint 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) carried out 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 all 751 firms.<sup>5</sup> 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 total workforce in

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<sup>5</sup> The majority comprises 714 company presidents, CEOs, general directors, or vice presidents, accounting for 95.1% of the total. The remaining respondents are 13 board chairmen (1.7%) and 24 senior managers responsible for corporate governance affairs (3.2%).

the industrial sector on average 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.<sup>6</sup>

The follow-up survey was organized and performed by a team of Japanese researchers, again in cooperation with the Levada Center. In this survey, between October and December of 2009, the Japanese research team confirmed whether or not the above 751 firms surveyed in 2005 were still surviving. The team also investigated the legal liquidation status of the then existing firms whose business had been discontinued. Among the firms that had completely ceased to exist at the time of the follow-up survey, the shutdown year of some firms could not be identified by the local staffs of the Levada Center. As for these firms, we carried out additional identification work by means of various information sources, including commercial databases, such as ORBIS of the Bureau van Dijk and SPARK of the Interfax Information Service and the *Kommersant* and other Russian business magazines as well as through the Internet.

**Figure 4** summarizes the results of the follow-up survey. The survival status of 741 of the 751 industrial firms was confirmed. Among these 741 firms, 39 (5.3%) had completely ceased to exist, and their company registrations had already been erased by the time of the survey. On the other hand, 65 firms (8.8%) still existed, but their business had been discontinued. Among these, 29 firms (3.9%) went bankrupt or were in the liquidation process. Thirty-six other firms (4.9%) were in the process of being merged, had already been merged with other companies, or otherwise, were in the process of being reorganized or had already been reorganized to inherit the management assets of the dissolved corporation. The remaining 637 firms (86.0%) were found to have maintained business activities without any drastic changes in their company profile.<sup>7</sup>

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<sup>6</sup> In this survey, 71 communication companies were also interviewed in parallel with the 751 industrial firms. For more details on the 2005 survey, see Dolgopyatova and Iwasaki (2006) and Dolgopyatova et al. (2009, Appendix).

<sup>7</sup> In sum, the exit rate of the surveyed firms stands at 14.0% during 2005-2009. Godart et al. (2011) report that a total of 9.2% of Irish firms, including foreign multinationals, exited the market within almost the same period. Moreover, according to Clarke et al. (2012), listed in Table 1, the exit rate of firms in five East European countries and Turkey reached 11.8% between April 2008 and March 2009. Although it is not a strict comparison, we conjecture that the exit rate of Russian firms before and after the 2008 global financial crisis is slightly higher than that of companies in developed economies and, for the most part, the same as that of companies in emerging markets.

In the U.S. and some other advanced countries with well-developed capital markets where venture capitalists play a remarkably active role, excellent companies in terms of both business performance and potentiality often become the target of business transfers via M&A. Meanwhile, in Russia, where the market economy is still underdeveloped and, hence, opportunity costs and/or transaction costs related to bankruptcy or reorganization proceedings through judicial authorities are extremely high, M&A deals mostly take the form of hostile takeovers or bail-out measures for failed firms or unprofitable firms with clouded prospects.<sup>8</sup> Therefore, unlike in the U.S., it is appropriate to consider that M&A cases in Russia rather signal corporate management failures. Accordingly, in this paper, all 104 firms, including the merged companies, shown in **Figure 4** are treated as exit firms that were eliminated by market competition.

**Figure 5** shows the composition of these 104 exit firms by the shutdown year. Of these 104 firms, 80 companies were forced to discontinue their operation in 2008, when the global financial crisis came to the surface, or in the following year, 2009, when severe economic recession was observed in Russia. This hard fact highlights how the historic financial shock dealt a fatal blow to many fragile businesses in Russia.

**Table 2** is a breakdown of the survival status of the firms by sector, company size, and firm type of either independent firms or group companies. **Figure 6** illustrates the time-series changes in the firm survival probability based on the estimation results of the Kaplan-Meier survivor function in accordance with the same segmentation as in **Table 2**. Panel (a) of **Table 2** indicates that there is a remarkable difference in the survival probability among 8 sectors both in terms of the exit rate calculated by dividing the number of exit firms by the total number of firms whose survival status was confirmed and the cumulative hazard for the entire period obtained from an estimation of the Nelson-Aalen cumulative hazard function. In fact, the chi-square test for independence and the Log-rank test for equality of survivor functions reject the null hypothesis that there is no difference among the sectors.

As shown in Panel (a) of **Table 2**, the survival probability of firms in the fuel and energy sector and those in the chemical and petrochemical sector is substantially lower

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<sup>8</sup> For more details of problems of judicial authorities and the bankruptcy system in Russia, see Golikova et al. (2003), Frye (2004), Fujiwara (2005), and Lambert-Mogiliansky et al. (2007). For details concerning the actual state of corporate takeovers or M&A deals in the country, see Aidis and Adachi (2007), Zukhurova and Novikova (2007), and Kasparova (2007).

than that of firms operating in any other sector. It is well known that these two sectors are key industries in the Russian economy and they are subject to strong regulations and policy interventions by the federal government. As symbolized by the dissolution of the Unified Energy System (RAO EES), in parallel with its dramatic reorganization into departmental entities in July 2008, the federal government has been actively involved in M&A deals and the business restructuring of leading firms since the early 2000s (Radygin, 2009). This effect is clearly reflected in our survey results. In fact, the rate of the merged and reorganized firms in relation to the exit firms is 68.8% in the fuel and energy sector (11 firms out of 16 firms) and 87.5% in the chemical and petrochemical sector (7 of 8 firms), and these figures far exceed the corresponding rate of 34.6% for the total number of industrial firms (36 of 104 firms). However, as shown in Panel (b) of **Figure 6**, a comparison of the heavy and light industries does not reveal any clear difference in the survival probability.<sup>9</sup> Panel (b) of **Table 2** and Panel (c) of **Figure 6** also suggest that a similar situation is true for a comparative analysis between upper-scale firms and lower-scale firms, in which the surveyed firms are divided into these two groups based on the median of the total number of workers per company (460 persons) as the threshold.

On the other hand, as shown in Panel (c) of **Table 2** and Panel (d) of **Figure 6**, the survival probability of the independent firms largely exceeds that of the group companies, and this gap is statistically significant at the 1% level in terms of both the exit rate and the cumulative hazard. Another remarkable difference between the independent and group companies is evident in the proportion of merged and reorganized firms in relation to the exit firms. While the rate of independent firms is 21.2% (11 of 52 firms), the group companies have a rate of 48.1% (25 of 52 firms), suggesting that a failed firm or an unprofitable firm within a business group might have been proactively liquidated or integrated with another affiliated group member company. These results demonstrate the predominance of the hypothesis of intensive crisis defense-type restructuring by business groups over the hypothesis of greater crisis resistance of business groups in comparison with independent firms mentioned in the Introduction. This point is discussed in the conclusion on the basis of the major results of our empirical analysis.

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<sup>9</sup> In fact, the Log-rank test for the difference between the two sectors cannot reject the null hypothesis ( $\chi^2=0.02$ ,  $p=0.892$ ).

### 3. Corporate Governance and Firm Survival: Hypothesis Development

As is evident in the survey results reported in the previous section, the survival status of Russian industrial firms in the late 2000s is too complicated to identify a basic trend. Because Russian companies have serious trouble with corporate governance and this problem often leads them to business failure, we emphasize this element, more specifically, the roles of the governance bodies among factors potentially affecting the survival probability of Russian firms during this period. In this section, we develop testable hypotheses from this viewpoint.

The independence of governance bodies from management is one of the key aspects in corporate governance research (Dalton et al., 1998; Jensen, 2000). This is precisely because the presence of an independent company organ is highly effective in solving the issue of disciplining top management through internal control mechanisms (Monks and Minow, 2004). Outside shareholders and outsider board members feel freer to make remarks on and/or criticize various matters regarding company management than employee shareholders and insider directors, who are more likely to support their company's top executives. For this reason, most of the preceding studies deal with the presence of outside shareholders and directors as a proxy variable for the independence of company organs.<sup>10</sup> We expect that governance bodies with a high degree of independence are able to reduce the potential exit risk by fulfilling an effective supervision function and preventing possible strategic deviation that would be led by the malpractice of top executives and/or their self-righteous management. Accordingly, we test the following hypothesis:

*H<sub>1</sub>: The independence of governance bodies from top management is positively correlated with the survival probability of the firm.*

The roles of company organs are not limited to the disciplining of top managers. They also serve as important sources of expertise to steer companies in the proper direction and to provide insight and know-how beyond ordinary business advice and recommendations (Baysinger and Butler, 1985). In this regard, not only management specialists and other experts from the outside but also insider corporate officers with seasoned knowledge of their company's business play an important role. In this regard, Raheja (2005) and Adams and Ferreira (2007) argue that, when the board of directors performs a double function of monitoring and advising top management, the optimal

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<sup>10</sup> For example, see Klein (2002), Baker and Gompers (2003), and Linck et al. (2008).

composition of the corporate board does not necessarily mean that all the positions on the board are occupied by outsiders. Both in the board of directors and in other company organs, the presence of corporate officers with expertise, broad insights, and experience reduces risks in management by providing top executives with appropriate advisory services (Agrawal and Chadha, 2005). Therefore, we propose the following hypothesis:

*H<sub>2</sub>: The abundance of human resources available to the governance bodies is positively related to the survival probability of the firm.*

Starting from the bankruptcy of Enron Corporation, one of the world's largest energy companies, and a series of corporate scandals subsequently unveiled in the U.S., as well as the shocking disclosure of a longstanding accounting fraud at the Olympus Corporation, the representative optical instrument maker in Japan, there has been an unending stream of cases in which none of the shareholders, directors, auditors, and audit firms was capable of correcting serious errors of judgment and/or vicious acts of the management executives despite the presence of governance bodies that take pride in a high degree of independence and rich human resources by external standards (Coffee, 2006; Ball, 2009). It has been argued that moral hazards associated with the corporate governance system losing its substance are a serious disease in modern capitalist economies that undermines even leading companies in advanced nations (Grey et al., 2005; Dowd, 2009). This threat can be diminished with effective corporate leadership. Top management could reduce a firm's probability of failure by carefully considering the recommendations and advice of its internal company organization. Consequently, we hypothesize that:

*H<sub>3</sub>: The governance bodies' influence over corporate management is positively correlated with the survival probability of the firm.*

In the empirical analysis of this paper, special attention is given to the roles of governance bodies discussed above and the effects of affiliation with a business group. At the same time, we also examine the impacts of other factors on firm survival in Russia, including (a) the difference in the form of incorporation between open and close joint-stock companies; (b) particulars of the company establishment during the transition period; (c) company size; (d) business diversification and internationalization; (e) R&D/innovation intensity; (f) financial performance and liability position; (g) fund procurement from the capital market and financial

institutions; and (h) operation in major industries.

In Russia, an individual who intends to set up a joint-stock company must choose as the legal form for its incorporation either an open company, whose shares can be freely traded, or a closed company, whose shares are allowed to be allocated and/or transferred only among the promoters and other designated investors.<sup>11</sup> This stipulation enables open joint-stock companies to procure funds more easily through the allocation of new shares to third parties, but, at the same time, it makes them more vulnerable to hostile takeovers by outside investors acting as corporate raiders and also increases the risk of shareholder lawsuits (Iwasaki, 2013a). Therefore, it is difficult to make a definite prediction about the effect of the choice of an open joint-stock company as a form of incorporation on the survival probability of the firm, which suggests that an empirical test would be required.

Our surveyed firms consist of the following three types: former state-owned (ex-municipal) privatized companies that had been established during the socialist era, newly established companies spun off from a state-owned (municipal) company or a former state-owned (ex-municipal) privatized company after the collapse of the Soviet Union, and *de novo* firms established by private investors. Since the latter two types were rather recently established, many of the businesses are likely to have a fragile management base. In this regard, Rinaldi (2008) found that, in the Russian footwear industry, the survival probability of former Soviet enterprises is relatively higher than that of new entrants during the transition period. Accordingly, we expect that the survival probability of the spin-off companies and *de novo* firms is estimated to be lower than that of former state-owned (ex-municipal) privatized companies, *ceteris paribus*.

Expansion of the size of a company is considered to enhance its survival probability by strengthening the resilience of the business organization based on the scale merit and the higher trust from investors, financial institutions, and customers. The same effect can be expected from business diversification and internationalization through the diversification of business risks. R&D/innovation intensity may also increase the survival probability of the relevant firm by improving in production technology and efficiency. In fact, these predictions are supported by many preceding

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<sup>11</sup> In addition, a certain degree of difference is made between the two in terms of the minimum capitalization requirements, the number of shareholders, and the obligation to disclose information. For details, see Iwasaki (2007b; 2009a).

studies.<sup>12</sup> In addition, there is considerable empirical evidence suggesting a positive correlation between good financial performance or a sound liability position and the survival probability of the firm.<sup>13</sup>

In general, fund procurement from the capital market and financial institutions substantially reinforces the management constitution of domestic firms in transition economies (Fidrmuc, 2007; Saeed, 2009; Li and Yuen, 2011). However, as reported above, in the case of Russia, the high liquidity of shares and bonds greatly increases the risk of hostile takeover. Besides, as noted in the Introduction, it is certain that the securities market crash in Russia triggered by the global financial crisis inflicted severe damage on the listed companies and bond-issuing firms through significant capital crunch and/or unrealized losses on assets. Therefore, we predict that fund procurement from the capital market negatively affected the survival probability of Russian firms in the late 2000s. Meanwhile, as advocated by Clarke et al. (2012), the fund procurement from financial institutions is considered to reduce the exit risk since it provides easy access to working capital at the time of a crisis. Finally, we expect that firms operating in the fuel and energy and the chemical and petrochemical sectors faced lower survival probabilities during the observation period in comparison with those in other industries due to the reason argued in the previous section that these two sectors are subject to strong regulations and policy interventions by the federal government.

**Table 3** summarizes our theoretical considerations. In the following two sections, we empirically examine these testable hypotheses.

#### **4. Empirical Methodology**

In this section, we describe our empirical methodology. Subsection 4.1 outlines the Cox proportional hazard model, and Subsection 4.2 selects variables to be used for the estimation.

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<sup>12</sup> As is the case with most of the preceding studies, the positive effect of company size on the firm survival has been verified in Konings and Xavier (2002) and the other transition studies listed in Table 1. Statistically significant and positive effects on firm survival have been proved by Kimura and Kiyota (2006), Bridges and Guariglia (2008), Esteve-Pérez et al. (2010), Harris and Li (2010), and Giovannetti et al. (2011) concerning business diversification and internationalization and by Audretsch et al. (2000), Jain and Kini (2000), Kimura and Fujii (2003), and Cefis and Marsili (2005) concerning R&D/innovation intensity.

<sup>13</sup> For instance, see Ferragina et al. (2011) and Tsoukas (2011).

#### 4.1 Survival Analysis and the Cox Proportional Hazard Model

The dataset employed for the empirical analysis in this paper gives information about the conditions of Russian industrial firms in the initial stage of the observation period and their survival time. It enables us to perform a survival analysis that is now broadly applied to micro econometrics.<sup>14</sup> The main objective of the survival analysis is to estimate the following survival function:

$$S(t) = \Pr(T > t) = \int_0^{\infty} f(t)dt,$$

where  $t$  refers to time;  $T$  represents the survival time; and  $f(t)$  is a density function of  $T$ . The survival function reports the probability of surviving beyond time  $t$ . The hazard, which means the instantaneous probability of an event (in our case, the market exit of a given Russian firm) within the next small interval of time, is defined as:

$$\lim_{\Delta t \rightarrow 0} \frac{\Pr(t \leq T < t + \Delta t | t \leq T)}{\Delta t}.$$

When this function is expressed as  $h(t)$ , the following relationship can be established between  $S(t)$  and  $h(t)$ :

$$S(t) = \exp\left\{-\int_0^t h(u)du\right\}, \quad h(t) = -\frac{S'(t)}{S(t)}.$$

These equations indicate that if either one of them is determined, the other is also determined simultaneously. Concerning the hazard function  $h(t)$ , the Cox proportional hazard model assumes its form in the following way:

$$h(t|x_{i1}, \dots, x_{in}) = h_0(t)\exp(\beta_1 x_{i1} + \dots + \beta_n x_{in}), \quad h_0(t) > 0,$$

where  $x_{i1}, x_{i2}, x_{i3}, \dots, x_{in}$  are covariates associated with the  $i$ th observation; and  $\beta_1, \beta_2, \beta_3, \dots, \beta_n$  are their respective parameters to be estimated. In this model, the baseline hazard  $h_0(t)$  depends only on time  $t$  and, thus, can take any form, while covariates enter the model linearly. For this reason, the Cox model is called a semi-parametric model. Compared to parametric models, the Cox model has an advantageous feature. Namely, regardless of how the survival time  $T$  is distributed, the results obtained from the estimation of the Cox model are robust.

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<sup>14</sup> Basically, the survival analysis is designed to regress the probability of an event occurring on *ex ante* conditions. By doing so, this method avoids the endogeneity problem arising from simultaneity between the dependent and independent variables.

The above-expressed Cox model can be estimated through the maximum likelihood method by taking the logarithms of both sides and transforming the equation into the following linear model:

$$\ln h(t|x_{i1}, \dots, x_{in}) = \ln h_0(t) + \sum_{j=1}^n \beta_j x_{ij}.$$

In this paper, the Breslow (1974) approximation is adopted to deal with the right-censoring that refers to the 637 firms that survived during the entire observation period. Every parameter estimate  $\beta$  to be reported in this paper is the hazard ratio that shows, when a certain covariate (an independent variable) changes by one unit, how the event probability will be multiplied. In other words, if an estimate exceeds 1.0, this covariate can be regarded as a risk factor that causes the event. Conversely, if an estimate takes a value of less than 1.0, this means that the corresponding covariate is a preventive factor that inhibits the event from occurring.<sup>15</sup>

#### 4.2 Variable Selection

Next, we select the variables to be used for the estimation of the Cox model.

To test hypothesis H<sub>1</sub>, we use the combined ownership share of non-managerial shareholders, excluding domestic individuals (*OWNOUT*), to represent the independence of the general shareholders' meeting from top management.<sup>16</sup> Regarding the independence of the board of directors, we employ two variables, namely an ordinal variable that takes a value of 0 for firms with an insider chairman, 1 for firms with a quasi-outsider chairman appointed from among those working in a business group or a business partner, and 2 for firms with an outsider chairman (*BOALEA*) and a continuous variable that refers to the proportion of outsider directors to the total board members (*BOACOM*). The independence of the audit committee is represented by the proportion of outsider auditors to the total committee members (*AUDCOM*). The impact of the independence of the audit firm functioning as the accounting auditor is estimated using an ordinal variable, which assigns zero to companies entrusting their external audit to an indigenous domestic audit firm, 1 to those appointing a

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<sup>15</sup> For a more detailed description of the survival analysis and the Cox proportional hazard model, see Hosmer et al. (2008) and Cleves et al. (2010).

<sup>16</sup> As seen from the above, the ownership share of domestic individual shareholders is completely excluded from *OWNOUT*. This is to eliminate the ownership effects from the management executives' family members, relatives, or friends as well as those of the employees, all of whom are formally categorized as outside shareholders.

non-indigenous domestic audit firm as their accounting auditor, and 2 to those making an external audit contract with an international audit firm (*AUDFIR*).<sup>17</sup> For brevity, the above 5 variables are hereinafter referred to as the variables for the independence of governance bodies.

To examine hypothesis H<sub>2</sub>, we utilize the ownership share of commercial banks (*OWNBAN*) to represent the human resource abundance in the general shareholders' meeting, paying special attention to their advisory capability about financial management and corporate strategies. To test the impact of the human resource richness in the board of directors and the audit committee on firm survival, we use the total number of board directors (*BOAMEM*), outsider directors (*OUTDIR*), and insider directors (*INSDIR*) for the board of directors and the total number of the audit committee members (*AUDMEM*), outsider auditors (*OUTAUD*), and insider auditors (*INSAUD*) for the audit committee. These 7 variables are hereinafter called the variables for the abundance of human resources available to the governance bodies.

To verify hypothesis H<sub>3</sub>, the degree of the influence of governance bodies over corporate management needs to be measured. In most cases, it is a latent variable unobservable for econometricians. However, in the 2005 enterprise survey, we asked the senior manager of each target company to evaluate the degree of influence of the board chairman and each company organ on important matters in corporate management using the following three options: "minimal influence," "moderate influence," and "strong influence." We obtained valid answers, and the response rate exceeded 90%. Accordingly, it is possible for us to measure these factors directly. This survey result can be adopted as a proxy for the organizational capability of a governance body not only to monitor and supervise company management, but also to detect and forestall self-righteous and/or opportunistic acts by top managers that could lead to bankruptcy. Based on this survey result, we construct five ordinal variables, which take a value from 0 (minimal influence) to 2 (strong influence) for representing the influence over corporate management of the general shareholders' meeting

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<sup>17</sup> In Russia, indigenous audit firms are often small or medium-sized entities whose business depends significantly on a small number of client enterprises. In contrast, when non-indigenous audit firms are appointed as accounting auditors, they are in most cases Russia's leading audit and consulting companies. These major audit firms are considered to be more independent from their clients, compared to indigenous small firms. Furthermore, it is obvious that international audit firms are much more independent from their clients than domestic audit firms. See Iwasaki (2013b) for a more detailed discussion on this point.

(*INFGSM*), the board chairman (*INFCHA*), the board of directors (*INFBOA*), the audit committee (*INFAUD*), and the audit firm (*INFAUF*). Hereinafter, we refer to these five variables as the variables for the governance bodies' influence over corporate management.

In addition to examining each governance body's idiosyncratic effect on firm survival by using the 17 variables given above, to scrutinize the possible synergy effects of different company organs, corporate officers, and shareholders, we also test for the comprehensive impact of the whole corporate governance system using first principal component scores of the variables for the independence of governance bodies (*INDSCO*), the variables for the abundance of human resources available to the governance bodies (*HUMSCO*), and the variables for the governance bodies' influence over corporate management (*INFSCO*).<sup>18</sup>

Besides, the effect of the collective executive board is also examined using the following three variables: a dummy variable that assigns a value of 1 to companies with a collective executive board (*COLEXE*); the total number of board members (*COLMEM*); and the degree of their influence over corporate management (*INFCOL*). We report the estimation results of these variables as the reference value for comparison to the other company organs.

Based on the arguments in the previous section, we introduce the following 13 variables into the Cox model as control variables. To capture the difference in the survival probability between independent firms and group companies, we utilize a group firm dummy variable (*GROFIR*) that takes a value of 1 to firms that belong to a holding company group or another business group through stock ownership. The effect of the difference in the legal form of incorporation is examined by a dummy variable that captures open joint-stock companies (*OPECOM*) by 1, while the effect of the particulars of company establishment is examined using a dummy variable for spin-off companies from a state-owned (municipal) company or a privatized company (*SPIOFF*) and a dummy variable for *de novo* companies established during the transition period (*DENOVO*).

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<sup>18</sup> The main results of the principal component analysis are reported in the Appendix. As shown in this table, each first principal component explains 32.4% - 45.3% of the total variance in each variable group. Judging from the values of eigenvector and component loading, these first components can be adopted as general indexes for the independence of the whole governance bodies, their human resource abundance, and their influence over corporate management.

As a proxy for company size, the average annual number of employees (*COMSIZ*) is adopted. As variables that reflect the extent of business diversification, the degree of business internationalization, and the intensity of R&D and innovation activities, we use the number of business lines of the company in accordance with the 2-digit industrial classifications in the Russian All-Union Classifier of the National Economy Branches (*BUSLIN*), the share of exports of total sales (*EXPSHA*), and the R&D expenditure intensity (*R&DEXP*). The financial performance is expressed by an industry-adjusted value of the average rate of gross profit on sales (*PROAVE*),<sup>19</sup> while the liability position is represented by the share of arrears in total liabilities (*ARREAR*). The effect of fund procurement from the capital market and financial institutions on firm survival is examined by a dummy variable that assigns a value of 1 to companies that have issued bonds or shares in overseas or domestic stock exchanges (*MARFIN*) and an ordinal variable for the length of the lending period of bank credits (*BANCRE*). We estimate the impact of the government regulation on the major industries using a dummy variable that specifies companies that are operating in the fuel and energy sector or the chemical and petrochemical sector by 1 (*REGIND*).<sup>20</sup>

**Table 4** contains the detailed definition and descriptive statistics of the above 36 variables. This table also reports the results of a univariate comparison between the surviving firms and the exit firms based on each variable, as well as correlation coefficient of each variable and the survival probability of the firm in Panel (a). According to these results, in terms of almost all the variables for the independence of governance bodies and for the abundance of human resources available to the governance bodies, no statistically significant difference at the 10% level is detected between the surviving firms and the exit firms, and the relevant correlation coefficients with the firm survival probability are also not significant. The only exception is the total member of the audit committee (*AUDMEM*), but the univariate analysis based on

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<sup>19</sup> *PROAVE* represents the distances from the median performance in the industry to which a given company belongs. The formula is:

$$PROAVE = sign(\Delta profit) \times \sqrt{|\Delta profit|}.$$

Here,  $\Delta profit$  is the value obtained by subtracting the median performance in the corresponding industry from the firm's performance (Eisenberg et al., 1998).

<sup>20</sup> The mean of the absolute value (standard deviation) and the maximum value of the correlation coefficient of the independent variables that are simultaneously estimated in the regression analysis are 0.097 (0.094) and 0.493, respectively. Thus, every combination falls well below the threshold of 0.700 for possible multicollinearity.

this variable does not support hypothesis H<sub>2</sub> regarding the relationship between the human resource abundance of the governance bodies and the survival probability. Meanwhile, Panel (b) of **Table 4** shows the results of univariate comparison between the independent firms and the group companies. This panel clearly indicates that the group companies far exceed the independent firms in terms of both independence and human resource abundance of their governance bodies. As reported in the previous section, however, the survival probability of group companies is much less than that of independent firms. We conjecture that these facts lead to the insignificant results of the univariate analysis reported in Panel (a). On the other hand, in the analysis based on the variables for the governance bodies' influence, four of the six variables support hypothesis H<sub>3</sub> with statistical significance at the 10% or lower level. This result strongly suggests that the practical influence of the governance organs on the decision-making of the top management is closely linked to the survival and death of Russian firms.

The univariate analysis using the control variables show that there is a statistically significant difference between the surviving firms and the exit firms in terms of nine of the 13 control variables, and among them, eight variables reveal that their respective correlation coefficients with the survival probability of the firm also have significant values in line with our predictions. In other words, the establishment of spin-off companies from state-owned (municipal) enterprises or privatized companies, smaller company size, inactiveness in product exports and R&D/innovation activities, bad financial performance and weak liability structure, dependence on the capital market as a source of fund procurement, and operation in the regulated industries tend to result in the market exit of a given Russian firm.

In summary, the results of the univariate analysis reported in **Table 4** broadly support our predictions concerning the effects of the governance bodies' influence over corporate management and those of the control variables described in Section 3. In the next section, we examine whether or not similar results can be obtained from a multivariate survival analysis that controls these independent variables simultaneously.

## **5. Estimation Results**

In this section, we perform the estimation of the Cox proportional hazard model using not only the observations of the entire sample but also those of two subsample groups by dividing the surveyed firms into independent firms and group companies with the

aim to capture any difference in survival logic between the two subgroups. We cluster the observations by industry and adopt the Huber-White sandwich estimator for computing robust standard errors.<sup>21</sup> We report  $z$  statistics estimated using these robust standard errors as test statistics of the regression coefficients. In the following subsections, we report and interpret the estimation results of the variables for the independence of governance bodies, the variables for the abundance of human resources available to the governance bodies, the variables for the governance bodies' influence over corporate management, and the control variables one after the other. Then, in the final subsection, we check the overall robustness of our estimation results.

### 5.1 Variables for the Independence of the Governance Bodies

**Table 5** contains the estimation results regarding the effect of the independence of the governance bodies on firm survival.<sup>22</sup> Panel (a) of the table reports the estimation results for the entire sample. According to this panel, the independence of the audit committee has a substantial effect on the probability of a Russian firm's survival. In fact, the estimate of *AUDCOM*, which reflects the proportion of outsider auditors, is statistically significant at the 5% level, and its hazard ratio is 0.353. That is to say, the survival probability of a firm in which the audit committee consists exclusively of outsider auditors is as much as 64.7% higher than for a firm with 100% insider-dominated one. In addition, the hazard ratio of *INDSCO*, which is the first principal component score of the variables for the independence of the governance bodies, is estimated to be less than the threshold of 1.0 with statistical significance at the 10% level, suggesting that a high degree of overall independence of company organs is also effective to prevent the market exit of Russian firms.

According to the results in Panel (b) of **Table 5**, which are limited to the observations of independent firms, the proportion of outsider directors (*BOACOM*) is estimated with a 10% level significance, but its hazard ratio is 1.864. This means that,

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<sup>21</sup> The clustering criteria correspond to the sector breakdown in Table 2. We also performed the estimation controlling the industry fixed effects using dummy variables and confirmed that these results differ little from those reported in this section.

<sup>22</sup> The number of observations used for the estimations reported in Tables 5 to 7 is far less than 741, which is the total number of firms whose survival status was confirmed in the 2009 survey. This is simply due to the lack of data on some surveyed firms. Nevertheless, in terms of basic attributes, including the survival probability and ownership structure, there is no statistically significant difference between firms that were dropped from the observations and those that were included in the estimations. Therefore, our estimation results are considered to be only modestly biased, if at all, by the partial omission of samples.

in the case of independent firms, a firm in which the board of directors consists exclusively of outside members is more likely to be forced to exit from the market than a firm in which all the positions in the corporate board are occupied by insider directors, with the exit risk of the former being about 1.9 times higher than that of the latter. Meanwhile, the hazard ratio of *AUDCOM* is again estimated at the 5% significance level with a value of 0.411. Accordingly, we can say that, in contrast with the board of directors, a highly independent audit committee is likely to play a crucial role in the subsistence of independent firms.

The estimation results in Panel (b) of the same table, which include only the observations for group companies, show that the independence of the corporate board has a positive effect on the survival probability that is equivalent to that of the audit committee. This result contrasts markedly with the case of independent firms. In fact, the hazard ratio of *BOACOM* shows a value of 0.264, meaning that, *ceteris paribus*, the exit risk of group companies with a board of directors that is solely composed of outsiders is 73.6% lesser than that of group companies having a completely insider-controlled board. Moreover, the hazard ratio of *INDSCO* is less than 1.0, with statistical significance at the 1% level. This suggests that the enhancement of the overall independence of the company organs is a very effective measure for a group company to avoid the potential risk of bankruptcy. On the other hand, the estimate of the dummy variable for firms with a collective executive board (*COLEXE*) is statistically significant at the 1% level with a hazard ratio of 2.002, showing that group companies with a collective executive board increase their market exit risk to about twice that of affiliated companies without it. This result suggests that the collective management system might have been an obstacle to surviving the global financial crisis because of its slow decision-making.

## **5.2 Variables for the Abundance of Human Resources Available to the Governance Bodies**

**Table 6** contains the estimation results concerning the effect of the abundance of human resources available to governance bodies on firm survival. In Panel (a) of the table, the total number of outsider directors (*OUTDIR*) is estimated with a hazard ratio of 0.940 at the 1% significance level, indicating that the additional appointment of an outsider director improves a firm's survival probability by 6.0%. This general tendency for Russian industrial firms, however, does not fit the typical independent firms. Actually, Panel (b) of **Table 6** indicates that the estimate of *OUTDIR* has a hazard ratio

of 1.072 at the 10% significance level when observations are limited to independent firms, suggesting that the increase of an outsider director depresses an independent firm's survival probability by 7.2%. This result is consistent with that of the proportion of outsider directors represented by *BOACOM* reported in Panel (b) of **Table 5**, in which the hazard ratio is statistically significant and exceeds 1.0. Based on this evidence, we surmise that, in the case of independent firms, outsider directors who behave as agents for outside investors tend to strongly oppose the management side, aiming to bring benefits to their principals, and, as a result, corporate management is frequently confused. In the meantime, as shown in Panel (c) of **Table 6**, in the case of group companies, the hazard ratio of *OUTDIR* is estimated with a value of 0.780 at the 1% significance level, indicating that the appointment of an outsider director by a business group makes a substantial contribution to the enhancement of the capability of an affiliated firm to control its potential exit risk. Overall, with regard to the governance effect of an outsider directorship, the asymmetry between independent firms and group companies is truly outstanding in Russia.

On the other hand, the hazard ratio of *INSAUD* that represents the total number of insider auditors exceeds 1.0 with statistical significance at the 1% level not depending on the observation conditions. In other words, the additional appointment of an insider auditor is prone to increase the market exit risk by 8.7% for all industrial firms, by 7.3% for the independent firms, and by 17.7% for group companies. According to the findings of the 2005 survey, the overwhelming majority of insider auditors had been selected from rank-and-file workers or the representatives of labor unions (Iwasaki, 2013b). Thus, their presence as internal auditors does not function as an effective monitor, or worse, there is a rather strong possibility that their membership on the audit committee may be detrimental to a company's goals. The harmful effects of worker control over management in Russia have been pointed out many times by researchers (Iwasaki, 2007c), and our empirical results back up their arguments.

The hazard ratio of the ownership share of commercial banks (*OWNBAN*) in Panel (b) and that of the total number of outsider auditors (*OUTAUD*) in Panel (c) of **Table 6** show less than 1.0 and statistical significance at the 1% level, suggesting that commercial banks serving as shareholders in the case of independent firms and outsider auditors working for group companies play a notable role in providing information and insights to reduce exit risks. Meanwhile, in Panel (b) of the same table, *COLMEM*, which counts the collective executive board members, is estimated at the 5% significance level with a hazard ratio of 1.186. Accordingly, in the case of

independent firms with a collective executive board, the more board members there are, the higher the risk of management failure. This suggests that exit risks may lurk in an excessively collective management system.

### **5.3 Variables for the Governance Bodies' Influence over Corporate Management**

The estimation results concerning the effect of the influence of governance bodies over corporate management on firm survival are shown in **Table 7**. Consistent with the results of the univariate analysis reported in the previous section, Panel (a) of this table strongly suggests that the influence of the board of directors, the audit committee, and the audit firm has a significant impact on the survival probability of Russian firms. More precisely, the estimates of *INFBOA*, *INFAUD*, and *INFAUF* are statistically significant at the 5% level or less with their hazard ratios ranging from 0.617 to 0.681. This means that, when the senior management upgrades their evaluation of the influence of these company organs by one scale, the probability of the firm's survival improves by 31.9% to 38.3%. Moreover, *INFSCO*, the first principal component score of the variables for the governance bodies' influence, shows a hazard ratio of 0.855 at the 1% significance level. This result strongly suggests that the improvement of the overall influence of governance bodies is very effective in reducing the potential exit risk of Russian corporations.

However, in terms of the types of company organs that have a statistically significant and positive impact on the survival probability, there is a substantial difference between independent firms and group companies. Namely, in Panel (b) of **Table 7**, in which the observations are limited to independent firms, the influence of both the board of directors and the audit committee is estimated with statistical significance at the 5% or less level. In contrast, the estimation results in Panel (c) of the same table, which use only the observations for group companies, show that the influence of the audit firm alone has a significant estimate. One possible interpretation of these results is that the company organs of independent firms can effectively reduce their firm's exit risk only when they have such a strong voice on company's decision-making that it is perceivable by management executives, since these organs are far inferior to those of group companies in terms of their independence and human resource richness. Meanwhile, the contrasting estimation results between the independent firms and the group companies concerning the influence of the audit firm are considered to be closely linked to the facts that, first, the overwhelming majority of accounting auditors employed by independent firms are small and medium-sized local

companies that lack administrative leadership over their clients,<sup>23</sup> and, secondly, as shown in Panel (b) of **Table 4**, their influence over corporate management receives extremely low evaluations from interviewed senior managers.

Another interesting estimation result shown in **Table 7** is that the influence of the general shareholders' meeting is negatively correlated with the survival probability of Russian firms irrespectively of the difference in the type of firm. In fact, the hazard ratio of *INFGSM* indicates that, when the influence of the general shareholders' meeting receives a higher evaluation from senior management by one scale, the risk of market exit increases by 33.4% for all firms, by 27.8% for the independent firms, and by 52.8% for group companies. In Russia, shareholders with a voice that is too strong might constrain management decisions far more than necessary, which, as a result, might result in serious business failure.

#### **5.4 Control Variables**

Many control variables are estimated in line with our predictions. Especially, the six variables, namely, the business group member dummy (*GROFIR*), the dummy for spin-off firms from a state-owned (municipal) company or privatized company (*SPIOFF*), company size (*COMSIZ*), R&D expenditure intensity (*R&DEXP*), the dummy for firms that issued shares or bonds in the stock markets (*MARFIN*), and the dummy for firms operating in the regulated industries (*REGIND*), are repeatedly verified to be statistically significant with an expected coefficient. For instance, the hazard ratios of *GROFIR* reported in Panel (a) of **Table 5** are estimated to be well over 1.0 with the maximum reaching 2.164, suggesting that the market exit rate of the group companies far surpasses that of independent firms even controlling for other potential determinants. The hazard ratios of *SPIOFF* are also estimated to be much higher than 1.0, revealing that the spin-off companies from state-owned enterprise or privatized companies have been exposed to a higher exit risk with the range from 1.9 to 3.1 times more than their mother companies and *de novo* firms. This unveils a poor management base for the spin-off companies.

The estimates of *MARFIN* are fairly robust with their hazard ratios exceeding even those of the *SPIOFF* and, thus, give clear evidence that the latest global financial crisis had a devastating impact on listed companies and bond-issuing companies in Russia. It

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<sup>23</sup> In fact, according to the results of the 2005 enterprise survey, the proportion of independent firms employing indigenous audit firms has reached 81.3% (360 of 443 surveyed firms), compared to 54.5% in the case of group companies (140 of 257).

is almost certain that one of the major reasons for large and medium-sized companies to exit the market during the observation period was their close connection with the capital market. This result is a noteworthy empirical finding, as in the case with *SPIOFF*. Further, relatively robust estimation results for *REGIND* verify the substantial negative impact of the federal government's regulation on the major industries.

In the meantime, the hazard ratios of both *COMSIZ* and *R&DEXP* are estimated to be constantly below 1.0. This suggests that the company scale and R&D/innovation intensity function as a preventive factor against market exit. Consistent with our predictions, the average rate of gross profit on sale (*PROAVE*) and the proportion of arrears of the total liabilities (*ARREAR*) also show statistically significant estimates in many models, suggesting that the financial performance and liability structure are closely related to the fate of Russian firms. These empirical results correspond well with those in previous studies and, hence, prove that the economic logic in developed economies works in the Russian transition economy as well.

As is the case with the effects of governance bodies, those of the control variables also show clear differences between independent firms and group companies. In the case of independent firms, along with *SPIOFF* and *COMSIZ*, three variables, *BULSIN*, *EXPSHA*, and *PROAVE*, take significant estimates in many models, and all the hazard ratios of these three variables are well below 1.0. Accordingly, as with the maintenance of good financial performance, business diversification and internationalization are very effective measures for independent firms to reduce the potential risk of failure. On the other hand, these factors are less likely to negatively affect the status of affiliated companies within their own business group. Rather, the relatively high significance of *SPIOFF* and *MARFIN* in the estimation results limited to the group companies implies that their establishment history and the relationship with the capital market are more crucial determinants for their life or death.

## 5.5 Robustness Checks

**Table 8** is a summary of the estimation results regarding the effect of the governance bodies on firm survival. As shown, 28 estimates are statistically significant at the 10% level or less, and, among them, having a positive sign, 19 support our hypotheses presented in Section 3. In this subsection, we examine the statistical robustness of these estimation results from the following five viewpoints.

First, to check the possibility of the omitted variable bias that might be caused by the

individual estimation of 20 variables listed in **Table 8**, we performed a re-estimation of the Cox proportional hazard model using 14 variables whose estimates are statistically significant at the 10% level or less. In this process, we simultaneously employed two or three variables whose correlation coefficient in absolute value falls below the threshold of 0.700 for possible multicollinearity. As a result, with regard to the five estimates shown in parentheses in **Table 8**, we confirmed that, in more than 20% of the total estimation results, there were some cases in which the statistical significance does not reach the 10% level. On the other hand, with regard to the remaining 14 estimates, in at least 80% of the total estimation results, their statistical significance remained at the 10% level or higher. In this sense, these 14 estimates are quite robust.

Second, the empirical analysis in this paper focuses on the presence of outside shareholders excluding domestic individuals and commercial banks as determining factors of firm survival in Russia. In preliminary regressions, we also examined the effects of the presence of a series of shareholders including: (a) the federal government, (b) regional and local governments, (c) non-banking financial institutions, (d) non-financial corporate shareholders, (e) foreign investors, (f) large managerial shareholders or shareholder groups, (g) controlling shareholders, and (h) block shareholders. These regressions show that no significant correlation is detected between the presence of these shareholders and the firm survival probability.

Third, to check the overall robustness of the estimation results including the control variables reported in **Tables 5 to 7**, we also performed supplemental regressions in which various sample restrictions were placed and confirmed that these sample restrictions do not cause any major changes in the empirical results reported in these tables. More specifically, the supplemental estimations were conducted with the following four settings: (1) limiting the samples to those with an average number of workers  $\pm 1$  of the standard deviation to exclude very large companies from the observations; (2) excluding companies that have issued securities from the observations; (3) splitting the sample into open joint-stock companies and closed companies; and (4) excluding companies that had exited from the market before 2008 from the observations.

Fourth, the empirical analysis in this paper was carried out based on the assumption that M&A cases signal management failures. In this study, this assumption is reasonable, since the market exit concentrates on the two years of 2008 and 2009 when the global financial crisis erupted and struck the Russian economy. However, we cannot rule out the possibility that the observed M&A cases may include transfers of

successful businesses. Accordingly, we conducted additional estimations by excluding all the observations of merged and reorganized firms. Since this sample restriction resulted in the exclusion of many group companies from the observations, the group firm dummy, *GROFIR*, is estimated to be insignificant in all models, and, at the same time, other control variables showed similar estimation results to those of independent firms. At the same time, we found that the estimation of the variables regarding governance bodies does not show any significant changes from those reported in this paper.

And finally, as discussed in Section 4, the Cox proportional hazard model has significant merit in the sense that it enables econometricians to estimate covariate effects without any special assumption about the form of the baseline hazard  $h_0(t)$ . On the other hand, the Cox model strongly depends on the proportional hazard assumption, which implies that hazard ratio remains constant over time. If this assumption is not satisfied, the survival analysis using the Cox model is inappropriate. Not all the independent variables used in our empirical analysis are guaranteed to meet the assumption. Accordingly, we conducted an estimation of a series of parametric survival models that strongly assume the survival distribution, including the exponential model, the Weibull model, the Gomperts model, the lognormal model, and the loglogistic model, and found that the estimation results of these parametric models are very similar to those based on the Cox model. Moreover, as Bandick (2010) and Tsoukas (2011) point out, the complementary log-log model may be more appropriate for survival analysis using annual data. Therefore, we also carried out an estimation of this model and confirmed that the hazard ratio and statistical significance of each covariate are not substantially different from those obtained from the estimation of the Cox model.

Therefore, the estimation results reported in this paper are fairly robust across the various specifications.

## **6. Conclusions**

The 2008 global financial crisis caused a deep macroeconomic recession in Russia, exposing its domestic firms to strong adverse impacts. Many Russian firms could not withstand this hardship and were forced to go under or to be either merged by or reorganized into other firms. Key industries were not an exception. In this paper, based on the nationwide questionnaire survey of joint-stock companies conducted in 2005 and its follow-up survey in 2009, we clarify the survival status of Russian firms before

and after the world economic shock and empirically examine the determinants of firm survival.

According to our survey results, among the 741 large and medium-sized industrial companies that had been investigated in 2005, 104 actually exited from the market by the 4th quarter of 2009, and these exits were largely from 2008 to 2009. These findings reveal that the latest historic financial crisis sent a major shock wave throughout the Russian industry. Although their dimensions are very complicated, the results of our survival analysis using the Cox proportional hazard model strongly suggest that the independence of governance bodies from top management, their human resource abundance, and influence over corporate management are statistically significant factors affecting the probability of the survival of the surveyed firms. In addition, the estimates of the first principal component score of each variable group indicate the emergence of synergy effects between different governance bodies in terms of their independence from top managers and influence over corporate management. Moreover, the empirical results demonstrate that the variables regarding the board of directors and the audit committee repeatedly show significant estimates, suggesting that these two company organs are likely to play a vital role in increasing the survival probability of Russian firms. Because both policy and academic arguments on Russian corporate governance tend to give little attention to the auditing, our empirical evidence showing the positive role of company auditors should be emphasized.

However, our estimation results also demonstrate that the presence of the insider auditors and the influence of the general shareholders' meeting have a rather negative impact on firm survival, against our predictions. Furthermore, in the case of independent firms, the presence of outsider directors is found to be negatively related to their survival probability. In Russia, the intervention of rank-and-file workers into company management and the hostile attitude of outside investors and their representatives on corporate boards to top managers are often blamed in the media and academic circles. From the evidence, we assume that these factors may have a real impact on corporate management in this country.

The essence of the empirical evidence above is that corporate governance bodies effective to discipline top management in a Russian firm also serve as important factors in determining a company's survival capability. So far, based on the arguments about the deleterious consequences of the insider-privileged mass privatization policy, poor institutional environments, and other negative factors for Russian firms, criticism on corporate governance in Russia has been repeatedly reported not only inside the

country but also in the international arena.<sup>24</sup> As a result, many people now share a viewpoint that formal governance institutions in Russia are too weak to adequately withstand strong behavior. Under the background of significant progress in the systemic transformation towards a market economy in the last two decades and policy efforts made by the federal government to promote a corporate governance system conformable to the international standards (Shleifer, 2005; Zhuravskaya, 2007; Frye and Iwasaki, 2011; National Council on Corporate Governance, 2012), the results of our study demonstrated the positive roles of the statutory company bodies in the survival of Russian firms and, accordingly, the need to reconsider skeptical views on this issue.

In addition to the findings above, the empirical analysis in this study reveals that the particulars of corporate establishment, company size, R&D/innovation intensity, fund procurement from the capital market, and government regulation of major industry are closely associated with the firm survival probability. We also found that the financial performance and the liability structure are the second important factors affecting the market exit of Russian firms. Furthermore, in the case of independent firms, business diversification and internationalization are verified to be very effective measures in reducing the potential risk of their business failure. These empirical results are largely consistent with findings in preceding studies of developed economies. This fact provides supporting evidence of the remarkable penetration of the market mechanism into Russia as well as the active role of corporate governance on firm survival.

Another notable finding in this paper is that there is a sharp difference in survival logic between independent firms and group companies. For the group companies, the independence of governance bodies and their human resource abundance do matter. In contrast, for the independent firms, the most important factor for enhancing their survival probability is the practical influence of their company organs on corporate management. This finding leads us to infer that Russian business groups have been striving to modernize their management system and enhance their risk control capabilities in pursuit of international standards of corporate governance, while independent firms have been effectively avoiding exit risk by forming company organs

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<sup>24</sup> Recent criticism includes that from Black et al. (2000), Buck (2003), Wright et al. (2003), McCarthy et al. (2004), Mickiewicz (2006), Adachi (2010), and Puffer and McCarthy (2011). Needless to say, we do not regard that these authors make incorrect claims about corporate governance in Russia.

that provide beneficial guidelines for corporate management, regardless of the background of the corporate officers. In this sense, the empirical analysis in this study represents a successful step forward to uncover the actual state of Russian firms by demonstrating the influence of governance bodies over corporate management, which had not been empirically examined in most preceding studies.

The question of why the exit frequency of group companies far exceeds that of independent firms, although the former is making greater efforts to make its company management healthier as well as shaping its organizations more proactively in comparison with the latter, is worth examining. According to Russian researchers who are well-versed in business group organizations and their management, it is highly likely that each Russian business group, which is strict about the profitability of its businesses even in non-crisis period, tried to overcome the global financial crisis across the organization by more boldly liquidating or downsizing low-profit businesses. On such occasions, M&A were aggressively carried out among affiliated firms, taking advantage of the merits of business groups.<sup>25</sup> As proof of this view, our survey results show that group companies clearly demonstrate higher rates of being merged or reorganized than do independent firms. In sum, of the two conflicting hypotheses presented in the Introduction, both the insights of Russian researchers and our empirical results strongly support the hypothesis of intensive crisis defense-type restructuring of business groups rather than the hypothesis of greater crisis resistance of business groups in comparison with independent firms. In the case of independent firms in which business liquidation leads directly to the massive dismissal of both managers and workers, it would be natural for them to look for ways to continue their business until they were pushed to the brink of bankruptcy. In other words, it is likely that there is asymmetric diversity in the thresholds for the market exit between the two types of Russian firms. Needless to say, this argument requires more rigorous empirical verification.

As Guriev and Rachinsky (2005) and many other researchers pointed out and the empirical evidence in this paper strongly indicates, two different microcosms appear to coexist in the Russian business community now. In Russia, not only firm organizational structures and management behaviors but also their survival logic is substantially different between group companies and independent firms. Whether one

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<sup>25</sup> Among the Russian economists with whom we consulted on this point, Svetlana Avdasheva and Tatiana Dologopyatova at the Higher School of Economics had particularly beneficial ideas. Their valuable contributions are highly acknowledged.

system will merge with the other into a specific type of corporate system remains to be seen. The current body of research on Russian firms does not provide any specific direction on this issue. Further study will be required before an accurate forecast can be made.

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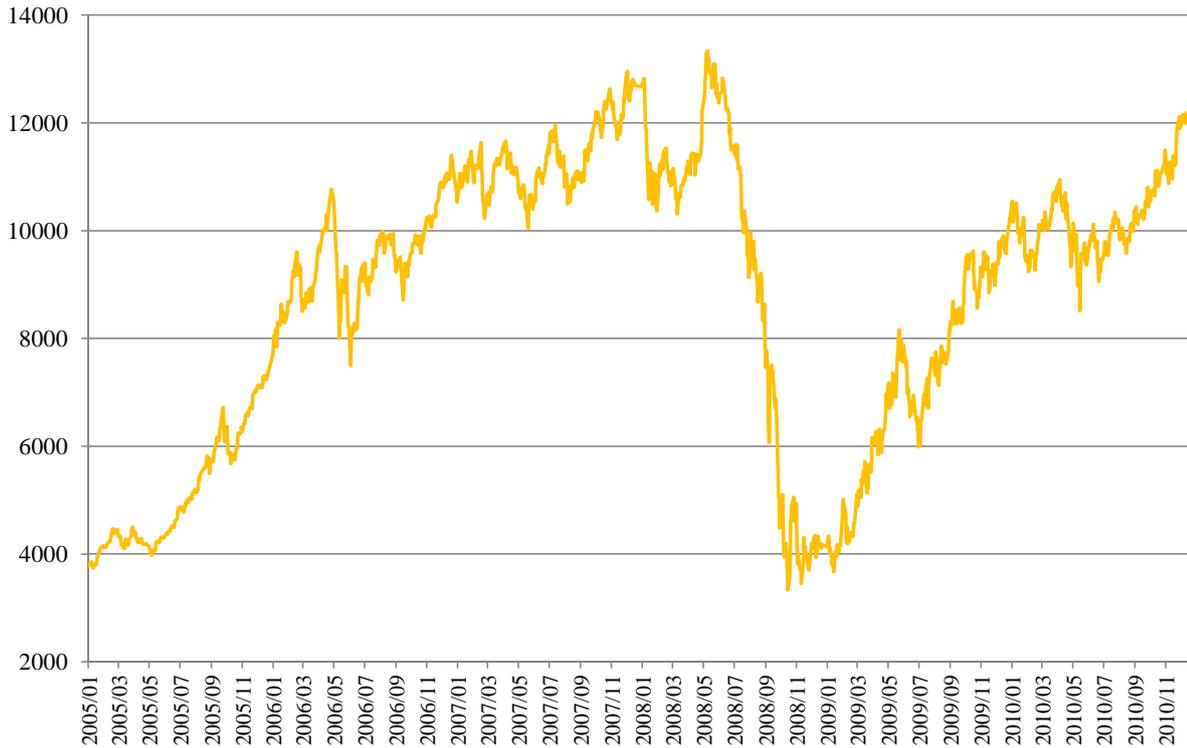
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**Figure 1.** The fluctuation of the Russian securities market: 2005-2010



*Note :* This figure plots the Ruble-denominated closing prices of the RTS Index from 1 January, 2005, to 31 December, 2010. The RTS Index is one of major stock price indices in Russia. The data is derived from the MICEX and RTS groups' website (<http://rts.micex.ru/>).

**Figure 2.** The dynamics of the market exit rate in Russia: 2008-2010



*Note :* This figure illustrates monthly changes in the number of liquidated firms and organizations per 1,000 registered entities in Russia. The unit in the vertical axis is a firm (organization). The original data is available at the website of the Federal State Statistics Service of the Russian Federation (<http://www.gks.ru/wps/wcm/connect/rosstat/rosstatsite/main/>).

**Table 1.** Preceding studies on firm survival and market exit in the post-socialist transition economies

Study	Target country	Target industry	Observation period	Estimator	Dependent variable	Independent variables and their estimation results
Konings and Xavier (2002)	Slovenia	Manufacturing	1994-1998	Heckman (Probit)	Firm survival probability	Number of workers (+), Total fixed assets to total sales (no), Total intangible assets to total assets (no), Total exports to total sales (-), Net profit to total sales (+), Total production costs to total sales (-), Total long-term liabilities to total assets (-), Degree of industrial concentration (no), Median of tangible assets in the affiliated industry (no)
Roberts and Thompson (2003)	Poland	Manufacturing	1988-1993	OLS	Number of exit firms by industry	Degree of market concentration (-), Total capital to total sales (no), Dummy for the consumption-goods production sector (no), Share of state-owned enterprises (-), Share of foreign firms (no), Total industrial sales growth rate (-), Industry price margin (-), Company price margin standard deviation (+), Total industrial sales (+), Number of entry firms in the previous term (+), Number of exit firms in the
Bojnec and Xavier (2004)	Slovenia	Manufacturing	1994-2000	OLS, panel fixed effects, panel random effects	Rate of exit firms by industry	Total industrial sales (no), Median of workers (-), Capital per worker (no), Share of private companies (no), Degree of market concentration (no), Total imports to total sales (+), Total exports to total sales (-), Share of profit-making companies (-), Total industrial long-term liabilities to total industrial sales (no), Total industrial sales growth rate (no)
Männasoo (2008)	Estonia	Manufacturing, trade and service, real estate, construction	1994-2004	Complementary log-log	Bankruptcy probability	Total assets (-), Dummy for open companies with limited liabilities (+), Total liabilities to total assets (+), Total bank borrowings to total assets (+), ROA (-), Profit to total sales (-), ROA standard deviation (no)
Rinaldi (2008)	Russia	Footwear industry	1992-2000	Probit, Cox proportional hazard, log-linear survival (Weibull, exponential, normal) <sup>a</sup>	Firm exit probability	Dummy for former Soviet enterprises (-), Total output (-), Dummy for the federal government-owned enterprises (-), Dummy for municipal enterprises (-), Dummy for charity firms (-), Dummy for privately owned firms (-), Dummy for mixed enterprises (-), Dummy for foreign and joint venture enterprises (no), Dummy for profit-making companies (-), Output per worker (no)
Kosová (2010)	Czech	All industries	1994-2001	Probit, log-normal survival, Cox proportional hazard <sup>a</sup>	Firm exit probability	Foreign sales growth rate (-), Dummy for first FDI entry (-), Firm age (+), Firm age squared (-), Sales revenues (-), Sales revenues squared (+), Interaction term of firm age and sales revenues (?), Foreign employment share (-), Firm percentage of foreign direct ownership (?), Intangible asset ratio (?), Firm technology gap (?) Interaction term of foreign employment share and firm technology gap (?), Firm solvency ratio (+), No foreign firm dummy (+)

(Continued)

(Table 1 continued)

Study	Target country	Target industry	Observation period	Estimator	Dependent variable	Independent variables and their estimation results
Kolasa et al. (2010)	Poland	All industries <sup>b</sup>	2006-2009	Probit	Firm exit probability	Total number of workers (-), Dummy for foreign firms (-), <sup>c</sup> Dummy for exporting firms (+), Dummy for the global financial crisis period (+), Interaction term of the foreign firm dummy and the global financial crisis period dummy (no), Interaction term of the exporting firm dummy and the global financial crisis period dummy (+)
Kejžar (2011)	Slovenia	Manufacturing	1994-2003	Probit, random-effects probit, complementary log-log	Firm exit probability	MNE entry rate (+), Greenfield FDI entry rate (+), Acquisition FDI entry rate (?), Export propensity (-), Export propensity squared (+), Interaction term of MNE entry rate and export propensity (-), Interaction term of greenfield FDI entry rate and export propensity (-), Interaction term of acquisition FDI entry rate and export propensity (-), New entry rate (?), Regional intra-industry foreign firm concentration (?), Foreign firm concentration in backward industries (?), Foreign firm concentration in upward industries (-), Market concentration rate (?), Number of subsidiaries (-), Dummy for foreign firms (+), Number of employees (-), Number of employees squared (?), Total factor productivity (-), Real fixed assets
Clarke et al. (2012)	Bulgaria, Hungary, Latvia, Lithuania, Romania, and Turkey	Manufacturing, service, retailing	2008-2009	Probit	Firm exit probability	Dummy for bank credits (-), Dummy for medium-sized firms (-), Dummy for large firms (-), Company age (-), Ownership share of foreign investors (no), Dummy for privatized firms (no), Total exports to total sales (no), Dummy for companies without the need for external fund procurement (no), Dummy for companies with ISO certification (-), Growth rate of workers (no), Dummy for investment records (no), ROA (no)

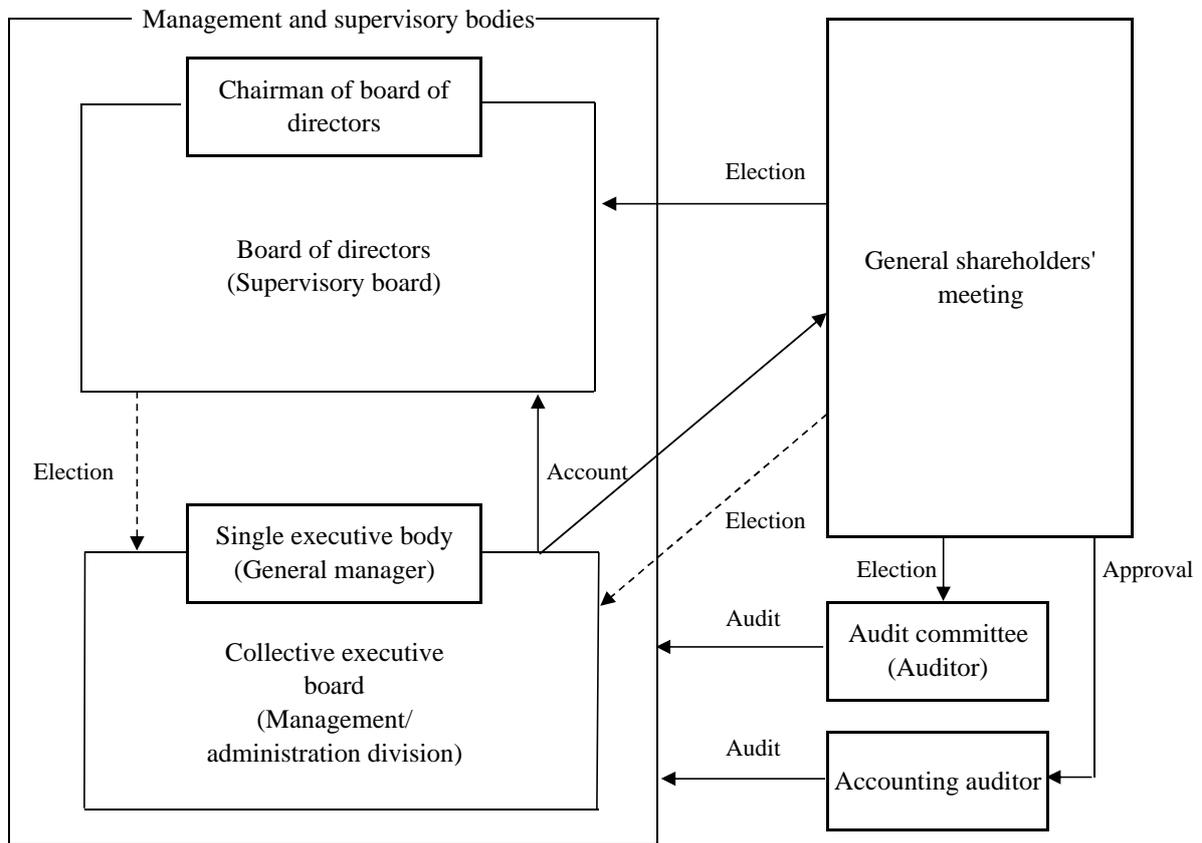
*Note* : This table summarizes the results of the empirical analysis conducted in 7 preceding studies on the determinants of the firm survival or the market exit in the post-socialist transition economies. Roberts and Thompson (2003) and Bojnc and Xavier (2004) are industry-level studies, and 5 other works use the firm-level dataset to perform a survival analysis. The estimation results of the independent variables are reported in the parentheses following each variable definition. The sign '+' denotes a positive correlation with the dependent variable with statistical significance at the 10% level; '-' for a negative correlation with the dependent variable with statistical significance at the 10% level; and 'no' means that the estimate is insignificant.

<sup>a</sup> The dependent variable used for parametric survival models is the firm survival probability, and the estimation results of independent variables are opposite to those in the Probit model and the Cox proportional hazard model.

<sup>b</sup> Excluding financial intermediation.

<sup>c</sup> If observations are limited to the manufacturing industry, the estimation results become insignificant.

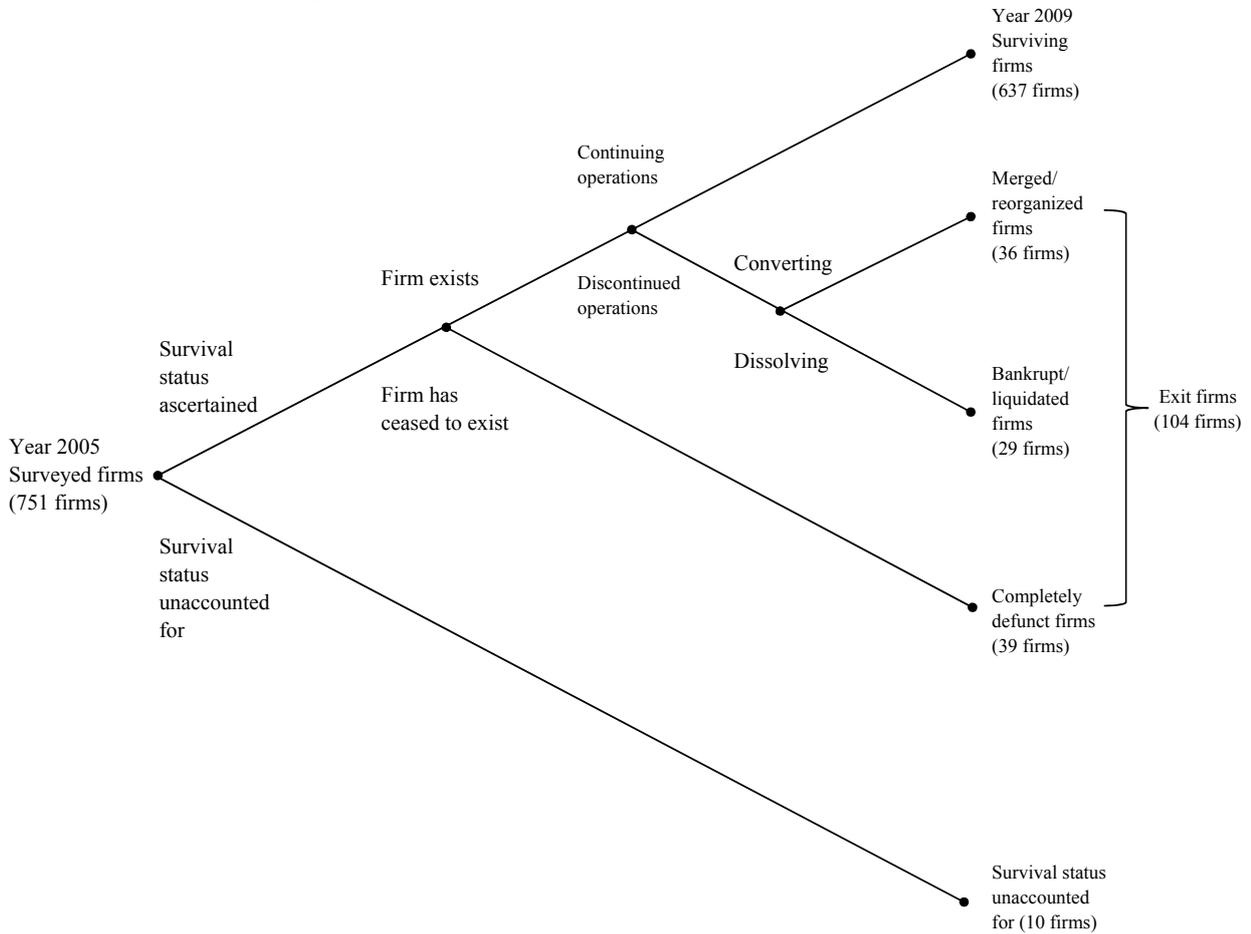
**Figure 3.** Corporate governance system of Russian joint-stock companies



*Note* : This figure illustrates the interrelations among statutory company organs in a Russian joint-stock company including a collective executive organ that can be established at the company's discretion according to the Federal Law on joint-stock companies. The alternative legal titles of company organs are shown in parentheses. The dotted line denotes that the members of executive organs shall be elected by the general shareholders' meeting or 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). For more details of the legislative structure and the corporate governance system of Russian firms, see Iwasaki (2007a).

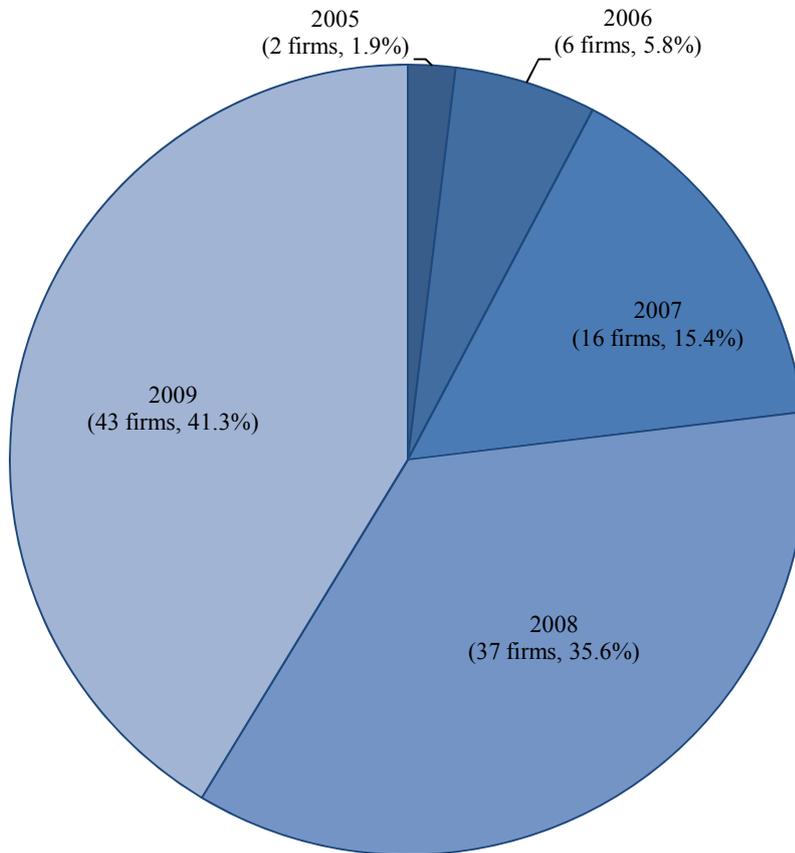
*Source* : Iwasaki (2007a, Figure 9.2, p. 223) with some modifications.

**Figure 4. Survival status of 751 industrial firms**



*Note* : This figure illustrates the main results of a follow-up survey conducted in the 4th quarter of 2009 that targets 751 Russian industrial firms that participated in a nationwide Japan-Russia joint enterprise survey carried out in the first half of 2005. The sample consists of joint-stock companies with 100 or more employees at the time of the 2005 survey. For more details, see Section 2 in this paper.

**Figure 5.** Breakdown of the 104 exit firms by shutdown year



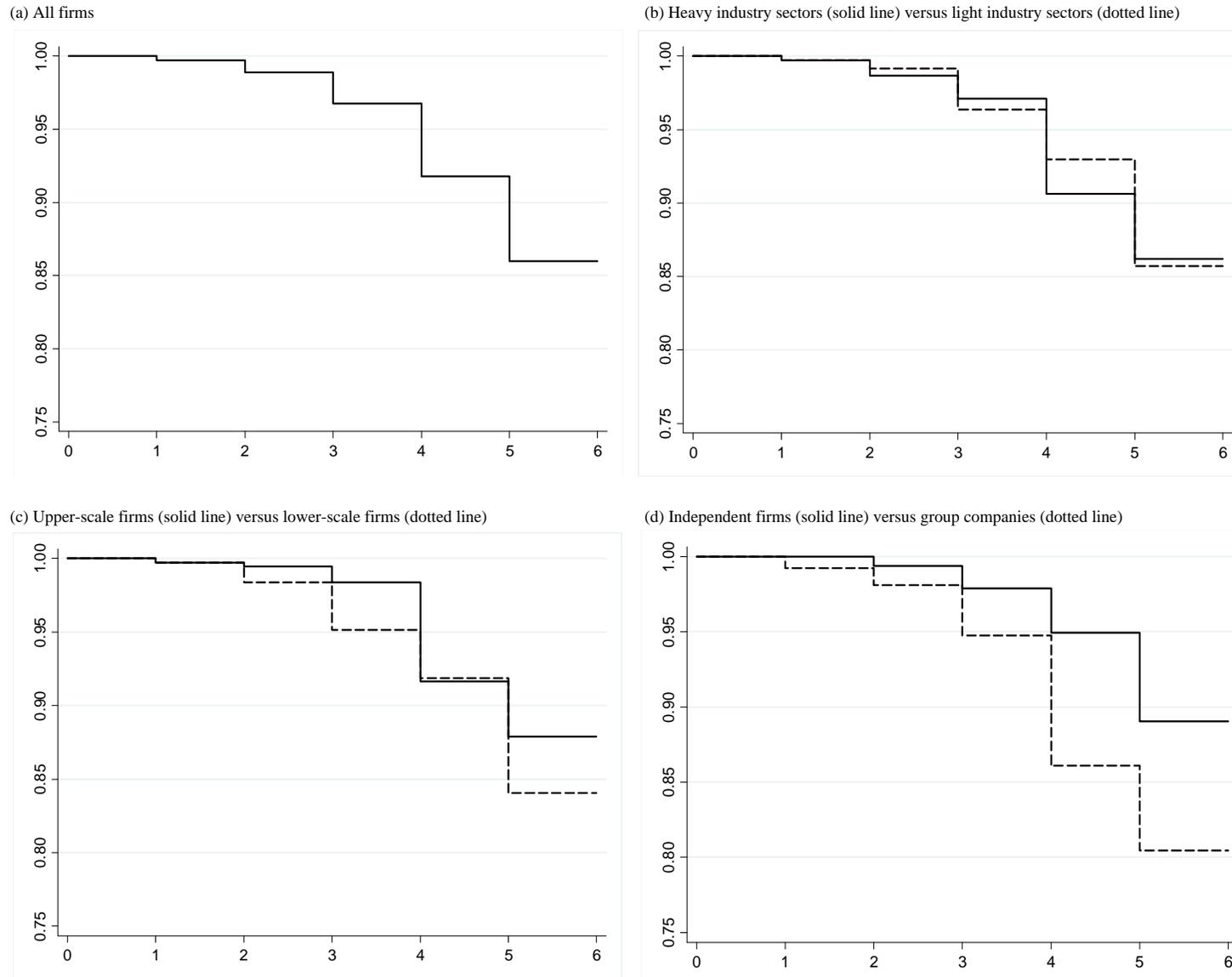
*Note* : This figure shows the composition of 104 Russian industrial firms that exited the market from 2005 to 2009 by shutdown year. The samples are Russian joint-stock companies that participated in a Japan-Russia joint enterprise survey conducted in 2005 whose survival status was confirmed in the course of the follow-up survey carried out in 2009. A total of 751 firms were surveyed. For more details, see Section 2 in this paper.

**Table 2.** Breakdown of the firm survival status by sector, company size, and firm type

	Number of surveyed firms in 2005 (i)	Number of surviving firms	Number of exit firms (ii)	Exit status at the time of the 2009 follow-up survey			Survival status unaccounted for (iii)	Exit rate (ii/(i-iii))	Nelson-Aalen cumulative hazard function	
				Completely defunct	Bankrupt/liquidated	Merged/reorganized			Entire period cumulative hazard	Standard deviation
All industrial firms	751	637	104	39	29	36	10	0.140	0.148	0.015
(a) Breakdown by sector										
Fuel and energy	66	48	16	3	2	11	2	0.250	0.276	0.069
Metallurgy (steel and non-ferrous metals)	36	32	4	2	2	0	0	0.111	0.115	0.058
Machine-building and metal working	255	226	25	9	10	6	4	0.100	0.103	0.021
Chemical and petrochemical	33	25	8	0	1	7	0	0.242	0.261	0.092
Wood, paper, and wood products	63	56	6	1	5	0	1	0.097	0.098	0.040
Light industry	51	44	6	3	3	0	1	0.120	0.123	0.050
Food industry	169	138	31	16	4	11	0	0.183	0.196	0.035
Construction materials	78	68	8	5	2	1	2	0.105	0.110	0.039
(b) Breakdown by company size										
Upper-scale firms	375	326	45	12	8	25	4	0.121	0.126	0.019
Lower-scale firms	376	311	59	27	21	11	6	0.159	0.169	0.022
(c) Breakdown by firm type										
Independent firms	483	423	52	19	22	11	8	0.109	0.113	0.016
Group companies	268	214	52	20	7	25	2	0.195	0.210	0.029
Multiple comparison among the 8 industrial sectors										
Chi-square ( $\chi^2$ ) test for independence								17.460 **		
Cramer's coefficient of association (V)								0.154		
Log-rank test ( $\chi^2$ )									19.02 ***	
Comparison between upper-scale firms and lower-scale firms										
Test for the equality of proportions (z)								0.135		
Cramer's coefficient of association (V)								0.055		
Log-rank test ( $\chi^2$ )									2.21	
Comparison between independent firms and group companies										
Test for the equality of proportions (z)								3.234 ***		
Cramer's coefficient of association (V)								0.119		
Log-rank test ( $\chi^2$ )									11.35 ***	

*Note:* This table contains the results of a follow-up survey conducted in 2009 that targets 751 Russian industrial firms investigated in the course of a nationwide Japan-Russia joint enterprise survey carried out in 2005. The exit rate is calculated by dividing the number of exit firms by the total number of firms whose survival status was confirmed. In Panel (b), the breakdown by company size means that the surveyed firms are divided into two groups based on the median (460 persons) of the total number of workers per company as the threshold. In Panel (c), a group company denotes a firm that belongs to a particular holding company group or another business group through stock ownership. \*\*\* and \*\* denote that the test statistics are significant at the 1% and 5% levels, respectively.

**Figure 6.** Kaplan-Meier survivor function of the firm survival probability



*Note:* This figure plots the time-series changes in the survival probability of Russian industrial firms based on the estimation results of the Kaplan-Meier survivor function. The samples are 741 joint-stock companies that participated in a Japan-Russia joint enterprise survey conducted in 2005 whose survival status was confirmed in the course of the follow-up survey carried out in 2009. The vertical axis denotes the survival probability, while the horizontal axis denotes the observation period. In Panel (b), the heavy industry sectors refer to the following four sectors: fuel and energy; metallurgy; machine-building and metal working; and chemicals and petrochemicals. Meanwhile, the light industry sectors refer to the following four sectors: wood, paper, and wood products; light industry; food industry; and construction materials. In Panel (c), the surveyed firms are divided into two groups based on the median (460 persons) of the total number of workers per company as the threshold. In Panel (d), a group company denotes a firm that belongs to a particular holding company group or another business group through stock ownership.

**Table 3.** Theoretical predictions regarding the determinants of firm survival in the context of the Russian transition economy

	Correlation with the firm survival probability
Independence of the governance bodies	+
Abundance of human resources available to the governance bodies	+
Governance bodies' influence over corporate management	+
Affiliation with a business group	?
Selection of an open joint-stock company as the form of incorporation	?
Establishment spun off from a state-owned (municipal) company or a former state-owned (ex-municipal) privatized company	-
New establishment as a private company	-
Company size	+
Business diversification	+
Business internationalization	+
Intensity of R&D/innovation activities	+
Good financial performance	+
Sound liability structure	+
Fund procurement from the capital market	-
Fund procurement from financial institutions	+
Operation in a regulated industry	-

*Note:* This table summarizes the theoretical predictions of the impacts of factors that may affect the survival probability of Russian firms on the basis of the discussion in Section 3 of the paper. The sign '+' denotes a positive correlation between a given factor and the survival probability, '-', for a negative correlation. The question mark, "?," means that the impact is unpredictable.

**Table 4.** Definitions and descriptive statistics of the variables used in the empirical analysis and comparison of surviving and exit firms as well as comparison of independent firms and group companies based on these variable

Definition of variables (variable name)	Descriptive statistics					(a) Comparison of surviving and exit firms				Correlation coefficients with the survival probability <sup>c</sup>	(b) Comparison of independent firms and group companies			
						Surviving firms		Exit firms			Independent firms		Group companies	
	Mean	S.D.	Median	Max.	Min.	Mean/proportion	Median	Mean/proportion <sup>a</sup>	Median <sup>b</sup>	Mean/proportion	Median	Mean/proportion <sup>a</sup>	Median <sup>b</sup>	
Variables for the independence of governance bodies														
Ownership share of outside shareholders ( <i>OWNOUT</i> )	1.772	2.096	0	5	0	1.766	0	1.807	0	-0.007	1.451	0	2.555 ***	3 ***
Outsideness of the chairman of the board of directors ( <i>BOALEA</i> )	0.817	0.870	1	2	0	0.808	1	0.871	1	-0.025	0.780	0	0.959 ***	1 ***
Proportion of outsider directors ( <i>BOACOM</i> )	0.473	0.348	0.500	1.000	0.000	0.467	0.500	0.508	0.540	-0.041	0.394	0.400	0.645 ***	0.750 ***
Proportion of outsider auditors ( <i>AUDCOM</i> )	0.403	0.399	0.330	1.000	0.000	0.410	0.330	0.363	0.250	0.041	0.330	0.200	0.590 ***	0.670 ***
Audit firm attribute ( <i>AUDFIR</i> )	0.339	0.575	0	2	0	0.332	0	0.376	0	-0.027	0.207	0	0.685 ***	0 ***
First principal component score for the independence of the governance bodies ( <i>NDSCO</i> )	0.000	1.492	-0.053	3.373	-2.180	-0.120	-0.170	-0.138	-0.053	0.004	-0.531	-0.703	0.879 ***	0.923 ***
Dummy for firms with a collective executive board ( <i>COLEXE</i> )	0.314	0.464	0	1	0	0.307	0	0.359	0	-0.039	0.281	0	0.435 †††	0 ***
Variables for the abundance of human resources available to governance bodies														
Ownership share of commercial banks ( <i>OWNBAN</i> )	0.145	0.593	0	5	0	0.150	0	0.114	0	0.021	0.109	0	0.225 **	0 **
Total members of the board of directors ( <i>BOAMEM</i> )	6.595	2.389	7	23	3	6.611	7	6.500	6	0.016	6.352	6	7.167 ***	7 ***
Total number of outsider directors ( <i>OUTDIR</i> )	3.250	2.812	3	17	0	3.243	3	3.297	3	-0.007	2.606	2	4.750 ***	5 ***
Total number of insider directors ( <i>INSDIR</i> )	3.326	2.440	3	21	0	3.367	3	3.066	3	0.043	3.711	4	2.417 ***	2 ***
Total members of the audit committee ( <i>AUDMEM</i> )	3.522	2.143	3	40	1	3.455	3	3.945 **	3 **	-0.079 **	3.426	3	3.749 **	3 ***
Total number of outsider auditors ( <i>OUTAUD</i> )	1.398	1.700	1	12	0	1.363	1	1.611	1	-0.050	1.103	0	2.156 ***	2 ***
Total number of insider auditors ( <i>INSAUD</i> )	2.110	1.983	2	30	0	2.076	2	2.322	2	-0.043	2.318	3	1.565 ***	1 ***
First principal component score of variable for the human resource abundance of the governance bodies ( <i>HUMSCO</i> )	0.000	1.504	-0.400	9.192	-2.326	-0.090	-0.404	-0.005	-0.519	-0.021	-0.374	-0.682	0.641 ***	0.334 ***
Total members of the collective executive board ( <i>COLMEM</i> )	7.032	3.841	6	23	2	6.897	6	7.722	7	-0.091	6.643	5	6.929	7
Variables for the governance bodies' influence over corporate management														
Influence of the general shareholders' meeting ( <i>NFGSM</i> )	1.292	0.771	1	2	0	1.283	1	1.350	2	-0.030	1.249	1	1.416 ***	2 ***
Influence of the chairman of the board of directors ( <i>INFCHA</i> )	1.233	0.715	1	2	0	1.247	1	1.146	1	0.050	1.240	1	1.252	1
Influence of the board of directors ( <i>INFBOA</i> )	1.575	0.627	2	2	0	1.596	2	1.449 **	2 *	0.081 **	1.556	2	1.651 **	2 **
Influence of the audit committee ( <i>INFAUD</i> )	0.591	0.705	0	2	0	0.617	0	0.433 **	0 **	0.092 **	0.596	0	0.638	1
Influence of the audit firm ( <i>INFAUF</i> )	0.515	0.602	0	2	0	0.533	0	0.410 *	0 *	0.072 *	0.493	0	0.584 **	1 **
First principal component score of the influence of the governance bodies ( <i>NFSCO</i> )	0.000	1.272	0.003	3.367	-2.667	-0.015	-0.214	-0.278 *	-0.503	0.074 *	-0.114	-0.214	0.181 ***	0.349 ***
Influence of the collective executive board ( <i>INFCOL</i> )	1.110	0.706	1	2	0	1.113	1	1.095	1	0.033	1.110	1	1.190	1

(Continued)

(Table 4 continued)

Definition of variables (variable name)	Descriptive statistics					(a) Comparison of surviving and exit firms					(b) Comparison of independent firms and group companies			
						Surviving firms		Exit firms		Correlation coefficients with the survival probability <sup>c</sup>	Independent firms		Group companies	
	Mean	S.D.	Median	Max.	Min.	Mean/proportion	Median	Mean/proportion <sup>a</sup>	Median <sup>b</sup>		Mean/proportion	Median	Mean/proportion <sup>a</sup>	Median <sup>b</sup>
Control variables														
Business group member dummy ( <i>GROFIR</i> )	0.359	0.480	0	1	0	0.336	0	0.500 <sup>†††</sup>	0.5 <sup>***</sup>	-0.119 <sup>***</sup>	0.000	0	1.000 <sup>†††</sup>	1 <sup>***</sup>
Open joint-stock company dummy ( <i>OPECOM</i> )	0.663	0.473	1	1	0	0.670	1	0.615	1	0.040	0.656	1	0.707	1
Dummy for spin-off firms from a state-owned (municipal) company or privatized company ( <i>SPIOFF</i> )	0.103	0.304	0	1	0	0.089	0	0.183 <sup>†††</sup>	0 <sup>***</sup>	-0.107 <sup>***</sup>	0.086	0	0.111	0
Dummy for <i>de novo</i> private companies ( <i>DENOVO</i> )	0.128	0.335	0	1	0	0.126	0	0.144	0	-0.019	0.116	0	0.204 <sup>†††</sup>	0 <sup>***</sup>
Average number of employees ( <i>COMSIZ</i> )	1529.922	4001.800	460	53677	115	1614.446	480	1012.212	400 <sup>***</sup>	0.052	1126.529	400	3055.325 <sup>***</sup>	650 <sup>***</sup>
Number of business lines ( <i>BUSLIN</i> )	2.139	2.015	1	11	1	2.170	1	1.932	1	0.040	1.970	1	2.433 <sup>***</sup>	1 <sup>***</sup>
Share of exports in total sales ( <i>EXPSHA</i> )	0.959	1.232	1	5	0	0.998	1	0.721 <sup>**</sup>	0 <sup>**</sup>	0.078 <sup>**</sup>	0.847	1	0.928	0
R&D expenditure intensity ( <i>R&amp;DEXP</i> )	0.940	0.881	1	2	0	0.968	1	0.769 <sup>**</sup>	1 <sup>**</sup>	0.079 <sup>**</sup>	0.872	1	0.981 <sup>*</sup>	1 <sup>*</sup>
Average rate of gross profit on sale ( <i>PROAVE</i> )	0.045	0.381	0.016	1.718	-0.880	0.064	0.059	-0.081 <sup>***</sup>	-0.209 <sup>***</sup>	0.130 <sup>***</sup>	0.026	-0.048	0.087 <sup>*</sup>	0.071 <sup>*</sup>
Proportion of arrears of the total liabilities ( <i>ARREAR</i> )	0.970	1.482	0	5	0	0.890	0	1.452 <sup>***</sup>	1 <sup>***</sup>	-0.132 <sup>***</sup>	0.966	0	0.858	0
Dummy for firms that issued shares or bonds in the overseas or domestic stock exchange ( <i>MARFIN</i> )	0.099	0.298	0	1	0	0.091	0	0.144 <sup>†</sup>	0 <sup>*</sup>	-0.062 <sup>*</sup>	0.055	0	0.255 <sup>***</sup>	0 <sup>***</sup>
Firms that used bank credits and their average lending period ( <i>BANCRE</i> )	2.519	1.431	3	5	0	2.524	3	2.485	3	0.010	2.419	3	2.696 <sup>***</sup>	3 <sup>***</sup>
Dummy for firms operating in the regulated industries ( <i>REGIND</i> )	0.131	0.338	0	1	0	0.231	0	0.115 <sup>†††</sup>	0 <sup>***</sup>	-0.120 <sup>***</sup>	0.088	0	0.170 <sup>†††</sup>	0 <sup>***</sup>

Note: This table presents the definition, descriptive statistics, and data source of variables used in the empirical analyses, results from the univariate comparison between surviving firms and exit firms, and the correlation coefficients between a given variable and the firm survival probability as well as results from the univariate comparison between independent firms and group companies. The samples are Russian joint-stock companies that participated in a Japan-Russia joint enterprise survey conducted in 2005 whose survival status was confirmed in the course of the follow-up survey carried out in 2009. The number of business lines (*BUSLIN*) and the average rate of gross profit on sales (*PROAVE*) originate in the SKRIN open database and the SPARK open database, respectively. All other variables were created on the basis of the results of the 2005 enterprise survey.

The following are the supplementary variable definitions: "Ownership share" means an ownership share 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%. *OWNOUT*, Excluding domestic individual shareholders; *BOALEA*, 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; *AUDCOM*, Proportion of the outsider directors to the total number of board directors, with a range  $0.00 \leq x \leq 1.00$  as a continuous variable; *AUDCOM*, Proportion of the outsider auditors to the total number of audit committee members, with a range  $0.00 \leq x \leq 1.00$  as a continuous variable; *AUDFIR*, 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; *INDDSCO*, Estimated using all the variables for the independence of governance bodies. See Appendix (a) for the major estimation results; *HUMSCO*, Estimated using all the variables for the abundance of human resources available to the governance bodies. See Appendix (b) for the major estimation results; *COLMEM*, Relevant only to firms with a collective executive board; *INFGSM*, *INFCHA*, *INFBOA*, *INFAUD*, *INFAUF*, *INFCOL*, Ordinal variables represent the following three-scale evaluation on the influence of the relevant governance body concerning important matters in corporate management: 0: minimal influence; 1: moderate influence; and 2: strong influence; *INFCOL*, is relevant only to firms with a collective executive board; *INFSCO*, Estimated using all the variables for the governance bodies' influence over corporate management. See Appendix (c) for the major estimation results; *GROFIR*, A dichotomous variable that assigns a value of 1 to member firms of a business group; *COMSIZ*, The unit is a person. The natural logarithm is used in the survival analysis; *BUSLIN*, A proxy for the level of business diversification measured by the Russian All-Union Classifier of the National Economy Branches two-digit classification; *EXPSHA*, "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%; *R&DEXP*, Evaluation of the R&D expenditures during the period from 2001 to 2004 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; *PROAVE*, Industry-adjusted figures based on the methodology proposed by Eisenberg et al. (1998); *ARREAR*, Evaluation of proportion of the arrears of the total liabilities falls under the following 6 categories: 0: 0%; 1: 1.0 to 5.0%; 2: 5.1 to 10.0%; 3: 10.1 to 20.0%; 4: 20.1 to 30.0%; and 5: 30.1% or more; *BANCRE*, "Firms which 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 to 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; *REGIND*, A dummy variable that assigns a value of 1 to companies that are operating in the fuel and energy sector or the chemical and petrochemical sector.

<sup>a</sup> \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively, according to the *t* test (or Welch test if the *F* test on the equality of variances rejects the null hypothesis that the population variances are equal) in terms of the differences in the means. ††† and † denote statistical significance at the 1% and 10% levels, respectively, according to the Chi-square ( $\chi^2$ ) test in terms of the differences in the proportion between the two types of firms.

<sup>b</sup> \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively, according to the Wilcoxon rank sum test in terms of the differences between the two types of firms.

<sup>c</sup> \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively, in terms of the correlation coefficient with the survival probability.

**Table 5.** Effect of the independence of the governance bodies:

(a) All firms							
Model	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Outside shareholding ( <i>OWNOUT</i> )	1.004 (0.04)						
Outsideness of board chairman ( <i>BOALEA</i> )		1.021 (0.16)					
Proportion of outsider directors ( <i>BOACOM</i> )			0.913 (-0.36)				
Proportion of outsider auditors ( <i>AUDCOM</i> )				0.353 ** (-2.54)			
Audit firm attribute ( <i>AUDFIR</i> )					1.096 (0.39)		
First principal component score ( <i>INDSCO</i> )						0.867 * (-1.86)	
Firms with a collective executive board ( <i>COLEXE</i> )							1.467 (1.21)
Affiliation with a business group ( <i>GROFIR</i> )	1.708 *** (2.66)	1.799 ** (2.01)	1.923 *** (3.04)	2.164 *** (3.53)	1.709 *** (3.12)	1.667 * (1.66)	1.771 *** (2.75)
Open joint-stock companies ( <i>OPECOM</i> )	1.129 (0.51)	1.043 (0.16)	0.896 (-0.46)	0.967 (-0.12)	1.008 (0.03)	0.994 (-0.02)	0.953 (-0.21)
Spin-off firms ( <i>SPIOFF</i> )	1.944 ** (2.26)	2.384 *** (2.78)	2.384 *** (2.54)	3.082 *** (3.19)	2.266 ** (2.52)	2.144 ** (2.42)	2.273 *** (2.79)
<i>de novo</i> private companies ( <i>DENOVO</i> )	0.563 * (-1.76)	0.653 * (-1.76)	0.777 * (-1.67)	1.155 (0.77)	0.799 (-1.02)	0.562 * (-1.72)	0.817 (-0.92)
Company size ( <i>COMSIZ</i> )	0.734 *** (-3.75)	0.704 ** (-2.54)	0.715 *** (-2.58)	0.768 * (-1.87)	0.713 *** (-3.15)	0.724 ** (-2.01)	0.703 *** (-2.57)
Business diversification ( <i>BUSLIN</i> )	0.951 (-1.03)	0.978 (-0.52)	0.977 (-0.58)	0.955 (-1.12)	0.957 (-1.12)	0.991 (-0.16)	0.955 (-1.12)
Business internationalization ( <i>EXPSHA</i> )	0.829 (-0.98)	0.865 (-0.95)	0.882 (-0.76)	0.881 (-0.70)	0.867 (-0.93)	0.887 (-0.55)	0.851 (-1.07)
R&D expenditure intensity ( <i>R&amp;DEXP</i> )	0.963 (-0.38)	0.813 ** (-2.49)	0.795 *** (-2.57)	0.805 ** (-2.07)	0.812 ** (-2.32)	1.017 (0.20)	0.810 ** (-1.98)
Profitability ( <i>PROAVE</i> )	0.369 ** (-2.13)	0.584 (-1.57)	0.590 (-1.29)	0.560 (-1.09)	0.470 * (-1.92)	0.467 * (-1.85)	0.478 * (-1.83)
Proportion of arrears ( <i>ARREAR</i> )	1.122 (1.56)	1.128 ** (2.19)	1.107 (1.54)	1.121 (1.58)	1.092 (1.34)	1.186 ** (2.40)	1.107 * (1.66)
Fund procurement from the capital market ( <i>MARFIN</i> )	2.365 *** (2.76)	2.794 ** (2.26)	3.151 *** (2.94)	4.159 *** (3.09)	2.971 *** (2.80)	2.615 ** (2.35)	2.991 *** (3.22)
Use of bank credits ( <i>BANCRE</i> )	0.999 (-0.01)	1.059 (0.62)	1.039 (0.42)	1.008 (0.11)	0.979 (-0.28)	1.083 (0.57)	0.959 (-0.50)
Operation in the regulated industries ( <i>REGIND</i> )	1.347 * (1.74)	1.533 ** (2.07)	1.521 ** (1.98)	2.030 *** (5.20)	1.523 ** (2.18)	1.564 * (1.91)	1.454 * (1.65)
N	460	499	508	480	525	370	546
Log likelihood	-329.84	-374.52	-376.29	-356.09	-418.94	-255.73	-420.99
Wald test ( $\chi^2$ )	213.27 ***	307.67 ***	315.35 ***	97.31 ***	149.81 ***	692.00 ***	126.73 ***

(Continued)

## (b) Independent firms

Model	[8]	[9]	[10]	[11]	[12]	[13]	[14]
Outside shareholding ( <i>OWNOUT</i> )	0.973 (-0.24)						
Outsideness of board chairman ( <i>BOALEA</i> )		1.055 (0.56)					
Proportion of outsider directors ( <i>BOACOM</i> )			1.864 * (1.72)				
Proportion of outsider auditors ( <i>AUDCOM</i> )				0.411 ** (-1.96)			
Audit firm attribute ( <i>AUDFIR</i> )					1.135 (0.27)		
First principal component score ( <i>INDSCO</i> )						0.931 (-0.34)	
Firms with a collective executive board ( <i>COLEXE</i> )							1.307 (0.56)
Open joint-stock companies ( <i>OPECOM</i> )	1.429 (1.05)	1.227 (0.61)	1.045 (0.15)	1.517 (1.03)	1.106 (0.27)	1.538 (1.35)	1.115 (0.33)
Spin-off firms ( <i>SPIOFF</i> )	2.417 *** (3.92)	2.646 *** (4.09)	2.585 *** (4.00)	2.211 *** (2.74)	2.082 *** (3.62)	2.325 *** (2.77)	2.317 *** (3.60)
<i>de novo</i> private companies ( <i>DENOVO</i> )	0.597 (-0.69)	0.284 (-1.47)	0.240 (-1.54)	0.811 (-0.26)	0.487 (-1.00)	0.347 (-1.17)	0.485 (-0.98)
Company size ( <i>COMSIZ</i> )	0.746 (-1.21)	0.654 ** (-2.29)	0.580 ** (-2.04)	0.694 (-1.49)	0.636 ** (-2.08)	0.712 (-1.46)	0.658 ** (-2.00)
Business diversification ( <i>BUSLIN</i> )	0.864 (-1.44)	0.861 * (-1.66)	0.856 * (-1.82)	0.771 * (-1.72)	0.824 ** (-2.23)	0.808 (-1.07)	0.832 ** (-2.20)
Business internationalization ( <i>EXPSHA</i> )	0.629 ** (-2.38)	0.636 *** (-2.90)	0.659 * (-1.90)	0.668 * (-1.84)	0.639 ** (-2.28)	0.695 * (-1.69)	0.605 *** (-2.73)
R&D expenditure intensity ( <i>R&amp;DEXP</i> )	0.921 (-0.62)	0.788 * (-1.67)	0.806 (-1.48)	0.824 (-1.34)	0.781 * (-1.75)	0.937 (-0.47)	0.809 (-1.58)
Profitability ( <i>PROAVE</i> )	0.286 *** (-3.14)	0.453 ** (-2.24)	0.483 * (-1.87)	0.348 ** (-2.15)	0.307 *** (-2.86)	0.464 ** (-2.17)	0.312 *** (-2.90)
Proportion of arrears ( <i>ARREAR</i> )	1.127 (1.10)	1.146 ** (2.02)	1.153 * (1.90)	1.116 (0.87)	1.102 (0.98)	1.186 (1.27)	1.117 (1.20)
Fund procurement from the capital market ( <i>MARFIN</i> )	1.047 (0.05)	1.137 (0.14)	2.445 (1.14)	2.679 (1.03)	2.037 (0.85)	1.137 (0.11)	2.057 (0.88)
Use of bank credits ( <i>BANCRE</i> )	1.036 (0.41)	1.105 (1.00)	1.031 (0.34)	1.009 (0.10)	0.981 (-0.23)	1.112 (0.87)	0.975 (-0.31)
Operation in the regulated industries ( <i>REGIND</i> )	0.853 (-0.20)	1.085 (0.10)	1.309 (0.58)	1.429 (1.28)	0.989 (-0.02)	1.266 (0.40)	1.046 (0.08)
N	310	334	344	324	347	251	366
Log likelihood	-174.63	-186.73	-186.81	-184.68	-208.77	-147.58	-211.19
Wald test ( $\chi^2$ )	189.10 ***	58.30 ***	474.35 ***	89.11 ***	404.62 ***	205.88 ***	64.78 ***

(Continued)

## (c) Group companies

Model	[15]	[16]	[17]	[18]	[19]	[20]	[21]
Outside shareholding ( <i>OWNOUT</i> )	1.005 (0.03)						
Outsideness of board chairman ( <i>BOALEA</i> )		0.971 (-0.14)					
Proportion of outsider directors ( <i>BOACOM</i> )			0.264 ** (-2.25)				
Proportion of outsider auditors ( <i>AUDCOM</i> )				0.233 *** (-5.13)			
Audit firm attribute ( <i>AUDFIR</i> )					1.104 (0.33)		
First principal component score ( <i>INDSCO</i> )						0.678 *** (-2.70)	
Firms with a collective executive board ( <i>COLEXE</i> )							2.002 *** (3.55)
Open joint-stock companies ( <i>OPECOM</i> )	0.738 (-1.39)	0.803 (-0.89)	0.712 (-1.33)	0.433 *** (-4.40)	0.841 (-0.87)	0.407 ** (-2.13)	0.701 (-1.54)
Spin-off firms ( <i>SPIOFF</i> )	2.092 (1.31)	2.805 * (1.84)	3.183 * (1.77)	6.939 *** (3.03)	2.983 ** (2.09)	4.959 ** (2.13)	2.509 * (1.78)
<i>de novo</i> private companies ( <i>DENOVO</i> )	0.639 (-0.79)	1.198 (0.59)	1.587 (1.48)	1.954 * (1.67)	1.292 (0.80)	1.028 (0.05)	1.404 (1.04)
Company size ( <i>COMSIZ</i> )	0.719 ** (-2.43)	0.710 (-1.55)	0.787 (-1.33)	0.764 (-1.35)	0.742 * (-1.86)	0.684 ** (-2.28)	0.712 * (-1.85)
Business diversification ( <i>BUSLIN</i> )	1.004 (0.07)	1.059 (0.70)	1.073 (1.10)	1.055 (0.61)	1.053 (0.81)	1.094 (1.15)	1.059 (0.93)
Business internationalization ( <i>EXPSHA</i> )	0.991 (-0.05)	1.037 (0.28)	1.026 (0.20)	1.057 (0.35)	1.013 (0.12)	1.147 (0.80)	1.002 (0.02)
R&D expenditure intensity ( <i>R&amp;DEXP</i> )	0.979 (-0.10)	0.806 (-1.29)	0.754 * (-1.88)	0.887 (-0.94)	0.851 (-1.38)	1.191 (0.84)	0.819 (-1.35)
Profitability ( <i>PROAVE</i> )	0.494 (-1.00)	0.626 (-1.01)	0.605 (-1.11)	0.806 (-0.34)	0.592 (-0.92)	0.491 (-1.04)	0.615 (-0.91)
Proportion of arrears ( <i>ARREAR</i> )	1.113 * (1.66)	1.108 (1.43)	1.096 (0.80)	1.165 (1.26)	1.105 (1.18)	1.151 * (1.83)	1.144 * (1.78)
Fund procurement from the capital market ( <i>MARFIN</i> )	2.324 *** (3.21)	3.130 * (1.76)	3.585 ** (2.21)	4.948 *** (3.48)	2.343 (1.33)	4.309 ** (2.56)	2.717 * (1.66)
Use of bank credits ( <i>BANCRE</i> )	0.998 (-0.01)	1.029 (0.22)	0.997 (-0.02)	1.020 (0.13)	1.013 (0.14)	1.109 (0.36)	0.960 (-0.37)
Operation in the regulated industries ( <i>REGIND</i> )	1.931 (1.38)	1.931 (1.21)	2.158 * (1.67)	3.967 *** (3.58)	2.391 ** (2.03)	2.922 (1.29)	1.815 (1.26)
N	150	165	164	156	178	119	180
Log likelihood	-112.90	-138.27	-137.74	-120.81	-155.17	-71.559	-154.76
Wald test ( $\chi^2$ )	160.35 ***	215.35 ***	677.03 ***	168.47 ***	261.84 ***	364.08 ***	300.33 ***

*Note* : This table contains the results from the survival analysis using the Cox proportional hazard model. See Subsection 4.1 for more details about the survival analysis and the Cox model. The samples are Russian joint-stock companies that participated in a Japan-Russia joint enterprise survey conducted in 2005 whose survival status was confirmed in the course of the follow-up survey carried out in 2009. The reported coefficient is a hazard ratio. Table 4 provides the detailed definitions and descriptive statistics of the independent variables. Standard errors are computed using the Huber-White sandwich estimator with clustering of the sample by industry.  $z$  statistics is reported in parentheses beneath the regression coefficients. The Wald test tests the null hypothesis that all coefficients are zero. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 6.** Effect of the abundance of human resources available to the governance bodies:

(a) All firms

Model	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Ownership of commercial banks ( <i>OWNBAN</i> )	0.988 (-0.04)								
Number of board directors ( <i>BOAMEM</i> )		0.974 (-0.27)							
Number of outsider directors ( <i>OUTDIR</i> )			0.940 *** (-2.97)						
Number of insider directors ( <i>INSDIR</i> )				0.991 (-0.17)					
Number of audit committee members ( <i>AUDMEM</i> )					1.047 (1.35)				
Number of outsider auditors ( <i>OUTAUD</i> )						0.943 (-0.56)			
Number of insider auditors ( <i>INSAUD</i> )							1.087 *** (6.27)		
First principal component score ( <i>HUMSCO</i> )								0.843 (-0.86)	
Number of collective executive board members ( <i>COLMEM</i> )									1.076 (1.37)
Affiliation with a business group ( <i>GROFIR</i> )	1.702 ** (2.41)	1.866 *** (3.52)	2.096 *** (4.07)	1.855 *** (2.83)	1.775 *** (2.59)	1.859 *** (3.01)	1.886 *** (2.97)	1.774 * (1.93)	2.760 ** (2.39)
Open joint-stock companies ( <i>OPECOM</i> )	1.160 (0.69)	0.914 (-0.35)	0.903 (-0.42)	0.890 (-0.51)	0.982 (-0.06)	0.985 (-0.05)	0.972 (-0.10)	1.013 (0.07)	1.023 (0.06)
Spin-off firms ( <i>SPIOFF</i> )	2.074 *** (2.90)	2.383 *** (2.60)	2.390 ** (2.55)	2.389 *** (2.58)	3.057 *** (3.68)	3.084 *** (3.85)	3.178 *** (3.69)	2.440 *** (2.84)	1.334 (0.44)
<i>de novo</i> private companies ( <i>DENOVO</i> )	0.698 (-1.03)	0.889 (-0.42)	0.770 * (-1.71)	0.766 * (-1.71)	0.977 (-0.12)	0.982 (-0.10)	1.024 (0.13)	0.659 (-1.19)	0.289 (-0.95)
Company size ( <i>COMSIZ</i> )	0.741 *** (-2.93)	0.723 *** (-2.72)	0.732 ** (-2.21)	0.711 *** (-2.77)	0.744 ** (-2.49)	0.767 ** (-2.44)	0.749 ** (-2.35)	0.804 * (-1.65)	0.736 *** (-2.56)
Business diversification ( <i>BUSLIN</i> )	0.948 (-1.27)	0.976 (-0.51)	0.991 (-0.21)	0.973 (-0.67)	0.932 * (-1.95)	0.942 (-1.49)	0.942 (-1.58)	0.955 (-0.82)	0.912 (-0.85)
Business internationalization ( <i>EXPSHA</i> )	0.779 (-1.28)	0.880 (-0.75)	0.888 (-0.70)	0.881 (-0.76)	0.856 (-0.92)	0.860 (-0.88)	0.867 (-0.86)	0.778 (-1.08)	0.817 (-1.26)
R&D expenditure intensity ( <i>R&amp;DEXP</i> )	0.890 (-1.10)	0.792 *** (-2.87)	0.798 *** (-2.77)	0.798 *** (-2.59)	0.804 ** (-2.23)	0.801 ** (-2.35)	0.801 ** (-2.24)	0.897 (-1.36)	0.622 *** (-2.64)
Profitability ( <i>PROAVE</i> )	0.467 ** (-2.07)	0.558 (-1.18)	0.597 (-1.22)	0.597 (-1.22)	0.571 (-1.11)	0.589 (-1.02)	0.568 (-1.06)	0.627 (-1.50)	0.981 (-0.05)
Proportion of arrears ( <i>ARREAR</i> )	1.122 (1.49)	1.094 (1.02)	1.129 * (1.74)	1.102 (1.45)	1.099 (1.37)	1.117 (1.49)	1.117 * (1.72)	1.184 ** (2.02)	1.092 (0.80)
Fund procurement from the capital market ( <i>MARFIN</i> )	2.336 *** (3.07)	3.321 *** (2.66)	3.397 *** (3.05)	3.149 *** (2.96)	3.297 *** (2.90)	3.487 *** (2.80)	3.468 *** (2.92)	2.967 *** (2.58)	1.779 (1.51)
Use of bank credits ( <i>BANCRE</i> )	0.981 (-0.16)	1.020 (0.23)	1.048 (0.52)	1.036 (0.39)	1.009 (0.12)	1.012 (0.16)	1.020 (0.24)	1.071 (0.48)	1.021 (0.13)
Operation in the regulated industries ( <i>REGIND</i> )	1.465 ** (2.07)	1.478 ** (2.14)	1.609 *** (2.59)	1.501 * (1.94)	1.707 *** (3.01)	1.790 *** (3.46)	1.807 *** (3.58)	1.767 *** (2.65)	1.525 ** (2.11)
N	477	510	508	508	503	496	496	408	173
Log likelihood	-349.14	-382.56	-375.75	-376.3	-373.59	-366.47	-365.88	-277.32	-120.70
Wald test ( $\chi^2$ )	162.69 ***	407.91 ***	505.65 ***	307.58 ***	170.48 ***	165.40 ***	154.50 ***	96.11 ***	96.40 ***

(Continued)

## (b) Independent firms

Model	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]
Ownership of commercial banks ( <i>OWNBAN</i> )	0.651 *** (-5.81)								
Number of board directors ( <i>BOAMEM</i> )		1.116 (1.35)							
Number of outsider directors ( <i>OUTDIR</i> )			1.072 * (1.67)						
Number of insider directors ( <i>INSDIR</i> )				0.932 (-1.07)					
Number of audit committee members ( <i>AUDMEM</i> )					1.055 ** (2.21)				
Number of outsider auditors ( <i>OUTAUD</i> )						1.001 (0.01)			
Number of insider auditors ( <i>INSAUD</i> )							1.073 *** (3.49)		
First principal component score ( <i>HUMSCO</i> )								0.946 (-0.27)	
Number of collective executive board members ( <i>COLMEM</i> )									1.186 ** (1.97)
Open joint-stock companies ( <i>OPECOM</i> )	1.289 (0.74)	1.187 (0.47)	1.076 (0.24)	1.031 (0.12)	1.373 (0.77)	1.345 (0.75)	1.347 (0.75)	1.318 (0.82)	1.896 (0.49)
Spin-off firms ( <i>SPIOFF</i> )	2.391 *** (4.00)	2.477 *** (3.59)	2.518 *** (3.84)	2.492 *** (3.83)	2.406 *** (3.48)	2.355 *** (3.33)	2.416 *** (3.36)	2.598 *** (4.26)	4.923 * (1.82)
<i>de novo</i> private companies ( <i>DENOVO</i> )	0.560 (-0.77)	0.570 (-0.78)	0.254 (-1.49)	0.231 (-1.58)	0.654 (-0.53)	0.624 (-0.60)	0.668 (-0.50)	0.324 (-1.24)	0.591 *** (-5.18)
Company size ( <i>COMSIZ</i> )	0.687 * (-1.69)	0.545 ** (-2.39)	0.566 ** (-2.07)	0.603 * (-1.94)	0.661 * (-1.90)	0.657 ** (-2.05)	0.653 * (-1.95)	0.658 (-1.59)	0.550 (-1.28)
Business diversification ( <i>BUSLIN</i> )	0.863 (-1.57)	0.866 (-1.50)	0.864 * (-1.73)	0.862 * (-1.75)	0.753 ** (-2.31)	0.764 * (-1.95)	0.769 * (-1.90)	0.810 (-1.33)	0.817 (-1.17)
Business internationalization ( <i>EXPSHA</i> )	0.638 ** (-2.24)	0.660 * (-1.89)	0.656 * (-1.89)	0.659 * (-1.90)	0.651 ** (-2.05)	0.659 ** (-2.05)	0.663 ** (-1.98)	0.678 * (-1.85)	0.470 (-0.79)
R&D expenditure intensity ( <i>R&amp;DEXP</i> )	0.856 (-1.21)	0.821 (-1.39)	0.814 (-1.42)	0.799 (-1.56)	0.800 (-1.48)	0.822 (-1.36)	0.813 (-1.42)	0.895 (-0.72)	0.483 (-1.16)
Profitability ( <i>PROAVE</i> )	0.338 ** (-2.55)	0.371 ** (-2.25)	0.477 * (-1.89)	0.489 * (-1.66)	0.352 ** (-2.33)	0.385 ** (-2.10)	0.362 ** (-2.12)	0.472 ** (-2.38)	0.229 (-1.60)
Proportion of arrears ( <i>ARREAR</i> )	1.130 (1.24)	1.135 (1.34)	1.160 ** (1.97)	1.165 ** (2.02)	1.091 (0.82)	1.106 (0.93)	1.109 (0.96)	1.170 (1.62)	0.620 * (-1.74)
Fund procurement from the capital market ( <i>MARFIN</i> )	1.150 (0.14)	2.305 (0.96)	2.406 (1.10)	2.395 (1.08)	2.250 (0.98)	2.302 (0.93)	2.493 (1.02)	1.205 (0.17)	1.593 *** (-3.08)
Use of bank credits ( <i>BANCRE</i> )	1.052 (0.58)	1.027 (0.31)	1.039 (0.44)	1.040 (0.42)	1.019 (0.24)	1.021 (0.25)	1.030 (0.34)	1.127 (1.23)	0.900 (-0.32)
Operation in the regulated industries ( <i>REGIND</i> )	0.852 (-0.19)	1.146 (0.27)	1.331 (0.62)	1.371 (0.69)	1.100 (0.19)	1.218 (0.45)	1.250 (0.51)	1.103 (0.14)	1.282 (0.28)
N	321	346	344	344	339	324	334	282	99
Log likelihood	-184.79	-192.74	-187.10	-187.11	-192.93	-185.81	-187.02	-155.33	-30.499
Wald test ( $\chi^2$ )	783.66 ***	219.37 ***	363.72 ***	1104.68 ***	68.68 ***	122.78 ***	184.23 ***	307.94 ***	1392.22 ***

(Continued)

## (c) Group companies

Model	[19]	[20]	[21]	[22]	[23]	[24]	[25]	[26]	[27]
Ownership of commercial banks ( <i>OWNBAN</i> )	1.085 (0.26)								
Number of board directors ( <i>BOAMEM</i> )		0.756 ** (-2.56)							
Number of outsider directors ( <i>OUTDIR</i> )			0.780 *** (-3.68)						
Number of insider directors ( <i>INSDIR</i> )				1.068 (0.69)					
Number of audit committee members ( <i>AUDMEM</i> )					1.020 (0.20)				
Number of outsider auditors ( <i>OUTAUD</i> )						0.885 ** (-2.09)			
Number of insider auditors ( <i>INSAUD</i> )							1.177 *** (3.57)		
First principal component score ( <i>HUMSCO</i> )								0.739 (-1.03)	
Number of collective executive board members ( <i>COLMEM</i> )									1.007 (0.13)
Open joint-stock companies ( <i>OPECOM</i> )	0.910 (-0.65)	0.654 * (-1.75)	0.693 (-1.60)	0.707 (-1.21)	0.609 ** (-2.22)	0.610 ** (-2.24)	0.583 *** (-2.65)	0.600 ** (-2.42)	0.707 (-0.97)
Spin-off firms ( <i>SPIOFF</i> )	2.091 (1.33)	3.405 ** (2.42)	3.557 ** (2.25)	2.866 (1.61)	5.752 *** (3.49)	6.268 *** (3.23)	6.236 *** (3.03)	4.390 (1.58)	1.375 (0.38)
<i>de novo</i> private companies ( <i>DENOVO</i> )	1.031 (0.06)	1.372 (0.79)	1.515 (1.11)	1.440 (1.04)	1.698 * (1.69)	1.771 * (1.69)	1.923 * (1.88)	1.526 (0.61)	0.711 (-0.30)
Company size ( <i>COMSIZ</i> )	0.773 * (-1.83)	0.773 (-1.55)	0.797 (-1.28)	0.758 (-1.51)	0.788 (-1.17)	0.826 (-0.89)	0.806 (-0.92)	0.857 (-0.95)	0.860 (-1.17)
Business diversification ( <i>BUSLIN</i> )	1.019 (0.40)	1.077 (1.14)	1.104 * (1.71)	1.057 (0.81)	1.025 (0.35)	1.036 (0.49)	1.037 (0.50)	1.061 (0.58)	0.949 (-0.36)
Business internationalization ( <i>EXPSHA</i> )	0.887 (-0.60)	1.001 (0.01)	1.030 (0.20)	1.011 (0.09)	1.029 (0.20)	1.034 (0.21)	1.032 (0.21)	0.889 (-0.40)	0.959 (-0.20)
R&D expenditure intensity ( <i>R&amp;DEXP</i> )	0.876 (-0.52)	0.919 (-0.56)	0.810 (-1.51)	0.788 (-1.64)	0.830 (-1.46)	0.823 (-1.42)	0.856 (-1.20)	0.895 (-0.39)	0.726 (-1.14)
Profitability ( <i>PROAVE</i> )	0.679 (-0.74)	0.916 (-0.18)	0.638 (-0.83)	0.662 (-1.00)	0.832 (-0.31)	0.834 (-0.28)	0.834 (-0.28)	1.007 (0.02)	1.080 (0.18)
Proportion of arrears ( <i>ARREAR</i> )	1.110 * (1.64)	1.097 (0.96)	1.144 (1.33)	1.058 (0.48)	1.160 (1.39)	1.191 (1.62)	1.198 (1.47)	1.224 ** (2.09)	1.374 ** (4.26)
Fund procurement from the capital market ( <i>MARFIN</i> )	1.934 * (1.84)	4.517 *** (3.03)	5.153 *** (3.04)	3.054 ** (2.08)	3.308 ** (2.33)	3.577 *** (2.69)	3.288 ** (2.29)	3.275 * (1.90)	2.249 (1.31)
Use of bank credits ( <i>BANCRE</i> )	0.931 (-0.40)	1.066 (0.35)	0.997 (-0.01)	1.020 (0.12)	1.017 (0.12)	0.996 (-0.03)	1.011 (0.07)	1.009 (0.03)	0.995 (-0.03)
Operation in the regulated industries ( <i>REGIND</i> )	2.318 * (1.77)	2.372 ** (2.01)	2.575 ** (2.53)	1.923 (1.34)	2.844 ** (2.18)	3.160 ** (2.29)	2.962 ** (2.11)	3.438 ** (2.19)	1.346 (0.52)
N	156	164	164	164	164	162	162	126	74
Log likelihood	-118.47	-136.44	-135.91	-139.06	-129.51	-128.87	-128.56	-83.34	-66.75
Wald test ( $\chi^2$ )	147.84 ***	947.91 ***	149.72 ***	208.73 ***	117.99 ***	191.33 ***	93.40 ***	909.24 ***	822.78 ***

*Note*: This table contains the results from the survival analysis using the Cox proportional hazard model. See Subsection 4.1 for more details about the survival analysis and the Cox model. The samples are Russian joint-stock companies that participated in a Japan-Russia joint enterprise survey conducted in 2005 whose survival status was confirmed in the course of the follow-up survey carried out in 2009. Models [12], [24], and [36] limit the observations to those for companies with a collective executive organ. The reported coefficient is a hazard ratio. Table 4 provides the detailed definitions and descriptive statistics of the independent variables. Standard errors are computed using the Huber-White sandwich estimator with clustering of the sample by industry.  $z$  statistics is reported in parentheses beneath the regression coefficients. The Wald test tests the null hypothesis that all coefficients are zero. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 7.** Effect of the governance bodies' influence over corporate management

(a) All firms

Model	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Influence of the general shareholders' meeting ( <i>INFGSM</i> )	1.334 * (1.92)						
Influence of the chairman of the board of directors ( <i>INFCHA</i> )		0.771 (-0.89)					
Influence of the board of directors ( <i>INFBOA</i> )			0.681 ** (-2.25)				
Influence of the audit committee ( <i>INFAUD</i> )				0.665 ** (-2.10)			
Influence of the audit firm ( <i>INFAUF</i> )					0.617 *** (-4.05)		
First principal component score ( <i>INFSCO</i> )						0.855 *** (-3.94)	
Influence of the collective executive board ( <i>INFCOL</i> )							0.989 (-0.04)
Affiliation with a business group ( <i>GROFIR</i> )	1.776 *** (3.12)	2.028 *** (3.22)	1.942 *** (2.92)	1.942 *** (3.14)	2.082 *** (3.21)	2.084 *** (3.13)	2.660 ** (2.14)
Open joint-stock companies ( <i>OPECOM</i> )	1.007 (0.03)	1.023 (0.10)	1.013 (0.06)	0.946 (-0.20)	0.990 (-0.04)	0.921 (-0.34)	1.148 (0.49)
Spin-off firms ( <i>SPIOFF</i> )	2.000 ** (1.97)	2.165 *** (2.64)	2.198 *** (2.96)	2.407 *** (3.59)	2.173 *** (3.51)	2.315 *** (3.81)	1.359 (0.41)
<i>de novo</i> private companies ( <i>DENOVO</i> )	0.773 (-1.11)	0.641 * (-1.78)	0.645 * (-1.68)	0.806 (-0.80)	0.750 (-1.51)	0.674 ** (-1.96)	0.305 (-0.92)
Company size ( <i>COMSIZ</i> )	0.726 *** (-2.73)	0.733 *** (-3.28)	0.752 ** (-2.44)	0.759 *** (-2.74)	0.729 *** (-2.88)	0.735 *** (-3.10)	0.738 *** (-2.77)
Business diversification ( <i>BUSLIN</i> )	0.956 (-1.03)	0.970 (-0.65)	0.968 (-0.70)	0.969 (-0.74)	0.969 (-0.74)	0.982 (-0.43)	0.924 (-0.71)
Business internationalization ( <i>EXPSHA</i> )	0.860 (-0.94)	0.887 (-0.84)	0.848 (-1.02)	0.876 (-0.83)	0.887 (-0.76)	0.902 (-0.66)	0.807 (-1.21)
R&D expenditure intensity ( <i>R&amp;DEXP</i> )	0.790 * (-1.93)	0.768 *** (-2.59)	0.776 *** (-2.59)	0.756 ** (-2.45)	0.746 *** (-3.09)	0.719 *** (-3.23)	0.641 *** (-3.03)
Profitability ( <i>PROAVE</i> )	0.496 * (-1.68)	0.558 (-1.60)	0.536 * (-1.67)	0.427 * (-1.82)	0.443 ** (-2.16)	0.475 ** (-1.99)	1.002 (0.00)
Proportion of arrears ( <i>ARREAR</i> )	1.105 * (1.67)	1.075 (1.11)	1.089 (1.29)	1.067 (0.94)	1.094 (1.51)	1.071 (1.16)	1.096 (0.84)
Fund procurement from the capital market ( <i>MARFIN</i> )	2.837 *** (3.01)	2.889 *** (3.00)	2.981 *** (3.06)	3.339 *** (3.34)	2.877 *** (2.99)	3.379 *** (3.46)	1.973 * (1.77)
Use of bank credits ( <i>BANCRE</i> )	0.967 (-0.41)	0.987 (-0.19)	0.999 (-0.02)	0.983 (-0.27)	0.974 (-0.41)	1.006 (0.10)	1.027 (0.18)
Operation in the regulated industries ( <i>REGIND</i> )	1.530 ** (2.40)	1.500 ** (2.11)	1.625 ** (2.26)	1.320 * (1.70)	1.374 * (1.78)	1.288 (1.46)	1.589 ** (2.50)
N	531	504	521	510	513	477	169
Log likelihood	-413.60	-381.04	-393.36	-385.17	-402.35	-364.08	-121.24
Wald test ( $\chi^2$ )	275.09 ***	181.89 ***	300.69 ***	418.99 ***	818.49 ***	278.74 ***	142.51 ***

(Continued)

## (b) Independent firms

Model	[8]	[9]	[10]	[11]	[12]	[13]	[14]
Influence of the general shareholders' meeting ( <i>INFGSM</i> )	1.278 * (1.83)						
Influence of the chairman of the board of directors ( <i>INFCHA</i> )		0.800 (-0.56)					
Influence of the board of directors ( <i>INFBOA</i> )			0.603 ** (-2.07)				
Influence of the audit committee ( <i>INFAUD</i> )				0.570 *** (-2.96)			
Influence of the audit firm ( <i>INFAUF</i> )					0.716 (-1.23)		
First principal component score ( <i>INFSCO</i> )						0.857 * (-1.68)	
Influence of the collective executive board ( <i>INFCOL</i> )							1.405 (0.84)
Open joint-stock companies ( <i>OPECOM</i> )	1.144 (0.36)	1.326 (0.77)	1.331 (0.94)	1.172 (0.45)	1.078 (0.21)	1.133 (0.34)	2.232 (0.72)
Spin-off firms ( <i>SPIOFF</i> )	1.704 * (1.89)	1.908 ** (2.47)	2.213 *** (2.78)	2.084 *** (2.93)	1.518 * (1.82)	1.730 ** (2.30)	9.403 * (1.87)
<i>de novo</i> private companies ( <i>DENOVO</i> )	0.483 (-0.98)	0.141 *** (-6.99)	0.138 *** (-7.97)	0.375 (-0.80)	0.482 (-0.98)	0.148 *** (-7.05)	0.130 *** (-4.52)
Company size ( <i>COMSIZ</i> )	0.666 * (-1.81)	0.689 * (-1.65)	0.737 (-1.26)	0.721 ** (-2.03)	0.652 ** (-2.01)	0.683 * (-1.87)	0.736 (-1.29)
Business diversification ( <i>BUSLIN</i> )	0.850 * (-1.82)	0.895 (-1.50)	0.888 (-1.48)	0.872 (-1.50)	0.863 ** (-2.00)	0.898 (-1.49)	0.726 (-1.15)
Business internationalization ( <i>EXPSHA</i> )	0.615 ** (-2.49)	0.654 ** (-2.36)	0.607 ** (-2.54)	0.654 *** (-2.70)	0.665 ** (-2.25)	0.703 ** (-2.03)	0.519 (-0.72)
R&D expenditure intensity ( <i>R&amp;DEXP</i> )	0.806 * (-1.66)	0.781 (-1.30)	0.771 (-1.46)	0.753 ** (-2.31)	0.724 ** (-2.45)	0.723 ** (-2.48)	0.473 (-1.47)
Profitability ( <i>PROAVE</i> )	0.289 *** (-2.98)	0.401 ** (-2.26)	0.414 ** (-2.40)	0.238 *** (-3.70)	0.244 *** (-3.78)	0.325 *** (-3.27)	0.323 (-1.44)
Proportion of arrears ( <i>ARREAR</i> )	1.093 (0.95)	1.105 (1.08)	1.134 (1.48)	1.027 (0.26)	1.074 (0.81)	1.085 (1.00)	0.520 (-1.58)
Fund procurement from the capital market ( <i>MARFIN</i> )	1.942 (0.87)	2.177 (1.03)	1.845 (0.69)	2.293 (1.03)	1.823 (0.69)	2.162 (0.97)	0.099 *** (-4.51)
Use of bank credits ( <i>BANCRE</i> )	0.996 (-0.06)	1.003 (0.03)	1.021 (0.25)	0.999 (-0.01)	0.984 (-0.28)	1.016 (0.18)	0.868 (-0.52)
Operation in the regulated industries ( <i>REGIND</i> )	1.154 (0.31)	1.374 (0.65)	1.487 (0.81)	0.758 (-0.53)	0.781 (-0.56)	0.926 (-0.18)	0.712 (-0.42)
N	352	336	348	339	340	316	95
Log likelihood	-204.80	-181.31	-189.49	-186.09	-196.84	-173.26	-31.35
Wald test ( $\chi^2$ )	53.17 ***	984.76 ***	756.91 ***	56.20 ***	72.39 ***	7214.46 ***	1014.51 ***

(Continued)

## (c) Group companies

Model	[15]	[16]	[17]	[18]	[19]	[20]	[21]
Influence of the general shareholders' meeting ( <i>INFGSM</i> )	1.528 * (1.74)						
Influence of the chairman of the board of directors ( <i>INFCHA</i> )		0.710 (-1.20)					
Influence of the board of directors ( <i>INFBOA</i> )			0.845 (-0.47)				
Influence of the audit committee ( <i>INFAUD</i> )				0.763 (-0.77)			
Influence of the audit firm ( <i>INFAUF</i> )					0.451 ** (-2.18)		
First principal component score ( <i>INFSCO</i> )						0.840 (-1.10)	
Influence of the collective executive board ( <i>INFCOL</i> )							0.829 (-0.40)
Open joint-stock companies ( <i>OPECOM</i> )	0.793 (-1.04)	0.772 (-1.05)	0.792 (-1.04)	0.695 * (-1.70)	0.775 (-0.84)	0.685 (-1.56)	0.672 * (-1.73)
Spin-off firms ( <i>SPIOFF</i> )	2.713 * (1.78)	2.956 ** (2.00)	2.663 * (1.65)	3.508 *** (2.89)	3.553 *** (4.14)	3.709 *** (2.98)	1.291 (0.28)
<i>de novo</i> private companies ( <i>DENOVO</i> )	1.156 (0.35)	1.289 (0.81)	1.357 (0.91)	1.307 (1.08)	1.097 (0.43)	1.330 (1.25)	0.728 (-0.28)
Company size ( <i>COMSIZ</i> )	0.732 * (-1.77)	0.732 ** (-1.97)	0.734 * (-1.78)	0.766 (-1.35)	0.759 (-1.50)	0.745 (-1.51)	0.846 (-1.05)
Business diversification ( <i>BUSLIN</i> )	1.037 (0.57)	1.041 (0.51)	1.048 (0.63)	1.047 (0.68)	1.027 (0.42)	1.048 (0.63)	0.950 (-0.39)
Business internationalization ( <i>EXPSHA</i> )	1.020 (0.13)	1.020 (0.17)	1.021 (0.16)	1.043 (0.31)	1.077 (0.66)	1.053 (0.43)	0.962 (-0.19)
R&D expenditure intensity ( <i>R&amp;DEXP</i> )	0.780 (-1.53)	0.795 * (-1.86)	0.772 * (-1.81)	0.738 ** (-1.97)	0.759 ** (-2.18)	0.724 *** (-2.69)	0.722 (-1.15)
Profitability ( <i>PROAVE</i> )	0.746 (-0.51)	0.674 (-0.92)	0.612 (-0.97)	0.564 (-0.89)	0.621 (-1.03)	0.551 (-1.09)	1.154 (0.30)
Proportion of arrears ( <i>ARREAR</i> )	1.134 (1.53)	1.081 (0.90)	1.070 (0.83)	1.129 (1.47)	1.146 (1.54)	1.105 (1.07)	1.372 *** (4.68)
Fund procurement from the capital market ( <i>MARFIN</i> )	2.969 ** (2.35)	2.816 ** (2.14)	3.138 ** (2.27)	3.298 ** (2.46)	2.901 ** (2.10)	3.575 ** (2.21)	2.119 (1.27)
Use of bank credits ( <i>BANCRE</i> )	0.957 (-0.43)	0.993 (-0.05)	1.010 (0.10)	0.952 (-0.45)	0.963 (-0.35)	0.974 (-0.22)	0.998 (-0.01)
Operation in the regulated industries ( <i>REGIND</i> )	1.924 * (1.83)	1.873 (1.41)	1.887 (1.12)	1.946 * (1.68)	1.989 * (1.94)	1.761 (1.17)	1.468 (0.62)
N	179	168	173	171	173	161	74
Log likelihood	-155.05	-148.57	-150.29	-147.55	-150.94	-140.7	-66.67
Wald test ( $\chi^2$ )	192.76 ***	182.09 ***	472.03 ***	1586.29 ***	1116.30 ***	121.86 ***	10.02

Note: This table contains the results from the survival analysis using the Cox proportional hazard model. See Subsection 4.1 for more details about the survival analysis and the Cox model. The samples are Russian joint-stock companies that participated in a Japan-Russia joint enterprise survey conducted in 2005 whose survival status was confirmed in the course of the follow-up survey carried out in 2009. Models [7], [14], and [21] limit the observations to those for companies with a collective executive organ. The reported coefficient is a hazard ratio. Table 4 provides the detailed definitions and descriptive statistics of the independent variables. Standard errors are computed using the Huber-White sandwich estimator with clustering of the sample by industry.  $z$  statistics is reported in parentheses beneath the regression coefficients. The Wald test tests the null hypothesis that all coefficients are zero. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 8.** Summary of estimation results

Variable	Effect on firm survival		
	All firms	Independent firms	Group companies
(A) Effect of the independence of the governance bodies			
Outside shareholding ( <i>OWNOUT</i> )			
Outsideness of board chairman ( <i>BOALEA</i> )			
Proportion of outsider directors ( <i>BOACOM</i> )		(-)	++
Proportion of outsider auditors ( <i>AUDCOM</i> )	++	++	+++
Audit firm attribute ( <i>AUDFIR</i> )			
First principal component score ( <i>INDSCO</i> )	(+)		+++
(B) Effect of the abundance of human resources available to the governance bodies			
Ownership of commercial banks ( <i>OWNBAN</i> )		+++	
Number of board directors ( <i>BOAMEM</i> )			++
Number of outsider directors ( <i>OUTDIR</i> )	+++	(-)	+++
Number of insider directors ( <i>INSDIR</i> )			
Number of audit committee members ( <i>AUDMEM</i> )		--	
Number of outsider auditors ( <i>OUTAUD</i> )			++
Number of insider auditors ( <i>INSAUD</i> )	---	---	---
First principal component score ( <i>HUMSCO</i> )			
(C) Effect of the governance bodies' influence over corporate management			
Influence of the general shareholders' meeting ( <i>INFGSM</i> )	-	-	(-)
Influence of the chairman of the board of directors ( <i>INFCHA</i> )			
Influence of the board of directors ( <i>INFBOA</i> )	++	++	
Influence of the audit committee ( <i>INFAUD</i> )	++	+++	
Influence of the audit firm ( <i>INFAUF</i> )	+++		++
First principal component score ( <i>INFSCO</i> )	+++	(+)	

*Note*: +++, ++, and + denote a positive effect on firm survival with statistical significance at the 1%, 5%, and 10% level, respectively. ---, --, and - denote a negative effect with statistical significance at the 1%, 5%, and 10% level, respectively. The absence of a sign denotes no statistically significant effect at the 10% or lower level. The sign in parentheses indicates that the statistical significance of the concerned variable may fall into the higher than 10% level in more than 20% of the cases of simultaneous estimation of other variable(s) listed in this table for the robustness check.

**Appendix.** Principal component analysis of the independence of governance bodies, their human resource abundance, and influence over corporate management

(a) Variables for the independence of governance bodies

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	Component loading
1	2.226	44.52	44.52	Ownership share of outside shareholders ( <i>OWNOUT</i> )	0.464	0.693
2	0.967	19.33	63.86	Outsidiness of the chairman of the board of directors ( <i>BOALEA</i> )	0.307	0.458
3	0.784	15.69	79.54	Proportion of outsider directors ( <i>BOACOM</i> )	0.549	0.819
4	0.605	12.10	91.64	Proportion of outsider auditors ( <i>AUDCOM</i> )	0.459	0.685
5	0.418	8.36	100.00	Audit firm attribute ( <i>AUDFIR</i> )	0.423	0.631

(b) Variables for the abundance of human resources available to the governance bodies

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	Component loading
1	2.263	45.27	45.27	Ownership share of commercial banks ( <i>OWNBAN</i> )	0.162	0.243
2	0.990	19.80	65.07	Total members of the board of directors ( <i>BOAMEM</i> )	0.478	0.719
3	0.870	17.40	82.47	Total number of outsider directors ( <i>OUTDIR</i> )	0.542	0.815
4	0.574	11.48	93.95	Total members of the audit committee ( <i>AUDMEM</i> )	0.416	0.626
5	0.302	6.05	100.00	Total number of outsider auditors ( <i>OUTAUD</i> )	0.528	0.794

(c) Variables for the governance bodies' influence over corporate management

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	Component loading
1	1.619	32.38	32.38	Influence of the general shareholders' meeting ( <i>INFGSM</i> )	0.498	0.634
2	1.519	30.38	62.76	Influence of the chairman of the board of directors ( <i>INFCHA</i> )	0.209	0.266
3	0.893	17.87	80.63	Influence of the board of directors ( <i>INFBOA</i> )	0.179	0.228
4	0.529	10.57	91.20	Influence of the audit committee ( <i>INFAUD</i> )	0.608	0.773
5	0.440	8.80	100.00	Influence of the audit firm ( <i>INFAUF</i> )	0.554	0.705

*Note:* This table reports the estimation results of the principal component analysis conducted to produce the first principal component score of the independence of governance bodies, their human resource abundance, and influence over corporate management of Russian industrial firms. The estimated component scores are used in the survival analysis as independent variables. The total number of insider directors (*INSDIR*) and insider auditors (*INSAUD*) is not used to produce the first principal component score of the human resource abundance available to governance bodies because the distribution of these two variables negatively correspond by 100% with that of *OUTDIR* and *OUTAUD*, respectively. The samples are Russian joint-stock companies that participated in a Japan-Russia joint enterprise survey conducted in 2005 whose survival status was confirmed in the course of the follow-up survey carried out in 2009. Table 4 provides the detailed definitions and descriptive statistics of the variables used for estimation.