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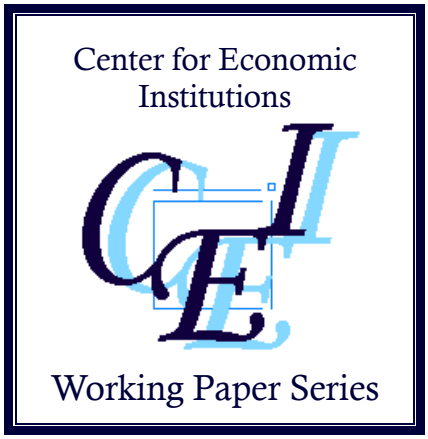

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Legal forms, organizational architecture, and firm failure: A large survival analysis of Russian corporations*

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Abstract: In this paper, we trace the survival status of more than 110,000 Russian firms from 2007–2015 and examine the relationship between legal forms of incorporation and firm survivability across industries and different periods of economic crisis and growth. Applying the Cox proportional hazards model, we find an optimal legal form that maximizes the probability of firm survival: closed joint-stock companies and those adopting limited liability survive longer than open joint-stock companies, partnerships, or cooperatives. This relationship is robust across periods of boom and recession and across industries.

Keywords: Firm failure; legal form; Cox proportional hazards model; Russia
JEL Classifications: D22, G01, G33, G34, P34

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1 Introduction

Why do firms survive or fail? This question is central to understanding a country's growth as well as firm dynamics. There is now a large body of literature on this topic as a whole. Studies have found that differences in ownership and corporate governance account for firm performance (Mata and Portugal, 1994; Claessens et al., 2000; Mitton, 2002; Anderson and Reeb, 2003; Commander and Svejnar, 2011). More specifically, outsider ownership that includes foreigners and an independent board of directors are typical characteristics of surviving firms. Firm size and age also matter for firm survival. Large firms are less likely to fail, whereas the effect of firm age is nonlinear (Dunne and Hughes, 1994; Mata and Portugal, 1994; Audretsch and Mahmood, 1995; Agarwal and Gort, 2002). There is also evidence that the orientation of firms affects their survival. Firms oriented toward innovation, export, and diversification survive longer than those that are not (Audretsch, 1991; Commander and Svejnar, 2011). Finally, a number of works looked at factors affecting the exit of firms during economic crisis. Using data from Indonesia, Korea, Malaysia, the Philippines, and Thailand during the East Asian financial crisis of 1997–1998, Mitton (2002) found that firms whose activities were concentrated rather than diversified performed better in terms of stock market price. Heavy exposure to bank lending and affiliation with conglomerates are positively associated with failure during the crisis period (Baek et al., 2004; Boeri et al., 2013). It was also found that companies with boards independent of owners or managers and institutional ownership suffered less from economic shocks (Kang et al., 2010; Erkens et al., 2012; Francis et al., 2012).

Despite much attention to firm survival in the areas indicated above, there is only a limited number of studies on the relationship between legal forms of incorporation and firm survival. Moreover, the results from the extant literature are mixed. For example, Harhoff et al. (1998) found that limited liability as a legal form is positively correlated with firm exit, while Mata and Portugal (1994) and Esteve-Perez and Mañez-Castillejo (2008) argued that firms adopting unlimited liability experience more bankruptcies. Given the possibility that knowledge of this issue contributes to firm growth and survival, this is an important research deficiency.

Why do legal forms influence the probability of firm survival? The reasons might

include that legal forms are associated with the growth of firms, stability in ownership, and corporate governance. Various types of legal forms are closely related to whether company shares can be traded and if firm liability is confined to the amount of investment. For example, joint-stock companies allow their shares to be traded freely, and shareholders' liabilities are limited to the amount of their respective investments.[1] Such flexibility and limited liability contribute to attracting capital more widely and, thus, growth. However, it can undermine the stability of ownership, especially when ownership is not concentrated. By contrast, members of firms whose legal structures are partnerships or cooperatives are less free in transferring their ownership and are responsible for firm debts beyond their respective contribution amounts. These characteristics help keep ownership of the firm stable, but firm growth can be undermined by the limited possibility for inviting investment. In addition to the above-mentioned issues, the mechanisms for monitoring and disciplining CEOs may be different depending on which legal form a firm adopts. Joint-stock companies rely heavily on capital markets to monitor and discipline CEOs, while partnerships or cooperatives are based on peer review and monitoring by banks. This may exert a different influence on the probability of firm survival.

Investigating the determinants of firm growth and survival is a challenging task because a number of factors potentially affect them. Previous works have found that such factors include not only firm-specific ones but also environmental ones, such as institutions and macroeconomic conditions, respectively. Unless such confounding factors are controlled, it is difficult to claim that the results are robust. This is one reason why findings on firm growth and survival are not always consistent.

This paper investigates the relationship between a firm's legal form and its survival using survey data of more than 110,000 Russian firms. The data span from 2007–2015 and cover all industries. As discussed as above, we focus on one of the mechanisms by which firms' legal forms affect their survival: balance between stability and flexibility of ownership. To ensure the exogeneity of legal forms, we control confounding factors such as ownership structure (federal state ownership, regional state ownership, foreign

[1] In Russia, there are two types of joint-stock companies: open and closed. We discuss their differences in Section 3.

ownership, large shareholding), corporate governance, firm performance, and other firm characteristics.

The analysis of a single country, such as Russia, provides an advantage in that differences in institutional settings across regions within a country are not as large as those across countries. Hence, a study looking at one country can relatively easily account for confounding factors originating from heterogeneous institutional settings. Moreover, the effect of business cycles on firm survival can be controlled by using data from various years and further by dividing the period of investigation into sub-periods of boom and recession. In this aspect, Russia is an interesting case, in that it experienced both boom and severe recession in the period above.

We found that the legal status of a firm is significantly associated with firm survival. In more detail, there is a nonlinear effect of legal forms on firm survival. Closed legal forms generally increase the probability of firm survival to a certain point. However, the probability decreases if legal forms are too closed. In this regard, both closed joint-stock companies and those adopting limited liability survive longer than open joint-stock companies, whose legal forms are more open than the former. At the same time, the survival probabilities of firms whose legal forms are partnerships or cooperatives are lower than those of closed joint-stock and limited liability companies. This relationship between legal form and firm survival is robust across periods of boom and recession and across industries.

This paper is laid out as follows: Section 2 reviews the relevant literature. Section 3 explains the different legal forms of Russian firms and their implications for firm survival. In Section 4, the data and the methodology used in this paper are explained. Section 5 reports the survival status of Russian firms. Section 6 provides results from the firm survival analysis. In this analysis, we not only discuss factors associated with firm survival from 2007–2015 as a whole but also compare those in different periods. The last section summarizes our main findings.

2 Literature Review

What determines firm survival has been frequently debated by economists. An economic

crisis is an especially good test field for understanding why firms fail or survive. From such exercises, it has been found that ownership and disclosure quality are main determinants of firm survival and performance. For instance, using the Korean financial crisis of the 1990s, Baek et al. (2004) found that unaffiliated foreign ownership improved survival probability, while firms with concentrated ownership, particularly by Korean conglomerates (*Chaebols*), undermined it. Furthermore, high disclosure quality and an alternative source of external financing reduced the exit rate of firms from markets, while excessive voting rights of controlling shareholders beyond cash flow rights and those firms that borrowed more from the main banks were more likely to exit. These results are in line with the outcome of previous research, such as that of Kang et al. (2010), Lemmon and Lins (2003), and Mitton (2002). In more detail, Kang et al. (2010) discovered that the differences between cash flow rights and control rights of controlling shareholders, especially for *Chaebol* firms in Korea, decreased the confidence of investors; however, equity ownership by unaffiliated financial institutions can mitigate such risks. The findings of Lemmon and Lins (2003), from the analysis of 800 firms in eight East Asian countries, also support the negative effect of separating control rights from cash flow rights: such a separation reduces firms' stock returns by 10–20%. Mitton (2002) analyzed firms from five Asian countries and found that higher outside ownership concentration and disclosure quality were positively associated with stock prices.

Details of corporate governance, such as board independence, are also found to determine firm success or failure during a crisis. Using data from 25 emerging markets affected by the Asian financial crisis of 1997–1998, Johnson et al. (2000) concluded that weak corporate governance, in the form of the expropriation of minority shareholders by managers, led to lower asset prices. Along this line, Francis et al. (2012) found that firm-level differences, particularly related to the corporate board, significantly determined firm performance. More specifically, outside directors less connected with current CEOs and the frequency of board meeting are positively associated with firm performance. This finding also applies to financial firms (Yeh et al., 2011; Erkens et al., 2012). Erkens et al. (2012) confirmed that the stock returns of financial firms with boards that were more independent increased during the 2007–2008 financial crisis. Similarly, Yeh et al. (2011)

found that financial institutions with directors on auditing and risk committees that were more independent performed better during a crisis.

The activities of firms also play an important role in firm survival. Bridges and Guariglia (2008) studied UK firms from 1997–2002 to determine that higher leverage leads to a higher probability of failure; however, such an effect is more pronounced for domestic firms but somewhat mitigated for globally engaged firms. Guariglia et al. (2016) confirmed the earlier finding using UK data but for a different period; they maintained that an economic crisis tended to hit bank-dependent and non-exporting firms hard through higher interest rates. This channel of interest rates during a financial crisis was echoed by Boeri et al. (2013), who stated that firms that have borrowed more experience larger layoffs, and by Byrne et al. (2016), who emphasized that bank-dependent non-public firms end up with higher rates of failure due to increased uncertainty.

One might question whether findings of firm failures during a crisis can apply during normal periods. The number of works on firm failure during normal periods is sparser than that during economic crises. Nevertheless, some factors appear to significantly affect firm failure in both normal periods and recessions. Board composition is a prime example. Perry and Shivdasani (2005) found that firms with a majority of outside directors on the board are associated with more active restructuring and, thus, better ex-post performance. Moreover, Iwasaki (2014a) argued that not only board directors but also corporate auditors and audit firms with a high degree of independence from top management are able to reduce the exit risk by fulfilling an effective supervision function and preventing possible strategic deviation caused by the malpractice of top executives and/or their management. Having said that, Yermack (1996) and other follow-up studies claimed that the size of corporate governance bodies may have a nonlinear effect on firm performance. This suggests that company organs have an optimal size in terms of the efficiency of managerial discipline (Raheja, 2005).

The literature also suggests that firm size and age are good predictors of firm survival (Geroski, 1995; Buehler et al., 2006). Geroski (1995) summarized works on the entry of firms and concluded that firm size decreases the probability of firm failure. This is in line with the findings of Buehler et al. (2006) and Esteve-Pérez and Mañez-Castillejo (2008),

that firm size is negatively correlated with the hazard rate of firm exit. However, the above works differ somewhat in the effect they suggest of firm age on failure: Buehler et al. (2006) confirmed that age reduces firm failure, while Esteve-Pérez and Mañez-Castillejo (2008) found that the relationship between age and firm failure follows a "U" shape—initially high, but lower afterward, before becoming high again. Regarding firm size, some works found that the effect of firm size on failure differs across industries. For instance, Audretsch et al. (1999) found that the relationship between the size of start-up firms and firm failure is positive in nine of thirteen industries, but it turns out to be insignificant in all but three industries.

Despite the large volume of literature on the determinants of firm survival, only a small number of works address the relationship between legal firms of incorporation and firm survival. Using data of West German firms, Harhoff et al. (1998) found that limited liability firms tend to record higher insolvency rates as compared with those with unlimited liability. By contrast, Mata and Portugal (1994) and Esteve-Perez and Mañez-Castillejo (2008), utilizing data from Portugal and Spain, respectively, suggest that firms whose legal form adopts limited liability survive longer than those having unlimited liability. In a similar vein, Cheng et al. (2017) suggested that the probability of the non-routine turnover of CEOs is higher for publicly traded nonfamily stock firms than for firms whose stocks are not publicly traded.

Given the possibility of heterogeneity in the determinants of firm failure according to different economic environments, one can argue that robust findings should be derived not only from the period of the economic crisis but also from a normal period. Pooling results from various countries may ignore substantial differences in their industrial structures, business environments, and government policies. A better approach is to investigate cases of firm failure within a country and analyze the causes of failure by different periods and various industries. This also helps us to control for unobservable factors that are different across countries and, thus, to find robust results.

3 Legal Forms of Russian Firms

In Russia, during the observation period of 2007–2015, there were five major legal forms

of business entities: open joint-stock company (JSC) (*Открытое акционерное общество*, OAO), closed JSC (*Закрытое акционерное общество*, ZAO), limited liability company (*Общество с ограниченной ответственностью*, OOO), partnership, and cooperative.[2] Open JSCs allow shareholders to publicly trade shares without the permission of other shareholders. By contrast, closed JSCs are subject to the pre-emptive right of other shareholders in purchasing shares that a leaving shareholder wants to sell. There is no limit to the number of shareholders possible in open JSCs, while the number of shareholders should not exceed 50 in closed JSCs. In this way, open JSCs are better than closed JSCs at attracting capital in the stock market, while both legal forms allow shareholders to be responsible for the debt of the firm only to the limit of their investments.[3]

A participant in a limited liability company is not liable for the obligations of the business entity beyond the value of his or her contributions to it, which is the same as a shareholder in joint-stock company. Closed JSCs and limited liability companies share commonalities, in many respects, including the number of maximum shareholders or participants and the minimum amount of charter capital. A main difference between these two is that, in a limited liability company, each transfer of shares requires that such changes be registered in the charter and foundation agreement. Although the sale of the shares of closed JSCs should be registered with the Federal Securities Commission, the registration procedure is less cumbersome than a transfer of shares in a limited liability company. However, it is known that limited liability companies are associated less statuary regulations than closed JSCs.

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[2] See Iwasaki (2007a) for more details of the legal forms of Russian companies. In June 2015, as a result of an amendment of the Federal Law of Joint Stock Companies, the legal forms of open and closed joint-stock companies were replaced by public and private joint-stock companies (*публичное/непубличное общество*), respectively (Art. 7). The distinction between these new legal forms is, however, almost the same as that between open and closed JSCs; hence, many Russian business people and other practitioners still utilize the terms *open JSC* and *closed JSC* on a daily basis.

[3] In addition, there are statutory distinctions between these two types of corporate forms related to the required minimum capitalization, government funding, and disclosure obligations (Iwasaki, 2014b).

The survey results from Russian firms are in line with the observations discussed above. For instance, according to Iwasaki (2007b), 68.3% of the surveyed open JSC firms expressed that such a legal form contributes to building trust with partners and investors and to gaining access to external financing. By contrast, the main advantage of the closed JSC was viewed as stability in ownership, in more detail, protection against seizure of the firm and constraint on change in owner of shares. Limited liability companies are preferred by those who want to minimize statutory obligations.

In contrast to joint-stock and limited liability companies, partners in a partnership and participants in a cooperative generally have unlimited liability.[4] Moreover, a transfer of ownership is likely to be more difficult than in a limited liability company. In the case of a partnership, a majority of partnership agreements contain transfer restrictions. If a transfer of ownership results in a change of membership in the partnership, the partnership is dissolved by default. In a cooperative, the transfer of the share to a third party is allowed only with the consent of the cooperative, and other members have a pre-emptive right to purchase it.

The above discussion suggests a tradeoff between growth potential and stability in ownership. In terms of growth potential, an open JSC can be regarded as the best legal form, followed by a closed JSC and a limited liability company. By providing both an easy exit option and limited liability, an open JSC increases incentives for investment and, thus, is able to exploit growth potential to its full extent. However, a frequent transfer of shares may cause instability in ownership and management, which can negatively affect firm performance. By contrast, partnerships and cooperatives are at the opposite extreme. Adopting these legal forms, a business entity might be handicapped in attracting capital but has advantages of long-term stable ownership and management. These different legal forms can also affect corporate governance. In an open JSC, the monitoring of CEOs is conducted partially by capital markets, which is also an important instrument in disciplining them. In firms following less-open legal forms, the monitoring and

[4] In more detail, all partners in a general partnership are fully liable for the assets of their business entity. In a limited partnership, there should be at least one partner who has unlimited liability while other limited partners can be partially liable.

disciplining of CEOs rely on a more direct measure through close and repeated interactions between CEOs and members. The ownership of these firms might be stable during recessions, but the limited potential to attract investment can affect firm survival negatively. Hence, a question that can be raised is, which legal form of a firm is associated with appropriate corporate governance in the Russian context?

A concern can be raised regarding the exogeneity of legal forms because a potential entrepreneur is able to choose a legal form to maximize the survivability of her firm given the conditions she faces. However, in the Russian context, policies are the main reason for the choice of legal form, which is closely associated with the type of ownership. Iwasaki (2007b) found that the most important reason for choosing an open JSC legal form is that the policy for mass privatization in the early 1990s resulted in the transformation of former state-owned enterprises into open JSCs. This indicates that government policies, which can be regarded as more exogenous than individual choices, were the most important determinant in choosing between two forms of JSC. By contrast, foreigners who prefer the least amount bureaucratic burden tend to choose LLC. Hence, by controlling ownership (federal state, regional state, foreign ownership) in our regressions, the problem of endogeneity can be mitigated. In addition, our methodology, using predetermined values as independent variables, may further reduce the problem of endogeneity.

4 Data and Methodology

To examine the relationship between legal forms and firm survival, we constructed a large dataset of Russian companies from the Orbis database of Bureau van Dijk (BvD). Orbis is one of the largest company databases, covering more than 300 million companies worldwide. It contains a large sample of Russian listed and unlisted companies operating in various industries and provides information regarding their legal status that enables us to identify when and how a Russian company failed.[5] From this dataset, we sought out

[5] Given the form of the dataset, our definition of failure may entail not only bankruptcy but also exiting the market due to other reasons, such as mergers. Although we are not able to identify the reasons for exiting, statistics from other sources suggest that exiting the market because of

companies that satisfy the following three conditions: first, they were operating at the end of 2006; second, their survival status was traceable until the end of 2015; third, their legal form of incorporation could be identified. We found a total of 112,280 Russian companies that met these three conditions. According to the dataset, a majority of companies (65.7%) are limited liability companies, followed by closed JSCs (14.8%), open JSCs (10.8%), and cooperatives (2.5%). Partnerships account for less than 1%.[6]

In addition to survival status and legal form, we also collected from the Orbis database a series of firm-level profiles related to ownership structure, corporate governance, financial performance, linkage with the capital market, firm size, firm age, and business organization. We were able to extract all variables to be used in our empirical analysis from the Orbis database for 74,308 of the 112,280 firms. The variables we compiled from this dataset are displayed in **Table 1**. As this table shows, to empirically examine the relationship between the characteristics of the legal form and firm survivability, we employed two variables: the first one is a 4-point ordinal scale variable, which assigns a value of 3 to open JSCs, 2 to closed JSCs, 1 to limited liability companies, and 0 to companies with other legal forms. The second is a dummy variable that assigns a value of 1 to firms that adopt limited liabilities. The former is designed to examine the relationship between ownership transferability of legal form and firm survival. The latter is used to capture the effect of liability limitation on firm survival.

As indicated in **Table 1**, most Russian companies have a dominant and/or a block of shareholder(s). Although the absolute majority of firms are owned by domestic private investors and legal entities, some companies have a foreign investor(s) (0.9% of the total sample), the federal government (2.3%), and the regional government (3.7%) as their ultimate owners. In terms of management discretion, the average is 3.4, which is between C+ and B-, according to the BvD independence indicator. The average numbers of board directors and auditors are 1.50 and 0.47, respectively.[7] Financial features, linkage with

bankruptcy is the predominant cause.

[6] Other companies include limited/unlimited partnerships, production cooperatives, and unitary enterprises. Unitary enterprises refer to purely state-owned and municipally owned enterprises (Iwasaki, 2018).

[7] *Auditors* refers to members of the audit committee. The audit committee (*revizionnaya*

capital market, and characteristics of the business organization of the firms, including return on assets, gross margin, listing on the stock market, gearing, as well as number of subsidiaries and operating industries, are also presented in addition to firm size and age. On average, firms had been operating for 16.8 years.

In the empirical part of the paper, using the survival status information of the above 112,280 Russian firms, we first report the exit rate for all firms and those in different industries and legal forms in each year from 2007–2015. We also estimate the Nelson-Aalen cumulative hazard function and the Kaplan-Meier survivor function through the observation period, in addition to the exit rate for the entire period, and conduct a Chi-square test of independence using the exit rate and a log-rank test for equality of survivor functions to test the difference in firm survivability between industrial sectors and legal forms.

Second, to identify which factors strongly affected the survivability of Russian companies during the observation period, we perform a univariate comparative analysis and a multivariate survival analysis using the data of 74,308 Russian firms, the company profiles of which are complete in the dataset, as mentioned above.

Fundamentally, the survival analysis is designed to regress the probability of an event occurring in ex ante conditions (Iwasaki, 2014a). More specifically, the survival analysis in this paper aims to examine the impact of initial conditions in 2006 on the survivability of Russian firms during the period of 2007–2015. In theory, the main objective of this 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

komissiya, in Russian) is the statutory company body of corporate auditors. Unlike in the USA and many European countries, in Russia, the audit committee is not a board subcommittee comprised of members of the board of directors. In this sense, the audit committee in a Russian firm is rather closely related to the board of corporate auditors in Japan and the board of statutory auditors in Italy (Iwasaki, 2014c).

given Russian firm) within the next small time interval, is defined as:

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

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

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

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 hazards model assumes its form in the following way:

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

where $x_{i1}, x_{i2}, x_{i3,} \cdots, x_{in}$ are covariates associated with the *i*th observation; and $\beta_1, \beta_2, \beta_{3,} \cdots, \beta_n$ 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 semiparametric model. As compared to parametric models, the Cox model has an advantageous feature, namely, that regardless of how the survival time *T* is distributed, the results obtained from the estimation of the Cox model are robust.

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:

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

To deal with the right censoring that refers to firms that survived during the entire observation period, we adopted the Breslow's approximation. Every parameter estimate β to be reported in this paper is a 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, the

corresponding covariate is a preventive factor that inhibits the event from occurring.

As stated above, all of the independent variables in our survival analysis were strictly predetermined using the 2006 value, thus mitigating the endogeneity problem arising from simultaneity between dependent and independent variables (Iwasaki, 2014a). Furthermore, the estimation period of nine years is sufficiently long that the dependent variable observed on a yearly basis is, hence, a discretional variable (Baumöhl et al., 2019; 2020). On the basis of the above arguments, we suggest that our survival analysis is not plagued by endogeneity.[8]

5 Survival States of Russian Firms

According to our dataset described in the previous section, among 112,280 Russian firms, a total of 41,294 failed during the period of 2007–2015. The exit rate reaches 35.6%. The failure risk in Russia is much higher than the comparable figure in Central and Eastern Europe (CEE). In fact, in 15 CEE countries, of 96,877 companies registered in the Orbis database, 19,635 firms, or 20.3%, were forced to exit during the same period. Accordingly, the exit rate is 15.3 percentage points lower in the CEE region than in Russia.[9]

Figure 1 illustrates the number of failed firms and the exit rate by industry and legal form. As shown in Panel (a) of this figure, in 2007, only 462 Russian companies were plunged into financial distress and forced to exit the market. However, the number of bankrupt firms rose sharply after 2008 due to the global financial crisis. In fact, by 2012, the number of failed firms had increased to 6,357; as a result, the exit rate jumped from 0.004 in 2007 to 0.064 in 2012. Following a rather stable period in 2013 and 2014 in terms of firm failure, a remarkable surge occurred in 2015; the number of failed firms and the exit rate reached 9,204 and 0.115, respectively. This might have been associated with a drop in the price of oil as well as the effects of sanctions against Russia due to its invasion of Ukraine and annexation of Crimea.

[8] Despite this rationale, we acknowledge that we cannot completely rule out that a potential endogeneity issue, omitted-variable bias, as well as selection bias may occur from entrepreneurs' choices between alternative legal forms and their firms' survival probability.

[9] More detailed information concerning the 15 CEE countries is available upon request.

Panels (b) through (e) and Panels (g) through (i) of **Figure 1** show the dynamics of firm failure in different industrial sectors and legal forms, respectively. Here, we confirm that a similar pattern of company bankruptcy can be observed beyond the differences in industries and legal forms. As mentioned above concerning the entire Russian corporate sector, the exit rates in agriculture, forestry, and fishing; mining and manufacturing; construction; and service industries rose considerably from 0.004 to 0.095, 0.004 to 0.094, 0.003 to 0.139, and 0.004 to 0.119, respectively, from 2007–2015. The exit rates of open JSCs, closed JSCs, limited liability companies, and firms with other legal forms also recorded large increases in the same period—from 0.003 to 0.074, 0.002 to 0.097, 0.005 to 0.132, and 0.004 to 0.077, respectively.

Table 2 reports the Nelson-Aalen cumulative hazard function and the Kaplan-Meier survivor function for the entire observation period, in addition to the entire period's exit rate.[10] As a consequence of the above-mentioned synchronous increase of firm failure across industries and legal forms, the exit rate has a value between 0.328 and 0.413 across four industries and between 0.275 and 0.400 across four legal forms, while the Nelson-Aalen cumulative hazard function that adopts data subject to right censoring ranges between 0.385 and 0.510 across four industries and between 0.313 and 0.491 across four legal forms. Although the magnitude of business failure was large for every industry and legal form, both the Chi-square test for independence using the exit rate and the log-rank test for equality of survivor functions indicate that firm survivability is statistically different between industries and legal forms.

In sum, Russia was faced with a significant increase in firm failure during the periods affected by the global financial crisis and the Russian crisis; this tendency had common features across various industries and beyond the differences in legal forms. Nevertheless, a certain gap exists between them. Keeping these facts in mind, we conduct a univariate comparison and a multivariate survival analysis in the next section to identify factors that have strongly affected the survivability of Russian firms in recent years.

[10] **Appendix 1** provides a more detailed breakdown of firm survival status by industrial sector.

6 Empirical Analysis

We analyze the determinants of firm failure in the following order. First, we conduct a univariate comparison between surviving firms and failed firms using company profile variables. Second, we estimate a Cox proportional hazards model in a multivariate setting. At this stage, we start by estimating our baseline model based on all industries in the entire period. Subsequently, we look at heterogeneity in the determinants of firm failure across industries and across periods. Then, we conduct robustness checks of our main results using a set of industry-adjusted variables, taking account of geographical dissimilarities, and check whether our main results are altered when we change our assumption of the survival distribution.

6.1 Univariate Analysis

Table 3 reports the results of a univariate comparative analysis between surviving and failed firms utilizing the variables listed in **Table 1**.

The result using the variable of ownership transferability reveals that, on average, surviving firms enjoy greater transferability of ownership than failed firms do. In fact, both the *t* test and the Wilcoxon rank sum test reject the null hypothesis at the 1% significance level, and the correlation coefficient between the variable of ownership transferability and survival probability is positive and highly significant. These findings imply that the ownership transferability of the legal form is likely to be closely related to the survivability of Russian firms during the period of 2007–2015.

The comparison based on the variable of limitation of liability shows that the proportion of firms that adopt limited liability is slightly lower in survivors than in failures, and the difference between the two is statistically significant. The correlation coefficient of the variable with survival probability takes a significant and negative value as well. These results indicate the possibility that limiting liability hampers the ability of Russian firms to stay in the market.

With regard to variables related to ownership structure, corporate governance, financial performance, firm size and age, as well as business organization, our results are in keeping with the standard theory of the determinants of firm survival; surviving firms

are more likely than failed firms to have a large shareholder(s) and to be owned by foreign investors and/or the state as an ultimate owner. In addition, survivors are more likely than failures to contract with an audit firm for external audits and to have larger boards of directors and audit committees than those of failures. Furthermore, surviving firms tend to exceed their failed counterparts in terms of their financial performance, likelihood of being listed on the stock market, asset size, years of operation, and number of subsidiaries as the initial conditions. By contrast, results regarding the effect of managerial discretion, fund procurement from the outside, and business diversification on firm survivability appear not to line up with findings from the existing literature.

The above results, however, should be taken with caution because they do not control for any confounding factors. Thus, in the next subsection, we examine the determinants of firm survival in a multivariate setting.

6.2 Survival Analysis in Different Industries

As described in Section 4, here we employ a Cox proportional hazards model. **Table 4** provides the results for different industries as well as industries as a whole. On the right-hand side of the model, a set of dummy variables is introduced to control for the fixed effects in the federal regions and industrial sectors together with the company profile variables.[11] In all models, robust standard errors are computed using the Huber-White sandwich estimator to deal with possible heteroskedasticity. Harrell's C-statistic values range between 0.6706 and 0.7116, indicating the sufficient predictive power of the fitted Cox models.

According to the estimates of Model [1] in **Table 4**, using 74,308 observations across

[11] In **Appendix 2**, the geographical distribution of the firm exit rate at the federal region level is illustrated. The figure indicates that, by and large, the exit rate of Russian companies tends to be higher in western regions than in their eastern counterparts and to be higher in the south than in the north. Nevertheless, some regions in the Central and North Caucasus federal districts have exit rates in the lowest class (less than 0.289). Although the region-level firm exit rate has a wide distribution, ranging from 0.200 (Chechen Republic) to 0.649 (Altai Republic), its mean and standard deviations are 0.365 and 0.076, respectively, suggesting that most Russian regions experienced similar negative impacts on firms from 2007–2015.

all industries, from the viewpoint of firm survivability, we find a nonlinear relationship between the ownership transferability of the legal form and firm survivability. In more detail, the probability of survival increases until a certain point but starts to decline beyond it. Based on the results using standard coefficients instead of the hazard ratio, the odds of survivability are maximized when the legal form of a firm is a closed JSC, followed by a limited liability company.[12] Yet, it becomes lower when a firm adopts open JSC, partnership, or cooperative as its legal form. This result applies to all industries except for agriculture, forestry, and fishing.

This finding can be interpreted as showing that maintaining a balance between the stability of ownership and the exploitation of growth potential is important for firm survival. A more open legal form attracts capital, and thus growth, but such a company's ownership might not be stable unless it has concentrated ownership. By contrast, members of firms that are partnerships or cooperatives are less flexible in transferring their ownership than are members of open JSCs and are responsible for the firm's debts, even beyond the amounts of their respective contributions.

In Model [1], the dummy variable for limited liability firms is significantly estimated with a hazard ratio of 1.5792, suggesting that, if the other conditions are held constant, the failure risk of firms that limit liability becomes higher by 57.9%. As shown in Models [3] and [5], similar results are obtained in the mining and manufacturing and service industries.

With respect to the impact of ownership structure on firm survival, the variable of large shareholding is estimated with a hazard ratio of 0.1327 at the 1% significance level in Model [1]. This result denotes that the presence of a dominant and/or block

[12] For reference, we also estimated dummy variables for limited liability companies, closed JSCs, and open JSCs instead of the ownership transferability variables, taking the other legal forms as a default category, using the same observations as in Model [1]. All of these dummy variables show statistically significant estimates at the 1% level; according to them, the hazard ratio for limited liability companies, closed JSCs, and open JSCs are 0.931, 0.826, and 1.104, respectively. In other words, if other conditions are held constant, the adoption of a limited liability company and a closed JSC improves survivability by 6.9% and 17.4%, respectively, while the adoption of an open JSC lowers survivability by 10.4%. The estimation results are reported in **Appendix 3** with those by industry.

shareholder(s) improves a firm's survival probability by 86.7%, as compared with firms without a large shareholder. It is also revealed that ultimate company ownership by either the federal government or a regional government increases the exit risk by 24.8% and 28.5%, respectively, as compared with domestic private ownership, while foreign ownership has no effect on the survivability of the enterprises owned.[13]

Regarding the relationship between corporate governance and firm survival, the estimate of managerial discretion suggests that, in Russia, top management with stronger decision-making power is prone to lead the company to bankruptcy, *ceteris paribus*, but the magnitude of the effect is rather small. The numbers of board directors and auditors are significantly estimated with a hazard ratio of 0.8820 and 0.8664, respectively, in Model [1], while both coefficients of these squared terms exceed the threshold of 1.0. These estimates suggest that the size effect of the board of directors and audit committee on the probability of firm survival is curvilinear, which is in line with the standard findings. Concerning external auditing, a local Russian audit firm increases the exit risk by 63.1% across the entire corporate sector, while there is little difference between an international audit firm and a large Russian one in terms of its effect on firm survivability as a whole.

Furthermore, the estimation results of Model [1] demonstrate that Russian companies with good financial performances successfully avoided the risk of failure during the observation period. In fact, the hazard ratios of both ROA (return on assets) and gross margin are estimated at the 1% significance level with a hazard ratio of less than 1.0. On the contrary, the effect of linkage with the capital market on firm survival is negative, which is not in line with previous findings. In fact, the hazard ratio of being listed on the stock market implies that, other things being equal, listed companies faced an exit risk 61.9% higher than that of unlisted firms. In addition, the risk of market exit was found to rise by 0.2% when gearing increased by 10%.

With regard to the impact of firm size and firm age on survivability, Model [1]

[13] One theory that supports this result is that state-owned enterprises prefer excess employment influenced by politicians, especially in the context of former socialist countries (Shleifer et al., 1996).

provides strong evidence that Russian corporations with greater assets and longer management experience were more likely to survive, as the hazard ratios of these two variables are statistically significant, with values of 0.9760 and 0.9521, respectively.[14] In addition, the hazard ratio of the business network is also estimated to be 0.9446 at the 1% significance level, suggesting that networking among subsidiaries is an effective tool for managing risk. Business diversification is also positively correlated with firm survivability, but the size of the effect is small.

Some notable differences in firm survivability are found across industries, according to Models [2] to [5] in **Table 4**. First, foreign-owned companies operating in the primary industries were at risk, while foreign ownership had little effect on firm failure in other industries. Second, construction and service enterprises owned by regional governments were more likely to exit the market than were their counterparts in the same industry, while federal state ownership exhibited a negative role in firm survival in all industries. Third, in the primary industries, external auditing by large Russian audit firms and, in the service industry, that by international audit firms helped avoid firm failure. These results contrast with those regarding the negative role of local Russian audits in the mining and manufacturing industries, as well as the service sector. Fourth, it is probable that a diversification strategy increases the probability of survival for service companies, even during nationwide crises.

6.3 Survival Analysis in Different Periods

To understand whether the determinants of firm survival exert similar influences in spite of different economic conditions, we divided the period of 2007–2015 into the following four subperiods. The first subperiod, 2007–2008, can be regarded as a normal period. The Russian economy experienced rapid growth in 2007, recording 8.5% GDP growth. Although the effect of the global financial crisis began to eat into the economic performance in late 2008, Russia was able to manage strong growth in 2008, with an

[14] Dissimilar to the findings of Esteve-Pérez and Mañez-Castillejo (2008) and Iwasaki and Kocenda (2020), our supplement to regression does not indicate a nonlinear effect of firm age, showing an insignificant estimate of the squared term of the firm-age variable.

annual growth rate of 5.2%. In the second subperiod, 2009–2010, the Russian economy was hit hard by the global financial crisis. The average growth rate for the two years was -1.7%. The third subperiod covered 2011–2013. Russia was able to recover from the crisis and record strong positive growth—5.3%—in 2011. Although growth decreased in 2011–2012, and further in 2013, the average growth rate for the three years was close to 4%. The last subperiod is 2014–2015, when the Russian economy was affected by lower oil prices and economic sanctions imposed by the international community following Russia's annexation of Crimea and the invasion of Ukraine in 2014. Western countries' sanctions against Russia included financial sanctions; travel bans; and sanctions on targeted individuals, some energy firms, and state banks (Shida, 2019). In response to Western sanctions, Russia implemented sanctions against the West, mainly targeting the import of agricultural products into Russia. As a result of these two-way sanctions, Russia's average growth rate for the two years deteriorated to -1%.

As revealed in the discussion above, Russia's economic performance in 2009–2010 and 2014–2015 was affected by global and local factors, respectively. Moreover, these two downturns can be regarded as being exogenous because they were rather unexpected shocks to economic agents. Hence, one can argue that Russia provides an interesting case study for understanding heterogeneity in the determinants of firm survival based on the different natures of shocks. In addition, two normal periods can be used for contrast with the recession periods, thus, helping us to identify whether determinants of firm failure are different in normal periods than in recession periods.

Table 5 presents estimation results by period together with those for the entire period, which, for comparison, are the same as those appearing in Model [1] of **Table 4**. The results suggest that, in all periods, regardless of boom or recession, there is no change in the nonlinear relationship between the ownership transferability of legal form and firm survivability. In all periods, closed JSCs and limited liability companies performed better than those based on open JSCs and other legal forms.[15] The negative impact of liability limitation on firm survival is also confirmed, except in 2014–2015.

[15] In all subperiods, we find that an optimal legal form in terms of firm survival lies between a closed JSC and a limited liability company.

Based on a comparison of the results of normal periods and those of recession, state ownership was found to increase firm failure in a recession period. The variable of federal state ownership is significant in Models [2] and [4], which refer to 2009–2010 and 2014–2015, respectively. Regional state ownership affects firm survival significantly and negatively in one of the boom periods (2011–2013) but both recession periods (2009–2010 and 2014–2015). One can understand this finding from the fiscal perspective of the government. State-owned firms can be better protected by the state in normal periods, as the central or regional government is able to provide these firms with fiscal resources when they are in trouble. By contrast, it is difficult to protect state-owned firms during economic recessions because of constrained fiscal expenditures.

Audit quality also matters for firm failure. According to our results, the quality of Russian audit firms, vis-a-vis international audit firms, improved over time because differences in the coefficients of international audit firms and large or local Russian audit firms became smaller. For instance, the average of the coefficients of international audit firms, large Russian firms, and local Russian audit firms in the first and second periods were 0.3782, 0.7166, and 6.4310, respectively; however, during the later periods, the difference between international audit firms and large Russian ones became insignificant and was much smaller between international audit firms and local Russian ones.

Comparing the determinants between two recession periods led to the following observations. First, foreign ownership correlated negatively with the global financial crisis of 2009–2010 but positively with the local recession of 2014–2015. This can be understood by recognizing that foreign-owned firms were more likely to be exposed to global markets than were firms owned by domestic agents and, thus, hit hard by the global financial crisis. However, these firms suffered less failure in 2014–2015 because the recession was geographically confined to Russia. Second, the effect of managerial discretion was also asymmetric, in that it induced more firm failure during global financial crisis but less during local recession. This can be explained by the possibility that managerial discretion limited checks and balances but, at the same time, increased decision-making flexibility and speed. However, the advantages associated with managerial discretion were not realized during a global crisis because there was little

room for managers to avoid shocks. At the same time, weaknesses resulting from limited checks and balances could worsen during this period. By contrast, during a local recession, the advantages could be exploited effectively by managers using their powers of discretion. Third, the effects of firm size were also opposite in the two recession periods. A larger firm was more likely to fail during the global crisis, while a smaller one was more likely to exit during the local recession. This finding could be related to the fact that a larger firm is more exposed to global trade and, thus, is more likely to be negatively affected by a global crisis.

6.4 Robustness Check

To check the statistical robustness of the estimation results of the Cox proportional hazards model reported in Subsections 6.2 and 6.3, we first carried out a supplementary estimation using log-transformed values of the number of board directors, number of auditors, gearing, firm age, business network, and business diversification to treat their skewness. This confirmed that using these log-transformed variables does not strongly affect the estimates of legal-form variables and, in addition, shows consistent results with those corresponding estimates in **Table 4** (**Appendix 4**).

Second, considering possible differences in the historical average of firm organization and performance for each industry, we also performed a survival analysis using a set of industry-adjusted variables that represent the distances from the median value in each industry, and found that this change in the model specification does not affect parameter estimate β remarkably (**Appendix 5**).

Third, to address the issue of the heterogeneity of the Russian regions, we also estimated a Cox model by dividing observations into four subsample groups, while considering the historical and geographical similarities and dissimilarities of the federal districts. Despite the fact that the estimation results of these region-specific models demonstrate that the effect size and statistical significance of our key variables related to the legal forms vary across regions, the main conclusions obtained from this attempt are largely unchanged (**Appendix 6**).

And finally, as discussed in the Data and Methodology section, the Cox proportional

hazards model has significant merit, in the sense that it enables us 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 hazards assumption, which implies that the hazard ratio remains constant over time. If this assumption is not satisfied, survival analysis using the Cox model should be avoided. There is no guarantee that all independent variables used in our empirical analysis meet this assumption (Iwasaki, 2014a). To examine possible estimation bias caused by the use of the Cox model, we estimated a series of parametric survival models that employ distinct assumptions in the survival distribution and confirmed that the estimates of these parametric models are very similar to those of the Cox model (**Appendix 7**). These observations indicated that the estimation results in **Tables 4** and **5** are robust across various model specifications.

7 Conclusions

Using a large dataset of Russian firms during the period of 2007–2015, this paper investigated the relationship between legal forms and firm survivability. The diversity of institutions related to firms and repeated experiences of economic upswing and downturns were expected to verify whether the results are sufficiently robust across industries and different periods. We relied on the relevant literature to identify potential determinants of firm failure, which we subsequently used as control variables.

We found a nonlinear relationship between firm survivability and the organizational openness of legal forms. In other words, there is an optimal degree of organizational openness in terms of ownership transferability for Russian firms that maximizes the probability of survival. On one hand, excessive openness as a legal form of open JSC undermined a firm's survival, perhaps because of ownership instability. On the other hand, firms adopting excessively closed ownership tended to fail more often, at least partially because investment and, thus, firm growth were constrained. These findings are fairly robust across most industries and all subperiods from 2007–2015. Furthermore, we also found that, with other conditions being equal, limitation of liability is negatively associated with firm survival and this effect is especially robust in the service industry.

Other findings are also noteworthy. We found that the numbers of board directors and auditors were positively associated with firm survival in a nonlinear manner. The relationship between the number of large shareholders, as an indicator of the concentration of ownership, and firm survival was also positive in all periods and most industries. Yet, the quality gap between audit firms as measured by their origins, namely, international or domestic Russian, was pronounced from 2007–2010 but became negligible or smaller from 2011–2013. In addition, firm age and business network were found to increase the probability of firm survival, regardless of the industry or business cycle. We also discovered that foreign ownership performed better than either federal state-owned or regional state-owned firms in terms of the hazard ratio. In particular, the difference in firm survivability was not pronounced in normal periods but became significant in economic recessions.

The above findings suggest that firms significantly reduce their probability of failure by adopting the optimal legal form. It is still unclear whether this optimal form is universal or heterogeneous across countries. The divergent results in the existing literature indicate that it may be country specific. However, this should be taken with caution, given the small number of studies. The issue of whether the Russian case is applicable to other countries, especially to emerging countries, is our next research agenda.

References

Agarwal, R., & Gort, M. (2002). Firm and product life cycles and firm survival. *American Economic Review*, 92(2), 184-190.

Anderson, R., & Reeb, D. (2003). Founding-family ownership and firm performance: Evidence from the S&P 500. *Journal of Finance*, 58(3), 1301-1327.

Audretsch, D. (1991). New-firm survival and the technological regime. *Review of Economics and Statistics*, 73(3), 441-450.

Audretsch, D., & Mahmood, T. (1995). New firm survival: New results using a hazard function. *Review of Economics and Statistics*, 77(1), 97-103.

Audretsch, D., Santarelli, E., & Vivarelli, M. (1999). Start-up size and industrial dynamics: Some Evidence from Italian manufacturing. *International Journal of Industrial Organization*, 17(7), 965-983.

Baek, J-S., Kang, J-K., & Park, K. (2004). Corporate governance and firm value: Evidence from the Korean financial crisis. *Journal of Financial Economics*, 71, 265-313.

Baumöhl, E., Iwasaki, I., & Kočenda, E. (2019). Institutions and determinants of firm survival in European emerging markets. *Journal of Corporate Finance*, 58, 431-453.

Baumöhl, E., Iwasaki, I., & Kočenda, E. (2020). Firm survival in new EU member states. *Economic Systems*, 44(1), Article 100743.

Boeri, T., Garibaldi, P., & Moen, E. (2013). Financial shocks and labor: Facts and theories. *IMF Economic Review*, 61(4), 631-663.

Bridges, S. & Guariglia, A. (2008). Financial constraints, global engagement, and firm survival in the U.K.: Evidence from micro data. *Scottish Journal of Political Economy*, 55, 444–464.

Buehler, S., Kaiser, C., & Jaeger, F. (2006). Merge or fail? The determinants of mergers and bankruptcies in Switzerland, 1995–2000. *Economics Letters*, 90(1), 88-95.

Byrne, J., Spaliara, M-E., & Tsoukas, S. (2016). Firm survival, uncertainty, and financial frictions: Is there a financial uncertainty accelerator? *Economic Inquiry*, 54(1), 375-390.

Cheng, J., Cummins, J. D., & Lin, T. (2017). Organizational form, ownership structure, and CEO turnover: Evidence from the property-casualty insurance industry. *Journal of Risk and Insurance*, 84(1), 95-126.

Claessens, S., Djankov, S., & Lang, L. H. P. (2000). The separation of ownership and control in East Asia corporations. *Journal of Financial Economics*, 58, 81-112.

Commander, S., & Svejnar, J. (2011). Business environment, exports, ownership, and firm performance. *Review of Economics and Statistics*, 93(1), 309-337.

Dunne, J., & Hughes, A. (1994). Age, size, growth and survival: UK companies in the 1980s. *Journal of Industrial Economics*, 42(2), 115-140.

Erkens, D., Hung, M., & Matos, P. (2012). Corporate governance in the 2007-2008 financial crisis: Evidence from financial institutions worldwide. *Journal of Corporate Finance*, 18, 389-411.

Esteve-Pérez, S., & Mañez-Castillejo, J. A. (2008). The resource-based theory of the firm and firm survival. *Small Business Economics*, 30(3), 231-249.

Francis, B., Hasan, I., & Wu, Q. (2012). Do corporate boards matter during the current financial crisis? *Review of Financial Economics*, 21, 39-52.

Geroski, P. A. (1995). What do we know about entry? *International Journal of Industrial Organization*, 13(4), 421-440.

Guariglia, A., Spaliara, M-E., & Tsoukas, S. (2016). To what extent does the interest burden affect firm survival? Evidence from a panel of UK firms during the recent financial crisis. *Oxford Bulletin of Economics and Statistics*, 78(4), 576-594.

Harhoff, D., Stahl, K., & Woywode, M. (1998). Legal form, growth and exit of German firms: Empirical results for manufacturing, construction, trade and service industries. *Journal of Industrial Economics*, 46(4), 453-488.

Iwasaki, I. (2007a). Corporate law and governance mechanism in Russia. In: Dallago, B., & Iwasaki, I. (Eds.), *Corporate Restructuring and Governance in Transition Economies*. Basingstoke: Palgrave Macmillan.

Iwasaki, I. (2007b). Legal forms of joint-stock companies and corporate behavior in Russia. *Problems of Economic Transition*, 50(5), 73-86.

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

Iwasaki, I. (2014b). Corporate form, institutional complementarity, and organizational behavior: Open versus closed joint-stock companies in Russia. In: Boubaker, S., & Nguyen, D. K. (Eds.), *Corporate Governance in Emerging Markets: Theories, Practices and Cases*. Berlin: Springer Verlag.

Iwasaki, I. (2014c). What determines audit independence and expertise in Russia? Firm-level evidence. *Corporate Ownership and Control*, 11(2), 81-107.

Iwasaki, I. (2018). Corporate governance system and regional heterogeneity: Evidence from east and west Russia. *International Journal of the Economics of Business*, 25(3), 391-420

Iwasak, I. & Kočenda, E. (2020). Survival of service firms in European emerging economies. *Applied Economics Letters*, 27(4), 340-348.

Johnson, S., Boone, P., Breach, A., & Friedman, E. (2000). Corporate governance in the Asian financial crisis. *Journal of Financial Economics*, 58, 141-186.

Kang, J-K., Lee, I., & Na, H. (2010). Economic shock, owner-manager incentives, and corporate restructuring: Evidence from the financial crisis in Korea. *Journal of Corporate Finance*, 16, 335-351.

Lemmon, M., & Lins, K. (2003). Ownership structure, corporate governance, and firm value: Evidence from the East Asian financial crisis. *Journal of Finance*, 58(4), 1445-1468.

Mata, J., & Portugal, P. (1994). Life duration of new firms. *Journal of Industrial Economics*, 42(5), 227-245.

Mitton, T. (2002). A cross-firm analysis of the impact of corporate governance on the East Asian financial crisis. *Journal of Financial Economics*, 64, 215-241.

Perry, T., & Shivdasani, A. (2005). Do boards affect performance? Evidence from corporate restructuring. *Journal of Business*, 78(4), 1403-1431.

Raheja, C. (2005). Determinants of board size and composition: A theory of corporate boards. *Journal of Financial and Quantitative Analysis*, 40(2), 283-306.

Shida, Y. (2019). Russian business under economic sanctions: Is there evidence of regional heterogeneity? *Post-Communist Economies*. (Early view: https://doi.org/10.1080/14631377.2019.1659567).

Shleifer, Andrei, Maxim Boycko, and Robert W Vishny. (1996). A theory of privatization. *Economic Journal*, 106(435), 309-319.

Yeh, Y-H., Chung, H., & Liu, C-L. (2011). Committee independence and financial institution performance during the 2007-08 credit crunch: Evidence from a multi-country study. *Corporate Governance: An International Review*, 19(5), 437-458.

Yermack, D. (1996). Higher market valuation of companies with a small board of directors. *Journal of Financial Economics,* 40(2), 185-211.

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

Variable group	Variable name	Definition	Descriptive statistics				
			Mean	S.D.	Median	Max.	Min.
Legal form characteristic	Ownership transferability	Ordered variable that gives a value of 3 to open JSCs, 2 to closed JSCs, 1 to limited liability companies, and 0 to other companies	1.275	0.768	1	3	0
	Limitation of liability	Dummy for firms that adopt limited liability	0.912	0.283	1	1	0
Ownership structure	Large shareholding	Dummy for firms with a dominant and/or block shareholder(s)	0.906	0.292	1	1	0
	Foreign ownership	Dummy for ultimate ownership of foreign investors	0.009	0.094	0	1	0
	Federal state ownership	Dummy for ultimate ownership of the Russian federal government	0.023	0.150	0	1	0
	Regional state ownership	Dummy for ultimate ownership of Russian regional governments	0.037	0.188	0	1	0
Corporate governance	Managerial discretion	BvD independent indicator (0: D; 1: C; 2: C+; 3: B-; 4: B; 5: B+; 6: A-; 7: A; 8: A+)[a]	3.389	3.635	0	8	0
	Number of board directors	Number of recorded members of the board of directors	1.499	1.879	1	36	0
	Number of auditors	Number of recorded coorporate auditors	0.472	0.673	0	27	0
	International audit firm	Dummy for firms that employ an international audit firm as an external auditor	0.001	0.027	0	1	0
	Large Russian audit firm	Dummy for firms that employ a large Russian audit firm as an external auditor	0.001	0.031	0	1	0
	Local Russian audit firm	Dummy for firms that employ a local Russian audit firm/auditor as an external audito	0.006	0.079	0	1	0
Firm performance	ROA	Return on total assets (%)[b]	10.597	20.649	5.990	100	-100
	Gross margin	Gross margin (%)[c]	14.261	20.441	9.790	100	-100
Linkage with capital market	Listing on the stock market	Dummy variable for listed companies	0.006	0.078	0	1	0
	Gearing	Gearing (%)[d]	71.375	160.537	1.160	1000	0
Firm size and age	Firm size	Natual logarithm of total assets	10.098	1.718	10	22.828	0
	Firm age	Years in operation	16.795	9.134	15	304	8
Business organization	Business network	Number of subsidiaries	0.738	3.897	0	628	0
	Business diversification	Number of operating industries according to the NACE Rev 2 secondary codes	6.770	3.819	7	24	0

Notes:

[a] Class A: Definition—Attached to any company with known recorded shareholders, none of which have more than 25% of direct or total ownership [A+: Companies with 6 or more identified shareholders (of any type) whose ownership percentage is known; A: Same as above, but includes companies with 4 or 5 identified shareholders; A-: Same as above, but includes companies with 1 to 3 identified shareholders]. Class B: Definition—Attached to any company with a known recorded shareholder, none of which has an ownership percentage (direct, total, or calculated total) over 50%, but which has one or more shareholders with an ownership percentage above 25%. The further qualifications of B+, B, and B- are assigned according to the same criteria relating to the number of recorded shareholders as for indicator A. Class C: Definition—Attached to any company with a recorded shareholder with total or a calculated total ownership over 50%. The qualification C+ is attributed to C companies in which the summation of direct ownership percentage (all categories of shareholders included) is 50.01% or higher. Indeed, this means that the company surely does not qualify under Independent Indicator D (since it cannot have an unknown direct shareholder with 50.01% or higher). Class D: Definition—This is allocated to any company with a recorded shareholder with direct ownership of over 50% (quotation from the BvD Orbis database website manual).

[b] Computed using the following formula: (profit before tax/total assets) × 100

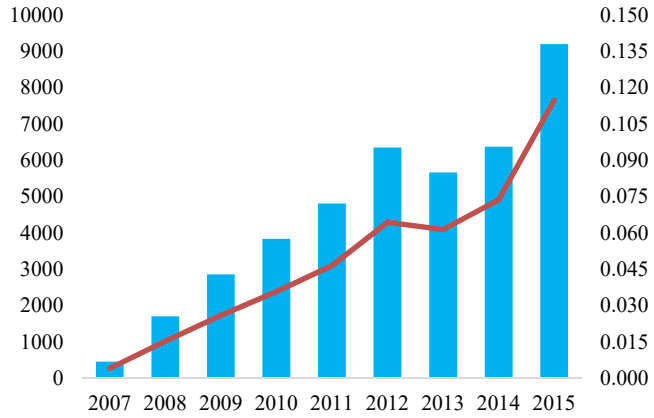
[c] Computed using the following formula: (gross profit/operating revenue) × 100

[d] Computed using the following formula: ((non current liabilities + loans) / shareholders' funds) × 100

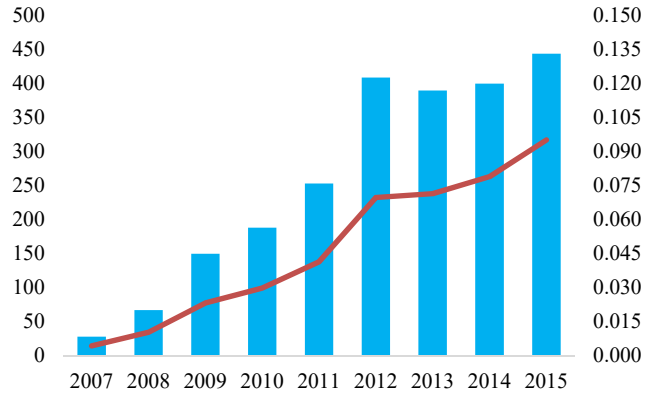
Source: Authors' compilation and estimation. Raw data was extracted from the Bureau van Dijk (BvD) Orbis database. For more details of the database and data, see the BvD website: https://webhelp.bvdep.com.

Figure 1. Number of failed firms and exit rate of 112,280 Russian firms by industry and legal form, 2007–2015

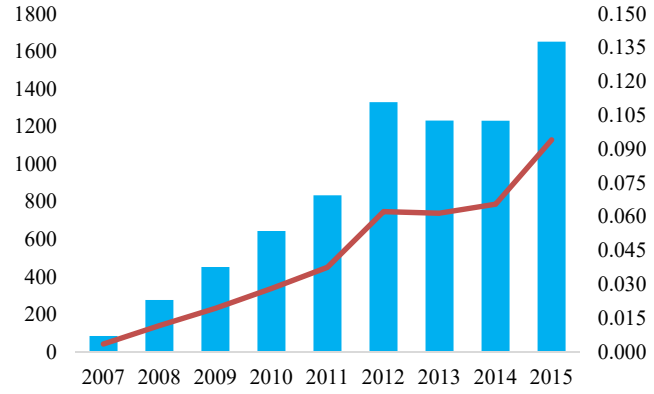
(a) All industries (Sections A–S; *N*=112,280)



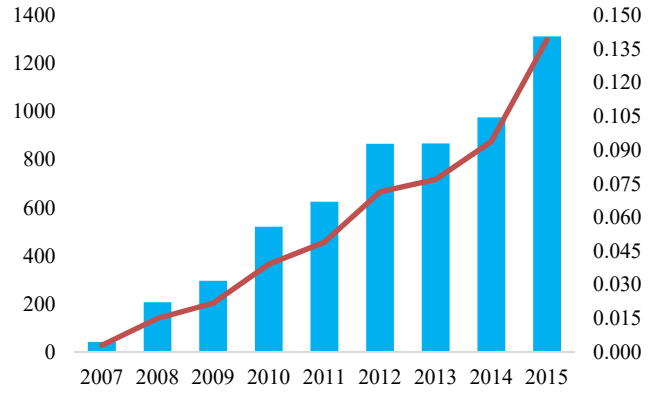
(b) Agriculture, forestry, and fishing (Section A; *N*=6,550)



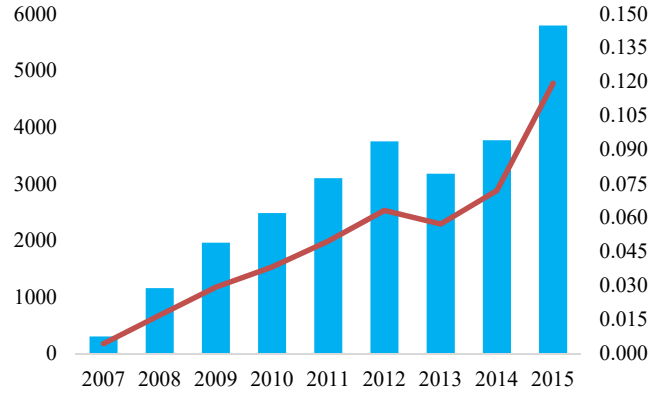
(c) Mining and manufacturing (Sections B–E; *N*=23,642)



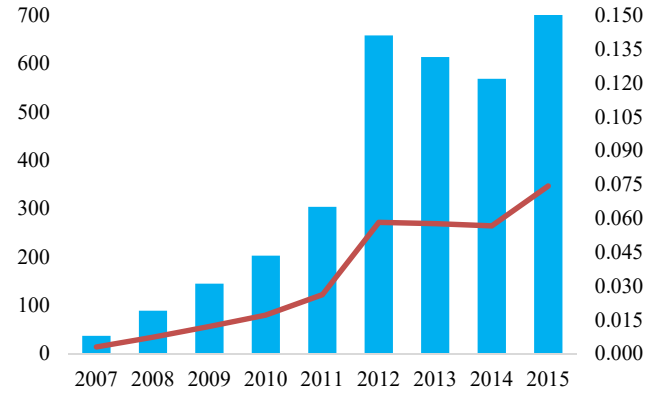
(d) Construction (Section F; *N*=13,838)



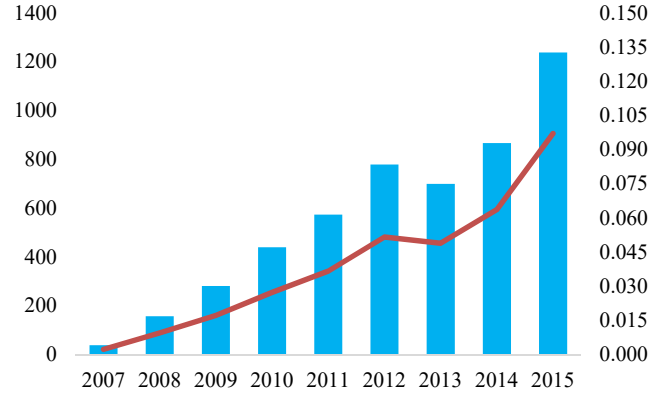
(e) Services (Sections G–S; *N*=68,250)



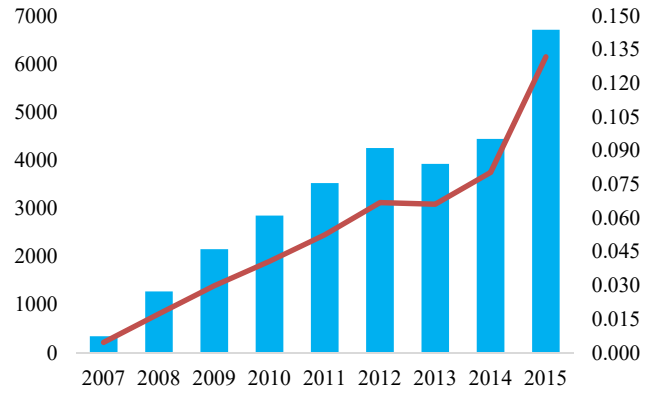
(f) Open JSCs (*N*=12,082)



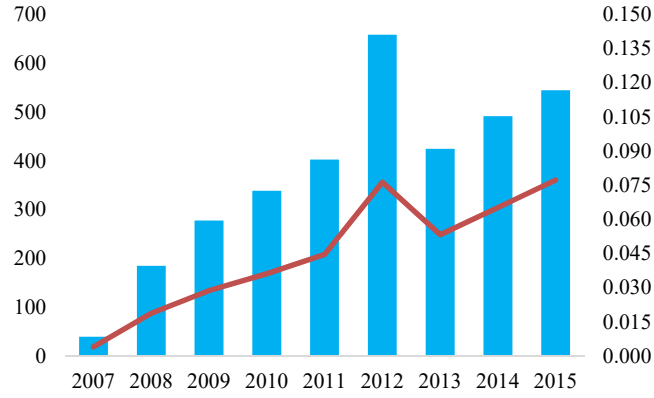
(g) Closed JSCs (N=16,588)



(h) Limited liability companies (N=73,742)



(i) Firms with other legal forms (N=9,868)



Notes:

Number of failed firms (left axis)

Exit rate (right axis)

NACE Rev. 2 section classification is indicated in parentheses.

Source: Authors' illustrations

Table 2. Survival status of 112,280 Russian firms by industry and legal form, 2007–2015

	Number of firms operating at the end of 2006 (i)	Number of firms surviving until the end of 2015	Total failures until the end of 2015 (ii)	Entire period exit rate (ii/i)	Entire period Nelson-Aalen cumulative hazard function	Entire period Kaplan-Meier survivor function
All firms	112,280	70,986	41,294	0.356	0.442	0.632
Breakdown by industry (NACE Rev. 2 section)						
Agriculture, forestry, and fishing (Section A)	6,550	4,221	2,329	0.356	0.424	0.644
Mining and manufacturing (Sections B–E)	23,642	15,897	7,745	0.328	0.385	0.672
Construction (Section F)	13,838	8,117	5,721	0.413	0.510	0.587
Services (Sections G-S)	68,250	42,751	25,499	0.374	0.451	0.626
Breakdown by legal form						
Open JSC	12,082	8,758	3,324	0.275	0.313	0.725
Closed JSC	16,588	11,514	5,074	0.306	0.354	0.694
Limited liability company	73,742	44,212	29,530	0.400	0.491	0.600
Firms with other legal forms	9,868	6,502	3,366	0.341	0.405	0.659
Multiple comparison among the 4 industries						
Chi-square test for independence using exit rate (χ^2)				302.38 ***		
Log-rank test for equality of survivor functions (χ^2)						288.87 ***
Multiple comparison among the 4 legal forms						
Chi-square test for independence using exit rate (χ^2)				1100.00 ***		
Log-rank test for equality of survivor functions (χ^2)						1088.57 ***

Source: Authors' calculations and estimations. Appendix 1 reports more detailed breakdown of firm survival status by industry.

Table 3. Univariate comparative analysis between surviving and failed firms [a]

Variable name	Surviving firms		Failed firms		Correlation coefficients with survival probability [d]
	Mean/ proportion	Median	Mean/ proportion [b]	Median [c]	
Ownership transferability	1.3174	1	1.2024 ***	1 ***	0.072 ***
Limitation of liability	0.9084	1	0.9185 †††	1 ***	-0.017 ***
Large shareholding	0.9883	1	0.7649 †††	1 ***	0.369 ***
Foreign ownership	0.0101	0	0.0068 †††	0 ***	0.017 ***
Federal state ownership	0.0286	0	0.0133 †††	0 ***	0.049 ***
Regional state ownership	0.0419	0	0.0274 †††	0 ***	0.037 ***
Managerial discretion	3.3982	0	3.3683	0	0.004
Number of board directors	1.6610	1	1.2207 †††	1 ***	0.113 ***
Number of auditors	0.5300	0	0.3729 †††	0 ***	0.113 ***
International audit firm	0.0010	0	0.0002 †††	0 ***	0.013 ***
Large Russian audit firm	0.0014	0	0.0002 †††	0 ***	0.017 ***
Local Russian audit firm	0.0081	0	0.0031 †††	0 ***	0.031 ***
ROA	12.9252	8.1100	6.5851 ***	3.2100 ***	0.148 ***
Gross margin	15.9532	11.5800	11.3403 ***	6.9200 ***	0.109 ***
Listing on the stock market	0.0083	0	0.0025 †††	0 ***	0.036 ***
Gearing	64.4100	1.5700	85.5435 ***	0.4400 ***	-0.062 ***
Firm size	10.1370	10.0641	10.0311 ***	10.0298 ***	0.030 ***
Firm age	17.7397	17	15.1689 ***	14 ***	0.136 ***
Business network	0.9718	0	0.3352 ***	0 ***	0.079 ***
Business diversification	6.7355	7	6.8305 ***	7 ***	-0.012 ***

Notes:

[a] See Table 1 for definitions and descriptive statistics of variables used for comparison.

[b] *** denotes statistical significance at the 1% level according to the t test (or Welch's test if the F test on the equality of variances rejects the null hypothesis that 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 (χ^2) test in terms of the differences in the proportion between the two types of firms.

[c] ***, **, 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.

[d] ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively, in terms of the correlation coefficient with the binary dummy variable that assigns a value of 1 to surviving firms during the observation period of 2007–2015.

Source: Authors' estimations

Table 4. Determinants of firm survival: Baseline estimation of Cox proportional hazards model, 2007–2015

Model	[1]	[2]	[3]	[4]	[5]
Target industry (NACE Rev2 section classification)	All industries (Sections A–S)	Agriculture, forestry, and fishing (Section A)	Mining and manufacturing (Sections B–E)	Construction (Section F)	Services (Sections G–S)
Legal form characteristic					
Ownership transferability	0.4804 ***	0.7035	0.5034 ***	0.5466 **	0.5039 ***
	(-7.58)	(-0.84)	(-3.62)	(-2.47)	(-4.92)
Ownership transferability ^{2}	1.2271 ***	1.1252	1.2015 ***	1.1956 ***	1.2159 ***
	(7.68)	(1.09)	(3.64)	(2.61)	(4.94)
Limitation of liability	1.5792 ***	1.5171	1.6307 ***	1.0857	1.3184 **
	(5.64)	(1.16)	(2.93)	(0.38)	(2.48)
Ownership structure					
Large shareholding	0.1327 ***	0.0920 ***	0.1028 ***	0.1489 ***	0.1501 ***
	(-66.61)	(-21.95)	(-32.83)	(-24.15)	(-46.00)
Foreign ownership	1.0708	2.4450 ***	0.8571	1.0440	1.1301
	(0.87)	(2.59)	(-1.01)	(0.10)	(1.24)
Federal state ownership	1.2477 ***	1.5396 **	1.2817 ***	1.5380 ***	1.1300 *
	(4.33)	(2.35)	(2.70)	(2.91)	(1.66)
Regional state ownership	1.2846 ***	1.1716	1.1269	1.2740 *	1.3608 ***
	(5.90)	(0.93)	(1.36)	(1.87)	(5.19)
Corporate governance					
Managerial discretion	1.0171 ***	0.9956	0.9898 **	1.0276 ***	1.0245 ***
	(8.35)	(-0.45)	(-2.02)	(5.37)	(9.56)
Number of board directors	0.8820 ***	0.9055 *	0.8880 ***	0.8840 ***	0.8660 ***
	(-7.90)	(-1.76)	(-4.62)	(-2.86)	(-6.55)
Number of board directors ^{2}	1.0055 ***	1.0025	1.0054 ***	1.0058 *	1.0055 ***
	(4.73)	(0.54)	(2.94)	(1.79)	(3.77)
Number of auditors	0.8664 ***	0.9662	0.8957 ***	0.8908 **	0.8876 ***
	(-8.80)	(-0.44)	(-3.45)	(-2.31)	(-5.38)
Number of auditors ^{2}	1.0103 ***	1.0143	1.0054 **	1.0171	1.0112 ***
	(6.17)	(0.57)	(2.25)	(0.87)	(2.87)
International audit firm	1.2271		1.7959		0.7105 ***
	(0.37)		(1.06)		(-8.14)
Large Russian audit firm	1.0140	0.1170 ***	0.8249	1.5276	1.6072
	(0.03)	(-30.67)	(-0.38)	(0.36)	(0.62)
Local Russian audit firm	1.6312 ***	0.7886	1.4348 **	0.7199	1.8587 ***
	(3.68)	(-0.30)	(2.09)	(-0.51)	(2.73)
Firm performance					
ROA	0.9931 ***	0.9917 ***	0.9926 ***	0.9944 ***	0.9932 ***
	(-16.63)	(-2.67)	(-7.03)	(-4.62)	(-13.77)
Gross margin	0.9959 ***	0.9923 ***	0.9951 ***	0.9953 ***	0.9970 ***
	(-9.07)	(-3.76)	(-3.97)	(-3.14)	(-5.66)
Linkage with capital market					
Listing on the stock market	1.6191 ***	3.2196 *	1.3467	2.8724 ***	0.9671
	(3.59)	(1.75)	(1.58)	(3.97)	(-0.10)
Gearing	1.0002 ***	1.0007 ***	1.0005 ***	1.0002	1.0002 ***
	(5.86)	(3.90)	(4.75)	(1.58)	(3.62)
Firm size and age					
Firm size	0.9760 ***	0.9370 **	0.9581 ***	0.9884	0.9772 ***
	(-4.55)	(-1.98)	(-3.23)	(-0.86)	(-3.51)
Firm age	0.9521 ***	0.9735 ***	0.9850 ***	0.9382 ***	0.9295 ***
	(-15.40)	(-3.60)	(-4.17)	(-11.83)	(-21.58)
Business organization					
Business network	0.9446 ***	0.9389 *	0.9398 ***	0.9527 ***	0.9454 ***
	(-5.59)	(-1.91)	(-4.96)	(-3.11)	(-3.25)
Business diversification	0.9959 **	0.9948	1.0003	0.9970	0.9934 ***
	(-2.12)	(-0.68)	(0.05)	(-0.56)	(-2.67)
Federal-region level fixed effects	Yes	Yes	Yes	Yes	Yes
NACE-division level fixed effects	Yes	Yes	Yes	Yes	Yes
N	74308	4363	16301	9317	44327
Log pseudolikelihood	-224140.00	-8037.16	-34139.47	-27585.37	-132612.24
Harrell's C-statistic	0.6910	0.7116	0.6825	0.6706	0.6964
Wald test (χ^2)	10241.74 ***	1216.43 ***	3532.40 ***	9343.73 ***	14450.14 ***

Note: This table contains results of the survival analysis using the Cox proportional hazards model. Table 1 provides detailed definitions and descriptive statistics of the independent variables. Reported estimates are the hazard ratio instead of regression coefficients. Standard errors are computed using the Huber-White sandwich estimator. z statistics are reported in parentheses beneath the hazard ratios. The Wald test examines the null hypothesis that all regression coefficients are zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimations

Table 5. Estimation of Cox proportional hazards model in different periods

Model	Table 4 Model [1]	[1]	[2] [a]	[3] [a]	[4] [a]
Estimation period	2007–2015	2007–2008	2009–2010	2011–2013	2014–2015
Legal form characteristic					
Ownership transferability	0.4804 ***	0.3811 ***	0.1656 ***	0.3956 ***	0.9495 *
	(-7.58)	(-5.87)	(-5.62)	(-5.82)	(-1.82)
Ownership transferability ^{2}	1.2271 ***	2.5005 ***	1.6062 ***	1.2976 ***	1.0211 *
	(7.68)	(6.10)	(5.32)	(6.05)	(1.74)
Limitation of liability	1.5792 ***	1.6585 ***	1.3814 ***	1.9360 ***	1.9905
	(5.64)	(3.77)	(4.22)	(4.93)	(0.83)
Ownership structure					
Large shareholding	0.1327 ***	0.6852 **	0.2777 ***	0.0804 ***	0.1882 ***
	(-66.61)	(-2.00)	(-15.55)	(-67.68)	(-22.56)
Foreign ownership	1.0708	0.6307	2.1623 ***	1.2901 **	0.7456 **
	(0.87)	(-0.79)	(4.22)	(2.21)	(-2.36)
Federal state ownership	1.2477 ***	1.2773	1.7571 ***	1.0646	1.2717 ***
	(4.33)	(0.72)	(3.02)	(0.70)	(3.53)
Regional state ownership	1.2846 ***	1.3869	2.2663 ***	1.2388 ***	1.1583 **
	(5.90)	(1.29)	(6.10)	(3.13)	(2.38)
Corporate governance					
Managerial discretion	1.0171 ***	1.1606 ***	1.1463 ***	0.9913 ***	0.9898 ***
	(8.35)	(14.20)	(21.97)	(-2.62)	(-3.53)
Number of board directors	0.8820 ***	0.4277 ***	0.3471 ***	0.8968 ***	0.9504 **
	(-7.90)	(-4.67)	(-5.19)	(-5.01)	(-2.30)
Number of board directors ^{2}	1.0055 ***	1.0310 ***	1.0359 ***	1.0040 ***	1.0019
	(4.73)	(5.73)	(5.37)	(2.69)	(1.17)
Number of auditors	0.8664 ***	0.8088 **	0.9062 *	0.8866 ***	0.8654 ***
	(-8.80)	(-2.35)	(-1.83)	(-4.51)	(-6.42)
Number of auditors ^{2}	1.0103 ***	1.0189 ***	1.0047	1.0104 ***	1.0092 ***
	(6.17)	(2.94)	(0.28)	(5.39)	(4.49)
International audit firm	1.2271	0.3790 ***	0.3774 ***	0.5818	2.2255
	(0.37)	(-7.28)	(-4.31)	(-0.50)	(1.30)
Large Russian audit firm	1.0140	0.4770 ***	0.9562 ***	0.8005	0.6734
	(0.03)	(-7.73)	(-3.78)	(-0.37)	(-0.66)
Local Russian audit firm	1.6312 ***	7.2580 ***	5.6040 **	1.4959 **	1.3802 *
	(3.68)	(3.44)	(2.53)	(2.01)	(1.74)
Firm performance					
ROA	0.9931 ***	0.9865 ***	0.9928 ***	0.9938 ***	0.9936 ***
	(-16.63)	(-6.43)	(-5.98)	(-9.09)	(-10.72)
Gross margin	0.9959 ***	1.0006	0.9958 ***	0.9961 ***	0.9955 ***
	(-9.07)	(0.28)	(-3.22)	(-5.20)	(-6.77)
Linkage with capital market					
Listing on the stock market	1.6191 ***	0.6468	0.2937	2.6195 ***	1.1307
	(3.59)	(-0.39)	(-0.90)	(5.57)	(0.60)
Gearing	1.0002 ***	0.9995 **	0.9997 **	1.0003 ***	1.0004 ***
	(5.86)	(-2.03)	(-1.98)	(4.17)	(7.30)
Firm size and age					
Firm size	0.9760 ***	1.0374	1.0465 ***	0.9703 ***	0.9527 ***
	(-4.55)	(1.35)	(3.02)	(-3.48)	(-6.17)
Firm age	0.9521 ***	0.8879 ***	0.9175 ***	0.9606 ***	0.9606 ***
	(-15.40)	(-8.74)	(-11.95)	(-7.57)	(-9.40)
Business organization					
Business network	0.9446 ***	0.8165 ***	0.8301 ***	0.9436 ***	0.9646 **
	(-5.59)	(-2.97)	(-4.34)	(-5.20)	(-2.52)
Business diversification	0.9959 **	0.9969	0.9943	0.9945 *	0.9975
	(-2.12)	(-0.31)	(-1.02)	(-1.68)	(-0.88)
Federal-region level fixed effects	Yes	Yes	Yes	Yes	Yes
NACE-division level fixed effects	Yes	Yes	Yes	Yes	Yes
N	74308	74308	71262	70913	63364
Log pseudolikelihood	-224140.00	-9327.66	-26865.75	-81428.38	-105204.23
Harrell's C-statistic	0.6910	0.8080	0.7777	0.7056	0.6657
Wald test (χ^2)	10241.74 ***	833237.51 ***	2304.95 ***	81115.08 ***	2801.53 ***

Note: This table contains results of the survival analysis using the Cox proportional hazards model. Table 1 provides detailed definitions and descriptive statistics of the independent variables. Reported estimates are the hazard ratio instead of regression coefficients. Standard errors are computed using the Huber-White sandwich estimator. z statistics are reported in parentheses beneath the hazard ratios. The Wald test examines the null hypothesis that all regression coefficients are zero. Models [2] to [4] show estimation results without the observations of failed firms before the period in question. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

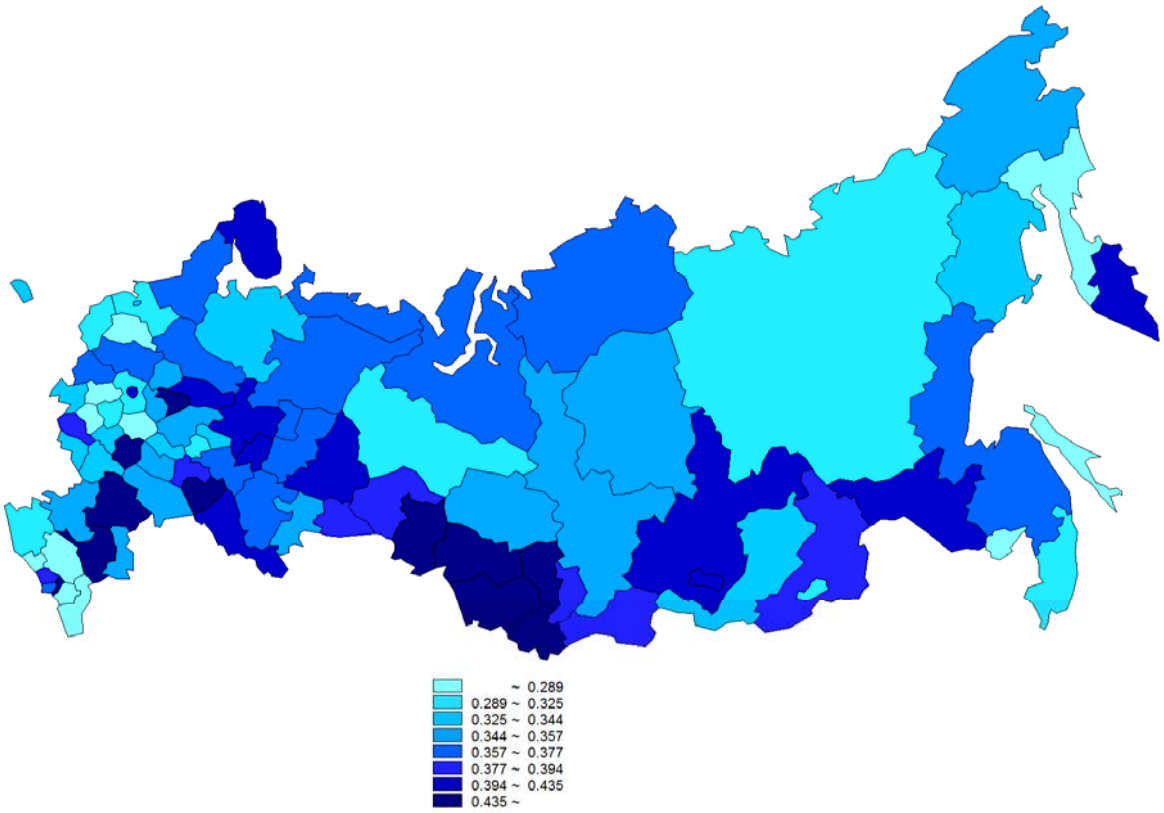
Source: Authors' estimations

Appendix 1. Detailed breakdown of firm survival status by industry

NACE Rev2 section	Number of firms operating at the end of 2006 (i)	Number of firms surviving until the end of 2015	Total failures until the end of 2015 (ii)	Entire period exit rate (ii/i)	Entire period Nelson-Aalen cumulative hazard function	Entire period Kaplan-Meier survivor function
Agriculture, forestry, and fishing (A)	6550	4221	2329	0.356	0.424	0.644
Mining and quarrying (B)	1191	796	395	0.332	0.391	0.668
Manufacturing (C)	19133	13106	6027	0.315	0.367	0.685
Electricity, gas, steam, and air conditioning supply (D)	1989	1204	785	0.395	0.484	0.605
Water supply; sewage, waste management, and remediation activities (E)	1329	791	538	0.405	0.499	0.595
Construction (F)	13838	8117	5721	0.413	0.510	0.587
Wholesale and retail trade; repair of motor vehicles and motorcycles (G)	42881	25300	17581	0.410	0.506	0.590
Transportation and storage (H)	4886	3230	1656	0.339	0.400	0.661
Accommodation and food service activities (I)	1366	1010	356	0.261	0.294	0.739
Information and communication (J)	2808	1964	844	0.301	0.347	0.699
Financial and insurance activities (K)	1564	914	650	0.416	0.513	0.584
Real estate activities (L)	4348	2843	1505	0.346	0.412	0.654
Professional, scientific, and technical activities (M)	6344	4486	1858	0.293	0.338	0.707
Administrative and support service activities (N)	1675	1112	563	0.336	0.396	0.664
Public administration and defense; compulsory social security (O)	49	36	13	0.265	0.298	0.735
Education (P)	437	378	59	0.135	0.143	0.865
Human health and social work activities (Q)	881	742	139	0.158	0.169	0.842
Arts, entertainment, and recreation (R)	409	275	134	0.328	0.386	0.672
Other service activities (S)	602	461	141	0.234	0.261	0.766
Multiple comparison among the 19 sections						
Chi-square test for independence using exit rate (χ^2)				1400.00 ***		
Log-rank test for equality of survivor functions (χ^2)						1321.2 ***

Source: Authors' calculations and estimations

Appendix 2. Regional distribution of firm exit rate during the period of 2007–2015



Note: Descriptive statistics of the regional-level firm exit rate are as follows: Mean, 0.365; S.D., 0.076; Kurtosis, 3.038; Skewness, 3.038. Kolmogorov-Smirnov test for normality: D =0.1097 (p =0.016).

Source: Authors' illustrations

Appendix 3. Estimation of Cox proportional hazards model using legal-form dummy variables

Model	[1]	[2]	[3]	[4]	[5]
Target industry (NACE Rev2 section classification)	All industries (Sections A–S)	Agriculture, forestry, and fishing (Section A)	Mining and manufacturing (Sections B–E)	Construction (Section F)	Services (Sections G–S)
Legal form characteristic					
Open JSC	1.1042 **	1.5270 ***	1.0851	0.8852	0.9797
	(2.19)	(3.14)	(0.88)	(-0.83)	(-0.30)
Closed JSC	0.8263 ***	1.2035 *	0.8610 *	0.6629 ***	0.7316 ***
	(-5.02)	(1.83)	(-1.65)	(-3.22)	(-5.83)
Limited liability company	0.9309 **	1.2009 *	0.9863	0.7095 ***	0.8077 ***
	(-1.98)	(1.84)	(-0.16)	(-2.84)	(-4.28)
Ownership structure					
Large shareholding	0.1327 ***	0.0920 ***	0.1028 ***	0.1489 ***	0.1501 ***
	(-66.61)	(-21.95)	(-32.83)	(-24.15)	(-46.00)
Foreign ownership	1.0708	2.4450 ***	0.8571	1.0440	1.1301
	(0.87)	(2.59)	(-1.01)	(0.10)	(1.24)
Federal state ownership	1.2477 ***	1.5396 **	1.2817 ***	1.5380 ***	1.1300 *
	(4.33)	(2.35)	(2.70)	(2.91)	(1.66)
Regional state ownership	1.2846 ***	1.1716	1.1269	1.2740 *	1.3608 ***
	(5.90)	(0.93)	(1.36)	(1.87)	(5.19)
Corporate governance					
Managerial discretion	1.0171 ***	0.9956	0.9898 **	1.0276 ***	1.0245 ***
	(8.35)	(-0.45)	(-2.02)	(5.37)	(9.56)
Number of board directors	0.8820 ***	0.9055 *	0.8880 ***	0.8840 ***	0.8660 ***
	(-7.90)	(-1.76)	(-4.62)	(-2.86)	(-6.55)
Number of board directors ^{2}	1.0055 ***	1.0025	1.0054 ***	1.0058 *	1.0055 ***
	(4.73)	(0.54)	(2.94)	(1.79)	(3.77)
Number of auditors	0.8664 ***	0.9662	0.8957 ***	0.8908 **	0.8876 ***
	(-8.80)	(-0.44)	(-3.45)	(-2.31)	(-5.38)
Number of auditors ^{2}	1.0103 ***	1.0143	1.0054 **	1.0171	1.0112 ***
	(6.17)	(0.57)	(2.25)	(0.87)	(2.87)
International audit firm	1.2271		1.7959		0.7105 ***
	(0.37)		(1.06)		(-8.14)
Large Russian audit firm	1.0140	0.1160 ***	0.8249	1.5276	1.6072
	(0.03)	(-30.71)	(-0.38)	(0.36)	(0.62)
Local Russian audit firm	1.6312 ***	0.7886	1.4348 **	0.7199	1.8587 ***
	(3.68)	(-0.30)	(2.09)	(-0.51)	(2.73)
Firm performance					
ROA	0.9931 ***	0.9917 ***	0.9926 ***	0.9944 ***	0.9932 ***
	(-16.63)	(-2.67)	(-7.03)	(-4.62)	(-13.77)
Gross margin	0.9959 ***	0.9923 ***	0.9951 ***	0.9953 ***	0.9970 ***
	(-9.07)	(-3.76)	(-3.97)	(-3.14)	(-5.66)
Linkage with capital market					
Listing on the stock market	1.6191 ***	3.2196 *	1.3467	2.8724 ***	0.9671
	(3.59)	(1.75)	(1.58)	(3.97)	(-0.10)
Gearing	1.0002 ***	1.0007 ***	1.0005 ***	1.0002	1.0002 ***
	(5.86)	(3.90)	(4.75)	(1.58)	(3.62)
Firm size and age					
Firm size	0.9760 ***	0.9370 **	0.9581 ***	0.9884	0.9772 ***
	(-4.55)	(-1.98)	(-3.23)	(-0.86)	(-3.51)
Firm age	0.9521 ***	0.9735 ***	0.9850 ***	0.9382 ***	0.9295 ***
	(-15.40)	(-3.60)	(-4.17)	(-11.83)	(-21.58)
Business organization					
Business network	0.9446 ***	0.9389 *	0.9398 ***	0.9527 ***	0.9454 ***
	(-5.59)	(-1.91)	(-4.96)	(-3.11)	(-3.25)
Business diversification	0.9959 **	0.9948	1.0003	0.9970	0.9934 ***
	(-2.12)	(-0.68)	(0.05)	(-0.56)	(-2.67)
Federal-region level fixed effects	Yes	Yes	Yes	Yes	Yes
NACE-division level fixed effects	Yes	Yes	Yes	Yes	Yes
N	74308	4363	16301	9317	44327
Log pseudolikelihood	-224140.00	-8037.16	-34139.47	-27585.37	-132612.24
Harrell's C-statistic	0.6910	0.7116	0.6825	0.6706	0.6964
Wald test (χ^2)	10241.74 ***	71275.04 ***	-34139.47 ***	10220.57 ***	6264.53 ***

Note: This table contains results of the survival analysis using the Cox proportional hazards model. Table 1 provides detailed definitions and descriptive statistics of the independent variables. Reported estimates are the hazard ratio instead of regression coefficients. Standard errors are computed using the Huber-White sandwich estimator. z statistics are reported in parentheses beneath the hazard ratios. The Wald test examines the null hypothesis that all regression coefficients are zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimations

Appendix 4. Estimation of Cox proportional hazards model using log-transformed variables of the number of board directors, number of auditors, gearing, firm age, business network, and business diversification

Model	[1]	[2]	[3]	[4]	[5]
Target industry (NACE Rev2 section classification)	All industries (Sections A–S)	Agriculture, forestry, and fishing (Section A)	Mining and manufacturing (Sections B–E)	Construction (Section F)	Services (Sections G–S)
Legal form characteristic					
Ownership transferability	0.5328 ***	0.7167	0.5582 ***	0.5651 **	0.5377 ***
	(-6.51)	(-0.81)	(-3.07)	(-2.34)	(-4.42)
Ownership transferability^2	1.2057 ***	1.1258	1.1892 ***	1.1889 **	1.1988 ***
	(6.98)	(1.10)	(3.41)	(2.52)	(4.53)
Limitation of liability	1.3714 ***	1.4707	1.2902 **	1.0769	1.2495 **
	(3.98)	(1.10)	(2.52)	(0.35)	(2.01)
Ownership structure					
Large shareholding	0.1376 ***	0.0973 ***	0.1074 ***	0.1535 ***	0.1534 ***
	(-65.19)	(-21.63)	(-31.79)	(-23.56)	(-45.64)
Foreign ownership	1.0606	2.5417 ***	0.8217	1.0263	1.1345
	(0.75)	(2.74)	(-1.29)	(0.06)	(1.28)
Federal state ownership	1.2406 ***	1.5939 **	1.2942 ***	1.5406 ***	1.1059
	(4.23)	(2.54)	(2.81)	(2.92)	(1.37)
Regional state ownership	1.2724 ***	1.1861	1.1144	1.2840 *	1.3293 ***
	(5.65)	(1.00)	(1.23)	(1.92)	(4.80)
Corporate governance					
Managerial discretion	1.0187 ***	0.9991	0.9953 **	1.0281 ***	1.0242 ***
	(9.22)	(-0.09)	(-2.01)	(5.46)	(9.51)
Number of board directors (log transformed)	0.7153 ***	0.6906 ***	0.7541 ***	0.7161 ***	0.6550 ***
	(-9.79)	(-3.21)	(-5.06)	(-3.66)	(-7.36)
Number of auditors (log transformed)	0.9054 ***	1.0045	0.9598 ***	0.9080 *	0.9032 ***
	(-4.43)	(0.05)	(-2.81)	(-1.67)	(-3.47)
International audit firm	0.8281		1.1963		0.8307 ***
	(-0.35)		(0.33)		(-6.74)
Large Russian audit firm	0.8826	0.1130 ***	0.7596	1.1882	1.4071
	(-0.31)	(-27.07)	(-0.53)	(0.16)	(0.45)
Local Russian audit firm	1.3885 **	0.8070	1.2586	0.6562	1.7158 **
	(2.56)	(-0.30)	(1.36)	(-0.67)	(2.40)
Firm performance					
ROA	0.9929 ***	0.9920 **	0.9922 ***	0.9946 ***	0.9930 ***
	(-17.27)	(-2.51)	(-7.56)	(-4.46)	(-14.18)
Gross margin	0.9962 ***	0.9925 ***	0.9956 ***	0.9951 ***	0.9973 ***
	(-8.34)	(-3.59)	(-3.64)	(-3.24)	(-5.21)
Linkage with capital market					
Listing on the stock market	1.5633 ***	2.5958	1.3294	2.9019 ***	0.9647
	(3.44)	(1.47)	(1.60)	(4.30)	(-0.11)
Gearing (log transformed)	1.0046 ***	1.0732 ***	1.0095 ***	0.9957	1.0202 **
	(4.43)	(3.41)	(3.16)	(-0.01)	(2.35)
Firm size and age					
Firm size	0.9875 **	0.9458 *	0.9727 **	0.9940	0.9875 **
	(-2.39)	(-1.65)	(-2.05)	(-0.43)	(-1.98)
Firm age (log transformed)	0.3333 ***	0.5999 ***	0.4257 ***	0.3323 ***	0.2920 ***
	(-33.98)	(-3.81)	(-11.59)	(-13.81)	(-29.72)
Business organization					
Business network (log transformed)	0.7782 ***	0.7396 ***	0.7988 ***	0.8055 ***	0.7612 ***
	(-14.86)	(-4.76)	(-6.47)	(-5.07)	(-11.56)
Business diversification (log transformed)	0.9705 ***	0.9437	0.9980	0.9857	0.9608 ***
	(-2.81)	(-1.24)	(-0.08)	(-0.47)	(-3.00)
Federal-region level fixed effects	Yes	Yes	Yes	Yes	Yes
NACE-division level fixed effects	Yes	Yes	Yes	Yes	Yes
N	74308	4363	16301	9317	44327
Log pseudolikelihood	-223843.37	-8029.16	-34066.97	-27569.72	-132525.55
Harrell's C-statistic	0.6935	0.7132	0.6930	0.6716	0.6972
Wald test (χ^2)	21594.15 ***	1249.97 ***	3557.00 ***	11604.47 ***	6939.27 ***

Note: This table contains results of the survival analysis using the Cox proportional hazards model. Table 1 provides detailed definitions and descriptive statistics of the independent variables. Reported estimates are the hazard ratio instead of regression coefficients. Standard errors are computed using the Huber-White sandwich estimator. z statistics are reported in parentheses beneath the hazard ratios. The Wald test examines the null hypothesis that all regression coefficients are zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimations

Appendix 5. Estimation of Cox proportional hazards model using industry-adjusted variables

Model	[1]	[2]	[3]	[4]	[5]
Target industry (NACE Rev2 section classification)	All industries (Sections A–S)	Agriculture, forestry, and fishing (Section A)	Mining and manufacturing (Sections B–E)	Construction (Section F)	Services (Sections G–S)
Legal form characteristic					
Ownership transferability	0.5403 ***	0.6053	0.5564 ***	0.5685 **	0.5542 ***
	(-6.38)	(-1.23)	(-3.10)	(-2.32)	(-4.19)
Ownership transferability^2	1.2003 ***	1.1789	1.1944 ***	1.1864 **	1.1845 ***
	(6.81)	(1.55)	(3.50)	(2.49)	(4.21)
Limitation of liability	1.3791 ***	1.6528	1.2715	1.1058	1.2747 **
	(4.07)	(1.43)	(1.45)	(0.47)	(2.19)
Ownership structure					
Large shareholding	0.1412 ***	0.1018 ***	0.1102 ***	0.1553 ***	0.1559 ***
	(-63.92)	(-21.07)	(-30.91)	(-23.47)	(-44.97)
Foreign ownership	1.0582	2.4899 ***	0.8122	1.0108	1.1377
	(0.72)	(2.66)	(-1.37)	(0.03)	(1.31)
Federal state ownership	1.2216 ***	1.5855 **	1.2893 ***	1.5270 ***	1.0952
	(3.91)	(2.47)	(2.76)	(2.87)	(1.23)
Regional state ownership	1.2508 ***	1.1610	1.1146	1.2989 **	1.3224 ***
	(5.23)	(0.88)	(1.23)	(2.01)	(4.68)
Corporate governance					
Managerial discretion (industry adjusted)	1.0373 ***	1.0096	0.9913	1.0609 ***	1.0543 ***
	(7.79)	(0.48)	(-0.81)	(5.68)	(8.18)
Number of board directors (industry adjusted)	0.8272 ***	0.7886 ***	0.8517 ***	0.8244 ***	0.7954 ***
	(-9.95)	(-3.68)	(-5.10)	(-3.80)	(-7.27)
Number of auditors (industry adjusted)	0.9248 ***	0.9681	0.9699	0.9231 **	0.9182 ***
	(-5.18)	(-0.49)	(-0.94)	(-2.01)	(-4.26)
International audit firm	0.8775		1.3228		0.6028 ***
	(-0.24)		(0.47)		(-7.30)
Large Russian audit firm	0.8558	0.1927 ***	0.7683	1.0818	1.2754
	(-0.40)	(-40.36)	(-0.51)	(0.07)	(0.32)
Local Russian audit firm	1.3507 **	0.8562	1.2417	0.6176	1.6559 **
	(2.37)	(-0.22)	(1.29)	(-0.76)	(2.25)
Firm performance					
ROA (industry adjusted)	0.9583 ***	0.9397 ***	0.9579 ***	0.9714 ***	0.9575 ***
	(-18.37)	(-3.58)	(-7.53)	(-4.16)	(-15.55)
Gross margin (industry adjusted)	0.9710 ***	0.9694 **	0.9735 ***	0.9664 ***	0.9741 ***
	(-12.17)	(-2.30)	(-4.48)	(-4.28)	(-8.98)
Linkage with capital market					
Listing on the stock market	1.5466 ***	2.5535	1.3160	2.8133 ***	0.9560
	(3.42)	(1.48)	(1.56)	(4.21)	(-0.14)
Gearing (industry adjusted)	1.0031 ***	1.0152 ***	1.0049 **	1.0050 *	1.0018
	(3.42)	(3.76)	(2.36)	(1.82)	(1.58)
Firm size and age					
Firm size (industry adjusted)	1.0006	0.9828	0.9956	1.0001	0.9972
	(0.28)	(-0.20)	(-0.81)	(0.82)	(-0.09)
Firm age (industry adjusted)	0.8639 ***	0.9420 ***	0.8786 ***	0.8638 ***	0.8538 ***
	(-33.67)	(-3.17)	(-13.13)	(-13.63)	(-27.63)
Business organization					
Business network (industry adjusted)	0.8223 ***	0.7716 ***	0.8392 ***	0.8424 ***	0.8103 ***
	(-15.15)	(-5.41)	(-6.60)	(-5.46)	(-11.49)
Business diversification (industry adjusted)	0.9891 ***	0.9889	0.9982	0.9942	0.9853 ***
	(-2.68)	(-0.65)	(-0.19)	(-0.51)	(-2.87)
Federal-region level fixed effects	Yes	Yes	Yes	Yes	Yes
NACE-division level fixed effects	Yes	Yes	Yes	Yes	Yes
N	74308	4363	16301	9317	44327
Log pseudolikelihood	-223743.33	-8016.23	-34039.41	-27558.61	-132493.37
Harrell's C-statistic	0.6951	0.7200	0.6948	0.6735	0.6981
Wald test (χ^2)	20215.82 ***	1250.96 ***	3651.60 ***	9459.72 ***	22419.68 ***

Note: This table contains results of the survival analysis using the Cox proportional hazards model. Table 1 provides detailed definitions and descriptive statistics of the independent variables. Reported estimates are the hazard ratio instead of regression coefficients. Standard errors are computed using the Huber-White sandwich estimator. z statistics are reported in parentheses beneath the hazard ratios. The Wald test examines the null hypothesis that all regression coefficients are zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimations

Appendix 6. Estimation of Cox proportional hazards model by regional group

Model	[1]	[2]	[3]	[4]	[5]
Targeted federal district(s)	North Caucasus and Southern Districts	Northwestern District	Central District	Volga and Ural Districts	Siberian and Far East Districts
Legal form characteristic					
Ownership transferability	0.3479 ***	0.3210 ***	0.5025 ***	0.6405 **	0.4477 **
	(-2.60)	(-3.65)	(-4.45)	(-2.13)	(-2.55)
Ownership transferability ^{2}	1.3865 ***	1.3813 ***	1.1921 ***	1.1524 **	1.2668 ***
	(2.96)	(3.65)	(4.04)	(2.46)	(2.71)
Limitation of liability	1.6880	1.6290 *	1.3714 **	1.2160	1.4992
	(1.55)	(1.89)	(2.37)	(1.11)	(1.56)
Ownership structure					
Large shareholding	0.1164 ***	0.1056 ***	0.1792 ***	0.1201 ***	0.1350 ***
	(-21.45)	(-22.11)	(-27.35)	(-37.23)	(-25.97)
Foreign ownership	0.6527	1.2900	0.9512	1.4140 *	1.1052
	(-0.86)	(1.20)	(-0.44)	(1.88)	(0.34)
Federal state ownership	1.0105	1.4777 ***	1.3212 ***	1.2218 *	1.1392
	(0.05)	(2.63)	(3.08)	(1.73)	(0.95)
Regional state ownership	1.1370	0.8801	1.4741 ***	1.2125 **	0.9843
	(0.78)	(-0.88)	(4.65)	(2.08)	(-0.12)
Corporate governance					
Managerial discretion	1.0067	0.9928	1.0351 ***	1.0143 ***	1.0068
	(0.83)	(-1.13)	(11.14)	(3.18)	(1.14)
Number of board directors	0.8591 ***	0.9728	0.8844 ***	0.8365 ***	0.8897 **
	(-3.02)	(-0.64)	(-4.56)	(-5.23)	(-2.48)
Number of board directors ^{2}	1.0032	0.9983	1.0062 ***	1.0085 ***	1.0049
	(0.93)	(-0.58)	(3.79)	(3.38)	(1.43)
Number of auditors	1.0225	0.6863 ***	0.8572 ***	0.9094 ***	0.9604
	(0.28)	(-6.56)	(-5.41)	(-2.73)	(-0.81)
Number of auditors ^{2}	0.9775	1.0420 ***	1.0151 ***	1.0056 *	1.0151 **
	(-0.51)	(3.01)	(3.91)	(1.87)	(2.16)
International audit firm	0.8107 ***	3.4160	0.9648	0.7216	0.1050 ***
	(-15.63)	(1.00)	(-0.03)	(-0.29)	(-31.89)
Large Russian audit firm	1.1063	0.3510 ***	0.8836	2.2023	1.4824
	(0.10)	(-5.14)	(-0.16)	(1.06)	(0.58)
Local Russian audit firm	0.5435	1.1074	2.4495 ***	1.7160 **	0.8830
	(-0.91)	(0.26)	(3.67)	(2.13)	(-0.32)
Firm performance					
ROA	0.9937 ***	0.9928 ***	0.9943 ***	0.9920 ***	0.9903 ***
	(-3.89)	(-5.29)	(-9.39)	(-8.61)	(-7.86)
Gross margin	0.9956 **	0.9940 ***	0.9961 ***	0.9962 ***	1.0003
	(-2.10)	(-3.78)	(-6.03)	(-3.42)	(0.20)
Linkage with capital market					
Listing on the stock market	2.1938 **	2.5590 **	1.0383	2.9350 ***	0.7458
	(2.10)	(2.14)	(0.14)	(4.04)	(-0.62)
Gearing	1.0003 **	1.0001	1.0002 ***	1.0002 **	1.0004 ***
	(1.98)	(0.97)	(2.56)	(2.30)	(3.75)
Firm size and age					
Firm size	0.9849	0.9701	0.9916	0.9443 ***	0.9485 ***
	(-0.65)	(-1.53)	(-1.20)	(-4.41)	(-3.19)
Firm age	0.9633 ***	0.9742 ***	0.9375 ***	0.9524 ***	0.9337 ***
	(-4.08)	(-3.22)	(-14.29)	(-7.72)	(-10.57)
Business organization					
Business network	0.9551 *	0.9907	0.9402 ***	0.9338 ***	0.9525 ***
	(-1.88)	(-0.22)	(-5.85)	(-4.82)	(-2.80)
Business diversification	0.9910	0.9919	0.9979	0.9956	1.0055
	(-1.17)	(-1.29)	(-0.66)	(-1.01)	(0.95)
Federal-region level fixed effects	Yes	Yes	Yes	Yes	Yes
NACE-division level fixed effects	Yes	Yes	Yes	Yes	Yes
N	6241	9098	32318	17082	9569
Log pseudolikelihood	-11110.49	-17439.04	-85798.08	-38407.35	-21009.42
Harrell's C-statistic	0.6927	0.6945	0.6944	0.6932	0.7054
Wald test (χ^2)	65417.00 ***	41771.55 ***	23745.26 ***	7664.30 ***	20368.17 ***

Note: This table contains results of the survival analysis using the Cox proportional hazards model. Table 1 provides detailed definitions and descriptive statistics of the independent variables. Reported estimates are the hazard ratio instead of regression coefficients. Standard errors are computed using the Huber-White sandwich estimator. z statistics are reported in parentheses beneath the hazard ratios. The Wald test examines the null hypothesis that all regression coefficients are zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimations

Appendix 7. Estimation of parametric survival models for robustness check

Model	Table 4 Model [1]	[1]	[2]	[3]	[4]	[5]	[6]
Assumption of survival distribution	Cox propotional hazards	Exponential	Weibull	Gompertz	Log-normal	Log-logistic	Generalized gamma
Legal form characteristic							
Ownership transferability	0.4804 ***	0.5093 ***	0.4715 ***	0.4700 ***	0.4689 ***	0.3203 ***	0.2909 ***
	(-7.58)	(-7.42)	(-7.50)	(-7.49)	(10.17)	(7.87)	(7.44)
Ownership transferability ^{2}	1.2271 ***	1.2080 ***	1.2337 ***	1.2353 ***	-0.1231 ***	-0.0883 ***	-0.0813 ***
	(7.68)	(7.57)	(7.60)	(7.61)	(-9.66)	(-7.84)	(-7.55)
Limitation of liability	1.5792 ***	1.4978 ***	1.5868 ***	1.5828 ***	-0.3410 ***	-0.2027 ***	-0.1785 ***
	(5.64)	(5.29)	(5.50)	(5.44)	(-8.49)	(-5.87)	(-5.49)
Ownership structure							
Large shareholding	0.1327 ***	0.2118 ***	0.1183 ***	0.1169 ***	0.9423 ***	0.8589 ***	0.8264 ***
	(-66.61)	(-77.51)	(-64.88)	(-65.70)	(69.96)	(75.55)	(71.76)
Foreign ownership	1.0708	1.0508	1.0594	1.0552	-0.0789 **	-0.0460	-0.0220
	(0.87)	(0.67)	(0.71)	(0.66)	(-2.12)	(-1.35)	(-0.70)
Federal state ownership	1.2477 ***	1.2222 ***	1.2570 ***	1.2555 ***	-0.0976 ***	-0.0947 ***	-0.0886 ***
	(4.33)	(4.08)	(4.33)	(4.27)	(-4.17)	(-4.53)	(-4.32)
Regional state ownership	1.2846 ***	1.2446 ***	1.2887 ***	1.2849 ***	-0.1292 ***	-0.1097 ***	-0.0981 ***
	(5.90)	(5.45)	(5.77)	(5.66)	(-6.41)	(-6.16)	(-5.75)
Corporate governance							
Managerial discretion	1.0171 ***	1.0135 ***	1.0175 ***	1.0170 ***	-0.0113 ***	-0.0082 ***	-0.0067 ***
	(8.35)	(7.21)	(8.14)	(7.89)	(-11.23)	(-9.22)	(-7.88)
Number of board directors	0.8820 ***	0.8883 ***	0.8799 ***	0.8797 ***	0.0660 ***	0.0512 ***	0.0496 ***
	(-7.90)	(-8.14)	(-7.83)	(-7.91)	(9.75)	(7.08)	(7.80)
Number of board directors ^{2}	1.0055 ***	1.0052 ***	1.0057 ***	1.0057 ***	-0.0029 ***	-0.0023 ***	-0.0022 ***
	(4.73)	(4.88)	(4.71)	(4.78)	(-6.09)	(-4.15)	(-4.71)
Number of auditors	0.8664 ***	0.8730 ***	0.8618 ***	0.8611 ***	0.0946 ***	0.0646 ***	0.0575 ***
	(-8.80)	(-8.76)	(-8.84)	(-8.84)	(10.81)	(8.76)	(8.83)
Number of auditors ^{2}	1.0103 ***	1.0098 ***	1.0106 ***	1.0107 ***	-0.0062 ***	-0.0047 ***	-0.0041 ***
	(6.17)	(6.10)	(6.31)	(6.35)	(-3.35)	(-3.43)	(-6.31)
International audit firm	1.2271	1.2384	1.2316	1.2299	-0.2127	-0.1143	-0.0801
	(0.37)	(0.39)	(0.37)	(0.36)	(-0.83)	(-0.48)	(-0.36)
Large Russian audit firm	1.0140	1.0182	1.0037	0.9980	-0.2879	-0.0548	-0.0001
	(0.03)	(0.05)	(0.01)	(0.00)	(-1.56)	(-0.33)	(0.00)
Local Russian audit firm	1.6312 ***	1.6023 ***	1.6482 ***	1.6488 ***	-0.2990 ***	-0.2240 ***	-0.1931 ***
	(3.68)	(3.68)	(3.67)	(3.65)	(-4.77)	(-4.04)	(-3.65)
Firm performance							
ROA	0.9931 ***	0.9935 ***	0.9929 ***	0.9928 ***	0.0034 ***	0.0030 ***	0.0028 ***
	(-16.63)	(-16.79)	(-16.52)	(-16.48)	(16.91)	(16.96)	(16.29)
Gross margin	0.9959 ***	0.9962 ***	0.9957 ***	0.9956 ***	0.0019 ***	0.0017 ***	0.0017 ***
	(-9.07)	(-9.19)	(-9.06)	(-9.10)	(8.79)	(9.07)	(9.04)
Linkage with capital market							
Listing on the stock market	1.6191 ***	1.5585 ***	1.6315 ***	1.6360 ***	-0.2217 ***	-0.1977 ***	-0.1897 ***
	(3.59)	(3.46)	(3.55)	(3.54)	(-3.45)	(-3.60)	(-3.54)
Gearing	1.0002 ***	1.0002 ***	1.0002 ***	1.0002 ***	-0.0001 ***	-0.0001 ***	-0.0001 ***
	(5.86)	(6.61)	(5.76)	(5.85)	(-5.35)	(-5.78)	(-5.76)
Firm size and age							
Firm size	0.9760 ***	0.9757 ***	0.9743 ***	0.9741 ***	0.0120 ***	0.0098 ***	0.0101 ***
	(-4.55)	(-5.02)	(-4.65)	(-4.65)	(3.98)	(4.25)	(4.66)
Firm age	0.9521 ***	0.9556 ***	0.9498 ***	0.9494 ***	0.0138 ***	0.0198 ***	0.0200 ***
	(-15.40)	(-14.78)	(-15.81)	(-15.86)	(7.92)	(13.70)	(15.78)
Business organization							
Business network	0.9446 ***	0.9465 ***	0.9432 ***	0.9428 ***	0.0162 **	0.0224 ***	0.0227 ***
	(-5.59)	(-5.53)	(-5.66)	(-5.68)	(2.39)	(5.33)	(5.66)
Business diversification	0.9959 **	0.9964 **	0.9957 **	0.9957 **	0.0015	0.0016 *	0.0017 **
	(-2.12)	(-2.00)	(-2.11)	(-2.09)	(1.51)	(1.91)	(2.11)
Federal-region level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NACE-division level fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	74308	74308	74308	74308	74308	74308	74308
Log pseudolikelihood	-224140.00	-50686.68	-43146.51	-43836.14	-44010.24	-43293.08	-43146.47
Wald test (χ^2)	10241.74 ***	15078.64 ***	11204.85 ***	11610.50 ***	10481.33 ***	10666.66 ***	10165.41 ***

Note: This table contains results from the survival analysis using 6 parametric estimators for a robustness check. Table 1 provides detailed definitions and descriptive statistics of the independent variables. Models [1] to [3] report hazard ratios instead of regression coefficients, while Models [4] to [6] report regression coefficients. Standard errors are computed using the Huber-White sandwich estimator. *z* statistics are reported in parentheses beneath the regression coefficients. The Wald test examines the null hypothesis that all regression coefficients are zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimations