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Corporate Governance System and Regional Heterogeneity: Evidence from East and West Russia*

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Abstract: Using a unique firm-level dataset obtained from a large-scale questionnaire survey conducted in late 2015, we examined the generality and heterogeneity of corporate governance systems between the eastern and western regions of Russia. The survey results strongly suggest that various characteristics of corporate governance systems observed in industrial firms and listed companies are, in fact, common and long-term trends that are seen across all Russian business sectors. At the same time, however, we also found pronounced regional heterogeneity between the eastern and western regions, with companies in the east being more reluctant than those in the west to introduce a governance system to monitor and supervise top management. Regression analysis shows that this finding is robust, even after a series of firm-level attributes are simultaneously controlled for.

JEL classification numbers: D22; G34; L22; M42; P25; P31

Keywords: corporate governance system; legal form of incorporation; board of directors; audit system; regional heterogeneity; Russia

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1 Introduction

For the past quarter-century, after the fall of the Soviet Union, Russia has striven to modernize its corporate systems. The progress it has made is nothing short of remarkable. In fact, by the mid-2000s, Russia's corporate law had been improved to incorporate a framework and contents that are comparable to those in developed nations (Oda, 2007). The administrative and judicial institutions that handle the registration and dissolution of companies and mediate business disputes are also fulfilling their functions, to a certain extent. In addition, it is no exaggeration that business service industries that provide accounting audits, management consulting, job placement services, and information communications and data processing services to companies, as well as financial intermediation today are, though still a work in progress, a world away from what they were 25 years ago. Furthermore, in the World Bank's assessment of the ease of doing business, Russia was ranked 40th among the world's 190 countries, as of 2017, which is close to Japan's ranking of 34th and higher than those of several Central and Eastern European EU member states, including Hungary and Croatia (World Bank, 2017). Considering the fact that Russia was ranked as low as 106 of 178 countries in the same ranking a decade ago (World Bank, 2008), it is evident that the environment surrounding Russian firms has improved considerably in recent years.

In this time of rapid change, Russian companies themselves have also evolved to refine their management organizations to adapt to market competition and globalization. A corporate governance system, which provides a framework for effective discipline of management executives to enable the attainment of business objectives and maximization of firm value, is a matter of great interest not only to policymakers and investors in Russia, where the separation of ownership and management is progressing at a fast pace, but also to researchers who have striven to gain deeper insights into the internal organizations of Russian corporations.¹ Although the quantity of empirical evidence available on Russian companies is fairly limited compared to that available on companies in developed economies, it has produced a common understanding that can be referred to as "stylized facts" about the Russian corporate governance system. This research evidence, however, is not without limitations: First, it is strongly dependent on findings from investigations and analysis of mining and manufacturing sectors and listed companies; therefore, it does not guarantee generality across the whole Russian corporate sectors. Second, although Russia, due to its vast territories, exhibits substantially different socioeconomic systems regionally, to the best of our knowledge, and according to the latest literature review conducted

¹ See Iwasaki (2007b) and Puffer and McCarthy (2011), which offer comprehensive literature surveys of corporate governance in Russia.

by Muravyev (2017),² no empirical study has been published to date that addresses the regional heterogeneity in corporate governance systems. Filling these gaps would undoubtedly have significant implications, not only for the study of the Russian economy but also for corporate finance and organizational economics. In this study, to address these two issues, we will elucidate the general structure of the Russian corporate governance system based on firm-level data of listed and unlisted companies encompassing a vast range of industries and verify the presence and degree of regional heterogeneity between the eastern and western regions of Russia.

The empirical analysis presented in this paper is based on a large-scale questionnaire survey conducted by the Economic Research Institute for Northeast Asia (ERINA) during the fourth quarter of 2015 (hereafter referred to as the ERINA Enterprise Survey). During the ERINA Enterprise Survey, a questionnaire was administered by interview in eight regions (i.e., federal entities) in eastern Russia and nine regions in western Russia, and valid responses were obtained from a total of 742 executives from 17 industrial sectors.³ According to the Russian Federal State Statistics Service (ROSSTAT), there were a total of 3391 registered business corporations in these 17 regions, encompassing 17 industrial sectors as of the end of 2013, 21.9% of which were covered in the ERINA Enterprise Survey. The average number of employees across the surveyed companies was 193.8 (median: 80), which is consistent with that of typical medium-scale firms in local areas. The distribution of these companies across industrial sectors suggests that the 742 surveyed firms reflect an excellent representation of various industries in the country. The survey results contain detailed data regarding not only the basic company profile but also the ownership structure, legal form of incorporation, board of directors, and audit committee, as well as the contracted external auditor (audit firm) that enables us to seek our objectives.⁴

The survey results strongly suggest that various characteristics of the Russian corporate governance system identified by previous studies that focused mainly on industrial firms and listed companies are, in fact, common and long-term trends that are seen across all Russian business sectors. At the same time, however, we also found pronounced regional heterogeneity between the eastern and western regions, with companies in the east being more reluctant than those in the west to introduce a governance system to monitor and supervise top management. Regression analysis verified that this finding is robust, even after a series of firm-level attributes are simultaneously controlled for.

² See Section 3 and Appendix A in Muravyev (2017).

³ Most respondents were either the president or executive director, accounting for 63.2% of all respondents. The average tenure and age of respondents were 7.6 years (median: 6 years) and 46.3 years (median: 46 years), respectively.

⁴ For further details about the ERINA Enterprise Survey, see Arai and Iwasaki (2016).

The reminder of this paper is structured as follows: In the next section, a common understanding among researchers about the structure and problems of the Russian corporate governance system is reviewed, based on the findings presented by previous studies. In Section 3, we examine the results of the ERINA Enterprise Survey in detail by using univariate comparative analysis of the eastern and western regions of Russia. In Section 4, multivariate regression analyses are performed to verify in a more rigorous manner the presence and degree of regional heterogeneity in corporate governance systems. Finally, in Section 5, we summarize the major findings and discuss their policy implications.

2 Stylized Facts of the Corporate Governance System in Russia: Literature Review

In this section, we first discuss the legal frameworks of Russian corporate systems and then argue the structure and problems of the Russian corporate governance system that have been identified in previous studies.

Russian law recognizes the following types of profit corporations and profit-seeking organizations as legal entities that can be founded within Russian territory: unitary enterprises,⁵ business partnerships (general partnerships, limited partnership companies), business companies (limited liability companies, supplementary liability companies, commercial companies, joint-stock companies), and production cooperatives. According to the official statistics shown in **Table 1**, as of January 2016, when the ERINA Enterprise Survey had just ended, business partnerships/companies except joint-stock companies (JSCs) accounted for 95.1% of all profit organizations, most of which fall under the category of limited liability companies (LLCs). In contrast, JSCs accounted for only 3.0%. However, taking into consideration the fact that the majority of state-owned enterprises were privatized by conversion into JSCs in the 1990s, just as many medium- and large-scale companies are run as JSCs as those that are run as LLCs (Iwasaki, 2014a). This is precisely the reason why researchers investigating and analyzing corporate governance systems in Russia have focused their attention first on JSCs, and then on LLCs.

Table 2 shows the statutory company organs within LLCs and JSCs in Russia. As described in this table, although these two legal forms of incorporation differ from one another in terms of which statutory company organs are mandatory, conditional, or optional, the board of directors (also referred to as the "supervisory board") and the audit committee (auditor) are defined for both corporate organs as the internal organizations responsible for monitoring and supervising management. Furthermore, the Federal Law of Audit Activities requires that JSCs, securities

⁵ Unitary enterprises refer to those purely state-owned and municipally owned enterprises that are exclusively owned by state institutions.

distribution companies, financial institutions, and any profit organizations whose annual sales or asset balance exceeds a designated amount shall be audited by an external certified auditor or audit firm.⁶ The mandatory external audit requirements are relatively stringent, and most LLCs are also required to be audited by an external entity. In view of these facts, focusing attention not only on the board of directors and the audit committee but also on the auditors and audit firms selected by the companies to conduct these external audits is key to understanding the fundamental structure of the Russian corporate governance system.⁷

Because the study of corporate governance in Russia was initially motivated by the privatization of state-owned companies, the overwhelming majority of the literature related to the internal organization of Russian firms is focused on ownership structure, with many such studies, in fact, being published in recent years (Ankudinov and Lebedev, 2016; Liljeblom and Maury, 2016; Moser, 2016). Since the late 1990s, however, a group of researchers, such as Blasi and Shleifer (1996), Wright et al. (1998), and Filatotchev et al. (1999a, 1999b), have published a number of articles in which they addressed the size and composition of boards of directors. From the same viewpoint, some notable research articles also published in the 2000s include those by Bevan et al. (2001), Judge et al. (2003), and Peng et al. (2003). The latest studies on listed companies are represented by Muravyev et al. (2014) and the aforementioned Muravyev (2017).⁸

In addition to these extant studies, findings produced by a joint research project undertaken by the Institute of Industrial and Market Research of Higher School of Economics (HSE) and the Institute of Economic Research of Hitotsubashi University (HU) also contributed to improving our understanding of the Russian system of corporate governance (Dolgopyatova et al., 2009). The study carried out in this research project is based on a large-scale questionnaire survey carried out across the Russian Federation during the first half of 2005 that was administered to both listed and unlisted JSCs in the mining, manufacturing, and telecommunications sectors (Dolgopyatova and Iwasaki, 2006); furthermore, the project examined not only boards of directors, but also

⁶ According to the Federal Law of Audit Activities that was in effect at the time this paper was written, any profit organization with annual sales of at least 400 million rubles and/or an asset balance of at least 60 million rubles is required to be audited by an external entity (Art. 5, Para. 4).

⁷ The single executive body refers to a top manager (CEO, President, or General Director), while the collective executive board consists of corporate officers and executes company management in cooperation with the single executive body. For more details of the legal forms of incorporation and statutory company organs of Russian companies, see Dolgopyatova et al. (2009) and Iwasaki (2007a; 2008; 2013).

⁸ Quite a few articles have been published in Russian as well as international comparative studies that include Russia, which we will not mention here because they have already been cited by Muravyev (2017).

corporate forms and audit systems, for which very little evidence is currently available in the literature. These characteristics make the HSE-HU joint research project an adequate candidate for comparison with the ERINA Enterprise Survey.

The major findings on corporate governance systems produced by the HSE-HU joint project can be summarized as follows:

(a) *Legal form of incorporation*: Most JSCs in Russia, including medium- and large-scale companies, are run as private (closed) rather than public (open) companies. This is mainly due to factors such as significant inside ownership, a strong orientation among managers toward closed organizations, slumping needs for corporate finance, and weak local financial institutions.

(b) *Board of directors*: (1) With the exception of companies with an extremely small number of shareholders with voting rights, most JSCs have a board of directors. (2) The corporate board consists of an average of 6.6 directors (median: 7), with an average of 48.9% (median: 55.6%) of them being elected from outside the company. The surveyed firms, however, were actually split between two extremes: those with more than 80% of board directors elected from outside the company and those with no more than 10% outside directors. (3) Few companies employ independent directors; consequently, independent directors account for only 6.5% of all board directors.⁹ (4) Board chairmen are most often appointed from inside the company (45.9%), followed by 30.9% who are appointed from outside the company and 23.2% who are invited from an affiliated business group or close business partner. (5) While the bargaining balance between the management and outside shareholders is a strong determinant of a board's composition (Hermalin and Weisbach, 1998), factors such as the historical background of the company's foundation, board size, export performance, debt ratio, and intensity of research and development (R&D) activities can also have a certain influence on the board structure.

(c) *Audit system*: (1) The audit committee consists of an average of 3.5 corporate auditors (median: 3), with an average of 42.8% (median 33.0%) being appointed from outside the company. Just as in the case with boards of directors, the surveyed firms were split between two extremes: those with more than 90% of auditors elected from outside the company and those with no more than 10% outside auditors. (2) Expert auditors account for only 16.5% of all committee members, and the majority of companies employ no expert auditors at all. (3) Local small- and medium-sized audit firms account for 68.5% of all external auditors elected by surveyed companies, and

⁹ According to Muravyev et al. (2014) and Muravyev (2017), the board of directors of Russian listed companies consists of 8.8 members on average, with 57% elected from outside the company and 10% independent directors. Furthermore, the polarization in board composition in terms of the proportion of outside directors observed by Iwasaki (2008) was not so marked in listed companies investigated by these authors.

large-scale national audit firms and international audit firms account for only 23.2% and 8.3%, respectively. (4) The independence and expertise of the audit system in a company are strongly and positively correlated with the proportion of outside directors on the board (Iwasaki, 2008, 2014a, 2014b; Dolgopyatova et al., 2009).

In addition, a follow-up survey conducted during the fourth quarter of 2009 by a team of Japanese researchers also revealed that changes in ownership structures and corporate governance systems were occurring at a very slow pace, and that no significant structural changes were observed in either boards of directors or audit systems in Russian industrial companies during the period from 2005 to 2009 (Iwasaki, 2016).

The findings and empirical evidence obtained from the HSE-HU joint project and its follow-up survey are more or less in agreement with those from other previous studies. In sum, the existing literature generally addresses stylized facts about the structure and problems of the Russian corporate governance system, and the empirical findings presented by Iwasaki (2016) strongly suggest that the internal organizations of Russian firms today are highly likely to have structural features that resemble those identified by previous studies.

3 Survey Results

In this section, we report results of the ERINA Enterprise Survey and, based on them, perform univariate analysis to tackle the following two questions: Can the stylized facts about the Russian corporate governance system described in the previous section be observed in the 742 companies included in the ERINA Enterprise Survey? Is there significant regional heterogeneity between the eastern and western regions of Russia with respect to corporate governance systems? To this end, the next three subsections examine the survey results regarding the legal form of incorporation, the board of directors, and the audit system. The fourth subsection draws the overall structure of corporate governance systems in the surveyed firms and argues the differences between the eastern and western regions from this perspective.

3.1 Legal Form of Incorporation

The legal forms of incorporation of the 742 surveyed firms are shown in **Table 3**. As described in Section 2, although various types of profit organizations can be established under Russian law, only JSCs and LLCs were included in the ERINA Enterprise Survey. Accordingly, the 742 surveyed firms fall under one of the following three categories: public JSCs (referred to as open JSCs in the former law), private JSCs (closed JSCs), and LLCs.

According to **Table 3**, 550 (74.1%) of 742 surveyed firms are run as LLCs. The remaining 192 companies (25.9%) are operating as JSCs. The percentage of JSCs in the surveyed firms is

much higher than that shown by the official statistics in **Table 2**. This is probably attributable to the fact that the ERINA Enterprise Survey only targeted companies with an annual average number of employees of 50 or greater. Nevertheless, even among medium- and large-scale companies in Russia, the overwhelming majority are operated as LLCs.

A chi-square test of equality detects a difference in the proportions of corporate forms between the eastern and western regions at the 5% level of statistical significance ($\text{Chi}^2=7.8013$, $p=0.0202$). This difference, however, is caused, not by the difference in the percentage shares of LLCs, but rather by the differences in the shares of public JSCs and private JSCs, as indicated in **Table 3**. While the shares of JSCs are more or less the same between the two regions (24.9% vs. 26.8%), the share of public JSCs is approximately 20% lower in the west than in the east (70.8% vs. 51.5%), with the difference being highly significant according to a z -test of proportions ($z=2.731$, $p=0.0063$). To sum up, although no marked difference is observed between eastern and western companies with respect to the choice of LLC or JSC, considerably more JSCs in the east than their counterparts in the west are likely to opt for a more open organizational architecture as their legal form of incorporation. This finding is closely related to the survey results with respect to board of directors and audit system, as described in the following subsections.

3.2 Board of Directors

Table 4 shows the survey results regarding the establishment, membership size, and composition of the board of directors.

As shown in Panel (a) of **Table 4**, the board of directors of 212 (28.6%) of 742 surveyed companies plays a key role in corporate governance. This implies that three of four Russian companies do not have a statutory company organ responsible for monitoring and supervising top management. This disappointing situation may reflect a lack of understanding about the need for corporate governance on the part of local governments and stakeholders. Furthermore, the same panel also shows that this trend is more prominent in the eastern region than in the western region. In fact, the percentage of surveyed firms that do not establish a board of directors is 68.2% (262 of 384) in the west and 74.9% (268 of 358) in the east. The difference between the two regions is significant at the 5% level ($z=-1.998$, $p=0.0457$).

However, when the focus is shifted to only those companies with a corporate board, new facts reveal themselves: First, according to Panel (b) of **Table 4**, which displays the frequency distribution of the board size, while a board typically consists of three to seven directors in both the eastern and western regions, eastern companies are more likely than their western counterparts to appoint a large number of directors to discipline the company's management. In fact, the mean number of board directors is 4.5 (median: 4.5) for companies in the west and 5.3 (median: 5.0)

for companies in the east; this difference between the two regions is statistically significant at the 5% level in both the t -test of means and the Wilcoxon (Mann-Whitney) rank sum test ($t=2.4734$, $p=0.0142$; Wilcoxon $z=2.332$, $p=0.0197$).

Second, there are noteworthy differences between eastern and western companies in board director attributes. Panel (c) of **Table 4** shows that the 212 surveyed companies have a total of 1027 directors on their boards. Among them, inside directors, which consist of managers and/or representatives of employees and labor unions, account for 54.9%, whereas outside directors, which consist of independent directors and representatives dispatched from government agencies and/or non-employee private shareholders, account for 45.1%. A test of equality carried out by using the seven categories of board directors ranging from management representatives to other outside members reveals highly significant differences between the eastern and western regions ($\text{Chi}^2=97.3559$, $p=0.0000$), with the value of Cramer's coefficient of association being very high ($V=0.3078$). As a result, the proportion of outside directors in the west becomes much lower in the east (37.2% vs. 54.2%), and this difference is also highly significant ($z=5.4590$, $p=0.0000$). In other words, despite the fact that eastern companies seem more reluctant than their western counterparts to establish a board of directors, the corporate boards in eastern companies tend to be greater in size and accept a greater number of members from outside the company. This finding closely corresponds with the differences observed between the eastern and western regions with respect to the choice of corporate form discussed in the previous subsection.

Intraregional differences in board composition are just as important as interregional differences for grasping the reality of Russian corporate governance. **Figure 1** illustrates the distribution of 212 surveyed firms with corporate boards in terms of the proportion of outside directors. The mean (median) share of outside directors is 41.7% (33.3%) when all 212 companies are taken into consideration. The figures for western and eastern companies are 36.5% (33.3%) and 48.6% (50.0%), respectively. The differences between the two regions are significant at the 5% level in both the t -test and the Wilcoxon rank sum test ($t=2.2782$, $p=0.0237$; Wilcoxon $z=2.029$, $p=0.0424$). What is noteworthy here is the fact that only a very limited number of surveyed firms are actually at the statistical mean or close to it in both regions. In other words, they are, in fact, split between two extremes: those that have few or no outside directors and those whose corporate board consists almost entirely of outsiders. No difference is found between the east and west with respect to this polarization tendency of board composition, with a test of equality showing an insignificant result ($\text{Chi}^2=13.5562$, $p=0.1390$). Furthermore, according to **Figure 2**, the mean percentage of independent directors is 8.3% (median: 0.0%) among the 212 companies with a board. It is extremely low, and no significant difference is observed between the two regions in this respect. Thus, findings from the ERINA Enterprise Survey strongly support

the stylized facts presented by previous studies that most Russian companies either have very few board directors elected from outside the company or have a board consisting almost entirely of outsiders, and that Russian firms are generally reluctant to appoint independent directors.

Another important aspect concerning the board composition in Russia firms is the appointment route of the chairman of the board. The related survey results are reported in **Table 5**. As this table shows, of the chairmen of the board of 194 companies that provided valid responses, 140 are insiders or quasi-insiders who have been promoted from inside the company or invited from an affiliated business group or a business partner, whereas only 54 are outsider chairmen who have been elected from government agencies, parliaments, or other companies. As a result, insider and quasi-insiders account for 72.2% of all board chairmen. Although a test of equality carried out by using the six categories of board chairmen detects a significant difference between the eastern and western regions at the 5% level ($\chi^2=11.8723, p=0.0365$), a comparison with respect to the percentage of board chairmen who fall under the category of insiders or quasi-insiders yields an insignificant result ($z=0.232, p=0.8162$). These findings suggest that, regardless of the company's location, board chairmen elected by a majority of Russian firms often share interests with the executive officers. This observation is also well in line with the stylized facts with respect to the board structure in Russian firms described in Section 2.

3.3 Audit System

Table 6 shows the survey results with respect to the establishment, membership size, and composition of the audit committee. As reported in Panel (a) of this table, only 244 (34.1%) of 715 surveyed firms that provided valid responses have an audit committee, suggesting a lack of understanding about the importance of internal control over financial reporting in local areas of Russia. As is the case with a board of directors, the percentage of companies that adopt an audit committee is approximately 7% lower in the eastern region than in the western region (30.5% vs. 37.4%). A test of proportions confirms that this difference between the two regions is significant at the 10% level ($z=-1.9504, p=0.0511$).

According to Panel (b) of **Table 6**, 115 (47.1%) of 244 companies organize their audit committees with three corporate auditors. This is followed by 37 (15.2%) companies having a committee consisting of five members. This trend is common in both the east and west, and no significant difference can be found in any statistical tests.

There are, however, notable gaps between the two regions with respect to auditor attributes. Panel (c) of **Table 6** shows that a total of 904 corporate auditors can be identified from the 224 surveyed firms with an audit committee. Among them, inside auditors, managers and/or representatives of employees and labor unions, account for 66.5%, while outside auditors that

include representatives of government agencies and/or non-employee private shareholders and expert auditors account for only 33.5%. Although inside auditors form the majority in both regions, their percentage share is much lower in the east than in the west (55.5% vs. 74.0%), with the difference being highly statistically significant ($z=-5.7881$, $p=0.0000$). This result can be explained by the fact that while western companies are inclined to actively invite representatives of employees and labor unions to join the audit committee, their eastern counterparts tend to elect corporate auditors with various backgrounds from outside the company.

Consequently, the presence of outsiders in the audit committee at the firm level also varies greatly between the east and west. In fact, the mean (median) percentage of outside auditors in western companies is approximately 20% (30%) lower than that in their eastern counterparts (24.5% (0.0%) vs. 45.1% (33.3%)). This difference is highly significant based on both the *t*-test and the rank sum test ($t=4.2160$, $p=0.0000$; Wilcoxon $z=3.543$, $p=0.0004$). This finding, however, does not imply that the polarization tendency, where most companies are split between those that have few or no outside auditors and those whose audit committee consists almost entirely of outsiders, varies greatly between the east and west. On the contrary, as distinctly exhibited in **Figure 3**, this phenomenon is evident in both regions. At the same time, as shown in **Figure 4**, in eastern and western regions alike, very few companies appoint expert auditors.

As reported in Panel (a) of **Table 7**, a total of 710 surveyed firms provided valid responses concerning external audit activities. This reveals that 312 (43.9%) of the 710 companies execute external audits, and there is no statistically significant difference between eastern and western regions in this respect ($z=-0.9595$, $p=0.3373$). Panel (b) of the same table shows, however, that remarkable differences can be found between the two regions with respect to the types of external auditors the surveyed firms contract with. Although both eastern and western companies are strongly inclined to select local individual auditors or indigenous audit firms to conduct an external audit, the percentage of companies that contract with local entities is 18% lower in the east than in the west (65.7% vs. 83.7%), with the difference being highly significant ($z=-3.6853$, $p=0.0002$). Considering the geographical constraints faced by firms in these two regions, eastern companies are more likely than their western counterparts to encounter difficulties in using international audit firms or large-scale audit firms as their external auditor in terms of time and costs. It is noteworthy, however, that companies in the east are more inclined than those in the west to seek audit firms capable of providing higher quality external auditing.

3.4 Generality and Heterogeneity of Corporate Governance Systems across Russian Regions

The observations made in this section can be summarized as follows: (1) Among Russian companies, the LLC by far outnumbers the JSC as a legal form of incorporation. On the other hand, the number of private JSCs almost equals the number of public JSCs. However, JSCs in the eastern region are slightly more likely than those in the western region to be run as public companies. (2) Only a limited number of Russian firms have boards of directors and/or audit committees and, thus, adopt a legitimate corporate governance system. This trend is more notable in the east than in the west. (3) Although, in both regions, a board of directors typically consists of three to seven members, companies in the east tend to have slightly larger corporate boards than their counterparts in the west. (4) Corporate boards in eastern companies operate with a greater degree of outside directorship as compared to their western counterparts. At the same time, however, the percentage share of independent directors is extremely low in both the east and west. (5) The percentage of board chairmen elected from outside the company is less than 30% in both regions. (6) Typical audit committees consist of three auditors, and no statistically significant difference is observed between the two regions, in this respect. (7) The presence of outside auditors in the audit committee is much larger for companies in the east, as compared to their counterparts in the west. On the other hand, the percentage share of expert auditors is extremely low in both regions. (8) The polarization tendency seen in the degree of independence of a board of directors and/or an audit committee from the management was evident and common in both regions. (9) The percentage of surveyed firms performing external auditing is a little over 40% in both the east and west, with no statistically significant difference found between the two regions. (10) Irrespective of a company's location, Russian firms are strongly inclined to select local individual auditors and indigenous audit firms as their external auditors. Eastern companies, however, are more likely than their western counterparts to select audit firms with greater levels of independence and expertise to conduct their external auditing.

The above findings demonstrate that the stylized facts about the Russian corporate governance system obtained from observations of industrial firms and listed companies are mostly true for the organization of companies studied in the ERINA Enterprise Survey. They also strongly indicate that the so-called "corporate governance syndrome" in Russia is a common, lasting condition that affects all types of Russian firms regardless of in which industrial sector they operate. This section has also manifested that there is no fundamental gap between the eastern and western regions of Russia with respect to the severity of this problem.

At the same time, from the perspective of regional heterogeneity in the Russian corporate governance system, the findings obtained from the ERINA Enterprise Survey also strongly point to the possibility that there could be considerable differences between the eastern and western regions of Russia. However, the simple aggregation of survey results or univariate analysis based

on such aggregate data cannot address how the heterogeneity across surveyed companies resulting from differences in industrial sectors, company's history of establishment, ownership structure, firm organizations, management activities, and other factors may affect survey results. In other words, to more closely examine the presence of regional heterogeneity in the corporate governance systems in Russia, it is necessary to validate whether statistically significant differences can be detected between the two regions even after simultaneously controlling for a series of factors that may influence the structure of corporate governance systems in surveyed firms. This is exactly what the next section will deal with.

4 Regression Analysis

In order to answer the aforementioned question, in this section, we attempt to verify the presence of regional heterogeneity by performing multivariate regression analysis. More concretely, we estimate the following regression equation, taking the probability of selecting a specific corporate form, the probability of establishing a board of directors, board composition, the probability of adopting an audit committee, the audit committee's structure, the probability of executing an external audit, and attributes of the external auditor as dependent variables and a dummy variable that assigns a value of 1 to firms operating in the eastern region of Russia (*EAST*) as an independent variable:

$$y = \mu + \beta_1 EAST + \sum_{i=2}^n \beta_i x_i + \varepsilon, \quad (1)$$

where y is a dependent variable, μ is a constant term (intercept), x is a control variable (x_2, \dots, x_n), ε is an error term, and β is a parameter to be estimated. The presence of regional heterogeneity is examined by testing the null hypothesis that β_1 is zero.

4.1 Variable Selection and Estimation Method

In light of the discussion in the previous section, the following dependent variables (y) are introduced in the left-hand side of the corporate form choice model: an ordinal variable that gives a larger value to firms having a greater degree of organizational openness from the viewpoint of the legal form of incorporation (*CORFOR*) and two dummy variables that specify public (open) JSCs and private (closed) JSCs by 1, respectively (*PUBJSC*, *PRIJSC*). To examine regional heterogeneity in the probability of establishing a board of directors, we utilize a dummy variable for companies having a board of directors (*BODFIR*). With respect to the board's composition, we use four variables, including the total number of board directors (*NUMDIR*), the proportion of outside directors (*BOACOM*), the proportion of independent directors (*INDDIR*), and the outsideness of the board chairman (*BOALEA*). Similarly, in the audit system model, the following

six variables are introduced as dependent variables: a dummy variable for firms with an audit committee (*AUDFIR*), the total number of audit committee members (*NUMAUD*), the proportion of outside auditors (*AUDCOM*), the proportion of expert auditors (*AUDEXP*), a dummy variable for companies that carry out external audits (*EXTAUDFIR*), and an ordinal variable that expresses the level of independence and expertise of the contracted external auditor (*EXTAUD*).

A total of 28 variables described below are adopted as control variables (*x*): In reference to Iwasaki (2014a), to examine possible regional heterogeneity in the choice of corporate form, the probability of establishing a board of directors and an audit committee, and the probability of executing an external audit, we estimate the *EAST* variable simultaneously with four variables representing the ownership structure consisting of outside ownership share (*OWNOUT*),¹⁰ a dummy for state-owned and municipal companies (*STAOWN*), a dummy for foreign-owned firms (*FOROWN*), and large managerial shareholder dummy (*MANSHA*), as well as a business group affiliation dummy (*GROFIR*), a dummy for former state-owned or ex-municipal privatized companies (*PRIVAT*), and a dummy variable for firms spun off from a state-owned/ex-municipal company or privatized company (*SPIOFF*), which captures the path-dependent effect exerted by the process of establishing a company, a dummy variable for firms located in urban areas (*URBAN*) to control for the heterogeneity of companies' locations between urban and rural areas, a natural logarithm of the average annual number of employees (*COMSIZ*), which serves as a proxy for company size, and a group of industry dummies to control for industry-level fixed effects.¹¹

Furthermore, following the procedure of Iwasaki (2008), for estimating the corporate board model, the following variables are simultaneously estimated along with the nine control variables mentioned above: two dummy variables for corporate forms of JSC (*PUBJSC*, *PRIJSC*), the share of exports in total sales (*EXPSHA*), the use of bank credits and their average lending period (*BANCRE*), and research and development expenses (*R&D*). On the other hand, in the audit system model, we introduce the proportion of outside directors (*BOACOM*) instead of the ownership variables of *OWNOUT* and *MANSHA* to account for the fact that a board of directors

¹⁰ The ownership share of domestic individual shareholders is excluded from the *OWNOUT* variable so as to exclude the inside ownership effect exerted by the family members, relatives, or friends of management executives and employees, all of whom formally fall under the category of outside shareholders.

¹¹ These include a total of 13 industrial sectors, consisting of mining, food industry, light industry, wood and paper products, chemical and petrochemical, building materials, metallurgy, machine-building, electricity, gas and water supply, construction, wholesale trade, transport, and telecommunications. The default category is agriculture, forestry, and fisheries industries.

can directly and decisively determine the structure of a company's audit system, which is strongly backed up by empirical analysis in Iwasaki (2014b).

For estimating the regression models above, the probit, ordered probit, Poisson, and Tobit estimators are applied, respectively, to the following types of dependent variables: binary random variables (*BODFIR*, *AUDFIR*, *EXTAUDFIR*), ordinal variables (*CORFOR*, *BOALEA*, *EXTAUD*), count data (*NUMDIR*, *NUMAUD*), and truncated data (*BOACOM*, *INDDIR*, *AUDCOM*, *AUDEXP*). For estimating a model that involves selection from three types of corporate forms, namely LLC, private JSC, and public JSC, the multinomial probit estimator is employed.

When analyzing the composition of the corporate board and audit committee as well as the attributes of the external auditor, it is necessary to take into account the fact that, as reported in the previous section, many companies do not adopt these company organs and/or do not perform external auditing at all. This is because, if the probability of establishing a company organ or performing an external audit is expressed as y_{prob} , and the composition of company organs or the attributes of an external auditor as y_{attr} , y_{attr} can only be observed in companies that establish these organs inside or contract with an external auditor. For this reason, a regression model that uses these dependent variables can be expressed as follows:

$$f(y_{attr}) = \begin{cases} 0 & \text{if } y_{prob} = 0 \\ \mu + \beta_1 EAST + \sum_{i=2}^n \beta_i x_i + \varepsilon & \text{if } y_{prob} = 1 \end{cases} \quad (2)$$

Estimating Equation (2), using an ordinary least squares (OLS) estimator, may produce inconsistent estimates due to sample selection bias, a problem that is highly likely to be exacerbated with increasing numbers of samples in which y_{attr} cannot be observed (Greene, 2017). To address this issue, we estimate a Heckman two-step selection model that controls for selection bias by using the inverse Mills ratio,¹² in addition to a regression model that utilizes only observations of companies that adopt a company organ in question or carry out an external audit for a robustness check.

Table 8 lists the definition and descriptive statistics of the variables used in the estimation of Equations (1) and (2).¹³

¹² The inverse Mills ratio is the ratio of the probability density function to the cumulative distribution function of a distribution and can be used to correct for the selection bias caused by truncated data. In the Heckman two-step estimation, the inverse Mills ratio is generated in the first-stage estimation and introduced into the right-hand side of the regression equation in the second-stage estimation.

¹³ Excluding industry dummies. In addition to **Table 8**, the **Appendix** in this paper reports descriptive statistics of the variables by region and the results of univariate comparative analysis between the eastern and western regions.

4.2 Estimation Results

Tables 9, 10, and 11 show estimation results. In these tables, heteroscedasticity-consistent standard errors are reported in parentheses beneath the regression coefficients. Standard errors for the Heckman two-step selection model are estimated by using the bootstrapping method.

Estimation results of the corporate form choice models in **Table 9** show that, when the ownership structure, business group affiliation, company's history of establishment, location in an urban area, and company size are simultaneously controlled for, there is no statistically significant difference between the eastern and western regions with respect to the openness of the legal form of incorporation. In fact, Model [1] in this table does not reject the null hypothesis that the regression coefficient (β_1) for *EAST* is zero. On the other hand, the regression equation that uses *PRIJSC* as the dependent variable in the multinomial probit model [2] yields a negative estimate for *EAST* at the 5% significance level, which means that, all other conditions being equal, the probability of companies in the east selecting private (closed) JSC as their corporate form is 51.8% lower than that of companies in the west.

In **Table 10**, which shows the estimation results of the corporate board models, Model [1] shows that companies in the east are more reluctant to establish a board of directors than their counterparts in the west, even when a series of firm-level attributes are taken into account. Actually, eastern firms have a 26.7% lower probability of establishing a corporate board than their western counterparts do. This result possibly reflects a lack of understanding regarding the necessity of a corporate governance system on the part of the company executives and investors in Russia's eastern region. With regard to board composition, Model [2] in the same table suggests that companies in the east have on average 0.095 more board directors than companies in the west do. This result, however, is not supported by a Heckman two-step model [3] that adjusted for potential selection bias. As shown in Models [4] and [5], when other corporate attributes are considered, no significant difference is found between the east and west with respect to the proportion of outside directors. Based on the estimation results from Models [8] and [9], a similar conclusion can be drawn about the outsidership of board chairmen. On the other hand, Models [6] and [7] indicate that, on average, eastern firms have a lower percentage share of independent directors than western firms do. This difference between the two regions, however, becomes considerably smaller when the sample selection bias is adjusted for.

The estimation results of the audit system models in **Table 11** also point to a similar regional difference to that observed in the corporate board models. Namely, all other conditions being equal, companies in the east have a 36.0% lower probability of establishing an audit committee than do their counterparts in the west. Similarly, eastern firms have a 26.3% lower probability of

executing external audits than do western firms. However, from the perspectives of the structure of the audit committee and the attributes of the external auditor, heterogeneity between the eastern and western regions does not exert a significant influence on these factors when simultaneously controlling for other firm-level attributes and the sample selection bias.¹⁴

5 Conclusions

Based on the results obtained from a large-scale questionnaire survey of companies operating in a total of 17 regions of Russia during the fourth quarter of 2015, we empirically examined whether regional heterogeneity exists between eastern and western regions with respect to corporate governance systems. To answer this question, using the findings and empirical evidence of previous studies as the reference standard, we investigated whether the stylized facts about the corporate governance system in Russian industrial firms and listed companies are applicable to firms in a wide range of industrial sectors and to identify whether there are significant differences between companies in the east and those in the west from this point of view.

The results of regression analyses reported in Section 4 demonstrate that the regional heterogeneity in corporate governance systems identified by our survey results is largely due to differences between the eastern and western regions in terms of ownership structure and other firm-level attributes. This finding is clearly reflected in the fact that the *EAST* variable was estimated to be insignificant, while a series of control variables showed significant estimates in many regression models.

It is extremely noteworthy, however, that in models that employed the probability of establishing a statutory company organ and the probability of executing an external audit as dependent variables, the *EAST* variable was repeatedly estimated to be significant with a negative sign. These empirical results demonstrate not only that eastern companies are more reluctant than their western counterparts to introduce a governance system to monitor and supervise management, but also that this trend could not simply be explained by differences in firm-level attributes, indicating the presence of pronounced regional heterogeneity between the eastern and western regions of Russia.

¹⁴ Although a detailed interpretation of estimates for control variables is omitted due to space limitations, all variables with a statistically significant coefficient are in agreement with the empirical results presented in Iwasaki (2008, 2014a, 2014b). We also note that variables such as total sales, respondents' subjective evaluation of their companies' current financial health, and capital investment performance in the past five years were also estimated; however, all of these variables were found to be insignificant.

We conjecture that the reasons behind the presence of regional heterogeneity could include the immaturity of civil society; a lack of understanding about the importance of corporate governance on the part of local governments, investors, and other stakeholders; the backwardness of the corporate service industry; and a lack of human resources in the eastern region as compared to the west. Further investigation of the causes of this phenomenon and the implementation of appropriate political measures will contribute to improving not only the management systems in the eastern companies but also the quality of the regional economies.

The policy implications of the present study do not stop there. The most important finding of the ERINA Enterprise Survey is that the various problems surrounding the Russian corporate governance system identified by previous studies by observing industrial firms and listed companies are, in fact, common and chronic issues that affect all Russian business sectors. It is highly likely that the corporate governance syndrome in Russia, which is characterized by the choice of closed corporate forms by the overwhelming majority of Russian companies, the polarization trend in boards of directors and audit committees in terms of independence from management, the reluctance to employ independent directors or expert auditors, and the strong preference for local auditors and indigenous audit firms as external auditors, is a deep-rooted structural issue that is far more serious than we had expected. To facilitate the fundamental resolution of this challenging issue, the federal government must work in close collaboration with local authorities and industries to pursue corporate governance reform more boldly than ever before.

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Table 1. Breakdown of profit organizations in the Russian Federation by legal form of incorporation (January 2016)

	Number of companies (in thousands)	Share (%)
All profit organizations	4,237	100.0
Business partnerships and companies	4,159	98.2
Joint-stock companies	129	3.0
Limited liability companies	4,030	95.1
Unitary enterprises	21	0.5
Other	57	1.3

Source : ROSSTAT (2016, p. 132)

Table 2. Statutory company organs within a limited liability company and a joint-stock company in Russia

	Limited liability company		Joint-stock company	
	Organ name	Obligation of establishment	Organ name	Obligation of establishment
Supreme decision-making body	General meeting of members	Yes	General meeting of shareholders	Yes
Executive body	Single executive body	Yes	Single executive body	Yes
	Collective executive board	No	Collective executive board	No
Management oversight body	Board of directors (Supervisory board)	No	Board of directors (Supervisory board)	Yes ^a
Financial oversight body	Audit committee (Auditor)	Yes ^b	Audit committee (Auditor)	Yes

Notes :

^a Mandatory if there are more than 50 shareholders in the company

^b Mandatory if there are more than 15 members in the company

Source : Federal Law of Joint-stock Companies and Federal Law of Limited Liability Companies that are effective as of November 1, 2017

Table 3. Survey results regarding legal forms of incorporation

	All surveyed firms		Eastern region		Western region	
	Number of firms	Share (%)	Number of firms	Share (%)	Number of firms	Share (%)
Public (open) joint-stock companies	116	15.6	63	17.6	53	13.8
Private (closed) joint-stock companies	76	10.2	26	7.3	50	13.0
Limited liability companies	550	74.1	269	75.1	281	73.2
Total	742	100.0	358	100.0	384	100.0

Note : Test of equality between the eastern and western regions: Chi2=7.8013, $p=0.0202$, Cramer $V=0.1025$

Source : ERINA Enterprise Survey

Table 4. Survey results regarding the establishment, membership size, and composition of the board of directors**(a) Establishment of the board of directors**

	All surveyed firms		Eastern region ^a		Western region	
	Number of firms	Share (%)	Number of firms	Share (%)	Number of firms	Share (%)
Firms that establish a board of directors	212	28.6	90	25.1	122	31.8
Firms that do not establish a board of directors	530	71.4	268	74.9	262	68.2
Total	742	100.0	358	100.0	384	100.0

(b) Membership size of the board of directors^b

	All surveyed firms		Eastern region ^c		Western region	
	Number of firms	Share (%)	Number of firms	Share (%)	Number of firms	Share (%)
1 person	3	1.4	2	2.2	1	0.8
2 people	14	6.6	6	6.7	8	6.6
3 people	55	25.9	16	17.8	39	32.0
4 people	26	12.3	13	14.4	13	10.7
5 people	62	29.2	21	23.3	41	33.6
6 people	8	3.8	4	4.4	4	3.3
7 people	24	11.3	16	17.8	8	6.6
8 people	3	1.4	2	2.2	1	0.8
9 people	6	2.8	4	4.4	2	1.6
10 people	6	2.8	3	3.3	3	2.5
11 people	2	0.9	1	1.1	1	0.8
12 people	0	0.0	0	0.0	0	0.0
13 people	2	0.9	1	1.1	1	0.8
14 people	0	0.0	0	0.0	0	0.0
15 people	1	0.5	1	1.1	0	0.0
Total	212	100.0	90	100.0	122	100.0
Mean ^d	4.8		5.3		4.5	
Median ^e	5.0		5.0		4.5	

(c) Composition of board directors^b

	All surveyed firms		Eastern region ^{f,g}		Western region	
	Number of people	Share (%)	Number of people	Share (%)	Number of people	Share (%)
Inside directors	564	54.9	218	45.8	346	62.8
Management representatives	511	49.8	210	44.1	301	54.6
Representatives of employees and labor unions	53	5.2	8	1.7	45	8.2
Outside directors	463	45.1	258	54.2	205	37.2
Representatives of federal government agencies	8	0.8	4	0.8	4	0.7
Representatives of local governments	41	4.0	18	3.8	23	4.2
Representatives of non-employee private shareholders	270	26.3	142	29.8	128	23.2
Independent directors	87	8.5	37	7.8	50	9.1
Other outside members	57	5.6	57	12.0	0	0.0
Total	1027	100.0	476	100.0	551	100.0

Notes:

^a Test of proportions of firms that establish a board of directors with the western regions: $z = -1.9980$, $p = 0.0457$ ^b Survey results limited to companies having a board of directors^c Test of equality with the western region: $\text{Chi}^2 = 15.7409$, $p = 0.2033$, Cramer $V = 0.2805$ ^d Test of means between the eastern and western regions: $t = 2.4734$, $p = 0.0142$ ^e Wilcoxon (Mann-Whitney) rank sum test between the western and eastern regions: $z = 2.332$, $p = 0.0197$ ^f Test of proportions of inside directors with the western region: $z = 5.4590$, $p = 0.0000$ ^g Test of equality with the western region using seven subcategories of board directors: $\text{Chi}^2 = 97.3559$, $p = 0.0000$, Cramer $V = 0.3078$

Source: ERINA Enterprise Survey

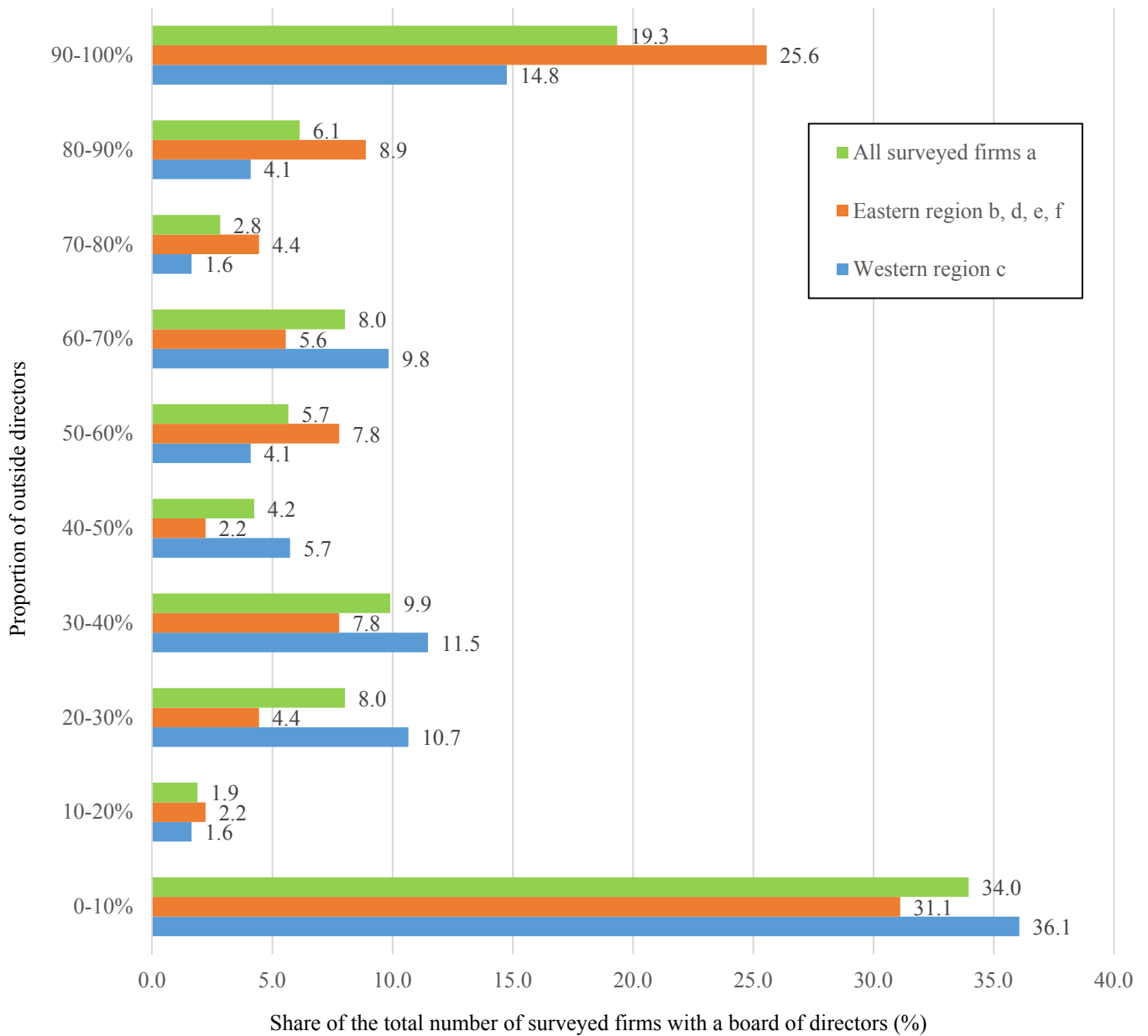


Figure 1. Distribution of the proportion of outside directors

Notes :

^a Limited to 212 companies having a board of directors; Mean: 41.7%, median: 33.3%

^b Mean: 48.6%, median: 50.0%

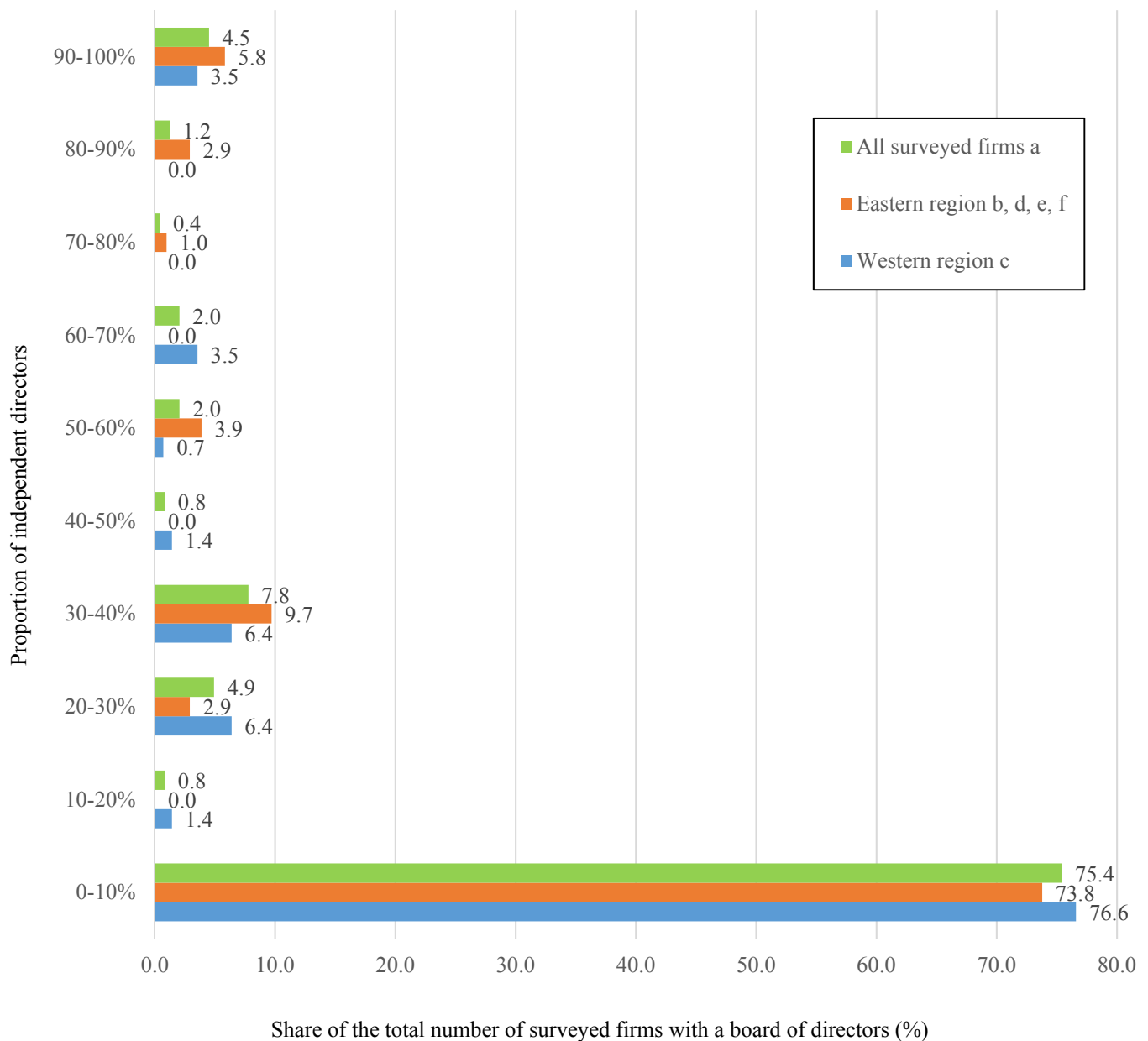
^c Mean: 36.5%, median: 33.3%

^d Test of equality with the western region: $\chi^2=13.5562$, $p=0.1390$, Cramer $V=0.2603$

^e Test of means with the western region: $t=2.2782$, $p=0.0237$

^f Wilcoxon (Mann-Whitney) rank sum test with the western region: $z=2.029$, $p=0.0424$

Source : ERINA Enterprise Survey



Share of the total number of surveyed firms with a board of directors (%)

Figure 2. Distribution of the proportion of independent directors

Notes :

^a Limited to 212 companies having a board of directors; Mean: 8.3%, median: 0.0%

^b Mean: 6.7%, median: 0.0%

^c Mean: 9.5%, median: 0.0%

^d Test of equality with the western region: $\chi^2=13.9475$, $p=0.1242$, Cramer $V=0.2640$

^e Test of means with the western region: $t=0.8556$, $p=0.3932$

^f Wilcoxon (Mann-Whitney) rank sum test with the western region: $z=-1.133$, $p=0.2573$

Source : ERINA Enterprise Survey

Table 5. Survey results regarding the appointment route of chairmen of the board ^a

	All surveyed firms		Eastern region ^{b, c}		Western region	
	Number of people	Share (%)	Number of people	Share (%)	Number of people	Share (%)
Inside and quasi-inside board chairmen	140	72.2	57	73.1	83	71.6
Promoted from inside the company	122	62.9	45	57.7	77	66.4
Elected from an affiliated business group or a business partner	18	9.3	12	15.4	6	5.2
Outside board chairmen	54	27.8	21	26.9	33	28.4
Elected from a federal government agency or parliament	4	2.1	2	2.6	2	1.7
Elected from a regional or local government or parliament	8	4.1	0	0.0	8	6.9
Elected from another company operating in the same industry	30	15.5	14	17.9	16	13.8
Elected from another company operating in a different industry	12	6.2	5	6.4	7	6.0
Total	194	100.0	78	100.0	116	100.0

Notes :

^a Survey results limited to companies having a board of directors

^b Test of proportions of inside and quasi-inside board chairmen with the western region: $z=0.232$, $p=0.8162$

^c Test of equality with the western region using six subcategories of board chairman: $\text{Chi}^2=11.8723$, $p=0.0365$, Cramer $V=0.2473$

Source : ERINA Enterprise Survey

Table 6. Survey results regarding the establishment, membership size, and composition of an audit committee^a**(a) Establishment of an audit committee**

	All surveyed firms		Eastern region ^b		Western region	
	Number of firms	Share (%)	Number of firms	Share (%)	Number of firms	Share (%)
Firms that establish an audit committee	244	34.1	103	30.5	141	37.4
Firms that do not establish an audit committee	471	65.9	235	69.5	236	62.6
Total	715	100.0	338	100.0	377	100.0

(b) Membership size of the audit committee^c

	All surveyed firms		Eastern region ^d		Western region	
	Number of firms	Share (%)	Number of firms	Share (%)	Number of firms	Share (%)
1 person	9	3.7	8	7.8	1	0.7
2 people	36	14.8	13	12.6	23	16.3
3 people	115	47.1	51	49.5	64	45.4
4 people	21	8.6	9	8.7	12	8.5
5 people	37	15.2	13	12.6	24	17.0
6 people	10	4.1	4	3.9	6	4.3
7 people	6	2.5	0	0.0	6	4.3
8 people	3	1.2	1	1.0	2	1.4
9 people	1	0.4	1	1.0	0	0.0
10 people	0	0.0	0	0.0	0	0.0
11 people	0	0.0	0	0.0	0	0.0
12 people	4	1.6	2	1.9	2	1.4
13 people	1	0.4	1	1.0	0	0.0
14 people	0	0.0	0	0.0	0	0.0
15 people	1	0.4	0	0.0	1	0.7
Total	244	100.0	103	100.0	141	100.0
Mean ^e	3.7		3.6		3.8	
Median ^f	3.0		3.0		3.0	

(c) Composition of the audit committee^c

	All surveyed firms		Eastern region ^{g,h}		Western region	
	Number of people	Share (%)	Number of people	Share (%)	Number of people	Share (%)
Inside auditors	601	66.5	203	55.5	398	74.0
Management representatives	426	47.1	155	42.3	271	50.4
Representatives of employees and labor unions	175	19.4	48	13.1	127	23.6
Outside auditors	303	33.5	163	44.5	140	26.0
Representatives of government agencies	47	5.2	16	4.4	31	5.8
Representatives of non-employee private shareholders	72	8.0	23	6.3	49	9.1
Expert auditors	120	13.3	60	16.4	60	11.2
Other outside members	64	7.1	64	17.5	0	0.0
Total	904	100.0	366	100.0	538	100.0

Notes:^a Except 27 firms that provided invalid responses^b Test of proportions of firms that establish an audit committee with the western region: $z = -1.9504$, $p = 0.0511$ ^c Survey results limited to companies having an audit committee^d Test of equality with the western region: $\text{Chi}^2 = 14.2714$, $p = 0.2183$, Cramer $V = 0.2671$ ^e Test of means between the eastern and western regions: $t = -1.0610$, $p = 0.2897$ ^f Wilcoxon (Mann-Whitney) rank sum test between the western and eastern regions: $z = -1.434$, $p = 0.1514$ ^g Test of proportions of inside directors with the western region: $z = -5.7881$, $p = 0.0000$ ^h Test of equality with the western region using seven subcategories of corporate auditor: $\text{Chi}^2 = 116.9332$, $p = 0.0000$, Cramer $V = 0.3596$

Source: ERINA Enterprise Survey

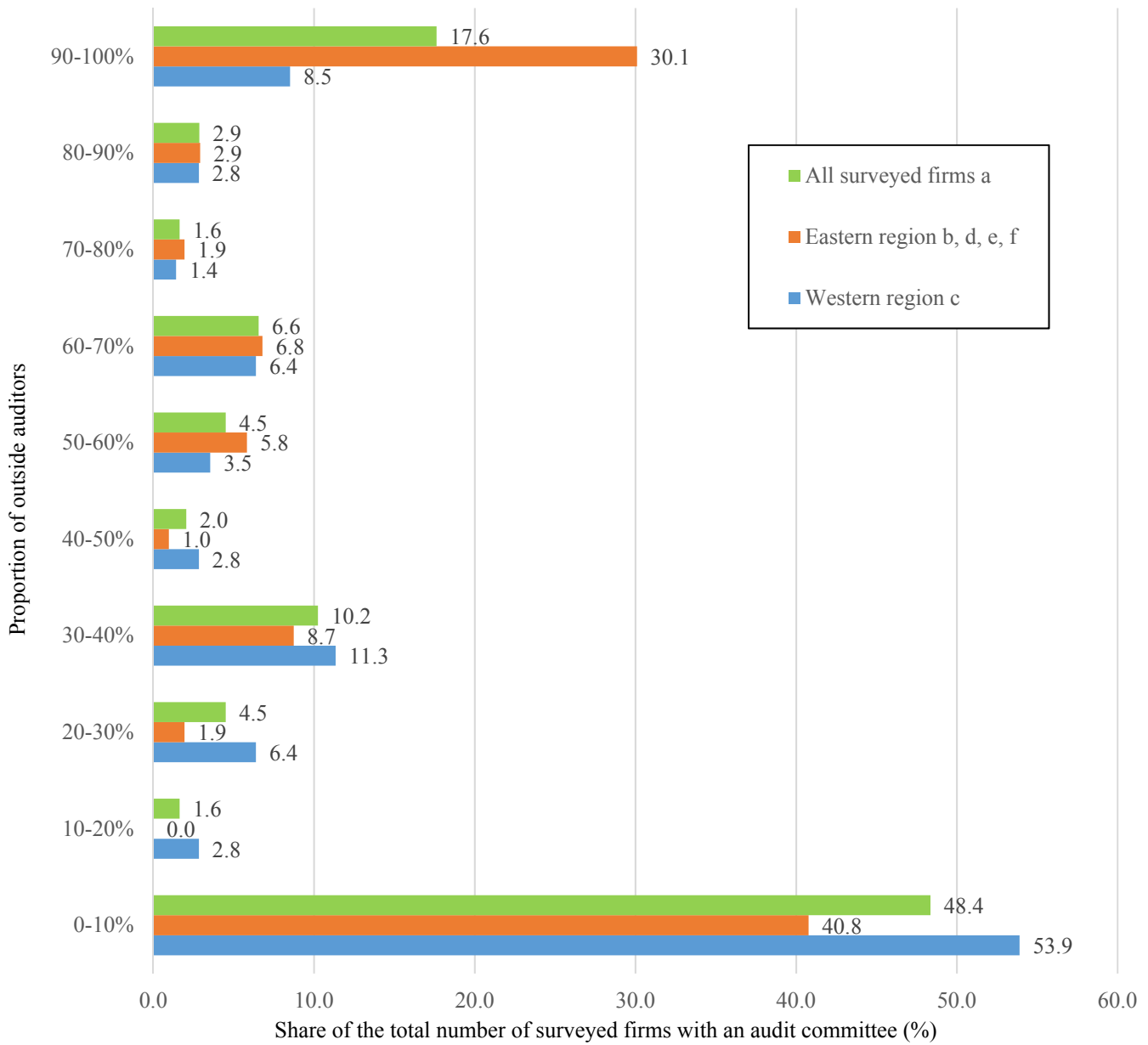


Figure 3. Distribution of the proportion of outside auditors

Notes :

^a Limited to 244 companies having an audit committee; Mean: 33.2%, median: 18.4%

^b Mean: 45.1%, median: 33.3%

^c Mean: 24.5%, median: 0.0%

^d Test of equality with the western region: $\text{Chi}^2=20.9982$, $p=0.0126$, Cramer $V=0.3240$

^e Test of means with the western region: $t=4.2160$, $p=0.0000$

^f Wilcoxon (Mann-Whitney) rank sum test with the western region: $z=3.543$, $p=0.0004$

Source : ERINA Enterprise Survey

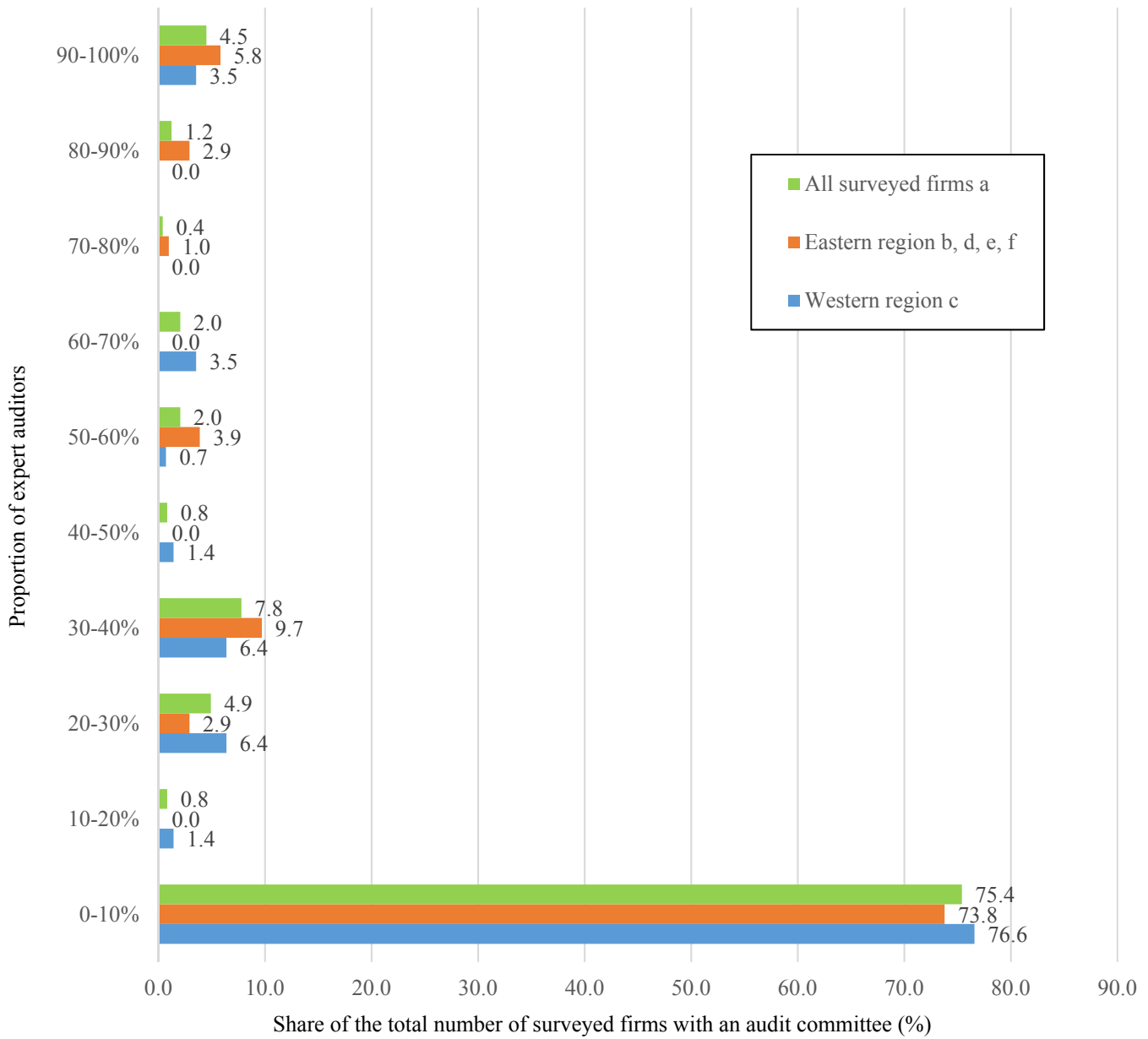


Figure 4. Distribution of the proportion of expert auditors

Notes :

^a Limited to 244 companies having an audit committee; Mean: 12.4%, median: 0.0%

^b Mean: 14.8%, median: 0.0%

^c Mean: 10.6%, median: 0.0%

^d Test of equality with the western region: $\chi^2=15.0501$, $p=0.0895$, Cramer $V=0.2743$

^e Test of means with the western region: $t=-1.2544$, $p=0.2109$

^f Wilcoxon (Mann-Whitney) rank sum test with the western region: $z=0.696$, $p=0.4865$

Source : ERINA Enterprise Survey

Table 7. Survey results regarding the execution of an external audit and the attributes of the contracted external auditor

(a) Execution of an external audit

	All surveyed firms		Eastern region ^a		Western region	
	Number of firms	Share (%)	Number of firms	Share (%)	Number of firms	Share (%)
Firms that execute an external audit	312	43.9	140	42.0	172	45.6
Firms that do not execute an external audit	398	56.1	193	58.0	205	54.4
Total	710	100.0	333	100.0	377	100.0

(b) Attributes of contracted external auditors ^b

	All surveyed firms		Eastern region ^c		Western region	
	Number of firms	Share (%)	Number of firms	Share (%)	Number of firms	Share (%)
Local individual certified auditors	48	15.4	15	10.7	33	19.2
Indigenous audit firms	188	60.3	77	55.0	111	64.5
Regional audit firms with a network of local branches	45	14.4	25	17.9	20	11.6
National audit firms with a federation-wide network of branches	21	6.7	16	11.4	5	2.9
International audit firms	10	3.2	7	5.0	3	1.7
Total	312	100.0	140	100.0	172	100.0

Notes :

^a Test of proportions of firms that execute external audit with the western region: $z=-0.9595$, $p=0.3373$

^b Survey results limited to companies that execute an external audit

^c Test of equality with the western region: $\text{Chi}^2=17.7207$, $p=0.0013$, Cramer $V=0.2383$

Source : ERINA Enterprise Survey

Table 8. Definition and descriptive statistics of the variables used in regression analysis

Variable name	Definition	Descriptive statistics				
		Mean/ proportion	S.D.	Median	Min.	Max.
<i>AUDCOM</i>	Proportion of outside auditors ^a	0.332	0.389	0.184	0.000	1.000
<i>AUDEXP</i>	Proportion of expert auditors ^a	0.124	0.259	0.000	0.000	1.000
<i>AUDFIR</i>	Dummy for firms having an audit committee	0.341	0.474	0	0	1
<i>BANCRE</i>	The use of bank credits and their average lending period ^b	2.430	2.227	3	0	6
<i>BOACOM</i>	Proportion of outside directors ^a	0.417	0.386	0.333	0.000	1.000
<i>BOALEA</i>	Outsideness of board chairman ^c	0.649	0.888	0	0	2
<i>BODFIR</i>	Dummy for firms having a board of directors	0.286	0.452	0	0	1
<i>COMSIZ</i>	Average annual number of employees ^d	4.669	0.870	4.382	3.912	8.613
<i>CORFOR</i>	Organizational openness of the legal form of incorporation ^e	0.415	0.746	0	0	2
<i>EAST</i>	Dummy for firms located in the eastern region of Russia	0.482	0.500	0	0	1
<i>EXPSHA</i>	Share of exports in total sales ^f	0.376	1.092	0	0	5
<i>EXTAUD</i>	Level of independence and expertise of contracted external auditor ^g	1.221	0.900	1	0	4
<i>EXTAUDFIR</i>	Dummy for firms executing external audit	0.439	0.497	0	0	1
<i>FOROWN</i>	Dummy for foreign-owned companies	0.044	0.205	0	0	1
<i>GROFIR</i>	Business group affiliation dummy	0.216	0.412	0	0	1
<i>INDDIR</i>	Proportion of independent directors ^a	0.083	0.230	0.000	0.000	1.000
<i>MANSHA</i>	Large managerial shareholder dummy	0.508	0.500	1	0	1
<i>NUMAUD</i>	Total number of audit committee members (corporate auditors)	3.713	2.010	3	1	15
<i>NUMDIR</i>	Total number of board directors	4.844	2.275	5	1	15
<i>OWNOUT</i>	Combined ownership share of institutional and foreign investors ^h	0.842	1.737	0	0	5
<i>PRJISC</i>	Dummy for private (closed) joint-stock companies	0.102	0.303	0	0	1
<i>PRIVAT</i>	Dummy for former state-owned or ex-municipal privatized companies	0.105	0.307	0	0	1
<i>PUBJSC</i>	Dummy for public (open) joint-stock companies	0.156	0.363	0	0	1
<i>R&D</i>	Research and development expenses ⁱ	0.208	0.682	0	0	3
<i>SPIOFF</i>	Dummy for firms spun off from a state-owned/ex-municipal company or privatized company	0.053	0.223	0	0	1
<i>STAOWN</i>	Dummy for state-owned and municipal companies	0.101	0.302	0	0	1
<i>URBAN</i>	Dummy for firms located in urban areas	0.790	0.408	1	0	1

Notes :

^a Share of specific board directors/corporate auditors of total members that takes a value from 0.00 to 1.00

^b 7-point scale ordinal variable that denotes 0: Firms did not use any bank credits during the period from 2010 to 2014; 1: Firms used bank credits, and their average lending period was less than months; 2: Firms used bank credits, and their average lending period ranged from 3 months to less than 6 months; 3: Firms used bank credits, and their average lending period ranged from 6 months to less than one year; 4: Firms used bank credits, and their average lending period ranged from one year to less than 3 years; 5: Firms used bank credits, and their average lending period ranged from 3 years to less than 5 years; 6: Firms used bank credits, and their lending period was more than 5 years.

^c 3-point scale ordinal variable that denotes 0: Firms elect an inside board chairman; 1: Firms elect a quasi-inside board chairman; 2: Firms elect an outside board chairman.

^d Natural logarithm is used in estimation.

^e 3-point scale ordinal variable that denotes 0: Limited liability companies; 1: Private (closed) joint-stock companies; 2: Public (open) joint-stock companies

^f 6-point scale ordinal variable that denotes 0: The share of exports to total sales is 0%; 1: The share of exports to total sales is 10% or less; 2: The share of exports to total sales ranges between 10.1 and 25.0%; 3: The share of exports to total sales ranges between 25.1 and 50.0%; 4: The share of exports to total sales ranges between 50.1 and 75.0%; 5: The share of exports to total sales is more than

^g 5-point scale ordinal variable that denotes: 0: Firms contract with a local certified individual auditor; 1: Firms contract with an indigenous audit firm; 2: Firms contract with a regional audit firm with a local branch network; 3: Firms contract with a national audit firm with a branch network across federation; 4: Firms contract with an international audit firm.

^h 6-point scale ordinal variable that denotes 0: Ownership share is 0%; 1: Ownership share is 10.0% or less; 2: Ownership share ranges between 10.1 and 25.0%; 3: Ownership share ranges between 25.1 and 50.0%; 4: Ownership share ranges between 50.1 and 75.0%; 5: Ownership share ranges between 75.1 and 100.0%.

ⁱ 4-point scale ordinal variable that denotes 0: No R&D expenses have been incurred during the period from 2010 to 2014; 1: A decreasing trend in R&D expenses has been shown during the period from 2010 to 2014; 2: R&D expenses have been mostly stable during the period from 2010 to 2014; 3: An increasing trend in R&D expenses has been shown during the period from 2010 to 2014.

Source : ERINA Enterprise Survey

Table 9. Estimation results of corporate form choice models

Model	[1]	[2] ^a	
Estimator	Ordered probit	Multinomial probit	
Dependent variable	<i>CORFOR</i>	<i>PRIJSC</i>	<i>PUBJSC</i>
<i>EAST</i>	-0.057 (0.14)	-0.518 ^{**} (0.24)	-0.032 (0.27)
<i>OWNOUT</i>	0.038 (0.05)	-0.074 (0.10)	0.042 (0.09)
<i>STAOWN</i>	0.289 (0.25)	0.010 (0.50)	0.613 (0.46)
<i>FOROWN</i>	-0.440 (0.36)	-0.647 (0.76)	-0.535 (0.59)
<i>MANSHA</i>	0.108 (0.13)	0.229 (0.23)	0.284 (0.25)
<i>GROFIR</i>	-0.048 (0.17)	-0.184 (0.31)	-0.065 (0.31)
<i>PRIVAT</i>	2.044 ^{***} (0.18)	3.179 ^{***} (0.53)	4.061 ^{***} (0.53)
<i>SPIOFF</i>	1.934 ^{***} (0.22)	3.119 ^{***} (0.51)	3.791 ^{***} (0.53)
<i>URBAN</i>	-0.245 (0.17)	-0.367 (0.28)	-0.585 [*] (0.32)
<i>COMSIZ</i>	0.490 ^{***} (0.08)	0.878 ^{***} (0.14)	0.874 ^{***} (0.14)
Const.	- (-)	-5.194 ^{***} (0.72)	-6.005 ^{***} (0.83)
Industry dummies	Yes	Yes	
N	647	647	
Pseudo R ²	0.39	-	
Wald test (χ^2) ^b	315.86 ^{***}	3789.96 ^{***}	

Notes :

^a Base category is limited liability company.

^b Null hypothesis: All coefficients are zero.

Robust standard error in parentheses. ***: significant at the 1% level, **: significant at the 5% level, *: significant at the 10% level

Source : Author's estimation. See Table 8 for the definition and descriptive statistics of the variables used in the estimation.

Table 10. Estimation results of corporate board models

Model	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Estimator	Probit	Poisson	Heckman	Tobit	Heckman	Tobit	Heckman	Ordered probit	Heckman
Dependent variable	<i>BODFIR</i>	<i>NUMDIR</i>	<i>NUMDIR</i> ^a	<i>BOACOM</i>	<i>BOACOM</i>	<i>INDDIR</i>	<i>INDDIR</i>	<i>BOALEA</i>	<i>BOALEA</i> ^a
<i>EAST</i>	-0.267 ** (0.12)	0.095 * (0.06)	0.070 (0.06)	0.036 (0.12)	0.029 (0.07)	-0.970 *** (0.29)	-0.085 * (0.05)	-0.099 (0.25)	-0.197 (0.16)
<i>OWNOUT</i>	0.042 (0.04)	0.006 (0.01)	-0.001 (0.03)	0.031 (0.03)	0.004 (0.02)	0.080 (0.07)	0.025 (0.03)	0.068 (0.08)	0.006 (0.06)
<i>STAOWN</i>	0.017 (0.23)	0.102 (0.07)	0.066 (0.11)	0.090 (0.14)	0.020 (0.13)	0.055 (0.28)	0.036 (0.15)	-0.200 (0.38)	0.025 (0.35)
<i>FOROWN</i>	0.056 (0.30)	0.071 (0.09)	0.098 (0.19)	0.185 (0.20)	0.132 (0.15)	-0.922 (0.66)	-0.034 (0.21)	-0.611 (0.52)	-0.204 (0.44)
<i>MANSHA</i>	0.229 * (0.12)	-0.056 (0.05)	-0.123 (0.10)	-0.658 *** (0.11)	-0.395 *** (0.11)	-0.603 ** (0.25)	0.039 (0.09)	-0.965 *** (0.26)	-0.149 (0.27)
<i>GROFIR</i>	0.320 ** (0.15)	0.047 (0.06)	0.015 (0.11)	0.188 (0.12)	0.009 (0.12)	-0.095 (0.21)	0.183 (0.12)	0.382 (0.24)	0.046 (0.23)
<i>PUBJSC</i>		0.243 *** (0.09)	0.216 ** (0.10)	-0.277 (0.19)	-0.148 ** (0.07)	-1.657 *** (0.55)	-0.071 (0.04)	-0.615 (0.45)	-0.279 (0.35)
<i>PRJSC</i>		0.278 *** (0.09)	0.256 *** (0.09)	0.063 (0.16)	0.004 (0.10)	-1.285 *** (0.49)	-0.034 (0.04)	-0.258 (0.40)	-0.203 (0.23)
<i>PRIVAT</i>	0.577 *** (0.20)	0.034 (0.07)	-0.031 (0.18)	0.127 (0.16)	-0.084 (0.20)	1.163 *** (0.45)	0.348 (0.21)	0.005 (0.44)	0.495 (0.68)
<i>SPIOFF</i>	0.857 *** (0.27)	0.115 (0.09)	-0.020 (0.26)	0.193 (0.18)	-0.052 (0.25)	2.151 *** (0.51)	0.577 * (0.32)	-0.227 (0.48)	0.248 (0.58)
<i>URBAN</i>	-0.386 ** (0.15)	-0.037 (0.06)	0.030 (0.19)	0.144 (0.11)	0.202 (0.16)	0.000 (0.30)	-0.266 (0.26)	0.717 ** (0.32)	-0.008 (0.31)
<i>COMSIZ</i>	0.404 *** (0.08)	0.112 *** (0.03)	0.059 (0.14)	0.134 * (0.07)	-0.015 (0.12)	0.318 ** (0.14)	0.217 (0.14)	0.139 (0.14)	0.060 (0.33)
<i>EXPSHA</i>		0.029 (0.02)	0.018 (0.03)	-0.042 (0.05)	-0.021 (0.02)	0.128 * (0.08)	-0.001 (0.01)	-0.151 (0.10)	0.026 (0.12)
<i>BANCRE</i>		-0.011 (0.01)	-0.008 (0.01)	-0.035 (0.02)	-0.021 (0.01)	-0.205 *** (0.06)	-0.022 *** (0.01)	-0.193 *** (0.05)	-0.015 (0.03)
<i>R&D</i>		0.132 *** (0.02)	0.134 *** (0.04)	0.056 (0.06)	0.035 (0.03)	0.020 (0.17)	-0.001 (0.02)	0.248 * (0.13)	-0.037 (0.10)
Const.	-2.483 *** (0.41)	0.690 *** (0.14)	1.310 (1.26)	-0.078 (0.37)	1.084 (1.15)	-1.762 *** (0.67)	-1.897 (1.35)		0.157 (3.18)
Inverse Mills ratio			-0.310 (0.50)		-0.396 (0.48)		0.835 (0.61)		0.258 (0.90)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	647	187	647	187	642	187	642	174	520
Uncensored N	-	-	187	-	187	-	187	-	65
Pseudo R ²	0.17	0.12	-	0.24	-	0.32	-	0.21	-
F-test/Wald test (χ^2) ^b	114.02 ***	563.55 ***	118.14 ***	3.00 ***	231.87 ***	3.05 ***	49.74 ***	442.44 ***	48.80 ***

Notes :

^a Natural logarithm is used in estimation.

^b Null hypothesis: All coefficients are zero.

Robust standard error in parentheses. In the Heckman models, the standard error is estimated by using the bootstrapping method. ***: significant at the 1% level, **: significant at the 5% level, *: significant at the 10% level

Source : Author's estimation. See Table 8 for the definition and descriptive statistics of the variables used in estimation.

Table 11. Estimation results of audit system models

Model	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Estimator	Probit	Poisson	Heckman	Tobit	Heckman	Tobit	Heckman	Probit	Ordered probit	Heckman
Dependent variable	<i>AUDFIR</i>	<i>NUMAUD</i>	<i>NUMAUD</i> ^a	<i>AUDCOM</i>	<i>AUDCOM</i>	<i>AUDEXP</i>	<i>AUDEXP</i>	<i>EXTAUDFIR</i>	<i>EXTAUD</i>	<i>EXTAUD</i> ^a
<i>EAST</i>	-0.360 *** (0.12)	-0.147 (0.12)	-0.111 (0.15)	-0.039 (0.21)	0.010 (0.08)	-0.574 ** (0.27)	-0.057 (0.07)	-0.263 ** (0.12)	0.613 * (0.32)	0.200 (0.13)
<i>OWNOUT</i>	0.021 (0.04)							0.038 (0.04)		
<i>BOACOM</i>		-0.032 (0.16)	-0.066 (0.19)	2.172 *** (0.36)	0.795 *** (0.13)	1.176 *** (0.41)	0.187 ** (0.09)		0.831 ** (0.37)	0.040 (0.19)
<i>STAOWN</i>	0.505 ** (0.24)	0.304 *** (0.10)	0.429 ** (0.17)	0.227 (0.15)	0.003 (0.12)	0.055 (0.21)	-0.011 (0.09)	-0.236 (0.23)	-0.195 (0.32)	-0.152 (0.24)
<i>FOROWN</i>	-0.397 (0.32)	-0.159 (0.12)	-0.243 (0.27)	0.485 (0.37)	0.220 (0.24)	1.283 ** (0.50)	0.266 (0.22)	0.200 (0.29)	-0.023 (0.48)	0.272 (0.30)
<i>MANSHA</i>	0.471 *** (0.12)							-0.143 (0.11)		
<i>GROFIR</i>	0.172 (0.15)	0.103 (0.08)	0.106 (0.12)	-0.133 (0.19)	-0.050 (0.10)	0.395 * (0.23)	0.102 (0.07)	0.259 * (0.14)	0.331 (0.26)	0.142 (0.21)
<i>PUBJSC</i>		-0.227 * (0.13)	-0.151 (0.17)	0.830 *** (0.31)	0.262 *** (0.10)	0.958 ** (0.40)	0.243 *** (0.09)		0.277 (0.45)	0.166 (0.20)
<i>PRIJSC</i>		-0.024 (0.14)	-0.047 (0.18)	0.579 ** (0.25)	0.178 * (0.09)	0.538 * (0.31)	0.133 * (0.07)		0.042 (0.37)	-0.027 (0.15)
<i>PRIVAT</i>	0.693 *** (0.21)	0.226 * (0.12)	0.405 ** (0.19)	-0.335 (0.25)	-0.201 (0.16)	-0.203 (0.30)	-0.050 (0.10)	0.428 ** (0.21)	-0.247 (0.33)	0.041 (0.29)
<i>SPIOFF</i>	0.482 * (0.29)	0.124 (0.10)	0.275 (0.19)	-0.348 (0.30)	-0.209 (0.17)	-0.688 * (0.38)	-0.094 (0.13)	0.100 (0.26)	-0.432 (0.44)	0.033 (0.30)
<i>URBAN</i>	0.057 (0.15)	-0.177 (0.11)	-0.248 * (0.14)	-0.620 *** (0.21)	-0.143 (0.11)	-0.522 ** (0.24)	-0.090 (0.08)	-0.329 ** (0.15)	-0.395 (0.31)	-0.188 (0.23)
<i>COMSIZ</i>	0.396 *** (0.09)	0.064 (0.05)	0.091 (0.12)	-0.311 *** (0.11)	-0.126 (0.08)	-0.326 ** (0.16)	-0.009 (0.06)	0.440 *** (0.09)	0.155 (0.16)	0.257 * (0.15)
<i>EXPSHA</i>		0.047 (0.03)	0.025 (0.05)	0.013 (0.06)	-0.004 (0.03)	0.241 ** (0.10)	0.038 * (0.02)		-0.052 (0.13)	0.087 (0.06)
<i>BANCRE</i>		-0.010 (0.02)	-0.004 (0.03)	0.072 * (0.04)	0.022 (0.02)	0.198 *** (0.07)	0.029 * (0.02)		-0.039 (0.06)	0.021 (0.02)
<i>R&D</i>		0.034 (0.05)	0.038 (0.06)	0.190 ** (0.10)	0.074 (0.05)	0.124 (0.11)	0.044 (0.04)		0.077 (0.11)	-0.082 (0.06)
Const.	-2.271 *** (0.45)	1.009 *** (0.26)	0.521 (0.89)	0.600 (0.49)	0.745 (0.66)	-0.183 (0.72)	-0.139 (0.53)	-1.928 *** (0.42)		-1.689 (1.33)
Inverse Mills ratio			0.246 (0.33)		-0.116 (0.23)		0.064 (0.22)			0.523 (0.46)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	633	119	535	119	535	119	535	626	112	445
Uncensored N	-	-	119	-	119	-	119	-	-	94
Adj. R ² /Pseudo R ²	0.18	0.07	-	0.36	-	0.26	-	0.13	0.16	-
F-test/Wald test (χ^2) ^b	98.63 ***	74.31 ***	47.07 ***	2.16 ***	446.46 ***	1.36	213.54 ***	88.19 ***	44.64 **	355.32 ***

Notes:

^a Natural logarithm is used in estimation.

^b Null hypothesis: All coefficients are zero.

Robust standard error in parentheses. In the Heckman models, the standard error is estimated by using the bootstrapping method. ***: significant at the 1% level, **: significant at the 5% level, *: significant at the 10% level

Source: Author's estimation. See Table 8 for the definition and descriptive statistics of the variables used in estimation.

Appendix. Descriptive statistics of the variables used in regression analysis by region and results of univariate comparative analysis between the eastern and western regions of Russia

Variable name	Descriptive statistics									
	Eastern region					Western region				
	Mean/ proportion ^a	S.D.	Median ^b	Min.	Max.	Mean/ proportion	S.D.	Median	Min.	Max.
<i>AUDCOM</i>	0.451 ^{***}	0.432	0.333 ^{###}	0.000	1.000	0.245	0.330	0.000	0.000	1.000
<i>AUDEXP</i>	0.148	0.290	0.000	0.000	1.000	0.106	0.234	0.000	0.000	1.000
<i>AUDFIR</i>	0.305 [†]	0.461	0 [#]	0	1	0.374	0.485	0	0	1
<i>BANCRE</i>	2.576 [*]	2.272	3 [#]	0	6	2.296	2.179	3	0	6
<i>BOACOM</i>	0.486 ^{**}	0.406	0.500 ^{###}	0.000	1.000	0.365	0.364	0.333	0.000	1.000
<i>BOALEA</i>	0.692	0.872	0	0	2	0.621	0.901	0	0	2
<i>BODFIR</i>	0.251 ^{††}	0.434	0 ^{###}	0	1	0.318	0.466	0	0	1
<i>COMSIZ</i>	4.749 ^{**}	0.940	4.443	3.912	8.517	4.595	0.792	4.317	3.912	8.613
<i>CORFOR</i>	0.425	0.773	0	0	2	0.406	0.720	0	0	2
<i>EAST</i>	1.000 ^{†††}	0.000	1 ^{###}	1	1	0.000	0.000	0	0	0
<i>EXPSHA</i>	0.393	1.175	0	0	5	0.360	1.011	0	0	5
<i>EXTAUD</i>	1.450 ^{***}	0.999	1 ^{###}	0	4	1.035	0.764	1	0	4
<i>EXTAUDFIR</i>	0.420	0.494	0	0	1	0.456	0.499	0	0	1
<i>FOROWN</i>	0.062 ^{††}	0.241	0 ^{###}	0	1	0.029	0.168	0	0	1
<i>GROFIR</i>	0.282 ^{†††}	0.451	0 ^{###}	0	1	0.154	0.361	0	0	1
<i>INDDIR</i>	0.067	0.219	0.000	0.000	1.000	0.095	0.238	0.000	0.000	1.000
<i>MANSHA</i>	0.530	0.500	1	0	1	0.488	0.501	0	0	1
<i>NUMAUD</i>	3.553	2.061	3	1	13	3.830	1.971	3	1	15
<i>NUMDIR</i>	5.289 ^{**}	2.554	5 ^{###}	1	15	4.516	1.993	5	1	13
<i>OWNOUT</i>	0.974 [*]	1.888	0	0	5	0.732	1.594	0	0	5
<i>PRIVAT</i>	0.089	0.286	0	0	1	0.120	0.325	0	0	1
<i>PRJSC</i>	0.073 ^{†††}	0.260	0 ^{###}	0	1	0.130	0.337	0	0	1
<i>PUBJSC</i>	0.176	0.381	0	0	1	0.138	0.345	0	0	1
<i>R&D</i>	0.203	0.670	0	0	3	0.212	0.695	0	0	3
<i>SPIOFF</i>	0.075 ^{†††}	0.264	0 ^{###}	0	1	0.031	0.174	0	0	1
<i>STAOWN</i>	0.083	0.276	0	0	1	0.117	0.322	0	0	1
<i>URBAN</i>	0.880 ^{†††}	0.326	1 ^{###}	0	1	0.706	0.456	1	0	1

Notes:

^a***: The difference of the means in comparison with the western region is significant at the 1% level according to the t-test; **: at the 5% level; *: at the 10% level; †††: the difference of the proportions in comparison with the western region is significant at the 1% level according to the test of proportions; ††: at the 5% level; †: at the 10% level.

^b###: The difference in comparison with the western region is significant at the 1% level according to the Wilcoxon rank-sum test; #: at the 5% level; #: at the 10% level.

Source: Author's estimation. See Table 8 for the definition and descriptive statistics of the variables.