



ORIGINAL PAPER

Citation: Spitsin, V., Mikhachuk, A., Pavlova, I., & Spitsina, L. (2018). Labor indicators and manufacturing companies ownership patterns in Russia and its regions: results of quantitative analysis, 9(2), 261–285. doi: 10.24136/oc.2018.014

Contact to corresponding author: spitsin_vv@mail.ru, Tomsk Polytechnic University, Lenina Avenue, 30, 634050, Tomsk, Russia

Received: 8 September 2017; Revised: 4 May 2018; Accepted: 18 May 2018

Vladislav Spitsin

Tomsk Polytechnic University, Tomsk State University of Control Systems and Radioelectronics, Russian Federation

Alexander Mikhachuk

Tomsk Polytechnic University, Russian Federation

Irina Pavlova

Tomsk Polytechnic University, Tomsk State University, Russian Federation

Lubov Spitsina

Tomsk Polytechnic University, Russian Federation

Labor indicators and manufacturing companies ownership patterns in Russia and its regions: results of quantitative analysis

JEL Classification: J210; J310; R110; L620

Keywords: *foreign direct investments (FDI); manufacturing industry, employment effects; economic productivity; economic crisis*

Abstract

Research background: There has been an extensive process of foreign and joint ownership enterprises establishment in the Russian economy since 2006. Domestic manufacturing industry has been experiencing certain pressure on behalf of foreign direct investment bringing new technologies and higher labor requirements.

Purpose of the article: The aim of this paper is to investigate differences in employment strategies and labor indicators in the case of enterprises in foreign and joint ownership (FJO) and domestic enterprises in Russian ownership (RO). We analyze the manufacturing industry in Russia and its regions under conditions of stable and crisis periods.

Methods: The study enhances the analysis of Rosstat's statistical data for 2005–2016 and applies ANOVA method to compare the employment results for companies with different ownership patterns. The research is carried out both at the national level of the Russian Federation and at the regional level according to the regions.

Findings & Value added: The study identifies significant decline in employment and increase in productivity for the period of 2005–2016. In contrast to the crisis of 2008–2009, in 2014–2016 there has been no sharp drop in employment. However, there is a substantial decline in real salaries which is comparable to the crisis of 2008–2009. According to ANOVA, statistically significant differences in labor indicators between FJO and RO companies are manifested. RO companies dominate in employment and payroll funds, while FJO enterprises have better productivity results with a higher average salary. FJO companies demonstrated faster growth in employment and payroll fund in relatively stable conditions (2012–2013). However, they reacted with a significant reduction in employment for a new crisis (2014–2016), although the creation of new FJO enterprises continued in separate regions of Russia. The results can be used in social policy to regulate the employment and earnings of industrial workers in the current economic conditions.

Introduction

The economic results of the manufacturing industry are of great importance for the domestic economy. Since 2006, there has been an extensive process of foreign and joint ownership (FJO) enterprises establishment in the Russian economy. According to the Statistics Department of Russian Federation (Rosstat), in 2015 the manufacturing industry of Russia accounts for 29 trillion rubles in output with over 7 million people employed, while the share of foreign and joint enterprises is represented by 27% of output and 13% of manufacturing industry employment (here and further on, authors' calculations on the basis of data retrieved from Rosstat's United Interdepartmental Statistical Information System (UniSYS, 2017; Russian Federal State Statistics Service, 2017). This process leads to significant changes in the structure of the Russian manufacturing sector.

Domestic industries can be significantly influenced by external stakeholders through internationalization of financial and human resources and information flows. With high competition in the global markets, domestic manufacturing industries also experience certain pressure from foreign direct investment (FDI) bringing new technologies and alternative labor standards (Pietrucha *et al.*, 2018; Nazarczuk & Krajewska, 2018). In general, FDI inflows often improve productivity for domestic and foreign-owned enterprises for numerous reasons. Foreign-owned companies employ different business approaches, management techniques, and have an asymmetric access to the international markets, which naturally creates market differentiation (Antonescu, 2015, pp. 681–689; Buys, 2010). There are numerous positive effects of the foreign-owned companies' presence on

the domestic market, such as outputs and real wages growth, technological advancement, a better communication between international and domestic players, and positive spillovers (Javorcik, 2004, pp. 605–627; Wang & Wang, 2015). Nevertheless, there is also a negative influence of FDI on the domestic industries (Girma, 2005, pp. 165–178; Jenkins, 2004, pp. 115–142). For example, Barnes *et al.* (2004, pp. 153–172) indicate that domestic firms cannot usually compete with their foreign rivals. In the modern economic science, the influence made by foreign business owners on various indicators of the national labor market has been studied in detail (Temouri *et al.*, 2008, pp. 32–54; Chen *et al.*, 2011, pp. 1322–1332).

At the same time, Jude and Silaghi (2015) suggest that there is a gap in the studies of the FDI effects on the employment indicators since major studies focus on productivity and wages (Aitken & Harrison, 1999, pp. 605–618; Girma *et al.*, 2002, pp. 93–100) while the employment has been only marginally addressed.

FJO companies have become more and more visible in different sectors of the Russian manufacturing industry while the share of products shipped varies from 15% to 42% in 2014 and to 40% in 2015 across sectors of the industry (Russian Federal State Statistics Service, 2017). Being active contributors to wages and gross payroll funds formation, these companies significantly impact the labor market, therefore generating certain employment effects in Russia. As a result, the study of labor indicators dynamics for different forms of ownership in Russian manufacturing industry becomes a factor of current interest. Analysis of the Russian manufacturing industries in the context of Russian regions, industries and economic sectors has become more and more common recently. For example, Zemtsov *et al.* (2016) employ quantitative methods to assess 22 innovative clusters within different Russian territories using a series of indicators measuring cooperation intensity of cluster participants and activity of cluster management teams. Other studies employ similar quantitative methods for the analysis of numerous indicators for manufacturing industries in Russia (Spitsin *et al.*, 2018). Also, a number of papers, such as in Lenart *et al.* (2016), address the issue of providing statistical evidence on how recent crises affect the properties of the business cycle fluctuations.

The aim of this paper is to investigate the differences in employment and labor indicators between the enterprises in foreign and joint ownership (FJO) and domestic enterprises in Russian ownership (RO) in manufacturing industry (section D in Russian statistics) in the Russian Federation and its regions. Among the objectives of the study are (1) a comparative analysis of labor indicators for FJO and RO manufacturing companies (section D in Russian statistics) on the national level in 2005–2016; (2) an analysis of

dynamics of labor indicators for FJO and RO manufacturing companies at the regional level in 2011–2016; (3) a comparison of the labor indicators dynamics during the crises of 2008–2009 and 2014–2016. We apply ANOVA method that allows us to compare labor indicators for companies with different ownership patterns and to reveal statistically significant differences between them.

The paper has the following structure. The next section — Literature review — describes scientific research on the impact of foreign direct investment and foreign-owned enterprises on labor indicators of the post-communist countries and the distinctive features of the object of this study. Next, it explains data collection and methodology for data processing. Then we describe the results of our empirical research. Finally, the last two sections present the discussion of empirical results and conclusions.

Literature review

In the early nineties, significant political and economic changes occurred in countries that had adopted the socialist economic system after the Second World War. It is noted that at the first stages of the transition from social to capitalism post-communist countries experienced a deep recession. In these conditions, FDI is one of the most important factors of economic development (Yucel, 2014; Pietrucha *et al.*, 2018). There is no consensus on the debate whether FDI flows have positive effects on economic growth or not, but in a number of papers on post-communist countries, a positive relation between foreign direct investment and economic growth has been revealed (Yucel, 2014; Próchniak, 2011; Staehr, 2017).

Empirical studies emphasize the benefits of FDI for a host country in terms of productivity and wages levels (see Hanousek *et al.*, 2011, pp. 301–322; Varblane *et al.*, 2002; Karpaty & Bandick, 2007). Researchers recognize the positive impact of FDI on the quality of human capital, the qualifications of workers, the level of wages (Javorcik, 2004, pp. 605–627; Wang & Wang, 2015). Also, corporate culture patterns and business philosophies as social factors influence performance of domestic and foreign enterprises (Bellak, 2004, pp. 483–514). Some studies discuss different influence of these factors on developed and developing domestic economies. Buys (Buys, 2010) demonstrates a better innovative performance and productivity of foreign enterprises of the South-African automotive industry.

Despite the positive impact of foreign direct investment on the growth of the economies of developing countries, a number of studies have noted problems with this factor and its ambiguous impact on social and labor

indicators. It is noted that the FDI produces social tensions and opportunities for protest in developing countries (Robertson & Teitelbaum, 2011). FDI did not prevent the growth of unemployment in the post-communist countries of Central and Eastern European Economies and moreover, may even increase the fall in employment in the industry of these countries, or improve the situation in the metropolitan regions, while strengthening the problems of peripheral regions (Onaran, 2008; Dogaru *et al.*, 2014; Decreuse & Maarek, 2015).

A direct consequence of the FDI is the further transformation of the forms of ownership of enterprises in transition economies, and the formation of enterprises in FJO, as well as the creation of new enterprises in FJO. Accordingly, there are two options for conducting economic analysis:

- study of the influence of FDI on socio-economic indicators of countries (Hanousek *et al.*, 2011, pp. 301–322; Varblane *et al.*, 2002),
- study of differences in the efficiency of functioning and social indicators of enterprises in terms of ownership (domestic firms and foreign-owned firms) (Temouri *et al.*, 2008, pp. 32–54; Bellak, 2004, pp. 483–514; Girma *et al.*, 2002, pp. 93–100).

Within the framework of the present work, a second version of the study is being implemented. The focus of the study is on social indicators, since, as shown above, FDI can have a different impact on these indicators, including a negative on the share of employment. Moreover, in modern studies, scientists note a decline in employment in industry due to the development of services, as well as the negative impact of innovative development on the dynamics of employment (Fiorini *et al.*, 2016; Mehta, 2016; Charles *et al.*, 2018).

The object of the study is Russia, its industry and its regions. Russia is one of the post-communist countries that is making a transition to market economy. At the same time, Russia has a number of distinctive features:

- a certain distance from Europe, which is characterized on the one hand by certain interactions in the economic sphere, including the involvement of FDI, and attempts to work in European political bodies, and on the other hand — preservation of independence and the conduct of its own policies;
- slow pace of reforms — maintaining state control over key enterprises in key industries, implementing reforms taking into account national security and independence, the importance of social issues and the desire to retain personnel in industrial enterprises;
- the desire to import technology and the availability of a large domestic market, but the preservation of customs barriers;

- low volumes of export of products of high degree of processing and prevalence of raw export.

Iwasaki, Mizobata and Muravyev (Iwasaki *et al.*, 2018) compare the behavior of enterprises in various forms of ownership in Russia. Russian economists (Gurkov *et al.*, 2017) show that the crisis periods did not lead to a decrease in the intensity of investments by multinational corporations in Russia. Researchers considered the economic and social results of the Russian, foreign and joint enterprises in some sections of industry such as vehicle industry (Spitsin *et al.*, 2016), electronic industry (Spitsin *et al.*, 2015).

The present study is focused on the entire Russian manufacturing industry on national and regional levels. These distinctive features of Russia reflect the specifics of this study. In this paper, we study the differences between the labor indicators of enterprises in FJO and enterprises in RO in the manufacturing industry in Russia during crisis and stable periods.

Research methodology

In NACE framework for collecting and presenting statistical data (Statistical Classification of Economic Activities in the European Community / Nomenclature Statistique des Activités Économiques dans la Communauté Européenne), economic activity in manufacturing industry is represented as a special field of economic statistics in the databases under the section D (NACE Rev. 1.1) or the section C (NACE Rev. 2) (Eurostat Statistics Explained, 2016). In Russian national statistics NACE Rev. 1.1 is applied by Rosstat, which is the major body for collecting statistical data on national and regional levels.

The data retrieved from the national statistical database of the Russian Federal State Statistics Service (Rosstat) as well as from the Rosstat's United Interdepartmental Statistical Information System (UniSYS) serves as the data source for absolute indicators description as well as for the quantitative analysis. For the purpose of research, the panel of 8 labor indicators was formed to study the situation with the employment in the manufacturing industry of the Russian Federation (Section D in the national statistics database) (see Table 1). The choice of the selected indicators is driven by the data availability in national statistics. Besides, the selected indicators allow for drawing conclusions relevant to macro- and micro-levels for different patterns of companies' ownership.

The research is carried out both at the national level of the Russian Federation (statistical analysis of the indicators) and at the regional level according to regions (analysis of variance). At the national level, the year-to-

year dynamics of the indicators is analyzed for 2005–2016 with the chain growth rates are used (the ratio of the current year to the previous year).

For the analysis on the regional level the following statistical samplings were formed:

- a panel of 59 Russian regions with enterprises in Russian ownership (RO);
- a panel of 28 Russian regions with enterprises in foreign and joint ownership (FJO).

The samplings include the regions with the largest volume of products shipped by the companies of each relevant ownership pattern. An annual minimum shipment of 50 billion rubles in 2014 was used as the selection criteria for the regions to be included into these panels. The authors use the analysis of variance (ANOVA) as the quantitative method applied to these samplings in STATISTICA software. The ANOVA method allows for static and dynamic comparison of two panels with the breakdown of the indicators corresponding to the mean value. At the regional level, the absolute, estimated and growth rate indicators for the variance analysis (shown in Table 1) are calculated for section D enterprises for different patterns of ownership.

Results

Statistical analysis on the national level

Analysis of the chosen indicators on macro level (Figure 1–5) allows to summarize some conclusions on the obvious employment differences and labor intensity gap for FJO and RO companies.

The manufacturing industry in general has witnessed a gradual reduction of employment which fell from 9.5 to 7.2 million employees (Figure 1). Under the influence of the factors connected to the decline in employment and increasing shipped products costs (primarily due to a prices rise), there is a strong decline in labor intensity from 11 to 2 persons per 10 million rubles (Figure 4). At the same time, there is a tendency of the growing average wages and gross payroll funds (Figure 2, 3). The share of payroll in shipped products decreased slightly — from 10% to 8.5-9%, primarily due to the reduction for RO enterprises (from 12% to 10%). Thus, labor indicators differ for different ownership forms in Russia. The employment indicator (number of employees) is mainly supported by RO companies (6.2 mln. or 87% of employees engaged in manufacturing industry in 2015). RO enterprises provide 83% of gross payroll funds in 2015 retaining a higher proportion of labor intensity and the hare of the gross payroll fund in goods

shipped. However, employment in RO enterprises has been decreasing almost throughout the entire period studied.

The share of FJO enterprises is 13% (0.9 million) of employees and 17% of gross payroll funds of the entire manufacturing industry in 2015. Employment is rather stable and the number of employees varies from 0.9 to 1.05 million people employed. FJO companies are characterized by a higher average salary (Figure 2), but it is not compensated in terms of the employment effects of the low number of employed and low labor intensity.

In the years 2009–2013 chain growth rates of employment and payroll funds for FJO were higher than those of RO companies, but they became smaller in 2014–2015 (Figure 5). Chain growth rates of salaries for both FJO and RO enterprises stayed similar throughout the entire period observed.

Also, it is possible to assume that there is no negative trend for absolute indicators dynamics for the period of 2014–2015 in contrast to the crisis of 2008–2009. We generalize that the number of employed for manufacturing industry is slowly declining, but the average salaries and payroll funds have a sustained steady growth in contrast to the crisis of 2008–2009. So, in 2009 the number of employees decreased by 11% compared to 2008, and in 2015 — only by 2% compared to 2014. Payroll funds decreased by 8% in 2009 compared to 2008, and in 2015 the indicator grew by 5% in relation to 2014.

At the same time, considering rising prices and inflation, it is possible to talk about a certain comparability of payroll and salaries effects for two crises periods — 2008–2009 and 2014–2016 (Figure 6, 7).

The official statistical data show, on the one hand, certain similarities between the two crisis periods with respect to average salaries and gross payroll funds, although the real gross payroll funds in 2015 decreased less (fell down by only 8%) than in 2009 (fell down 18%). On the other hand, a smaller consumer prices growth in 2009 could be justified by an essential drop in payroll and employment. At the same time, the year of 2015 shows nominal payroll increase, employment preservation, growth of the dollar against the ruble. All these factors could be responsible for creating conditions for a more significant consumer prices growth. Therefore, a higher rise in prices in 2015 could be attributed to overall a fairly stable situation in the economy. We also defined the growth of real wages and the cessation of the decline in the real gross payroll fund in 2016, which may indicate a gradual recovery of the Russian economy from the crisis.

Next, we will proceed with the above preliminary findings to testing them as hypotheses using methods of mathematical statistics at the level of regions of Russia.

The ANOVA analysis at the regional level

In order to correctly apply the analysis of variance criteria, first, we check whether the distribution of the considered indicators (Table 1) corresponds to the normal distribution law by means of Pearson χ^2 test. During this test, it was revealed that there is a highly significant difference from the normal distribution of all absolute indicators samplings (average salaries, number of employed, gross payroll funds) and most samplings of growth rates indicators ($p < 0.0005$). Consequently, we apply nonparametric Kruskal-Wallis test to identify the differences between enterprises in FJO and RO.

The results of comparing average salaries between RO and FJO companies in 2011–2016 are shown in the Figure 8. Using nonparametric Kruskal-Wallis test, it was revealed that there are highly significant differences in patterns of ownership for the average salaries (significance level of $p < 0.0005$). Thus, ANOVA confirmed that the average salaries at enterprises in FJO are higher than at enterprises in RO during the whole period 2011–2016.

Analysis of other absolute and estimate indicators (Table 1) produced the following highly significant differences for the whole period 2011–2016 (significance level of $p < 0.0005$):

- the number of employees is greater at RO enterprises than at FJO enterprises;
- the gross payroll fund is higher at RO enterprises than at FJO enterprises;
- the labor intensity is greater at RO enterprises than at FJO enterprises;
- the share of the gross payroll fund in goods shipped is higher at RO enterprises than at FJO enterprises.
- To analyze the development of the manufacturing industry in the context of ownership we apply the ANOVA analysis for growth rates for the periods:
 - a relatively stable conditions (2012–2013);
 - an unfavorable external environment with the imposition of sanctions and falling of oil prices and the ruble exchange rate (2014–2016).

Results of the indicators dynamics analysis are shown in Figures 9, 10, 11.

Case of relatively stable conditions (2012–2013)

According to the analysis of variance results, using Kruskal-Wallis test, growth rates in 2012–2013 show insignificant differences for the average salary growth rate ($p \approx 0.56 > 0.1$). The growth rate of the employed for FJO companies statistically significantly exceeds the same indicator for the RO companies ($0.005 < p \approx 0.02 < 0.05$). The growth rate of payroll funds for the FJO companies significantly ($p < 0.0005$) exceeds the same indicator for RO firms.

These results confirm the specific advantages of FJO companies in a relatively stable period of 2012–2013. It resulted in higher rates of growth of employees' number and gross payroll funds, while employment growth in FJO enterprises on average was greater than 1, in contrast to RO enterprises with a decreasing number of employees in the indicated period.

Case of unfavorable external environment (2014–2016)

Non-parametric Kruskal-Wallis test of the average salaries growth rate produced the following results:

- insignificant differences between RO and FJO companies in 2014 and 2015 ($p > 0.1$);
- higher growth rates of the average salaries for FJO enterprises in 2016 (statistically significant with $0.005 < p \approx 0.007 < 0.050$).

The results of the ANOVA for employees and gross payroll fund growth rates in 2014 are shown in Figure 10, 11. In these cases the ANOVA method were applied to the following panels at the regional level:

- 59 regions with RO companies;
- 27 regions with FJO companies (excluding abnormal Vologda region).

Analyzing the differences for employees' growth rates by Kruskal-Wallis test, we obtained the following results:

- higher growth rates at RO enterprises in 2014 (statistically significant with $0.005 < p \approx 0.02 < 0.05$);
- insignificant differences in 2015 ($p > 0.10$);
- significant excess the growth rates at RO enterprises in 2016 (highly significant with $p < 0.0005$).
- For the case of gross payroll fund growth rates, Kruskal-Wallis test found:
 - excess growth rates at RO enterprises in 2014 (statistically significant with $0.005 < p \approx 0.0135 < 0.05$);

- insignificant differences in 2015 ($p \approx 0.6 > 0.1$);
- excess growth rates at RO enterprises in 2016 (statistically significant with $0.005 < p \approx 0.033 < 0.050$).

Therefore, the indicators of employees and gross payroll fund growth rates for RO companies are higher than the corresponding numbers for FJO companies.

Overall, the crisis of 2014–2015 shows that the dynamics patterns change for the FJO and RO companies. The period of unfavorable external environment with the imposition of sanctions was a pivoting point in manufacturing industry development trends in the context of companies' ownership patterns. In 2014 and 2016, the RO companies perform with higher growth rates of employees and gross payroll funds, although average employees' growth rate has remained below 1, i.e. gradual personnel decrease. FJO companies have lower growth rates of employees and gross payroll funds in 2014, i.e. they were less capable of reacting to the challenging economic environment. At the same time, some regions, e.g. statistically abnormal Vologda region, shows the continued process of FJO enterprises establishment.

Discussion

Numerous recent studies confirm that ownership is a firm-specific feature in differentiating productivity and FJO companies have higher productivity than their domestic counterparts for developing countries and countries in transition that are characterized as the challenging environment due to numerous reasons (Huang & Yang, 2016, pp. 356–371; Vukšić, 2015, pp. 322–335). In the study by Jude and Silaghi (2015), it has been shown that the main determinant of employment dynamics in Central and Eastern European countries was the economic restructuring and the institutional change that accompanied progress in transition with traditional labor determinants, like output and wages, proved to be less important for different patterns of ownership.

The present analysis of variance at the level of Russia's regions also proves the statistically significant differences in terms of labor indicators between FJO and RO companies. We found the following differences in Russian manufacturing industry:

- RO companies dominate in employment and payroll funds;
- FJO enterprises manifest better economic productivity results with a higher average salary, while labor intensity and the share of gross pay-

roll funds in the goods shipped is considerably lower than that of RO companies.

Our study shows a significant reduction in employment and labor intensity, as well as an increase in productivity for the years of 2005–2016. This is one of the modern trends in the development of manufacturing in many countries. But the Russian economy has its own specifics, in particular, it experienced two crises (2008–2009 and 2014–2016). Comparing these crisis periods, we found some differences between them. In contrast to the crisis of 2008–2009 crisis, in 2014–2016 there was no sharp drop in employment, and the manufacturing industry is characterized by a steady growth in terms of nominal salaries and payroll funds. However, these crises were comparable when we analyzed the fall in real salaries and payroll. These results are consistent with the findings of some Russian studies (Gaidar Institute for Economic Policy, 2016; Institute of World Economy and International Relations of the Russian Academy of Sciences, 2015; Analytical Center under the Government of the Russian Federation, 2016). However, we identified the growth of real salaries in manufacturing industry in 2016, which may indicate a gradual recovery of the Russian economy from the crisis.

Comparing the dynamics of labor indicators for 2011–2016, we have defined some differences between FJO and RO companies. FJO companies demonstrated faster growth in employment and payroll fund in relatively stable conditions (2012–2013). However, they reacted with a significant reduction in employment for a new crisis (2014–2016), although the creation of new FJO enterprises continued in separate regions of Russia.

The analysis of employment strategies employed by FJO companies as compared to RO companies suggests that foreign owners tend to seek efficiency by cutting personnel and increasing the productivity of the remaining workforce. This is reflected in both the employment numbers and labor compensation statistics. While it may be seen as a desirable strategy on the part of companies — after all, higher efficiency leads to improved competitiveness — it creates undesirable effects of workers displacement that increase tensions on the labor markets and jeopardize local authorities' ability to manage the socio-economic development of their regions. As such, depending on the level of the analysis, the strategies employed by FJO companies could be seen as either effective or ineffective. It also highlights the hidden conflict of interests between the firms and regional authorities. Although in the long run such strategies would be beneficial for regions, in the short run they complicate the situation such that policy makers may feel compelled to intervene and resist the strategic moves of FJO companies, especially on the brink of elections. The implication for the FJO firm man-

agers, then, is that the strategic moves aimed at cutting the excessive workforce should be carefully timed with the local election cycle in mind.

Conclusions

The study reveals a number of differences between the labor indicators of foreign-owned manufacturing enterprises and domestic manufacturing enterprises in developing (post-communist) countries (the case of Russia). Domestic (RO) companies dominate in employment and payroll funds while foreign-owned (FJO) enterprises have better productivity results with a higher average salary. FJO companies demonstrated faster growth in employment and payroll fund in relatively stable conditions (2012–2013). However, they reacted with a significant reduction in employment for a new crisis (2014–2016), although the creation of new FJO enterprises continued in separate regions of Russia.

We also identify significant decline in employment and increase in productivity for the period of 2005–2016, especially during the crisis of 2008–2009. This crisis, evidently, revealed the ineffectiveness of the policy of retaining personnel in industrial enterprises and forced enterprises to substantially reduce the number of employees, leaving efficient workers and increasing labor productivity. In contrast to the crisis of 2008–2009, in 2014–2016 there was no sharp drop in employment, which shows that the disproportion of employment had been eliminated earlier.

The present study has certain limitations concerning the statistical data analyzed in the paper. Statistical data does not distinguish foreign-owned and joint companies. So, this study articulates with the data for foreign and joint companies taken together while notwithstanding that the dynamics for foreign-owned and joint companies taken separately could differ considerably.

At the same time, although employees number for FJO companies represent only 13% of total number of people employed, this study contributes to literature by offering a sector-specific analysis of labor indicators and considers FJO and RO companies at the meso- and macrolevels. FJO companies are characterized by higher labor productivity, but produce fewer labor effects. If they compete with domestic companies for the domestic market, it can lead to an acceleration in the fall of employment in the manufacturing industry. In times of crisis, FJO enterprises can significantly reduce employment and close its production centers in the country. These actions can create social and economic problems for the regions and local areas on which they predominated.

The results can be used in social policy to regulate the employment and earnings of industrial workers in the current economic conditions. It is shown that the inefficiency of the policy of retaining personnel in industrial enterprises of post-communist countries was against the world trends. The crisis periods reveal these disproportions and contribute to their elimination. Foreign-owned enterprises assist in improving the quality of human capital and the efficiency of its use. But at the first stages of the establishment of such enterprises in post-communist countries, they are often assembly plants, with a low number of personnel. It is required in the shortest possible time to increase the level of localization of production, and in the future to switch to the export of their products. A specific feature of Russia is to encourage the creation of FJO enterprises with owners from different countries to prevent their mass closure in the face of economic sanctions.

Future research should acknowledge the conflict of interests between FJO companies and local authorities, and investigate the extent to which efforts at improving the efficiency, despite their short-term negative impact on the labor statistics in the region, could help economic development in the long run. A careful longitudinal study that links improvements in efficiency at FJO firms to the spillover effects that such improvements cause is in order. It is also essential to analyze the role of FJOs beyond the mere employment numbers and consider the economic outcomes — such as profitability — of such strategic moves. It is also possible, even likely, that the ability of firms to use their resources, such as own capital, is conditioned by the type of ownership they are under. For instance, it may be expected that joint enterprises can utilize their “dual heritage” and get the best of the two worlds.

It is also possible that the very notion of foreign ownership should be further unpacked. Given the institutional weaknesses of the economic environment in Russia, it is likely that some of the foreign owners represent domestic Russian capital that seeks protection in foreign jurisdictions. Naturally, the effects of such nominally foreign owners may be quite different from the effects of genuine international capital. Future research should investigate this issue in detail.

References

- Aitken, B. J., & Harrison, A. E. (1999). Do domestic firms benefit from direct foreign investment? Evidence from Venezuela. *American Economic Review*, 89(3). doi:10.1257/aer.89.3.605.
- Analytical Center under the Government of the Russian Federation. (2016). Employment, income and personal consumption: regional differences. *Socio-economic crisis in Russia Bulletin*. Retrieved from: <http://ac.gov.ru/files/publication/a/9465.pdf> (28.02.2017).
- Antonescu, D. (2015). Empirical analysis of foreign direct investments at NUTS 2 region, in European Union and Romania. *Procedia Economics and Finance*, 22. doi: 10.1016/s2212-5671(15)00284-1.
- Barnes, J., Kaplinsky, R., & Morris, M. (2004). Industrial policy in developing economies: developing dynamic comparative advantage in the South African automobile sector. *Competition & Change*, 8(2).
- Bellak, C. (2004). How domestic and foreign firms differ and why does it matter? *Journal of Economic Surveys*, 18(4). doi: 10.1111/j.0950-0804.2004.00228.x.
- Buys, A. (2010). Ownership and innovative behavior. The case of South African automotive component manufacturing industry. *Proceeding Technology Management for Global Economic Growth (PICMET)*.
- Charles, K. K., Hurst, E., & Schwartz, M. (2018). The transformation of manufacturing and the decline in U.S. employment. *SSRN Electronic Journal*. doi: 10.2139/ssrn.3154376.
- Chen, Z., Ge, Y., & Lai, H. (2011). Foreign direct investment and wage inequality: evidence from China. *World Development*, 39(8). doi: 10.1016/j.worlddev.2010.12.006.
- Decreuse, B., & Maarek, P. (2015). FDI and the labor share in developing countries: a theory and some evidence. *Annals of Economics and Statistics*, 119/120. doi: 10.15609/annaeconstat2009.119-120.289.
- Dogaru, T., Burger, M. J., Karreman, B., & van Oort, F. G. (2014). Functional and sectoral division of labour within Central and Eastern European countries: evidence from Greenfield FDI. *SSRN Electronic Journal*. doi: 10.2139/ssrn.2417250.
- Eurostat Statistics Explained. (2016). Glossary: statistical classification of economic activities in the European Community (NACE). Retrieved from: http://ec.europa.eu/eurostat/statistics-explained/index.php/Main_Page (24.02.2017).
- Fiorini, M., Hoekman, B., & Malgouyres, C. (2016). Services policy reform and manufacturing employment: evidence from transition economies. *SSRN Electronic Journal*. doi: 10.2139/ssrn.2879325.
- Gaidar Institute for Economic Policy (2016). Real-time monitoring of the economic situation in Russia: trends and challenges for socio-economic development. Retrieved from: http://iep.ru/files/text/crisis_monitoring/2016_2-20_february.pdf (27.02.2017).

- Girma, S. (2005). Safeguarding jobs? Acquisition FDI and employment dynamics in U.K. manufacturing. *Review of World Economics*, 141(1). doi: 10.1007/s10290-005-0020-1.
- Girma, S., Thompson, S., & Wright, P. W. (2002). Why are productivity and wages higher in foreign firms? *Economic and Social Review*, 33(1).
- Gurkov, I., Kokorina, A., & Saidov, Z. (2017). The cul-de-sac of foreign industrial investments to Russia. *Post-Communist Economies*, 29(4). doi: 10.1080/14631377.2017.1339536.
- Hanousek, J., Kočenda, E., & Maurel, M. (2011). Direct and indirect effects of FDI in emerging European markets: a survey and meta-analysis. *Economic Systems*, 35(3). doi: 10.1016/j.ecosys.2010.11.006.
- Huang, C.-H., & Yang, C.-H. (2016). Ownership, trade, and productivity in Vietnam's manufacturing firms. *Asia-Pacific Journal of Accounting & Economics*, 23(3). doi: 10.1080/16081625.2016.1188449.
- Institute of World Economy and International Relations of the Russian Academy of Sciences (2015). Russia and the World: 2016. *Annual Forecast: Economy and Foreign Policy*. Retrieved from: http://www.imemo.ru/files/File/ru/publ/2015/2015_024.pdf (27.02.2017).
- Iwasaki, I., Mizobata, S., & Muravyev, A. (2018). Ownership dynamics and firm performance in an emerging economy: a meta-analysis of the Russian literature. *Post-Communist Economies*, 30(3). doi: 10.1080/14631377.2018.1442036.
- Javorcik, B. S. (2004). Does foreign direct investment increase the productivity of domestic firms? In search of spillovers through backward linkages. *American Economic Review*, 94(3). doi: 10.1257/0002828041464605.
- Jenkins, R. (2004). Globalization, FDI and employment in Viet Nam. *Transnational corporations. UNCTAD*, 15(1). doi: 10.1080/1024529042000271416.
- Jude, C., & Pop Silaghi, M. I. (2015). Employment effects of foreign direct investment. New evidence from Central and Eastern European countries. *SSRN Electronic Journal*. Retrieved from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2607520 (27.02.2017).
- Karpaty, P., & Bandick, R. (2007). Foreign acquisition and employment effects in Swedish manufacturing. *SSRN Electronic Journal*. Retrieved from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1030512 (27.02.2017).
- Lenart, Ł., Mazur, B., & Pipień, M. (2016). Statistical analysis of business cycle fluctuations in Poland before and after the crisis. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 11(4). doi: 10.12775/EQUIL.2016.035.
- Mehta, S. (2016). Innovation and employment: a study of Indian manufacturing sector. *Millennial Asia*, 7(2). doi: 10.1177/0976399616655032.
- Nazarczuk, J., & Krajewska, A. (2018). Local determinants of foreign direct investment in Poland: the role of relative distance. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 13(1). doi: 10.24136/eq.2018.004.
- Onaran, O. (2008). Jobless growth in the Central and East European countries: a country-specific panel data analysis of the manufacturing industry. *Eastern European Economics*, 46(4). doi: 10.2753/eee0012-8775460405.

- Pietrucha, J., Żelazny, R., Kozłowska, M., & Sojka, O. (2018). Import and FDI as channels of international TFP spillovers. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 13(1). doi: 10.24136/eq.2018.003.
- Próchniak, M. (2011). Determinants of economic growth in Central and Eastern Europe: the global crisis perspective. *Post-Communist Economies*, 23(4). doi:10.1080/14631377.2011.622566.
- Robertson, G. B., & Teitelbaum, E. (2011). Foreign direct investment, regime type, and labor protest in developing countries. *American Journal of Political Science*, 55(3). doi: 10.1111/j.1540-5907.2011.00510.x
- Russian Federal State Statistics Service (2017). United Interdepartmental Statistical Information System. Retrieved from: <http://www.fedstat.ru/indicators/start.do>. (24.02.2017).
- Spitsin, V. V., Mikhalechuk, A. A., Spitsina, L. Yu., Shabalina, N. V., & Novoseltseva, D. A. (2015). Comparative analysis of economic and social results of foreign and domestic firms: case Russian electronic industry. In *International Business Information Management Association conference, IBIMA: 26th International Conference*. Madrid: IBIMA.
- Spitsin, V. V., Mikhalechuk, A. A., Spitsina, L. Yu., Tyuleneva, N. A., & Novoseltseva, D. A. (2016). Manufacture of transport equipment. social results of domestic and foreign firms: case manufacture of transport equipment in Russia. *International Journal of Economics and Financial Issues: International Academic Journal*, 6(1).
- Spitsin V. V., Mikhalechuk A. A., Chistyakova N. O., & Spitsina L. Yu (2018). Development of innovative industries in Russia under unfavourable external environment. *Equilibrium. Quarterly Journal of Economics and Economic Policy*. 13(3).
- Staehr, K. (2017). Capital flows and growth dynamics in Central and Eastern Europe. *Post-Communist Economies*, 30(1). doi: 10.1080/14631377.2017.136219.
- Temouri, Y., Driffield, N. L., & Añón Higón, D. (2008). Analysis of productivity differences among foreign and domestic firms: evidence from Germany. *Review of World Economics*, 144(1). doi: 10.1007/s10290-008-0136-1.
- Unified Interdepartmental Statistical Information System (UniSIS), Russia (2017). Retrieved from: <http://www.fedstat.ru/indicators/start.do> (28.07.2017).
- Varblane, U., Mickiewicz, T., & Radosevic, S. (2002). The value of diversity: foreign direct investment and employment in Central Europe during economic recovery. *SSRN Electronic Journal*. Retrieved from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=418541 (28.07.2017).
- Vukšić, G. (2015). Effects of private ownership, trade, and foreign direct investment on labor productivity growth in transition economies: evidence from the Croatian manufacturing industry. *Emerging Markets Finance and Trade*, 52(2). doi: 10.1080/1540496x.2015.1011540.
- Wang, J., & Wang, X. (2015). Benefits of foreign ownership: evidence from foreign direct investment in China. *SSRN Electronic Journal*. Retrieved from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2581295. (28.07.2017).

- Yucel, G. E. (2014). FDI and economic growth: the case of Baltic countries. *Research in World Economy*, 5(2). doi:10.5430/rwe.v5n2p115
- Zemtsov S. P., Pavlov, P. N., & Sorokina, A. V. (2016). Specifics of cluster policy in Russia. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, 11(3). doi: 10.12775/EQUIL.2016.023.

Acknowledgements

The research is conducted with financial support from Russian Foundation for Basic Research (RFBR) in the frames of scientific and research project of RFBR named “Dynamic modeling of Russian, foreign and joint industrial enterprises development in situation of economic sanctions,” project №. 17-06-00584(a).

Annex

Table 1. Panel of labor indicators for the manufacturing industry in the Russian Federation (Section D)^{*/**}

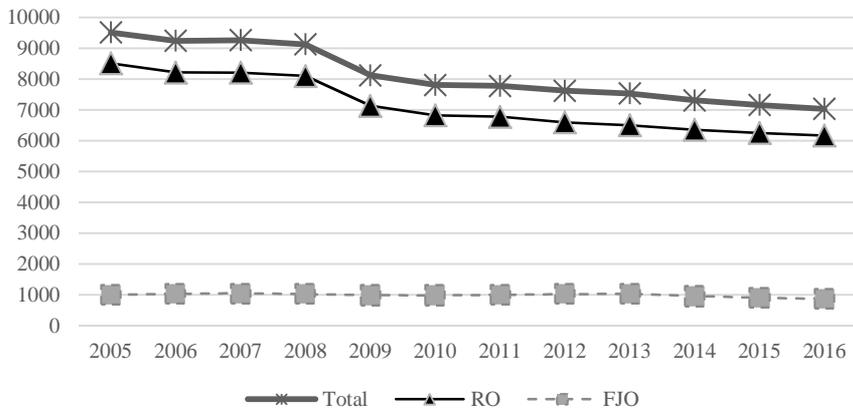
№	Indicators	Indicator description	Data source and calculation formula
Absolute indicators			
1	<i>Number of employees</i>	Employment, in thousand employees.	Rosstat, UniSYS: Indicator 'Full-equivalent employees number' URL: https://www.fedstat.ru/indicator/43007
2	<i>Average salary</i>	An average total salary per month as an employee total monthly income, in thousand rubles.	Rosstat, UniSYS: Indicator ' <i>Nominal monthly average wage paid per 1 employee</i> ' URL: https://www.fedstat.ru/indicator/33433
3	<i>Gross payroll fund</i>	All payments made to company employees (per year) including monthly salaries as well as all motivation and etc.	Calculated by authors as Indicator 1 × Indicator 2 × 12 months
Estimate ratio indicators			
4	<i>Labor intensity</i>	The measure describes the cost of labor per unit of output in financial terms for the entire range of products (services), pax/10 million rubles.	The indicator is calculated by authors as a ratio of employees number to 10 million rubles of total number of goods (services) produced and shipped.
5	<i>Share of the gross payroll fund in products shipped (GPF/SP)</i>	The estimate indicator shows the ratio of the annual gross payroll fund (in rubles) to total produced and shipped goods (in rubles), %.	The indicator is calculated by authors as $\frac{\text{gross payroll fund}}{\text{goods shipped}} \times 100\%$
Growth rate indicators			
6	<i>Employees growth rate</i>	The growth rate of employee numbers per year, %.	Calculated by authors as a chain index.
7	<i>Average salary growth rate</i>	The growth rate of average salaries per year, %.	Used for macroeconomic statistical analysis and variance analysis of labor indicators.
8	<i>Gross payroll fund growth rate</i>	The growth rate for gross payroll funds per year, %.	

Note:

*All the research calculations were made in rubles as the national Russian currency.

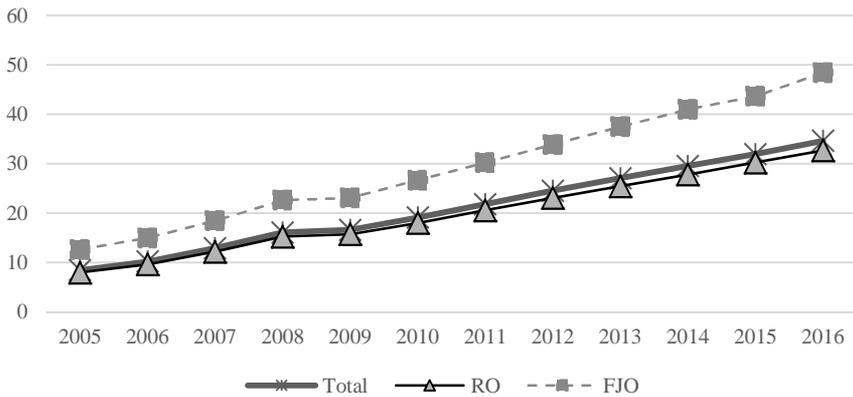
** Indicators are calculated and analyzed as nominal and as real values.

Figure 1. Number of employees in the Russian manufacturing industry, thous. Employees



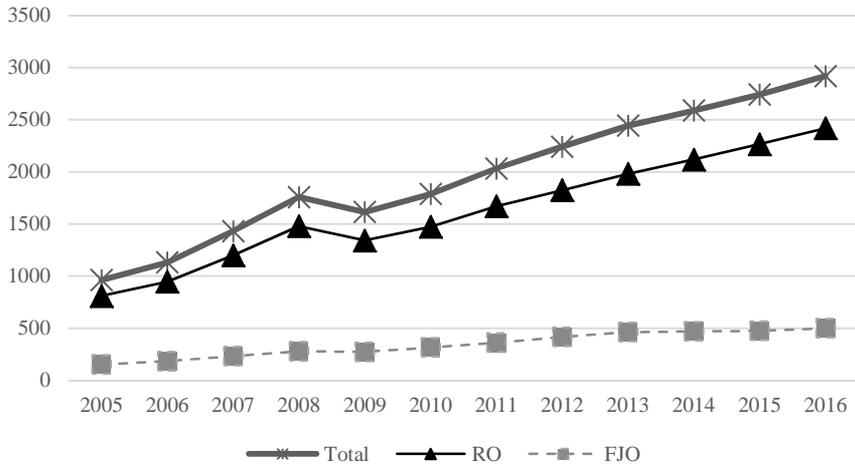
Source: compiled by the authors based on Rosstat (2017), UniSIS (2017).

Figure 2. Average month salary in the Russian manufacturing industry, thous. rub.



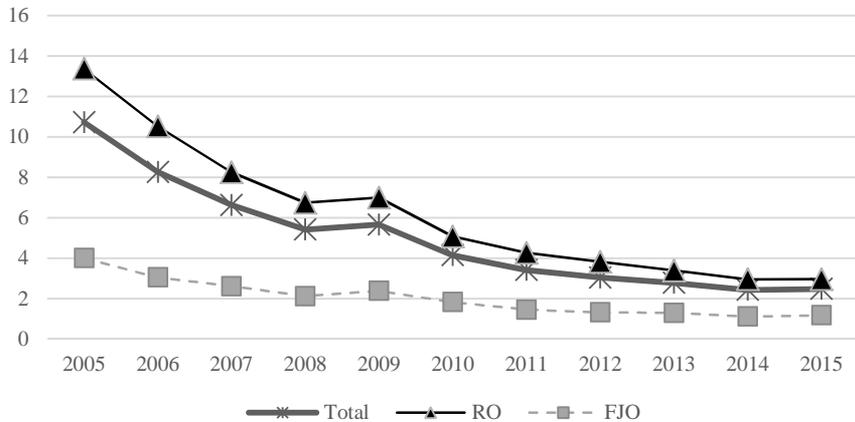
Source: compiled by the authors based on Rosstat (2017), UniSIS (2017).

Figure 3. Gross payroll fund, bln. rub.



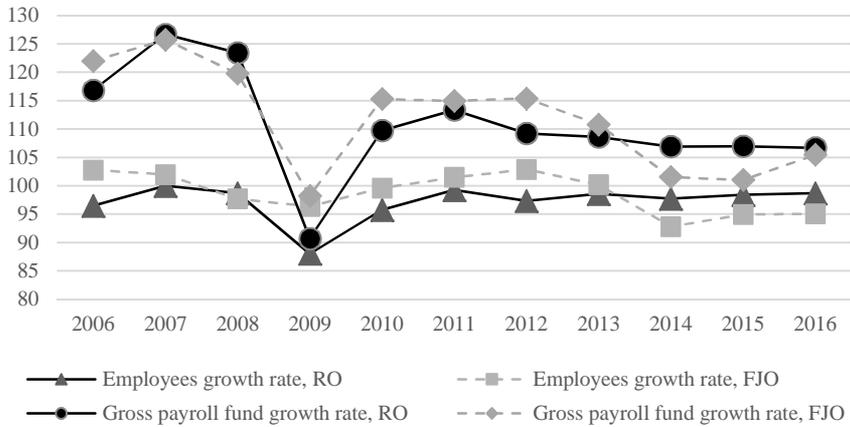
Source: own calculations based on Rosstat (2017), UniSIS (2017).

Figure 4. Labor intensity in the Russian manufacturing industry, pax / 10 mln. Rubles



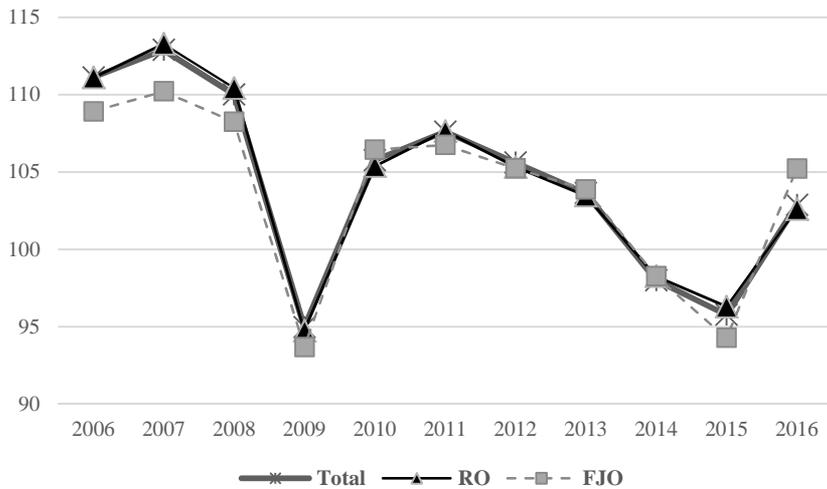
Source: own calculations based on Rosstat (2017), UniSIS (2017).

Figure 5. Annual growth rates of employees and payroll fund, %



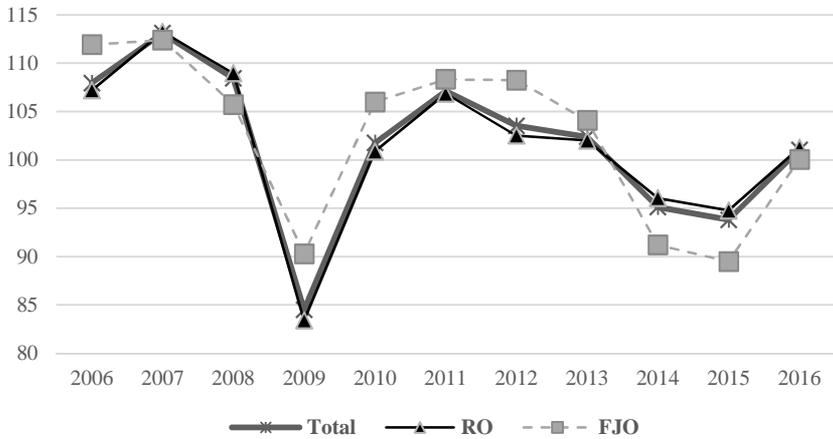
Source: own calculations based on Rosstat (2017), UniSIS (2017).

Figure 6. Real average salary growth rate (adjusted for the annual consumer price index), %



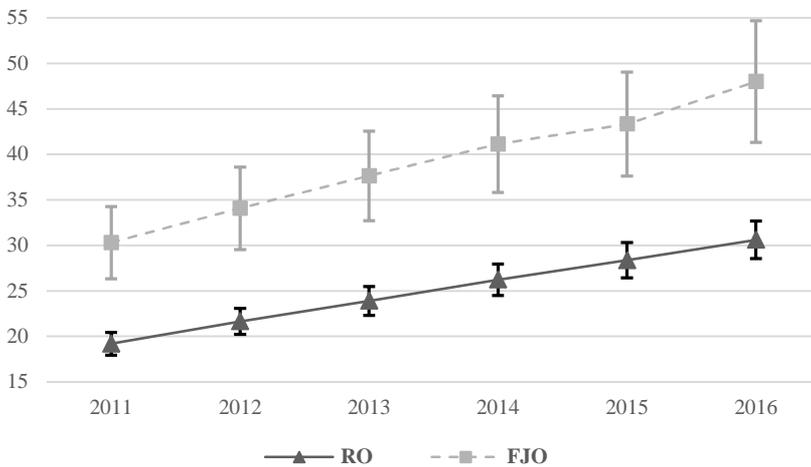
Source: own calculations based on Rosstat (2017), UniSIS (2017).

Figure 7. Real gross payroll funds growth rate (adjusted for the annual consumer price index), %



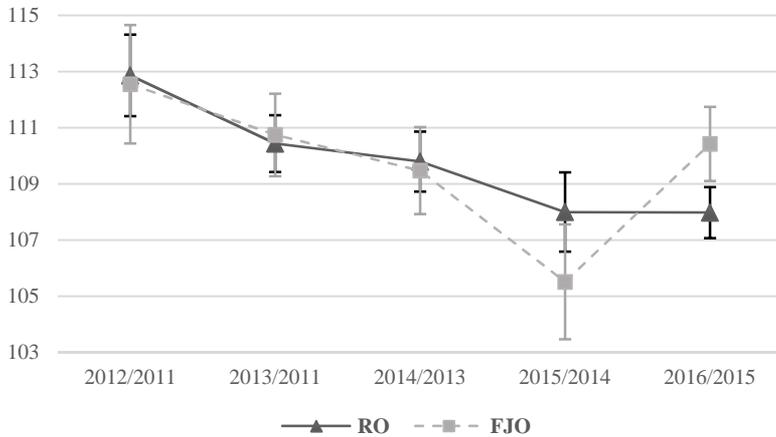
Source: own calculations based on Rosstat (2017), UniSIS (2017).

Figure 8. Average salary for RO and FJO companies at the level of Russian regions in 2011–2016, thousand rubles (Group means values with 95% confidence interval)



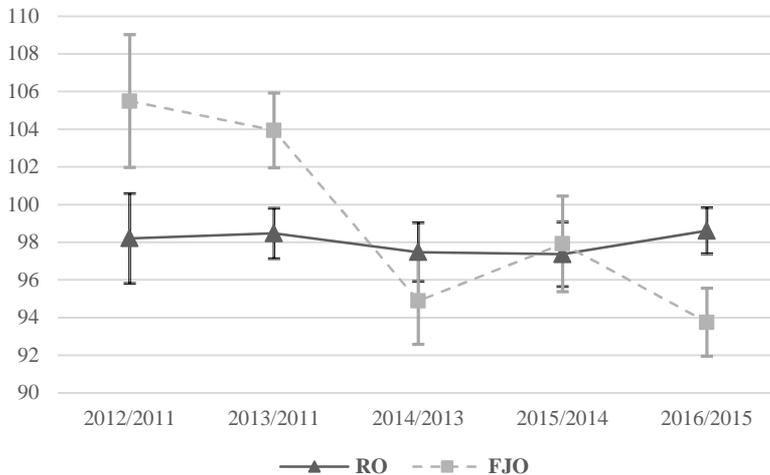
Source: own calculations based on Rosstat (2017), UniSIS (2017).

Figure 9. Average salaries growth rate in 2012-2016, % (Group means values with 95% confidence interval)



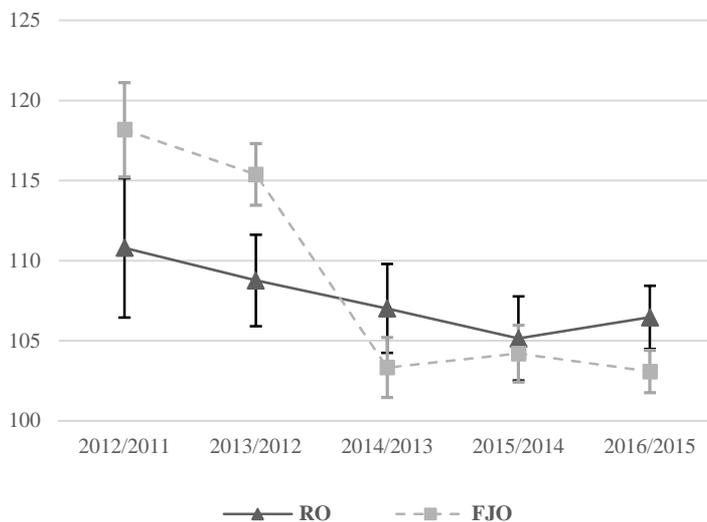
Source: own calculations based on Rosstat (2017), UniSIS (2017).

Figure 10. Employees growth rate in 2012-2016, % (Group means values with 95% confidence interval)



Source: own calculations based on Rosstat (2017), UniSIS (2017).

Figure 11. Gross payroll fund growth rates in 2012-2016, % (Group means values with 95% confidence interval)



Source: own calculations based on Rosstat (2017), UniSIS (2017).