IE UNIVERSIDAD

TESIS DOCTORAL/ DOCTORAL DISSERTATION

Factores socioeconómicos de la percepción de la corrupción empresarial en las regiones rusas /

Socio-Economic Factors of Business Corruption Perception in Russian Regions

Alexander Strakhov

SEGOVIA, 2022

IE UNIVERSIDAD

TESIS DOCTORAL/ DOCTORAL DISSERTATION

Factores socioeconómicos de la percepción de la corrupción empresarial en las regiones rusas /

Socio-Economic Factors of Business Corruption Perception in Russian Regions

Alexander Strakhov

Doctoral Thesis Advisor: Maxim Mironov

Abstract

International studies define Russia as one of the highly corrupted countries. The paper is devoted to the identification of factors of business corruption perception in Russian regions and is based on the original survey of 1051 businessmen in 39 regions. To measure perceived corruption the new index (RCPI) is created. It demonstrates external validity correlating with other independent measures of malpractices. The survey data is analyzed at three levels: regions, cities and firms. The study revealed for the first time for Russia a positive correlation between state participation in the economy and malpractices. An increase by one standard deviation for the share of employees of state-owned firms is accompanied with increase by 0.32 standard deviation in the RCPI. Also, the paper demonstrates the negative correlation between the government size and perceived corruption, which was not detected by previous studies. An increase of the share of state officials in labor force by one standard deviation is accompanied with the decrease of RCPI by 0.42 of its standard deviation. Finally, the negative relationship between the prosperity and bribes is confirmed convincingly. An increase of the average salary by one standard deviation is correlated with the decrease of RCPI by 0.30 of its standard deviation. These findings contribute to investigation of corruption perception factors in post-communist countries. Particularly important is identification of such factors as wealth and state's interference in the economy. They are especially relevant for the current situation in Russia, where the role of the state is growing, and the well-being of the population is declining.

Resumen

Los estudios internacionales definen a Rusia como uno de los países más corruptos. El documento está dedicado a la identificación de los factores de percepción de la corrupción empresarial en las regiones rusas y se basa en la encuesta original de 1051 empresarios en 39 regiones. Para medir la corrupción percibida se crea el nuevo índice (IPRC). Demuestra validez externa al correlacionarse con otras medidas independientes de malas prácticas. Los datos de la encuesta se analizan en tres niveles: regiones, ciudades y empresas. El estudio revela por primera vez para Rusia una correlación positiva entre la participación del Estado en la economía y las malas prácticas. Un aumento de desviación estándar de la proporción de empleados de las empresas estatales va acompañado de un aumento de 0,32 desviaciones estándar del IPRC. Asimismo, el documento demuestra la correlación negativa entre el tamaño del gobierno y la percepción de la corrupción, que no fue detectada por estudios anteriores. Un aumento de la proporción de funcionarios del Estado en la población activa en una desviación estándar va acompañado de la disminución del IPRC en 0,42 de su desviación estándar. Por último, la relación negativa entre la prosperidad y los sobornos se confirma de forma convincente. Un aumento del salario medio en una desviación estándar está correlacionado con la disminución del IPRC en un 0,30 de su desviación estándar. Estos resultados contribuyen a la investigación de los factores de percepción de la corrupción en los países poscomunistas. Es especialmente importante la identificación de factores como la riqueza y la interferencia del Estado en la economía. Son especialmente relevantes para la situación actual de Rusia, donde el papel del Estado es cada vez mayor y el bienestar de la población está disminuyendo.

Acknowledgements

The completion of my dissertation would not have been possible without the support and guidance of my adviser Maxim Mironov. From the very beginning he gave me valuable advice, shared practical experiences, pointed out mistakes and helped to correct them.

I would like to express my deepest appreciation to the President and members of Doctoral Committee – Garen Markarian, Nikolay Petrov, Vahid Saadi, Juan Santalo, Natalya Volchkova – for constructive criticism and invaluable contribution to an improvement and focus of my research.

I would also like to extend my deepest gratitude to those who have taught me and helped me to learn all these years: Salvador Carmona, Julio de Castro, Carl Kock, Laura Maguire, Caterina Moschieri, and all professors and the administration of Instituto de Empresa.

I want to express my sincere thanks to my colleagues Eduard Inozemtsev, Irina Lackman and Alexey Pavlov, who provided me with invaluable assistance in collecting materials and analyzing data for this work.

Thanks should also go to Timur Aimaletdinov and to all employees of the NAFI Research Center, who have done a high quality job of completing the survey in Russian regions, which formed the basis of this work.

My family has played a special role for the entirety of the time I was doing the research. I'm extremely grateful to Nona, Alexander and Kirill who provided me with encouragement and patience throughout the duration of this project. Their help and advice during my work cannot be underestimated.

And last but not least, I am grateful to all my friends and colleagues who assisted me in my research or simply have never let me down during this stressful time.

List of contents

Notations

Abbreviations

BEEPS – Business Environment and Enterprise Performance Survey

CPI – Corruption Perception Index of TI

EBRD – European Bank of Reconstruction and Development

EC – Europe Council

EU – Europe Union

FOM – “Fond Obchestvenoe Mnenie” – “Foundation of Public Opinion” (translation from Russian)

GRP – Gross Regional Product

INDEM – Russian think tank “Informatics for Democracy”

PCA – principal component analysis

RosStat – Russian Statistical Agency

TI – Transparency International

Variables

Corrup1, Coprrup2 … - sub-indexes for RCPI

Extractive – share of extractive industries in GRP

Manufacturing – manufacturing industries’ output per capita in the city

Officials_city – % of civil servants in the total number of employed in the city

Officials_reg – % of civil servants in the total number of employed in the region

RCPI – Regional Corruption Perception Index constructed in this paper

Salary_city – average monthly salary for cities

Salary_reg – average monthly salary for regions

StateEmploy_city – % of employees of state-owned firms in the total number of employed in the city

StateEmploy_reg – % of employees of state-owned firms in the total number of employed in the region

Students – number of university and college students out of 10000 people in the region

Introduction

In the modern world, government transparency and anti-corruption policy are in the focus of politicians', citizens' and academic attention (e.g., Sandholtz and Koetzle, 2000; Judge et al., 2011). One of the reasons is importance of this problem for the development of the economy and business climate. Malpractices complicate economic growth and reduce the motivation of businessmen to develop their enterprises (Shleifer and Vishny, 1993; Mauro, 1995). Therefore, the study of the perception of corruption by businessmen is one of the topical tasks in economics.

For Russia, venality has been among the most urgent issues in recent years. Russia, as many other post-communist countries, faced the period of rampant corruption in the beginning of democratization (Kofanova and Petukhov, 2006). In the early 2000s, researchers estimated more than half of the active population involved in corruption in Russia, and more than 80% among businessmen (Popov, 2004). Nowadays, according to national polls, corruption is one of the three key issues for Russian citizens (Levada-Center, 2019) and the second one for businesspeople (Kisunko et al., 2013). Meanwhile, Corruption Perception Index (CPI) of Transparency International (TI) ranks Russia the 129th out of 180 countries (TI, 2020). Thereby, Russia is an interesting country for research with high level of corruption and increasing attention to this problem.

There are plenty of cross-national studies of corruption, where Russia is one of the many countries on the list (e.g., Mauro, 1995; La Porta et al., 1999; Montinola and Jackman, 2002; Treisman, 2007). This realm of research

substantiated key dependences between bribery and different economic, social and political factors of national development. It is important to note, that cross-country dimension is an essential measurement of corruption for international studies. According to World Bank estimates, country factors account for a substantial part of the variation in the level of corruption, which significantly exceeds the factors of companies, industries, etc. (Kisunko et al., 2013). However, the common criticism for cross-country studies is high heterogeneity of cross-national data. As noticed by Schulze et al. (2016) “studies using within-country variation suffer much less from unobserved heterogeneity and thus from omitted-variable biases, as unobserved determinants of corruption like institutions, tradition, histories, and so forth, are much more similar, if not equal” (p.137). Thus, the cross-regional aspect, by analogy with the cross-country aspect, can be of great importance in the study of corruption factors and, at the same time, is less susceptible to the problem of data heterogeneity.

Meanwhile, corruption in Russia is not among the most popular areas for research. International findings could be tested and developed in a cross-regional studies in Russia that is large enough for such surveys and relatively homogenous in economic and political conditions in comparison with cross-national studies. However, a major obstacle is the lack of regional data on corruption. In recent years, only a few polls have been conducted on this topic in the Russian territories. Based on their data, studies of corruption factors in Russia were carried out, which, however, did not reveal many statistically significant dependencies. Dininio and Orttung (2005), and Sharafutdinova (2010) detected a negative correlation between Gross Regional Product (GRP) per capita and the

regional corruption index. However, Kisunko et al. (2013) did not find such a relationship. Dininio and Orttung (2005) and Belousova et al. (2016) found a positive correlation between the size of the bureaucratic apparatus and the level of bribery, however with number of limitations. Thus, researchers have not been able to reach a consensus on how the most common international theories of corruption are suitable for Russian regions.

Also several works investigate political factors of regional corruption in Russia: malpractices at local elections (Mironov and Zhuravskaya, 2016), propensity to bribes of Russian politicians in relation to their expected electoral success (Sidorkin and Vorobyev, 2018), etc. However, political factors are outside the focus of this work for several reasons. Firstly, most political indicators are difficult to measure, for example, the level of political competition, government transparency or accountability. Taking into account the complexity of measuring corruption itself, it seems preferable for this work to take more strict indicators as independent variables. Secondly, most measures of political processes in Russia are relevant until the beginning of the 2010s, since over the past decade, the country has seen an increase in authoritarianism and a narrowing of the space for political competition (Petrov, 2015). As a result, in modern Russia the search for indicators of real political processes is a rather difficult task.

This research is devoted to revealing the economic determinants of business corruption on regional level in Russia. The data comes from the 2019 original survey of 1051 businessmen in 39 major Russian regions in terms of their share in national GDP and population. The questionnaire has been specifically designed for this survey taking into account previous studies in this field. In

particular, it was decided to investigate the perception of corruption, due to the difficulty of measuring real incidents. That is why the final integral index is determined by questions about the perception of corruption, although the questionnaire itself contains question about respondents' personal experience in this area.

Based on the literature analysis, I formulated research hypotheses about the correlation between bribery and various socio-economic factors. In accordance with data available, 5 hypotheses are chosen, that have been verified in cross-country studies and that have not yet been finally proved at Russian regional level. The following constructs act as the corruption factors in these hypotheses: prosperity, government size, state intervention in the economy, rental economic factor, education.

As a measure of corruption I use Regional Corruption Perception Index (RCPI) for Russian territories which is created on the base of businessmen's evaluation of the bribery level in their localities. The principal component analysis (PCA) is used to calculate the aggregate index based on the initial responses for the survey questionnaire. Further, this study explores regression framework with RCPI as a dependent variable and several economic and social indicators of the Russian regions as independent variables, selected in accordance with the aforementioned research hypotheses. The analysis reveals statistically significant correlations between the RCPI and economic prosperity, as well as government interference into economy and government size. An increase of the average monthly salary by one standard deviation is associated with the decrease of RCPI by 0.30 of its standard deviation. An increase of the share of

state officials in total number of employees by one standard deviation is correlated with the decrease of RCPI by 0.42 of its standard deviation, while there is an increase of one standard deviation for the share of employees of state-owned firms that is accompanied by increase by 0.32 standard deviation in the RCPI. These correlations serve to verify three out of five initial hypotheses.

Next step is to conduct the analysis on company level instead of regional level. Additional testing of the hypotheses at the company level allows the increase of the sample size from 39 to 1051 observations and the inclusion of control variables in the analysis. Company level calculation confirms previous results. As a robustness check, the same hypotheses are tested on the city level using the initial sample limited by inhabitants of cities (705 respondents in 42 cities). At this stage RCPI for cities was calculated identically to regional level but with different sample size and structure. City analysis confirms most of previous findings. In addition, negative correlation between non-extractive industries and RCPI is detected. Thus, obtained results reveal important correlations between corruption and several economic indicators that had not been unambiguously detected in previous studies of Russian regions.

This work contributes to the research of factors that determine the level of corruption within one country (Glaeser and Saks, 2006; Charron, 2010; Di Bella et al., 2019) and develops research line of malpractices in Russian regions (Kisunko et al., 2013; Belousova et al., 2016). Several points of newness can be identified in this study. First, it tests the cross-country theories using the sample of regions and cities that are located within one country, which helps to reduce the data heterogeneity and to increase the reliability of the obtained results. In

addition to studying sample of regions, which has few analogues in previous studies, this work examines corruption in a sample of cities, which, to the best of my knowledge, is being done for the first time in Russia. Secondly, this study is based on the unique survey data. A survey on the topic of corruption was conducted among the businessmen in Russian regions, specifically for the purposes of this study, and has not been published yet.

Thirdly, this research deliberately focuses on business corruption in line with World Bank and INDEM-TI surveys. RCPI is based on a poll of regional entrepreneurs and managers, who have the most comprehensive knowledge on shadow schemes in the economy. Most bribery ratings are based on opinions of analysts or ordinary citizens (e.g., CPI and Corruption Barometer of TI), which might lead to erroneous estimates due to various stereotypes and lack of information. Businesspeople survey creates a more complete picture, since they are informed experts and sometimes participants in informal deals.

Fourth, this research fills the gap in detailed analysis of corruption in the Russian regions. For the first time, it finds a positive correlation between the number of employees in state-owned firms and corruption. It clearly confirms a negative correlation between the size of the state apparatus and the level of bribery, which previous researchers could not define unambiguously. It also confirms the previously detected correlation between welfare and corruption, and it finds the evidence of the role of manufacturing industries as a factor in corruption - an observation that is entirely new for Russia.

Empirical limitations do not allow me to make a casual inference. However, several conjectures can be made with high likelihood. The survey results show

that well-being and a competitive economy in Russian regions are associated with low bribes. It can be assumed that in economically developed regions the system is more resistant to corruption. In this case, the growth of business and income of the population should reduce malpractices. The reverse logic suggests that corruption negatively affects development and private business. Then the fight against bribery should improve the market conditions and prosperity. In any case, people's incomes and private business are associated with a reduction in corruption. The main conclusion of the study is that this pattern is just as true for Russian regions as for more developed and democratic countries.

On the other hand, the discovered negative correlation between the government size and corruption can be attributed to the Russian specifics. This phenomenon is detected in transitional regimes (Goel and Budak, 2006). For most democracies, an increase in the number of officials rather leads to an increase in bribes (e.g., Tanzi, 1998). However, in modern Russia, the state apparatus is the most powerful instrument of control over local government, since civil society and independent media have been severely oppressed by the state in recent years. Therefore, the fight against corruption in Russia is likely to be carried out by repressive methods with an increase in the state apparatus. This creates risks of growth in budget expenditures and a decrease in the productivity of the economy due to an increase in the share of civil servants. This is the second main conclusion of this work.

The results of this research could be employed in further studies of corruption at intra-country level, particularly in post-communist nations. It is important to mention that Russia is a developing post-communist economy and

one of the world leaders in terms of territory, population and resource potential. The obtained data can explain the dynamics of corruption in Russia and form approaches that will help study corruption at regional level in other countries, which have similar political and economic conditions. Practical implementation is possible in national anti-corruption programs targeted at different territories with their specific economic and social characteristics.

Introducción

En el mundo moderno, la transparencia gubernamental y la política anticorrupción están en el centro de la atención de políticos, ciudadanos y académicos (por ejemplo, Sandholtz y Koetzle, 2000; Judge et al., 2011). Una de las razones es la importancia de este problema para el desarrollo de la economía y el clima empresarial. Las malas prácticas complican el crecimiento económico y reducen la motivación de los empresarios para desarrollar sus empresas (Shleifer y Vishy, 1993, Mauro, 1995). Por ello, el estudio de la percepción de la corrupción por parte de los empresarios es una de las tareas de actualidad en economía.

Para Rusia, la venalidad ha sido uno de los temas más urgentes de los últimos años. Rusia, al igual que muchos otros países poscomunistas, se enfrentó a un periodo de corrupción rampante al comienzo de la democratización (Kofanova y Petukhov, 2006). A principios de la década de 2000, los investigadores estimaron que más de la mitad de la población activa estaba implicada en la corrupción en Rusia, y más del 80% entre los empresarios

(Popov, 2004). Hoy en día, según las encuestas nacionales, la corrupción es uno de los tres temas clave para los ciudadanos rusos (Levada-Center, 2019) y el segundo para los empresarios (Kisunko et al, 2013). Mientras tanto, el Índice de Percepción de la Corrupción (IPC) de Transparencia Internacional (TI) sitúa a Rusia en el puesto 129 de 180 países (TI, 2020). Por lo tanto, Rusia es un país interesante para la investigación con un alto nivel de corrupción y una creciente atención a este problema.

Hay muchos estudios internacionales sobre la corrupción, en los que Rusia es uno de los muchos países de la lista (por ejemplo, Mauro, 1995; La Porta et al, 1999; Montinola y Jackman, 2002; Treisman, 2007). Este ámbito de investigación corroboró las dependencias clave entre el soborno y diferentes factores económicos, sociales y políticos del desarrollo nacional. Es importante señalar que la dimensión transnacional es una medida esencial de la corrupción para los estudios internacionales. Según las estimaciones del Banco Mundial, los factores de los países representan una parte sustancial de la variación del nivel de corrupción, que supera significativamente los factores de las empresas, las industrias, etc. (Kisunko et al, 2013). Sin embargo, la crítica común a los estudios entre países es la elevada heterogeneidad de los datos transnacionales. Como señalan Schulze et al (2016), "los estudios que utilizan la variación dentro del país sufren mucho menos de la heterogeneidad no observada y, por tanto, de los sesgos de las variables omitidas, ya que los determinantes no observados de la corrupción, como las instituciones, la tradición, las historias, etc., son mucho más similares, si no iguales" (p. 137). Así, el aspecto interregional, por analogía con el aspecto transnacional, puede ser de

gran importancia en el estudio de los factores de la corrupción y, al mismo tiempo, es menos susceptible al problema de la heterogeneidad de los datos.

Mientras tanto, la corrupción en Rusia no se encuentra entre las áreas más populares para la investigación. Los hallazgos internacionales podrían probarse y desarrollarse en un estudio interregional en Rusia, que es lo suficientemente grande para este tipo de encuestas y relativamente homogénea en condiciones económicas y políticas en comparación con los estudios transnacionales. Sin embargo, un obstáculo importante es la falta de datos regionales sobre la corrupción. En los últimos años, sólo se han realizado unas pocas encuestas sobre este tema en los territorios rusos. Sobre la base de sus datos, se realizaron estudios sobre los factores de la corrupción en Rusia, que, sin embargo, no revelaron muchas dependencias estadísticamente significativas. Dininio y Orttung (2005), y Sharafutdinova (2010) detectaron una correlación negativa entre el Producto Regional Bruto (PRB) per cápita y el índice de corrupción regional. Sin embargo, Kisunko et al. (2013) no encontraron dicha relación. Dininio y Orttung (2005) y Belousova et al (2016) encontraron una correlación positiva entre el tamaño del aparato burocrático y el nivel de soborno, aunque con varias limitaciones. Así, los investigadores no han podido llegar a un consenso sobre la adecuación de las teorías internacionales más comunes sobre la corrupción a las regiones rusas.

También varios trabajos investigan los factores políticos de la corrupción regional en Rusia: malas prácticas en las elecciones locales (Mironov y Zhuravskaya, 2016), propensión a los sobornos de los políticos rusos en relación con su éxito electoral esperado (Sidorkin y Vorobyev, 2018), etc. Sin embargo,

los factores políticos quedan fuera del enfoque de este trabajo por varias razones. En primer lugar, la mayoría de los indicadores políticos son difíciles de medir, por ejemplo, el nivel de competencia política, la transparencia gubernamental o la rendición de cuentas. Teniendo en cuenta la complejidad de medir la corrupción en sí misma, parece preferible para este trabajo tomar indicadores más estrictos como variables independientes. En segundo lugar, la mayoría de las mediciones de los procesos políticos en Rusia son relevantes hasta principios de la década de 2010, ya que durante la última década, el país ha visto un aumento del autoritarismo y un estrechamiento del espacio para la competencia política (Petrov, 2015). Como resultado, en la Rusia moderna la búsqueda de indicadores de los procesos políticos reales es una tarea bastante difícil.

Esta investigación está dedicada a revelar los determinantes económicos de la corrupción empresarial a nivel regional en Rusia en 2018-19. Los datos provienen de la encuesta original de 1051 empresarios en 39 regiones principales de Rusia en términos de su participación en el PIB nacional y la población. El cuestionario se ha diseñado específicamente para esta encuesta teniendo en cuenta los estudios anteriores en este campo. En particular, se decidió investigar la percepción de la corrupción, debido a la dificultad de medir los incidentes reales. Por ello, el índice integral final está determinado por preguntas sobre la percepción de la corrupción, aunque el propio cuestionario contiene preguntas sobre la experiencia personal de los encuestados en este ámbito.

A partir del análisis de la literatura, formulé hipótesis de investigación sobre la correlación entre el soborno y diversos factores socioeconómicos. De acuerdo con los datos disponibles, se determinan 5 hipótesis, que han sido verificadas estadísticamente en estudios entre países y que aún no han sido finalmente probadas a nivel regional ruso. Los siguientes constructos actúan como factores de corrupción en estas hipótesis: prosperidad, factor económico rental, tamaño del gobierno, intervención del Estado en la economía, educación.

Este trabajo sugiere un nuevo Índice de Percepción de la Corrupción Regional (IPRC) para los territorios rusos, que se crea sobre la base de la evaluación de los empresarios del nivel de corrupción en sus localidades. Se utiliza el Análisis de Componentes Principales (ACP) para calcular el índice integral a partir de las respuestas iniciales del cuestionario de la encuesta. A continuación, este estudio explora la ecuación de regresión con el IPRC como variable dependiente y varios indicadores económicos y sociales de las regiones rusas como variables independientes, seleccionadas de acuerdo con las hipótesis de investigación mencionadas. Los cálculos revelaron correlaciones estadísticamente significativas entre el IPRC y la prosperidad económica, así como la injerencia del gobierno en la economía y el tamaño del gobierno. Un aumento del salario medio mensual en una desviación estándar está correlacionado con la disminución del IPRC en 0,3 de su desviación estándar. Un aumento de la proporción de funcionarios del Estado en el número total de empleados en una desviación estándar está correlacionado con la disminución del IPRC en 0,42 de su desviación estándar, mientras que hay un aumento de una desviación estándar para la proporción de empleados de las empresas

estatales que va acompañado de un aumento de 0,32 desviaciones estándar en el IPRC. Estas correlaciones sirven para verificar tres de las cinco hipótesis iniciales.

El siguiente paso es calcular una ecuación similar a nivel de empresa en lugar de a nivel regional. La comprobación adicional de las hipótesis a nivel de empresa permite aumentar el tamaño de la muestra de 39 a 1.051 observaciones y la inclusión de variables de control en el análisis. Los controles minimizan el impacto en el resultado de los efectos fijos de determinadas regiones, industrias y tipos de empresas. El cálculo a nivel de empresa confirma los resultados anteriores. Para la verificación adicional de los resultados obtenidos, se probaron las mismas hipótesis a nivel de ciudad utilizando la muestra inicial limitada por los habitantes de las ciudades (850 encuestados en 42 ciudades). En esta fase, el IPRC de las ciudades se calculó de forma idéntica al nivel regional, pero con un tamaño y una estructura de muestra diferentes. En esta ocasión se encuentran correlaciones estadísticamente significativas para la mayoría de las hipótesis previamente conformadas y se detecta una justificación adicional para la hipótesis sobre la economía de búsqueda de rentas. Así, los resultados obtenidos revelan importantes correlaciones entre la corrupción y varios indicadores económicos que no se habían detectado de forma inequívoca en estudios anteriores sobre las regiones rusas.

Este trabajo contribuye a la investigación de los factores que determinan el nivel de corrupción dentro de un país (Glaeser y Saks, 2006, Charron, 2010, Di Bella et al, 2019) y desarrolla la línea de investigación de las malas prácticas en las regiones rusas (Kisunko et al, 2013, Belousova et al, 2016). Se pueden

identificar varios puntos de novedad en este estudio. En primer lugar, pone a prueba las teorías transfronterizas utilizando la muestra de regiones y ciudades que se encuentran dentro de un país, lo que ayuda a reducir la heterogeneidad de los datos y a aumentar la significación de los resultados obtenidos. Además de estudiar las regiones rusas, que tiene pocos análogos en estudios anteriores, este trabajo examina la corrupción en una muestra de ciudades, lo que, hasta donde yo sé, se hace por primera vez. En segundo lugar, este estudio se basa en los datos de una encuesta única. Se ha realizado una encuesta sobre el tema de la corrupción entre los empresarios de las regiones rusas, específicamente para los fines de este estudio, y no se ha publicado todavía.

En tercer lugar, esta investigación se centra deliberadamente en la corrupción empresarial, de acuerdo con las encuestas del Banco Mundial y del INDEM-TI. El IPRC se basa en un sondeo de empresarios regionales, que son los que tienen un conocimiento más amplio de las tramas en la sombra en la economía. La mayoría de los índices de soborno se basan en opiniones de analistas o ciudadanos de a pie (por ejemplo, el PCI y el Barómetro de la Corrupción de TI), lo que puede dar lugar a estimaciones erróneas debido a diversos estereotipos y a la falta de información. La encuesta de los empresarios crea una imagen más completa, ya que son expertos informados y a veces participantes en tratos informales.

En cuarto lugar, esta investigación llena el vacío del análisis detallado de la corrupción en las regiones rusas. Por primera vez, encuentra una correlación positiva entre el número de empleados en las empresas estatales y la corrupción. Confirma claramente una correlación negativa entre el tamaño del aparato

estatal y el nivel de soborno, que los investigadores anteriores no pudieron definir de forma inequívoca. También confirma la correlación detectada anteriormente entre el bienestar y la corrupción, y encuentra la evidencia del papel de las industrias manufactureras como factor de corrupción, una observación totalmente nueva para Rusia.

Las limitaciones empíricas no me permiten inferencia casual. Sin embargo, se pueden hacer varias conjeturas con alta probabilidad. Los resultados de la encuesta muestran que el bienestar y la economía competitiva en las regiones rusas están asociados a un bajo nivel de sobornos. Cabe suponer que en las regiones económicamente desarrolladas el sistema es más resistente a la corrupción. En este caso, el crecimiento de los negocios y los ingresos de la población deberían reducir las malas prácticas. La lógica inversa sugiere que la corrupción afecta negativamente al desarrollo y a los negocios privados. Entonces, la lucha contra el soborno debería mejorar las condiciones del mercado y la prosperidad. En cualquier caso, los ingresos de la población y los negocios privados están asociados a una reducción de la corrupción. La principal conclusión del estudio es que este patrón es tan cierto para las regiones rusas como para los países más desarrollados y democráticos.

Por otra parte, la correlación negativa descubierta entre el tamaño del gobierno y la corrupción puede atribuirse a las especificidades rusas. Este fenómeno se detecta en los regímenes de tránsito (Goel y Budak, 2006). En la mayoría de las democracias, un aumento del número de funcionarios conduce más bien a un aumento de los sobornos (por ejemplo, Tanzi, 1998). Sin embargo, en la Rusia moderna, el aparato estatal es el instrumento más poderoso de

control sobre el gobierno local, ya que la sociedad civil y los medios de comunicación independientes han sido gravemente oprimidos por el Estado en los últimos años. Por lo tanto, es probable que la lucha contra la corrupción en Rusia se lleve a cabo mediante métodos represivos con un aumento del aparato estatal. Esto crea riesgos de crecimiento de los gastos presupuestarios y de disminución de la productividad de la economía debido al aumento de la proporción de funcionarios. Esta es la segunda conclusión principal de este trabajo.

Los resultados de esta investigación podrían emplearse en otros estudios sobre la corrupción en el interior de los países, especialmente en las naciones postcomunistas. Es importante mencionar que Rusia es una economía poscomunista en desarrollo y uno de los líderes mundiales en términos de territorio, población y potencial de recursos. Los datos obtenidos pueden explicar la dinámica de la corrupción en Rusia y formar enfoques que ayudarán a estudiar la corrupción a nivel regional en otros países, que tienen condiciones políticas y económicas similares. La aplicación práctica es posible en los programas nacionales de lucha contra la corrupción dirigidos a diferentes territorios con sus características económicas y sociales específicas.

Literature review

Corruption and corruption perception

There are a lot of different definitions of corruption in social sciences. One of the most well-known notions comes from United Nations Development

Program «…the misuse of public office or authority for private benefit, through bribery, extortion, influence peddling, nepotism, or embezzlement» (UNDP, 2009, p.28). Rose-Ackerman evolves a similar approach assuming that one part in bribery is always a public official because it «…occurs at the interface of the public and private sectors» (Rose-Ackerman, 1997, p.31). The Anti-Corruption Plan Guides of TI (2009, p.14) suggests treating corruption as «the abuse of entrusted power for private gains». This definition covers the fact that corruption can take place in either public or private sectors. The important aspect of corruption is indicated by Nye, who emphasized that misuse of entrusted power could lead not only to individual benefits, but also to the gains of the group such as family, clan and so on (Nye, 1967). Another crucial characteristic of corruption is its embeddedness in complex social ties (Nielsen, 2003).

The classification of corruption by type is quite diverse. First of all, it is a grand corruption, related to high-level malpractices, and petty corruption, associated with ordinary people and small bribes for police and low-level state officials (TI, 2009). Administrative or bureaucratic corruption could be presented as a middle level misuse of trusted power (Prasad et al, 2019). Researchers also distinguish administrative burden and state capture: first one is related to traditional graft and second one is more sophisticated method of capitalizing on public status, when informal groups or individuals influence public policy in their own interests (World Bank, 2000). Some studies identify independent types of malpractices by industries: police, custom, general administrative corruption and so on (Goel et al., 2016). Others highlight business corruption as an area where authority and business meet each other (Satarov, 2002).

This study focuses on all kind of administrative corruption in interaction with firms such as bribes, gifts and favors in exchange for business benefits or even for administrative services required by law (so-called "speed-money").[1] The choice is due to the key role of this type of malpractices for economic development of the region. Whereas petty corruption influences ordinary people life, business corruption determines investment climate and economic dynamics of the territory (Satarov, 2002).

Since real bribes are difficult to measure, this study investigates corruption perception. It is a common approach in most studies which however has its drawbacks related to perception biases and disingenuous responses (e.g., Lensvelt-Mulders et al., 2005; Azfar and Murell, 2009).[2] Some researchers even suppose that perception of corruption has nothing in common with real malpractices (Sharafutdinova, 2010). Others emphasize substantial difference between two phenomena, e.g., Belousova et al. (2016) estimate their correlation for Russian regions as 0.34. However, most of previous works show that despite of possible errors, in general perception of corruption conveys significant part of variation of malpractices in the territory (Popov, 2004; Olken, 2009).

The problem of perception biases in this study is minimized by the fact that businessmen are interviewed about their daily practices. This is very different from polling experts or ordinary citizens, who mostly voice their opinions, and not practical knowledge. Similar approach was explored in World Bank

[1] Bose notices that in emerging economies bribe for legal service to avoid bureaucratic delays is more than usual case and suggests a special treatment for such a problem – to monitor length of service rather than bribe-taking (2004).

[2] For instance, Azfar and Murrell evaluate share of insincere answers in Romanian surveys close to 35% (2009).

entrepreneurial survey – BEEPS (Kisunko et al., 2013). For businessmen biases are also possible but there should be fewer of them because businesspeople are the most knowledgeable experts in the field of informal transactions. As INDEM researchers note, there are almost no discrepancies between assessments and personal experience, when respondents assess corruption in familiar situations. However, when they talk about institutions that they don't encounter in everyday life, divergences appear (Popov, 2004).

Another problem with sensitive polls – insincere responses – is often solved using randomized and depersonalized survey questions. This study is based on different types of survey questions including depersonalized ones. Moreover, results of all responses are combined in aggregate index in line with INDEM-TI survey (2004). I believe that this approach reduces the impact of disingenuous responses and takes into account different aspects of businessmen perception of corruption.

Cross-national studies on corruption

In recent decades cross-national studies became popular among researchers of corruption (e.g., Montinola and Jackman, 2002; Paldam, 2002, and many others). Scientists make comparisons between different countries seeking economic, political, and cultural causes of malpractices. These studies made significant progress in investigating the bribery roots because of rich data from all over the world. On the other hand, many hypotheses did not get convincing support in strict statistical procedures due to high heterogeneity of data and possible omitted variables in cross-country comparisons.

The complexity of researching cross-country data is due to the fact countries can be very different from one another in many ways. Although researchers include many controls in the analysis, there is a high probability that some variables will go unreported and distort the results. The analyzing within-country data has the advantage that laws, institutions, culture and a variety of other dimensions are more similar in internal territories. For Russia an important additional reason is that even in comparison with the former Soviet republics, it has a more homogeneous composition of regions than, for example, Kazakhstan and Ukraine (Zubarevich, 2010, pp. 27-28). Nonetheless, several substantial conclusions were made in cross-country studies about correlations between corruption and different social factors.

Economic drivers are among the most popular determinants of corruption. Many researchers suppose that the level of economic development / prosperity is the most powerful predictor of the spread of misuse in society: in the most developed economies this trouble is significantly less prominent (La Porta et al*.,* 1999; Treisman, 2000). Economic growth leads to increase in educational standards, technological level, transparency, and political freedom. All these elements create multiplicative obstacles for illegal acts in addition to abundant financing available for governments and NGOs fighting corruption. Besides that, rich countries provide good salaries both in the public and private sectors that per se decreases willingness to take bribes.

Some papers associate corruption with a country's dependency on natural resources (Ades and Di Tella, 1999; Gylfason, 2001). The explanation of high graft level in a rent-seeking society could be stretched to the simplified way of

control over the major financial resources that are concentrated in limited industries and regions. For such kind of economies, the government does not need sophisticated tools and procedures to rule, bearing in mind the abundance of funds accompanied by weak community and market players. Under these circumstances there are a lot of unhampered incentives for tunneling public money to private pockets.

To wind up with economic factors, it is important to mention the role of state intervention in the markets, and openness of economy. For instance, Ades and Di Tella (1999) connect economic openness with decrease in monopoly that leads to less tight government control over businesses. Tullock (1967), Krueger (1974) and Bhagwati (1982) postulate that state intervention and government control over markets increase opportunities and number of tools for bureaucrats to take bribes.

Cultural and historical factors also attract attention of observers as determinants of corruption. For instance, Protestantism as well as some key features of national character defined by Hofstede (1980), reveal a statistically significant correlation with the level of corruption (Treisman, 2007). However, for this research such factors are less useful because Protestantism is practically non-existent in Russia, whereas the difference between Russian regions in the level of individualism and power distance described by Hofstede are not likely to be detected. Moreover, the dominant religions in Russia are Orthodoxy and Muslims, and previous studies have not recorded significant differences between the two with regard to corruption (North et al., 2014).

Democracy maturity and political competition are among the most accepted political determinants of corruption (Diamond and Plattner, 1993; Putnam, 1993; Mauro, 1995). Political theories explaining corruption include citizen activism, participation in protests, voting, influence of electoral cycles, media activity, decentralization of power and the segmentation of the political landscape (Montinola and Jackman, 2002). As discussed above, political factors of corruption are not in the focus of this work. They will also not be used as control variables, since the measurement of political phenomena in modern Russia is complicated by distortions, and many factors, such as decentralization or the level of democracy, are relatively uniform across the country.

Russia has a strong centralized system of government, the political differences between the regions can be called not so crucial. Cultural and social differences after more than 70 years of communist rule, which was famous for its egalitarian approach, can also be considered insignificant. Political theories explaining corruption in the regions of Russia are beyond the scope of this work mostly because there has been a general decline in the level of democracy in Russia in recent years (Yakovlev, 2016). For instance, in 2011 Freedom House classified Russia as a “partly free” state, in 2018 the country’s classification changed to “not free”. (Freedom House, 2020). According to the Economist Intelligence Unit classification (2020), Russia belongs to the “authoritarian regime” and has seriously worsened its position in recent years. Moreover, the strengthening of the central government and the decrease in the independence of the local authorities lead to a significant unification of government throughout the country (Remington et al, 2020). This makes it difficult to identify any specific

political regimes in different regions of Russia. These circumstances reduce the credibility of political data in Russian regions and reinforce the expectation that economic data will be more reliable predictors of corruption.

International and Russian indexes of corruption

An important contribution to corruption research was made by creation of special international indexes in this field. These indexes gave researchers powerful instruments for comparative studies and stimulated search for cause-effect relations on cross-sectional and panel data from many countries (e.g., Paldam, 2002; Anderson and Tverdova, 2003). Later, several Russian indices in this area were calculated. This paper is constructing its own index of corruption in the Russian regions. That is why understanding the major works in this area is crucial for such endeavor.

Corruption Perception Index of TI is one of the most recognized measures of corruption all over the world. Calculation of CPI is based on several international expert surveys about government integrity and business environment in the countries. TI releases CPI annually since 1995, and in 2020 it covers 180 countries (TI, 2020). The index has a 100-point scale with 0 for maximum corruption level. Another important product of TI is Corruption Barometer that measures malpractices in different countries by asking ordinary citizens about their personal experience in facing bribery or participating in it. By definition this survey could measure only petty corruption and very likely fails to reach wealthy businessmen and politicians.

CPI, Corruption Barometer and some other similar indexes are criticized by observers (e.g., Lancaster and Montinola, 1997; Ko and Samajdar 2010;

Thomas, 2010) because of their contradictory computation. For example, CPI is largely based on experts' perception of country policies that could be partial, prejudiced or outdated. The most substantial concern is related to dissimilarities between perception-based and experience-based evaluations (Pellegata and Memoli, 2016). There are important drawbacks of both methods: perceptions could be biased and too distant from reality, experience-based surveys mostly deal with ordinary people and consequently suffer from lack of expertize and deep understanding of the problem (Treisman, 2007). Not to mention the possible insincere answers of the respondents about their personal experience in informal transactions.

For this work, the most important are studies of businessmen' perception of bribes. First of all, it is Business Environment and Enterprise Performance Survey (BEEPS), which is conducted with support of World Bank and other international institutions (EBRD, EC) on the basis of questionnaire for top managers of firms (http://www.enterprisesurveys.org/). The last wave of this survey covers 139 countries with 131000 respondents. For a number of countries, including Russia, BEEPS provides data on regions. For Russia BEEPS was conducted in 2011-12, where 4220 firms were interviewed across 37 regions. Although this survey devoted to business climate, several its questions are related to corruption.

The most well-known corruption index for Russian regions was done by INDEM with participation of TI-Russia in the beginning of 2000-s under the name "Diagnosis of Russian Corruption" (TI and INDEM, 2004). The authors conducted a broad survey of 5666 ordinary respondents and 1838 entrepreneurs in 40

regions. The purpose of this work was to evaluate the scope and sources of petty and business corruption, and to classify regions in relation to this sphere. The study was focused on social distrust in different public institutions and their evaluation in terms of corruption.

Finally, a large-scale survey was conducted by a group “Fond Obchestvenoe Mnenie” [3] (FOM) commissioned by the Russian Ministry of Economic Development in 2010 (FOM, 2010), which surveyed 17500 respondents in 70 regions, making it the largest survey on corruption in Russia. However, possibly due to the position of the government customer, these data were published only in aggregated form and in Russian, which reduced the attention of researchers.

Of the listed indices, this work relies primarily on the experience of the INDEM-TI study, which created an extensive questionnaire and built an aggregate rating from various questions. The BEEPS study, which specifically focused on entrepreneurs, had a significant impact as well. At the same time, RCPI differs from both previous studies as it is an index of perceived business corruption, without the use of experienced-based questions. In addition, the RCPI is based on significantly more recent data, which might substantially affect the assessment of corruption. The changes that have taken place over the past five years in Russian politics, public sentiments and the economy have significantly changed the picture of current situation in the country (Petrov, 2015).

[3] The translation from Russian is – Foundation of Public Opinion

Corruption studies in Russia

The majority of literature about malpractices in Russia belongs to journalistic investigations and anecdotal narrations (e.g., Khlebnikov, 2001; Harding, 2011; Pomerantsev, 2014, etc.). Several academic papers in this area are devoted to particular aspects of corrupt practices and behavior. For instance, Mironov investigated effectiveness of abusive managers in Russian business environment (2015), Enikolopov et al. (2018) study social media behavior in relation to big bribery cases in Russia. Karhunen and Ledyaeva (2012) research entry strategies of foreign investors as a function of corruption distance between home country and Russia. The recent dynamics of corruption ties in Russia is discussed in the work of Yakovlev (2011). He points to a change from “state capture” to “exchange” models in the state-business relationship.

As for cross-regional comparisons related to corruption, there are not many studies in Russia. Mokhtary and Grafova (2007) investigate impact of growth of tax service personal on tax collection and show negative dependency between two variables. Zhuravskaya and Mironov (2016) analyze misuse of electoral donation in Russian regions and further tunneling of state funds in favor of these illegal donors. Schulze et al. (2016) compare official crime statistics on bribery in Russian regions with relative level of salaries of state officials. Libman and Obydenkova (2013) record a positive correlation between corruption and the number of Communist Party members in the region during the Soviet period.

A prominent work is done by INDEM-TI as a result of large-scale survey in Russian territories and is described in the previous paragraph (TI and INDEM, 2004). It serves as the basis for several regional comparative studies in Russia. Using its results Sharafutdinova investigates relations between corruption

perception and several economic and political measures (2010). She notices impact of prosperity, political competition and media on perceived corruption in 40 territories. Also based on INDEM-TI work Belousova et al. (2016) investigate impact of political and economic competition on perceived and actual corruption. They find out several statistically significant relations between perceived corruption and prosperity and size of local government. Dininio and Orttung (2005) analyze data of INDEM-TI for the relationships between corruption and several economic and political indicators and prove negative dependency with economic development and positive one with number of bureaucrats in the region. Unfortunately, due to the lack of access to initial data most of researches use only aggregated figures from INDEM-TI work, i.e. very limited number of observations.

Some studies are based on the mentioned above World Bank entrepreneurial survey BEEPS. Sidorkin and Vorobyev (2018) investigate propensity to bribes of Russian politicians in relation to their expected success on regional elections. As a measure for corruption level authors used answers for the only question in BEEPS survey. More comprehensive analysis of BEEPS data on corruption for Russia was done by World Bank team in the Policy Note applying to the official publication of the data (Kisunko et al., 2013). Authors make detailed analysis of all answers of survey related to the corruption and suggest several indexes of bribe-taking in Russian territories. They also detected some correlations between malpractices and social-economic factors in the regions. However, they do not manage to confirm most of well-known theories about corruption.

Several surveys touch upon the problem of extortion in Russian regions indirectly by doing other work. One of the most notable examples is the survey conducted by the Russian Agency for Strategic Initiatives about regional investment climate that started in 2014. It covers all Russian territories and among other variables includes bribery level (https://asi.ru/investclimate/rating/). At last, official statistics on bribery crimes is represented by annual reports of Russian General Prosecutor's office (2019).

All these sources influenced this study. Of greatest importance are the study of World Bank team (Kisunko et al., 2013) and works using INDEM-TI survey: Dininio and Orttung (2005), Belousova et al. (2016) and others. A distinctive feature of this work is a new corruption index - RCPI, based on original data and calculated exclusively on perception-based questions. In addition, in this work, the hypotheses are sequentially tested at three levels of the region-city-company analysis, which makes it possible to obtain more reliable results.

Hypotheses

This paper is devoted to analysis of factors that influence the level of business corruption perception in the Russian regions. The key construct that is going to be measured in this research is the level of corruption in a certain territory. It is calculated in the form of index based on survey questionnaire. In regression model this index will represent the left part of equation, i.e. dependent variable. The formulation of hypotheses for independent variables relies on conclusions of previous studies described in Literature review.

Economic development / prosperity

One of the well-recognized factors that influence corruption is the level of economic development of the territory (Treisman, 2007). It seems intuitively correct that welfare growth is accompanied with new technologies, political freedom, and increase in service and creative sectors of economy. As it was mentioned in Literature review, all these factors lead to transparency in government and active social movement against corruption. In addition, state officials and business managers in developed territories usually have a more attractive salary that prevents them from being involved in illegal deals (Van Rijckeghem and Weder, 2001).

The alternative point of view could suggest that in wealthier regions people have more excessive financial resources to "invest" in illegal connections (Goel et al., 2016). Thus, wealthier territories could demonstrate higher level of corruption. However, for cross-national studies the first point of view – that more developed economies are less corrupt – got statistically significant support (Sandholtz and Koetzle, 2000). The same result was demonstrated in some within-country studies (e.g., Glaeser and Saks, 2006).

Russian studies have not been able to unambiguously confirm the relationship between economic development and corruption. Dininio and Orttung (2005) and Belousova et al. (2016) recorded a negative correlation between these indicators, while Sharafutdinova (2010) noted such a relationship only for perceived but not for incidental corruption. At the same time, Kisunko et al. (2013) and Libman and Obydenkova (2013) did not find it. The explanation for these discrepancies may relate to the data used: those who found the link between development and corruption relied on the INDEM-TI study, the rest used other

sources. At the same time, it should be noted that the authors who used the INDEM-TI and FOM data, as far as I know, cited the aggregated rating of the regions and did not have access to the primary survey data. While the authors, who did not find conformation for this hypothesis, constructed their index from primary materials of BEEPS survey, i.e. have the opportunity to look at the data more comprehensively.

The causal relationship in this correlation is difficult to determine unambiguously. While it is possible that the low level of corruption contributes to the economic development (e.g., Pellegrini and Gerlagh, 2004), it is also possible that the economic development leads to a decrement in corruption (Aidt et al., 2008). Unfortunately, both for this hypothesis and for the rest, the cross-sectional data collected for this study does not provide an opportunity to examine the causal relations.

Hypothesis 1.

The level of perceived corruption negatively correlates with the level of economic development / prosperity of the region.

State intervention in economy

The government role in economy associates with proliferation of bureaucracy and appearance of monopolistic actors in different industries. Both effects foster incentives and possibilities for state officials to take bribes (e.g., Tullock 1967; Shleifer and Vishny, 1993). It could be especially correct for developing nations with weak communities and oppressed media.

The problem of government intervention in the economy is particularly pressing in Russia. According to the Federal Antimonopoly Service of the

Russian Federation, the state's share in the Russian economy exceeds 50%, and according to some estimates it reaches 60-70% (Federal Antimonopoly Agency of Russia, 2019). Although some experts provide smaller figures, even they recognize disproportionally large-scale and not always transparent participation of the government in the market (e.g., Di Bella et al., 2019). [4]

The role of the government in Russian economy began to grow especially rapidly in recent years (Federal Antimonopoly Agency of Russia, 2019) after the military conflict with Ukraine and the beginning of confrontation with the West in the foreign policy. These events led to an increase in defense spending, the strengthening of monopolistic companies with state participation, and a decrease of a private sector. Such trend affected all Russian regions, however the conditions of market competition between them may vary to some extent.

The state interference in the economy is expressed in several aspects: the bloated bureaucratic apparatus, the presence of state-owned properties and companies, including labor market, and finally, the severity of state regulations for the economy and business. [5] The researchers are almost unanimous that most of these types of strengthening of government interventions relates to the increase of graft level (e.g., Kotera et al., 2012).

The only difference of academic opinion on state interventions is about the size of the bureaucratic apparatus. Most researchers believe that the more state officials are, the higher is the corruption (e.g., Tanzi, 1998). However, later

[4] According to the estimates of these researchers, the share of the state in the formal sector employment exceeds 50%.

[5] Some researchers explore more sophisticated measures of government intervention, for example, Kuzmina et al. (2014) assess governance quality in Russian regions based on a complex index that includes corruption issues.

studies have shown that the growth of the state apparatus does not always lead to an increase in bribery. For example, several researchers note that in recent Russia, because of the centralization and increased control over regional officials, bribery at the local level has decreased (Yakovlev, 2011; Remington et al., 2020). One of the theories suggests that in democratic countries the increase in number of state officials leads to higher malpractices, however in transitional countries it can sometimes even reduce corruption (Goel, Budak, 2006).

Also, it can be noted that Russian society belongs to countries with a low level of trust and political activity of the population. The main political actor in Russia is the state, which in recent years has been actively suppressing political freedoms and the independence of the media (Petrov, 2015). Under these conditions, there is no one to resist the corruption of local officials, except for state controllers from the center. Famous Russian anti-corruption activist, E. Panfilova, notes that in Russia all anti-corruption policy comes down to law enforcement and prosecution of individual bureaucrat, while there is almost no systemic prevention of corruption (SocioDigger, 2021, pp. 14-16).

Russian studies do not provide an unambiguous answer to the question of the relationship between the role of the state in the economy and bribery. Belousova et al. (2016) find a positive correlation between the number of civil servants and actual corruption, but do not find this relationship with corruption perception. Dininio and Orttung (2005) find that corruption increases with the number of officials, but only for the absolute value of civil servants. When they divide the population of the region by the number of officials, the dependence disappears, which reduces the reliability of the results obtained. Kisunko et al.

(2013) does not detect relations between malpractices and local government size.

Among the most popular measures of government intervention in the economy – the size of the state apparatus, the state's share in the economy, and the severity of business regulation – the first and the second are most accurately measured. The third indicator is rather homogeneous within Russia recent years since the local authorities do not have enough power to regulate business on their own. In addition, there are no accurate statistics on the severity of government regulation on regional level, so researchers usually take it from surveys of entrepreneurs' opinion (e.g., Yakovlev and Zhuravskaya, 2013).

Therefore, this paper examines two aspects of government intervention in the economy: the government size and the activity of state-owned enterprises. The size of the state apparatus is presented in the Russian territorial statistics according to several criteria: federal officials, regional bureaucracy, and grassroots authorities. Unfortunately, numerous power bodies remain out of sight - the army, police, state security and other departments, the number and composition of which has grown significantly in recent years. Data on them are not published, and these people make up the majority of the state apparatus (according to some data, more than 2.5% of all employed) [6]. However, the data on the size of the bureaucracy without law enforcement agencies is open.

Indicators of state participation in the economy provide a complete picture from different angles: the number of state-owned enterprises, the number of their

[6] https://www.proekt.media/research/zarplata-siloviki/

employees and turnover. Nevertheless, there are serious complaints about the data here, due to the informal state control over a number of large enterprises, especially in the of extractive industries and infrastructure.

Bearing in mind the experience of previous works and the availability of data, two hypotheses related to government role could be formulated: about size of bureaucracy and about share of state-owned firms into economy. It is important to mention that for both factors the relationship with bribery could be reverse causality type as in the first hypothesis.

Hypothesis 2.1

The level of corruption perception negatively correlates with size of local government (bureaucratic apparatus).

Hypothesis 2.2

The level of corruption perception positively correlates with share of state-owned firms in the local economy.

Rent-seeking economy

Interconnection between economy of natural resources and corruption is not so obvious at first glance. This dependency was detected in cross-country studies as deviation from the correlation between economic development and corruption level (Leite and Weidmann, 1999). Several oil and gas economies distort the negative relation between average income and level of corruption, e.g., in Arabic countries high GDP per capita goes together with prevailing social patterns of nepotism and informal ties (Gylfason, 2001). Russia also could be a vivid example of such cases with the 71st place out of 228 countries in GDP per capita ranking, and the 133rd place out of 174 nations in CPI ranking (numbers

go from 2012, i.e., before the radical drop in oil prices that decreased Russia's wealth).

The rationale that lies behind this correlation refers to the peculiarity of rent-seeking economies with money concentration in one industry under the control of government and close-to-government oligarchs. Easiness in capturing great resources by controlling only one industry allows state officials to suppress economic competition and civil rights as well as to control cash flows through nepotism, opacity, and corruption. At the same time, the state abundance allows to maintain a satisfactory standard of living for ordinary people in return for their loyalty.

According to most scholars, weak political institutions play an important role in the growth of corruption based on resource industries. If public control over officials is weak, then they prefer rental industries, "because resource rents are less sensitive to corruption than domestic production" (Bhattacharyya and Hodler, 2010, p.609). Rental industries are defined in different ways, but the most common approach is the oil and gas industry, minerals, and metals (Ades and Di Tella, 1999). Another sign of resource and rental industries is their export potential. A number of researchers measure the rent economy as a factor of bribery not through production, but through the export of resources (Sachs and Warner, 1997).

Researchers in Russia have tried to find a link between corruption and extractive industries in Russian territories, but have not been successful (e.g., Dininio and Orttung, 2005; Kisunko et al., 2013). In general, it should be noted that cross-country studies predominate in this area and the above-mentioned

patterns are found in them. Does the dependency between malpractices and rental factor work for intra-country, i.e., on regional level, as well as for cross-national comparison?

Hypothesis 3

The level of corruption perception positively correlates with share size of natural resources industries within economy structure of the region.

Educational level of population

High education is an important factor of regional development. Cross-national studies revealed substantial negative relations between malpractices and educational level of population (Treisman, 2007). Within-country works also support this interdependency (e.g., Glaeser and Saks, 2006). High education usually associates with more active and demanding citizens as well as with democracy and political competition that leads to decrease in bribery and bureaucratic abuses in government acts (Goel and Nelson, 2010).

Association of the degree of malpractices in society with the level of literacy and education is one of the oldest traditions in social sciences. For instance, Huntington (1968) indicated that education provides greater number of opportunities for citizens to control government's actions. However, in this case the causal relationship is not defined yet again. Does corruption reduce incentives to obtain education or does education increase the resilience of society to malpractice? Most authors are inclined to concur with the second point of view in line with arguments mentioned above (e.g., Charron, 2010). However, some studies indicate other dependency, for instance, Dimant et al. (2013) connects

outflow of educated people from countries with high corruption, so-called “brain drain”.

Researchers in Russia have not come to an unambiguous opinion about the relationship between education and corruption. For instance, Schulze et al. (2016) found a negative relationship between real corruption and education, while Kisunko et al. (2013) did not find it for either perceptions of corruption or real incidents.

Russia is considered to be among the world leaders in level of education of the general population. For most Russian regions there is no significant difference in the proportion of residents with higher education. In this sense, the situation is substantially different from many developing countries, where statistics often measures not the proportion of people with higher education, but the percentage of literate and where this value varies from state to state, such as in India (Charron, 2010). Therefore, in Russia the effect of higher education factor on level of corruption may be not overly noticeable.

Hypothesis 4.

The level of corruption negatively correlates with the high education among population of the region.

Method and Data

Data description

This research is based on the questionnaire for entrepreneurs and managers in the Russian regions. Survey was conducted specifically for this

study at the beginning of 2019 and was not published anywhere before. The questionnaire was developed for the purposes of this study and is based on the experience of similar studies in the field of corruption, namely INDEM-TI survey, BEEPS of World Bank, CPI of TI.

Taking into account the experience of these polls, as well as the works done on their basis, it was decided to include in the questionnaire a general assessment of corruption, an assessment of various government agencies, the personal experience of respondents and an assessment of the dynamics of changes in this area in recent years. This set is due to the intention, on the one hand, to consider corruption from several angles, and on the other hand, not to overload the questionnaire with a large number of sensitive questions for respondents. The question about personal experience was introduced specifically to take into account real cases from everyday activity of respondents, and not just their subjective views (by analogy with INDEM-TI survey). At the same time, the question of personal experience was depersonalized, i.e., asked about “companies you know” (by analogy with BEEPS).

Thus, the questionnaire consists of the following 4 questions:

- about the level of corruption: “How would you rate the level of corruption in your region?”
- about its dynamics in the region: “How has the level of corruption changed in your region over the past 5 years?”
- about level of corruption in the local state institutions: “How would you rate the level of corruption of the following government

institutions (police and security services / courts / local authorities … etc.)?”

- about respondent’s personal experience with informal deals in the local state institutions: “Have the companies known to you had to make informal payments or give expensive gifts when dealing with the following government institutions (police and security services / courts / local authorities … etc.)?”

In addition to the aforementioned points, the questionnaire contains a number of information about the respondents, such as gender, age, position, size and age of the company, and the industry in which the company operates.

The sample for the survey was selected by stratified random sampling, i.e., for each region a structure of regional economy was defined with percentage proportion of major industries based on official statistics of RosStat (Russian Statistical Agency). Thus, the sample for each region was supposed to be formed in accordance with the structure of GRP. However, due to the complexity of collecting suitable respondents, sample proportions could slightly vary within the regions. Despite that, the overall picture maintains its preplanned structure.

39 territories were selected out of 85 Russian regions in accordance with size of their population, and their output in country GDP. Summative population of selected regions constitutes nearly 75% of the national population and 70% on Russian GDP. The total size of the sample is 1051 respondents, i.e., more than 26 respondents per region on average. The number of the respondents amounted to more than 50 people for the large regions and less than 20 people for other ones. In 6 regions number of respondents is lower than 10 people (with 5

respondents in the smallest one). The two largest cities in Russia, Moscow and St. Petersburg had the largest number of respondents (more than 100 for each).

The survey was conducted by a specialized company with the experience in organizing similar studies among entrepreneurs. Questions about corruption were included in the broader omnibus, which is polled on a regular basis. These conditions softened the sensitive topics for the entrepreneurs about corruption and introduced this survey as a common practice, rather than a specialized study. Audio recordings are available for all interviews. The major task for conducting this survey is to select sufficient data to calculate the Regional Corruption Perception Index (RCPI), which would represent the dependent variable in regression equation.

The second part of the study is related to the testing of the hypotheses listed above. To accomplish it the second data block is used, i.e., the statistical data on the Russian regions. The majority of this data is published by the official state agency RosStat (2020) and is calculated on a regular basis. For the most part, official indicators are calculated annually, however there are exceptions, for example, the level of citizens' education is listed in accordance with the latest population census, which was conducted in 2010. In addition to RosStat statistics, some characteristics of the regions are taken from alternative sources. For instance, the statistics of regional crime of bribe-taking comes from the website of General Prosecutor Office. All this data is used to select independent variables (see below), which represent proxies for constructs employed in this study. At the stage of verification of the results obtained, control variables are used for the size

of the respondent's place of residence, industry, and company size. These data are taken from the materials of the original survey.

Method

The study is carried out in several stages. The first one is to calculate RCPI index based on the conducted survey. Respondents' assessment of the corruption level in the region acts as the key indicator for the index. The additional indicators are composed of the dynamics of the level of malpractices in the region and the assessment of local authorities' propensity to bribe. Available data allows me to create several independent sub-indexes and to combine them into one aggregate index. The latter is done using principal component analysis (PCA).

The second stage begins with selecting independent variables that represent the constructs used in the original hypotheses most correctly. After formation of the independent variables list, a search is conducted to determine their relationship with the RCPI. The following linear regression is estimated:

$$RCPIreg = \alpha + \beta * I + e$$

where ***RCPIreg*** *is regional corruption index,* ***α*** *is a constant,* ***β*** *is a set of all coefficients,* ***I*** *is a set of independent variables,* ***e*** *is an error term.*

The third phase consists of testing the results. Because the corruption rating contains a limited number of regions (39), control variables cannot be used. Since the power of the test is very limited, it is advisable to increase the number of observations to enhance the reliability of the data. In order to do this, the calculation similar to the calculations in the second stage have to be carried out, but at the companies' level (not at the regions' one). This will increase the sample size to 1051 observations and will include control variables in the regression

analysis. A model applied at the company level can be described by the following equation:

$$RCPIfirm = \alpha + \beta * I + \gamma * C + e$$

where ***RCPIfirm*** *is a corruption index for the companies,* α *is a constant,* β *is a set of independent variables' coefficients,* γ *is a set of control variables' coefficients,* ***I*** *is a set of independent variables,* ***C*** *is a set of control variables,* ***e*** *is an error term.*

Finally, at the fourth stage the additional attempt is to be made to check the results obtained. For this, a new sample is formed from the same data - at the city level. Only those respondents who live in cities are selected and the corruption index for cities is calculated from their answers. Also, new independent variables are selected from RosStat data on cities' indicators (RosStat, 2020). Thus, a new sample is formed, differing in structure and number of observations (42 cities with 705 respondents). The results obtained earlier are additionally checked on city level.

The connection between the three levels of data analysis is quite close. All three levels are different compilations of the same answers from 1051 respondents. At the company level, we look at the original responses, boiled down to one index for each respondent. At the regional level, we compute the regional average from all individual company indices. At the city level, we exclude those respondents who do not live in the selected cities and calculate the average index value for each city from all individual indexes.

In this work, as in most studies on corruption in Russia (e.g, Mokhtary and Grafova, 2007), the key level of research is the regional one since region is the

main territorial unit in the country. In other countries, the analysis as well is most often carried out at the level of the main territorial unit, e.g., regions in Del Monte and Papagni (2007) and provinces in Dang (2016). The sample of regions – 39 – is close in size to similar studies in Russia, e.g., 37 regions in Sidorkin and Vorobyev (2018) and 40 regions in INDEM-TI (2004), as well as in the other countries, e.g., 50 states in Fisman and Gatti (2002). That is why, analysis at the regional level is used as a major test for initial hypotheses. Respectively, the main measure of perceived corruption in the work is the regional index – RCPI.

At the same time, the limited number of observations at the regional level makes it preferable to conduct additional verification of the results at the micro level with the inclusion of control variables. Also, in accordance with the comments received, calculations are made at firm level with robust errors clustered by regions. This kind of analysis – calculations at the firm level, taking into account the characteristics of the regions, were used, for example, in the work on the influence of administrative burden in Russian territories by Yakovlev and Zhuravskaya (2013).

Finally, an additional robustness check is the verification of the results at the city level. In this case, we deviate from the traditional regional measurement to see if the patterns obtained at the regional level still work at a different viewing angle. This step is an auxiliary test, because statistical data on cities in Russia are less available and a different set of indicators has to be taken as independent variables.

Variables

RCPI calculation

The initial survey data make it possible to calculate the corruption index for each question in the questionnaire. Thus, four regional sub-indices are obtained, each of which reflects one of the aspects of the corruption: a general assessment of the current situation, an assessment of the dynamics, an assessment of various authorities and, finally, personal experience.

For instance, first question “How would you rate the level of corruption in your region?” has six variants of response: Low, Below average, Average, Above average, High, Not sure. Answers are marked with numbers from 1 to 5, the last answer (not sure) gets a score of 0. Thus, the answer of each respondent has a certain score, and the regional score is obtained by calculating the average of the answers of all local respondents. The higher the value, the higher the assessment of the level of corruption in the region.

The third and fourth questions require more complex calculations. For instance, the third question “How would you rate the level of corruption of the following government institutions?” has 6 columns: Siloviki (FSB [7], Police and other institutions of force), Courts, Regional and municipal administrations, Federal state agencies, Supervisory agencies (Rospotrebnadzor, firefighters, etc.), and Tax agency and other budget-raising agencies. For each column the same answer options are provided as in the first question: Low, Below average, Average, Above average, High, Not sure. In this case, the score of the respondent

[7] Russian security service – Federal Security Service of Russia

will be calculated as the average of all his answers, and the score of the region as the average of all scores of local respondents.

The obtained scores of the respondents' answers to each question are the basis for further calculations of various dependent variables in this study. First of all, we are talking about the main index in this work - RCPIreg, but this also applies to auxiliary variables - RCPIfirm and RCPIcity. RCPIfirm is used to verify the results obtained at the firm level, and RCPIcity is used at the city level.

For further calculations of RCPIreg, I obtained 4 sub-indices of regions according to their corruption level degree: Corrup1, Corrup2, Corrrup3 and Corrup4. These sub-indices reflect different aspects of the respondents' assessment of corruption, and accordingly, the degree of their correspondence to each other is different.

Table 1. Correlation between sub-indexes of survey questions.

Correlation between respondents' answers for survey questionnaire: Corrup1 – general assessment of the current situation in the region, Corrup2 – assessment of the dynamics of corruption, Corrup3 – assessment of the level of bribes in government branches, Corrup4 – personal experience of facing corruption (see the exact wording of the questions above in paragraph "Data description"). *** indicates statistical significance at 99% level.

	Corrup1	**Corrup2**	**Corrup3**	**Corrup4**
Corrup1	1			
Corrup2	0.539***	1		
Corrup3	0.663***	0.495***	1	
Corrup4	0.288***	0.253***	0.371***	1

As can be seen from the Table 1, all indices have a substantial and statistically significant correlation with each other. However, the question about personal experience (Corrup4) has the lowest correlation with the rest. This indicates the difference between perceived corruption and corruption incidents, recorded by many researchers (e.g., Sharafutdinova, 2010). However, positive correlation with other indices from 0.253 to 0.371 indicates a strong relationship between perception and reality, which has also been noted in previous works (e.g., Olken, 2009). It is interesting to note that a similar relationship between perception and reality - 0.34 - was noted by researchers in the INDEM-TI survey data (Belousova et al., 2016).

To construct the aggregate index, only questions related to the perception of corruption are used, namely sub-indices Corrup1, Corrup2 and Corrup3. The fourth question is of a distinct nature, which is expressed in its lower correlation with the rest, therefore Corrup4 is excluded from the further calculations. The three remaining sub-indices reflect three different aspects of the assessment of corruption: the current situation, the recent years dynamics and the assessment of the level of corruption in various government agencies. The final aggregate measure (RCPIreg) is constructed using principal component analysis based on three sub-indices, to include in the computation all of three different aspects of the perception of corruption by regional businessmen. The calculations provide one final index that takes into account more than 71% of the variation in the entire data set.

Table 2. Components' eigenvalues in computation of RCPIreg index.

Components of RCPI computed by PCA and listed in accordance with their eigenvalues. For aggregate index only first Component with eigenvalue higher than 1 was identified.

Component	Eigenvalue	% of variance	Cumulative %
1	2.139	71.306	71.306
2	0.533	17.762	89.068
3	0.328	10.932	100

The Table 3 below shows the ranking of regions in accordance with the obtained RCPI values. Regions are ranked in ascending order, i.e., the former regions have the best indicators of corruption, and the latter the worst. Visual examination of the rating does not give an unambiguous idea of the characteristics of the “bad” and the “good” regions. Nevertheless, some patterns can be determined. For instance, predictably, among the outsiders are relatively poor Vladimir and Tver, underdeveloped oil-and-gas Orenburg, southern Stavropol, and Caucasian territory Kabardino-Balkaria. However, the comparatively rich and industrially developed Sverdlovsk region is also located here. On the other hand, among the best regions, as expected, there are rich and developed oil districts, the closest to EU Russian territory – Kaliningrad, and the scientific and technical center of Siberia - Novosibirsk. However, the eastern Primorsky Territory, known for criminal scandals related to the port, foreign trade operations and fishing, also is here.

Table 3. Ranking of regions by RCPIreg.

Regions are arranged according to the rating value: the higher the value, the higher the level of corruption. Thus, the regions with the highest levels of perceived corruption are at the bottom of the list. Russian territories have different administrative statuses: region (oblast), territory (krai), district (okrug), republic. For this work, it is important that all regions in the sample fall into the unified accounting methodology of RosStat and data on them are published in annual

reports (RosStat, 2020). AO stands for Autonomous Okrug, which means an autonomous region within a larger administrative unit.

N	Region	RCPI	N	Region	RCPI
1	Yamalo-Nenets AO	-1,160	***21***	Tula Oblast	-0,031
2	Kaliningrad Oblast	-0,830	***22***	Ulyanovsk Oblast	-0,031
3	Novosibirsk Oblast	-0,636	***23***	Kemerovo Oblast	-0,030
4	Khanty-Mansi AO	-0,504	***24***	Samara Oblast	0,015
5	Primorsky Krai	-0,411	***25***	Chelyabinsk Oblast	0,030
6	Voronezh Oblast	-0,394	***26***	Saratov Oblast	0,077
7	Vologda Oblast	-0,381	***27***	Saint-Petersburg	0,123
8	Omsk Oblast	-0,373	***28***	Perm Krai	0,124
9	Republic of Bashkortostan	-0,266	***29***	Arkhangelsk Oblast	0,154
10	Nizhny Novgorod Oblast	-0,198	***30***	Krasnodar Krai	0,182
11	Belgorod Oblast	-0,181	***31***	Moscow	0,223
12	Khabarovsk Krai	-0,175	***32***	Tver Oblast	0,250
13	Krasnoyarsk Krai	-0,135	***33***	Tomsk Oblast	0,257
14	Udmurt Republic	-0,132	***34***	Kabardino-Balkar Repub	0,265
15	Irkutsk Oblast	-0,085	***35***	Rostov Oblast	0,284
16	Volgograd Oblast	-0,079	***36***	Stavropol Krai	0,306
17	Moscow Oblast	-0,068	***37***	Orenburg Oblast	0,336
18	Tyumen Oblast	-0,058	***38***	Sverdlovsk Oblast	0,402
19	Republic of Tatarstan	-0,053	***39***	Vladimir Oblast	0,598
20	Altai Krai	-0,040			

One of the ways to assess the adequacy of the rating obtained is to compare it with alternative indicators in this field. The closest similar survey in terms of time is the FOM survey (2010).[8] The comparison of ratings is complicated by the fact that their samples of regions differ. For this comparison only those regions were selected that are represented in each of the surveys. The regions remaining on the list - 37 - were numbered in order from best to worst (Table 4 in Appendix), and the correlation was searched for by serial numbers

[8] The 2011 BEEPS study is not mentioned here since it is focused on the business climate and survey questions about corruption were not combined into an integral rating of territories.

(Table 5). The resulting correlation is 0.303, significant at 95% level. Considering that the time difference between the surveys is about 9 years, such a correlation gives hope that both polls to some extent recorded similar manifestations of corruption in the territories and our results as well as previous survey evidence have external validity.

Table 5. Correlation between RCPI, FOM and official bribe statistics.

This table represents Spearman's 1-tailed correlation between region ranking of RCPI, FOM rating and official statistics of registered bribe-taking in Russian regions in 2018. All regions and their sequence numbers see in Table 4 in Appendix. ** indicates statistical significance at 95% level.

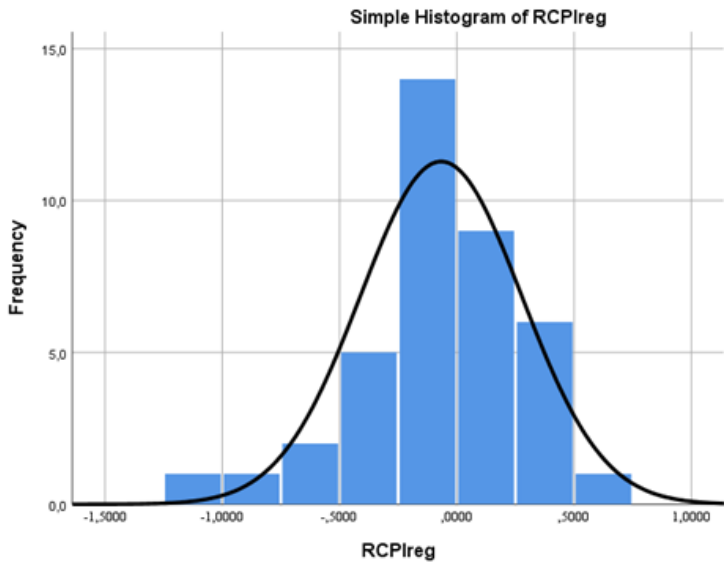
	RCPI	**FOM**	**Official bribe**
RCPI	1		
FOM	0.303**	1	
Official bribe	0.360**	-0.075	1

An additional test of the adequacy of the RCPI rating can be a comparison with the official indicators of regional corruption. In Russia it is the statistics of the General Prosecutor's Office on registered corruption crimes. Comparison of RCPI, FOM and official bribe statistics is presented in Table 4 (in Appendix). In this case, it is necessary to take into account two circumstances that complicate such a comparison. First, official crime statistics depend on the activities of law enforcement agencies in the region, and they themselves are the most corrupt government authority in many countries of the world (Goel et al., 2016). Secondly, even if we neglect the distortions of police reporting, it is important to remember

that official statistics reflect real corruption, which can differ significantly from perceived one. Nevertheless, the search for a correlation between the RCPI and the data of the Prosecutor General's Office on registered cases of bribe-taking per 1000 inhabitants in 2018 gives the result: the correlation coefficient is 0.360 with 95% significance (Table 5). Which is a noteworthy result, given the abovementioned possible obstacles for the measurement of real bribes.

Figure 1. RCPIreg distribution with its descriptive statistics

The resulting RCPIreg index has an approximately normal distribution. Descriptive statistics on it are presented in the chart.



	RCPI_reg
N valid	39
N missing	0
Mean	-0.067
Median	-0.040
Std. dev.	0.344
Min	-1.160
Max	0.598

Thus, based on three survey questions reflecting different aspects of the perception of corruption, excluding the question about personal experience, and using the PCA tool, an aggregate rating of Russian regions – RCPI – is calculated. It has a distribution close to normal (Figure 1) and shows a significant

correlation with similar FOM study and with the official statistics of bribe crimes of the Russian Prosecutor General's Office.

Variables of interest

Variables of interest are based on data from official statistics of Russian regions taken from official website (RosStat, 2020). Russian regional statistics are quite detailed: most of the constructs used in this work have a number of possible proxies, the choice of which is the subject of this section. It is also important to note that while regional statistics in Russia are unified (i.e., identical data can be found for each territory), urban data are more scattered and often differ from city to city. In general, the number of urban indicators is much less than the regional ones: therefore, at the city level, it is reasonable to use those indicators that are available.

Economic development / prosperity

For Hypothesis 1 the most common measure of development and well-being is GRP per capita, which is used in most Russian studies (e.g., Sidorkin and Vorobyev, 2018), like GDP per capita is used in most cross-national studies (e.g., Treisman, 2007). GRP is calculated annually based on the system of national accounts for all the territories in Russia. However, the use of this indicator has three significant limitations. First, this indicator formally takes into account all goods and services produced in the territory and divides them by the number of inhabitants. However, the mechanical calculation of GRP per capita can significantly distort the picture. For instance, most of the Russian natural resource territories are remote from the traditional centers with a harsh climate

and undeveloped areas, i.e., these are territories with low population and high production. A striking example is the Yamalo-Nenets Autonomous Okrug, one of the least populated areas (approx. 540 thousand people) with one of the largest GRP in the country. Yamalo-Nenets Okrug is more than 24 times smaller than the leader – Moscow – in terms of population and only 6 times smaller than Moscow in terms of GRP. Similar situation is in many other export-oriented territories. In these cases, the formal GRP indicator does not always reflect the real well-being in the region, since a significant part of the funds can be redistributed in favor of the federal center through taxes and other payments.

Secondly, official GRP statistics often suffer from the formal affiliation of large companies to a particular region. Zubarevich notes cases of drastic changes in CPR per capita as a result of administrative decisions to change the registration of large companies (Zubarevich, 2010, p.15). Finally, the GRP is not published for cities and is only available for regions, which limits the ability to verify the obtained data in accordance with the research plan described above (see “Method”).

There are several indicators in Russian statistics that can serve as a substitute for GRP per capita. Among them, the most obvious and published for both regions and cities is the average monthly salary. The correlation between these two indicators for our sample of territories is 0.838 at 99% significance. At the same time, the difference between the maximum and minimum values for GRP per capita is almost 34 times, and for the average monthly salary - 4 times. Bearing in mind these figures, the average monthly salary will be taken as a proxy

for the level of development / prosperity. To reduce the magnitude of variable, the logarithm of this indicator is used.

State intervention into economy

In accordance with the Hypotheses 2.1 and 2.2, it is necessary to select variables for the constructs of government size and state participation in economy. For the first construct, RosStat publishes an annual indicator both at the regional and city levels - the number of civil servants (RosStat, 2020). The regional indicator was used by Dininio and Orttung (2005), who considered it in two versions: as the nominal number of civil servants and as a percentage of employees in the region's population. The use of the second option seems to be more correct, since without considering the size of the population of the territory, it is difficult to make comparisons. Therefore, in this work, government size is measured by the percentage of civil servants from the working population.

The second indicator of share of state-owned firms is somewhat more difficult to choose since previous researchers did not use it. It is logical to assume that state participation in the economy can be expressed in three ways: through the number of companies with state ownership, through their production, and through the number of employees. At the regional level, there are indicators that reflect all these three aspects of state participation in the economy. However, at the city level there is only one indicator - the number of employees in municipal enterprises. It must be said that it only partially satisfies the given criterion, since it may not include state-owned companies that are in federal ownership. But in the absence of an alternative, this indicator has to be used. However, at the regional level, a similar indicator is correct and is used in further calculations as

the percentage of employees of state-owned enterprises of the total number of employees in the region.

Rent-seeking economy factor

For Hypothesis 3 to assess the extractive factor of the regional economy, Russian official statistics provides a ready-made indicator - the share of extractive industries in the structure of gross value added - which was also used by most previous researchers (e.g., Kisunko et al, 2013). Unfortunately, at the city level, this indicator is not presented for all cities in our sample. An alternative indicator is the volume of the manufacturing industry in the city. It can be considered to a certain extent "inverse" to the level of extractive industries, and it is published on the RosStat website for all cities in the sample (RosStat, 2020).

Educational level

The educational level in Russia is measured directly in the national population census, which was last taken in 2010 and this indicator was used by previous researchers (e.g., Belousova et al., 2016). However, the date of the last census is quite far from the date of the present survey - a difference of 9 years may change the interregional proportions. There are not many alternative indicators, and the closest of them is the number of university students per 1000 inhabitants of the region. The correlation of this indicator for 2018 with the number of people with higher education from the 2010 census is 0.475 with 99% significance, which indicates their substantial relationship. Unfortunately, it was not possible to find any close indicators at the city level, so this hypothesis will have to be excluded from city-level testing.

Independent variables' descriptive statistics

The independent variables list that is used in calculations are presented in Table 6.

Table 6. List of independent variables

The table presents research hypotheses and constructs, as well as their proxies for regions and cities. The independent variables in the first three lines are based on indicators of Russian official statistics that are very similar for regions and cities and have the same names. In the fourth case, the indicators for regions and cities are different. In the last line, there is no indicator for cities in the official Russian statistics.

Hyp.	Construct	Variables for regions	Variables for cities
1	Economic development / prosperity	Average monthly salary – *Salary_reg*	Average monthly salary – *Salary_city*
2.1	Role of state in economy – Government size	% of civil servants in the total number of employed – *Officials_reg*	% of civil servants in the total number of employed – *Officials_city*
2.2	Role of state in economy – State-owned firms in the market	% of employees of state owned firms in the total number of employed – *StateEmploy_reg*	% of employees of municipal firms in the total number of employed – *StateEmploy_city*
3	Share size of natural recourses industries in regional economy	Share of extractive industries in GRP – *Extractive*	Manufacturing industries' output per capita – *Manufacturing*

4	Educational level of population	Number of university and college students out of 10K people – *Students*	N/A

It is important to note that the main variables in the study are the variables for the regions. Indicators at the city level are supportive and are used to validate the findings at the regional level. Descriptive statistics for the explanatory variables for regions are provided below.

Table 7. Descriptive statistics for independent variables for regions

The table presents data on regional variables of interest. The first variable is the salary, which is presented in the form of a logarithm to reduce magnitude of the variable. The next three variables are percentages: *Officials_reg* and *StateEmploy_reg* are the % of labor force, and *Extractive* is the % of GRP. The last variable is the number of university and college students per 10000 population.

	Log of Salary_reg	**Officials_reg, %**	**StateEmploy_reg, %**	**Extractive, %**	**Students (per 10K)**
N valid	39	39	39	39	39
N missing	0	0	0	0	0
Mean	10.539	2.837	24.928	13.426	274.050
Median	10.453	2.737	23.505	3.200	257.000
Std. dev.	0.301	0.576	5.855	18.718	113.253
Min	10.150	1.686	13.810	0	14.000
Max	11.480	4.761	44.425	73.300	560.000

An important circumstance is the absence of extraordinary correlation between the independent variables. As you can see from the Table 8 below, the correlations between the variables are within 0.5 (the only exception is 0.503), which is acceptable for use in regression analysis, and it does not create a multicollinearity problem. The greatest correlation has the share of the extractive industries in the GRP with an average salary, which is expected, given the serious dependence of the Russian economy on commodity exports.

Table 8. Correlations between independent variables for regions.

Correlations between variables are present, but they do not exceed 0.503. The variable *Extractive* correlates most with other proxies. This is due to the high dependence of the Russian economy on the extractive industries. Typically, regions with a larger share of the extractive industry have higher salaries, employ more officials, and can afford more students. *, ** and *** indicate statistical significance at 90%, 95% and 99% level respectively.

	Log of Salary_reg	**Officials_reg**	**StateEmploy_reg**	**Extractive**	**Students**
Log of Salary_reg	1				
Officials_reg	0.212*	1			
StateEmploy_reg	-0.164	0.098	1		
Extractive	0.503***	0.478***	-0.352**	1	
Students	0.050	-0.409***	0.185	0.268**	1

Control variables

The control variable problem has been addressed by previous researchers in various ways. Although the most common controls are the region's population and GRP, variation of controls are very wide: from nationalities to average annual

temperatures (e.g., Mokhtary and Grafova, 2007; Libman and Obydenkova, 2013). In this work, the population size and GRP are already included in the initial variables, since the absolute values are divided either by the number of inhabitants, or by the volume of the regional product. Questions related to religious, cultural and political differences, as mentioned above, are outside the scope of this study, since they are presumably less significant for corruption in Russian regions and certainly less well measured than economic ones.

In this paper, it is decided to focus on three control variables associated with three levels of possible data analysis: locality, industry, company. The respondent's address is included in the initial survey data, which makes it possible to classify the place of residence according to the size of the population. The size of the place of residence is an important characteristic of the corruption environment and is often considered separately by researchers, for example, in the form of the variable "urbanization" (e.g., Schulze et al., 2016). For this variable, the traditional classification for Russian statistics was chosen, namely: cities with a population of over 1 million people / from 500 thousand to 1 million / from 250 to 500 thousand / less than 250 thousand. Thus, the control variable for a settlement is categorical from 1 (the largest cities) up to 4 (the smallest ones).

The industry type control variable is also one of the most common and intuitively understandable. Different sectors of the economy might have completely different conditions for illegal transactions. For example, extractive industry companies with high margins can pay more illegal payments and are the subject of more official scrutiny than local retailers. Most of the previous studies consider industry specifics (e.g., Karhunen and Ledyaeva, 2012). The

questionnaire used in this work includes the following industry divisions of the surveyed firms:

1. Agriculture, forestry, hunting, fishing and fish farming,
2. Manufacturing industries,
3. Construction,
4. Wholesale and retail trade; repair of vehicles, household goods and personal items,
5. Transport and communications,
6. Operations with real estate, rent and services,
7. Other industries.

The control variable for companies is based on the size of the companies in the perception of their representatives. The categories are micro, small, medium and large. Company size is a standard control variable in many studies (e.g., Yakovlev and Zhuravskaya, 2013; Chadee and Roxas, 2013). There are different points of view on the impact of the company size on its propensity to bribes. On the one hand, small firms may be more susceptible to extortion by officials, since they have fewer resources to resist them. On the other hand, large companies in the extractive industries have the most profits and are largely controlled by the government, which forces them to interact more with officials and create more potential situations for bribery. In any case, this control here is not a variable of interest and is only needed to control our results. By controlling on firm size, we effectively compare corruption in different regions among firms of the same size.

So, from the initial survey data the characteristics of the respondents / companies were collected, allowing us to control the results obtained on city size, industry and company size. Descriptive statistics for controls are presented below.

Table 9. Descriptive statistics for control variables

All control variables are categorical. *Industry* and *Firm Size* controls are taken from the original survey directly from the respondents' answers. The control *City Size* is obtained by assigning a numerical characteristic to the respondent's place of residence in accordance with the city classification used in Russia.

	City Size	Industry	Firm Size
N valid	1051	1051	1051
N missing	0	0	0
Mean	2.410	4.460	1.320
Median	2.000	4.000	1.000
Std. dev	1.342	1.764	0.662
Min	1.000	1.000	1.000
Max	4.000	7.000	3.000

Empirical results

Regional level calculations

As described above, RCPI has a distribution close to normal, and the selected independent variables do not have critical levels of correlation with each other. Therefore, this work is focused on the estimations of standard linear regression, although more rigorous estimations with robust standard errors will

be given for reference. It is important to note that the number of observations is not large (39), which does not allow the use of control variables at this stage. They will be used later in firm-level analysis.

Calculations are made by stepwise adding independent variables to the regression equation (see Table 10). At the first stage (column 1) only Hypothesis 1 is tested, at the second stage (column 2) a variable for Hypothesis 2.1 is added and they are tested together. Then, variables for the following hypotheses are also added one by one, and as a result, the entire set of variables is tested. This method was chosen in order to demonstrate that adding new variables to the equation does not lead to serious fluctuations in the values of the coefficients of others, or to a change in the signs of the coefficients.

Table 10. Results of linear regressions at regional level

The table demonstrates the OLS regression results for RCPIreg and independent variables for 39 regions. Columns 1-4 show the calculations for various sets of variables, starting with the first and adding one proxy at each subsequent step. Column 5 represents the final results for all variables. Column 6 gives the same set of variables using the heterogeneity robust standard errors method. In the table each cell displays the β-coefficient and corresponding t-statistics within parentheses. *, ** and *** indicate statistical significance at 90% and 95% level respectively.

Indep. Variables	1	2	3	4	5	6
Intercept	4.074**	3.791**	2.715	3.530*	3.648*	3.648*
	(2.189)	(2.143)	(1.531)	(1.790)	(1.816)	(1.907)
Log of Salary_reg	-0.393**	-0.313*	-0.246	-0.323*	-0.344*	-0.344*
	(-2.226)	(-1.819)	(-1.469)	(-1.735)	(-1.780)	(-1.886)
Officials_reg		-0.198**	-0.223**	-0.273**	-0.252**	-0.252**
		(-2.202)	(-2.573)	(-2.692)	(-2.267)	(-2.333)
StateEmploy_reg			0.018**	0.022**	0.020**	0.020**
			(2.101)	(2.303)	(2.102)	(2.181)
Extractive				0.004	0.004	0.004
				(0.951)	(0.974)	(1.016)

Students					0.000 (0.486)	0.000 (0.432)
Robust std.errors	No	No	No	No	No	Yes
N	39	39	39	39	39	39
Adj R^2	0.094	0.180	0.251	0.249	0.231	0.231

As can be seen from the Table 10, the first three independent variables show results consistent with the initial hypotheses. Thus, the Log of average monthly salary demonstrates a negative correlation with perceived corruption with a significance from 95 to 90% in almost all variants of calculation. The share of civil servants among the working-age population shows a negative correlation with the RCPI in all calculations with a significance of 95%. The share of employees in state owned firms is positively associated with perceived corruption with a significance level of 95%. I couldn't find supportive evidence for the last two hypotheses.

The final multivariate regressions 5 and 6 demonstrate the results obtained both when using the conventional method for calculating standard errors (5) and with the more rigorous method of robust standard errors (6). The difference between the two are not substantial and significance of the results remains the same.

The discovered relations have the following size effect according to column 5. An increase of the average monthly salary by one standard deviation is associated with the decrease of RCPI by a value equivalent to 0.30 of its standard deviation. An increase of the share of state officials in total number of employees by one standard deviation is correlated with the decrease of RCPI by

0.42 of its standard deviation, while there is an increase of one standard deviation for the share of employees of state-owned firms that is accompanied by increase by 0.32 standard deviation in the RCPI. These interdependencies serve to verify three out of five initial hypotheses.

It is important to note, that Russia is the biggest country in the world in terms of territory size, that may lead to the idea of using the geographic variable in the calculations. However, geographic factors are less common in cross-country studies of corruption (e.g. Goel and Nelson, 2010) and more often they are used as control variables (e.g., Sandholtz and Koetzle, 2000). Russian studies also take geographic variables into account as controls, more often in the form of urbanization (e.g., Belousova et al, 2016). The most common geographic variables in corruption studies are size of the region, natural resources endowment, and level of urbanization. The last two indicators are considered in my calculations in the form of closely related variables: “share of extractive industries in GRP” and “city size”.

Therefore, for additional verification, complimentary calculations are made with the new variable for the size of the territory in the regression analysis at the regional level. This variable is named “Region size” and represents the area of the territory. It is measured by millions of hectares. The Appendix contains a corresponding Table 10a. The results do not change significantly, so the supportive evidence for Hypotheses 1, 2, and 3 is sustained.

In addition, one could ask the question about presence of outlying regions in the sample. In this work, the data analysis was carried out without studying the outlying regions, since the distribution of the dependent variable is close to

normal one and no significant outliers are observed on the graph in the “RCPI calculations” paragraph. Moreover, the number of observations is small and excluding extreme values can reduce the power of the test. However, to answer this question, one can try to define outlying regions in a logical way. In terms of economic indicators, the most obvious outlier for Russian regions is Moscow city. The population of Moscow is roughly equal to the 10 other largest Russian cities combined, and the GRP per capita is more than 8 times higher than the sample average. To check the results obtained earlier, additional calculations are carried out at the regional level with the exclusion of data for Moscow (i.e., for 38 regions). Data are given in the Appendix (Table 10b). The results obtained do not change significantly.

Firm level calculations

Next, I conduct analysis at the company level. For doing this, RCPIfirm is constructed similarly to RCPIreg, however, without calculating the average values of respondents' answers by region, but keeping the values obtained by the PCA tool for each respondent / firm. In this case, the dependent variable is the firm's corruption index, while the independent variables remain the same and for all firms from the same region their values are equal. This approach allows us to increase the number of observations to 1051 respondents. It is unlikely going to seriously change the results, since the initial data and the values of the independent variables remained the same, but it can somehow correct them. Also, an important advantage of this stage is the ability to include control variables

in the regression, which was problematic at the regional level with 39 observations.

The sequential addition of variables and testing was applied at the regional level and did not show significant fluctuations compared to the final results. Therefore, in computation at the firm level, the focus is on the outcome of adding controls to the equation. For this purpose, Table 11 considers regressions for all variables with controls with normal standard errors (column 1) and with robust standard errors (column 2). Regressions for all variables without controls are also considered - similarly with normal and robust errors (columns 3 and 4, respectively).

Table 11. Results of linear regressions with controls at company level

Dependent variable in the regression is RCPIfirm. The values of the explanatory variables in the calculations at the firm level are the same as those at the regional level. Therefore, the same names are used to denote variables. Controls' information is not listed individually as they are not variables of interest. Columns 1 and 3 represent the results for all variables with common standard errors with and without controls respectively. Columns 2 and 4 give the same set of variables using the heterogeneity robust standard errors method also with and without controls. In the table each cell displays the β-coefficient and corresponding t-statistics within parentheses. *, ** and *** indicate statistical significance at 90%, 95% and 99% level respectively.

Indep. Variables	**1**	**2**	**3**	**4**
Intercept	3.772**	3.772**	3.515**	3.515**
	(2.497)	(2.490)	(2.328)	(2.318)
Log of Salary_reg	-0.317**	-0.317**	-0.318**	-0.318**
	(-2.329)	(-2.327)	(-2.335)	(-2.328)
Officials_reg	-0.219***	-0.219**	-0.217***	-0.217**
	(-2.678)	(-2.563)	(-2.656)	(-2.559)
StateEmploy_reg	0.017**	0.017*	0.016**	0.016*
	(2.101)	(1.895)	(1.995)	(1.795)
Extractive	0.000	0.000	0.000	0.000
	(0.099)	(0.095)	(0.050)	(0.048)

Students	-0.001 (-0.523)	-0.001 (-0.490)	0.000 (0.360)	0.000 (0.338)
Controls	Yes	Yes	No	No
Robust std. errors	No	Yes	No	Yes
N	1051	1051	1051	1051
Adj R^2	0.020	0.020	0.015	0.015

Table 11 shows that all hypotheses confirmed at the regional level are confirmed at the firm level as well, both with and without controls. In comparison with regional analysis the coefficient significance of the variable “Log of average monthly salary” (Hypothesis 1) increases at the firm level from 90% to 95%, while the coefficient changed insignificantly (from -0.344 for regions to -0.317 for firms). Variable “% of civil servants in the total number of employed” (Hypothesis 2.1) increases significance of β-coefficient with common standard errors from 95 to 99% and also slightly changes the coefficient volume from -0.252 in Table 10 to -0.219 in Table 11. Variable “% of employees of state-owned firms” (Hypothesis 2.2) shows approximately the same results as for the regions: the significance remains in the range of 90-95%, and the coefficient changes from 0.02 to 0.016. Just as for regional analysis, I could not find the supportive evidence for hypotheses 3 and 4 at the firm level.

Thus, results at the firm level with controls confirm and somewhat improve the main results obtained at the regional level. The signs (+/-) of the correlations remain the same and the β coefficients change insignificantly. At the same time, the significance of the coefficients increases, while the standard errors decrease. Calculations with robust standard errors demonstrate similar results.

For additional verification of the results obtained, new calculations are made with different way to compute the standard errors. Table 11a in the Appendix shows company-level calculations with standard errors clustered by regions. The new results are practically the same as in Table 11, so the supportive evidence for Hypotheses 1, 2, and 3 is sustained.

City level calculations

An additional test for the results obtained is analysis at the city level. The initial regional sample consists of 60% of central cities residents and another 29% of those who live in medium and small cities. From these respondents, another database can be organized by cities. Unfortunately, not all cities are included in the official statistics with the same data set. Also in the initial database, some cities are represented by only two or three respondents, i.e., the sample size is too small for analysis. Taking into account these limitations, it was possible to form a new sample of 42 cities, limiting the number of respondents to at least 5. The total number of respondents in the sample is 705 people.

Thus, new calculations are carried out on the same data (only structured in a different way) and should not give very different results. However, it is important to remember that a decrease in the sample and a decrease in the average number of respondents representing one territorial unit can lead to some distortion of the results. In addition, the official statistics for cities are structured differently than for regions, and the independent variables will be different. Taking in account all the above circumstances, urban calculations can be considered auxiliary.

RCPIcity is calculated in the same way as the index for regions and allows us to form a ranking of cities in terms of corruption. Comparing it with the regional ranking gives a similar picture with a few exceptions. The selection of independent variables for urban calculations is complicated by the availability of statistical data and is described above in the section “Independent variables”. It may be recalled here that there is no “education” variable at the city level, and the share of extractive industries is measured by the “inverse” indicator - manufacturing output per capita.

Table 12. Results of linear regressions at city level

The dependent variable in the regression is RCPIcity. For independent variables different measures are used than for the regions. *Log of Salary_city* and *Officials_city* are very close in meaning to analogous regional variables. *StateEmploy_city* does not quite correspond to the meaning of a similar regional variable since it includes only employees of municipal firms. *Manufacturing* is, to a certain extent, the opposite of *Extractive*. There is no education indicator at the city level. Column 1 represents the results for all variables. Column 2 gives the same set of variables using the heterogeneity robust standard errors method. In the table each cell displays the β-coefficient and corresponding t-statistics within parentheses. *, ** and *** indicate statistical significance at 10%, 5% and 1% level respectively.

Indep. Variables	**1**	**2**
Intercept	7.156**	7.156**
	(2.296)	(2.429)
Log of Salary_city	-0.625**	-0.625**
	(-2.193)	(-2.438)
Officials_city	-2.565*	-2.565
	(-1.727)	(-1.346)
StateEmploy_city	-0.531	-0.531
	(-0.397)	(-0.190)
Manufacturing	-0.001***	-0.001**
	(-3.010)	(-2.287)
Robust std. errors	No	Yes

N	42	42
Adj R^2	0.223	0.223

The results of the calculations go in line with two of the three hypotheses that were confirmed at the regional level. The hypothesis about the negative role of the state in the economy is not confirmed here. However, it should be kept in mind that statistics for cities provide data only for firms with municipal ownership, which can distort the picture. On the other hand, the hypothesis about the role of the extractive industries unexpectedly "start working": the volume of manufacturing industries showed a negative correlation with the level of corruption with a significance of 99%. This is unlikely to significantly change the picture of the study obtained in the previous calculations. However, this could be an interesting area for further research.

Computing with robust standard errors gives similar results. Only the significance of the coefficient for the variable "government size" deteriorates a little bit. However, it should be remembered that computation for cities is performed on a smaller sample, which can reduce the reliability of results on such strict procedure as robust standard errors test.

Conclusions and discussion

This study constructs new index (RCPI) of perceived corruption for Russian regions that demonstrates reliability and external validity. It became possible firstly, because of the choice to interview local entrepreneurs and managers who are aware of the shadow schemes in the regional markets.

Secondly, because of a sample of respondents in accordance with the sectoral structure of the economy, which ensures the representativeness of the results. Thirdly, because the set of questions reflecting different aspects of perceived corruption: general assessment, assessment of individual authorities, assessment of its dynamics. Fourth reason is the choice of regions covering more than 70% of the national GDP and population. Finally, it is a method for constructing an integral rating using the PCA tools, which made it possible to consider different aspects of perceived corruption in a single index.

Supportive evidence of the adequacy of the data obtained is the correlation of RCPI with other published measures of corruption. For instance, RCPI shows correlation with the results of a similar study conducted in 2010 by FOM. In addition, it demonstrates the relationship with the official statistics of the General Prosecutor Office on corruption crimes in the regions of Russia in 2018.

The RCPI construction makes it possible to identify the following relationships, which were either not found by previous studies or did not get unambiguous assessment. First, the negative correlation between the level of development / prosperity and bribes was convincingly confirmed. In contrast to previous works, where this dependence was either not found (Libman and Obydenkova, 2013), or was detected with several reservations (Sharafutdinova, 2010), RCPI has shown a strong correlation with the average monthly wage both at the regional level, as well as at the level of firms and cities. For regions an increase of the average monthly salary by one standard deviation is associated with the decrease of RCPI by a value equivalent to 0.30 of its standard deviation.

Second, this study clearly demonstrates the negative correlation between the size of the state apparatus and corruption. Previous studies have either reported the opposite relationship (e.g., Dininio and Orttung, 2005), or found none (Kisunko et al, 2013). The RCPI has shown a stable correlation with the bureaucracy share of labor force at all levels of calculations. For regions an increase of the share of state officials in total number of employees by one standard deviation is associated with the decrease of RCPI by 0.42 of its standard deviation. Thus, the point of view of several researchers (e.g., Goel, Budak, 2006) was confirmed that in non-democratic regimes a bureaucracy growth could lead to an increase in control and a decrease in abuse. In democracies, numerous public and political institutions monitor officials, so an increase in the number of officials does not so much strengthen control as it increases the number of potential bribe-takers. In contrast, in transitional countries monitoring activity of social and political institutions is weak, and the growth of bureaucracy can actually increase the only state control over potential abusers.

Third, the results of the study revealed a positive correlation between state participation in the economy and corruption. An increase of one standard deviation for the share of employees of state-owned firms is accompanied by increase by 0.32 standard deviation in the RCPI. This dependence is discovered for Russia for the first time and is confirmed in calculations both at the level of regions and firms. It is not found only for cities, but this could be attributed to inaccuracy of data, since the official statistics for cities does not give a very suitable indicator. The revealed dependence is of great importance in connection with the growing share of the state in the Russian economy. It gives reason to

expect that further growth of the state-owned sector will stimulate corruption, since the management of cash flows of enterprises with state participation is controlled by the bureaucracy.

Fourth, the results of a city-level computation found a negative association between manufacturing industries and corruption. This correlation has been discovered for the first time in Russia. However, it is not confirmed by basic calculations at the level of regions and firms, which does not allow considering this dependence as proven. Nevertheless, it is advisable to further investigate this issue, since the problem of extractive export industries remains extremely relevant for the Russian economy, and previous attempts to identify such a relationship have not succeeded (e.g., Dininio and Orttung, 2005).

In addition, in future studies it would be interesting to compare the results obtained for corruption perception with calculations based on corruption incidents. In this study, only one question is responsible for assessing real corruption, which was originally supposed to be included in the general integral index constructed by the PCA method. It was initially planned to balance possible biases of the corruption perception with the personal experience of the respondents. However, following the example of previous researchers who strictly divided perception and personal experience in their analysis, the question related to bribe incidents was excluded from the construction of the final index.

The correlations obtained in this study raise a series of questions regarding the role of Russian government and overall corruption on development of Russian regions. It might be the case, that one can significantly improve the live standards by imposing legal restrictions on bribe taking. On the other hand, it is possible

that improving the lives of the population and the development of regional markets will help reduce malpractices in the regions. The causal relationship between corruption and the well-being of citizens and the development of a market economy may become an important subject for further research in this area. In any case, it is obvious that the relationship between the decrease in bribe taking and the growth of incomes of the population and the development of business in Russian regions is in accordance with the global trend.

Conclusiones y discusión

Este estudio ha permitido construir un nuevo índice (IPRC) y elaborar una clasificación de las regiones según el nivel de corrupción percibido. En primer lugar, porque se ha optado por entrevistar a empresarios y directivos locales que están al tanto de las tramas en la sombra en los mercados regionales. En segundo lugar, por una muestra de encuestados acorde con la estructura sectorial de la economía, lo que garantiza la representatividad de los resultados. En tercer lugar, se trata de un conjunto de preguntas que reflejan diferentes aspectos de la corrupción percibida: evaluación general, evaluación de las autoridades individuales, evaluación de su dinámica. La cuarta razón es la elección de regiones que cubren más del 70% del PIB nacional y de la población. Por último, se trata de un método para construir una calificación integral utilizando las herramientas del ACP, que permitió considerar diferentes aspectos de la corrupción percibida en un solo índice.

Otra prueba de la idoneidad de los datos obtenidos es la correlación del IPRC con otras medidas de corrupción publicadas. Por ejemplo, el IPRC muestra correlación con los resultados de un estudio similar realizado en 2010 por el FOM. Además, demuestra la relación con las estadísticas oficiales de la Fiscalía General sobre los delitos de corrupción en las regiones de Rusia en 2018.

La construcción del IPRC permite identificar las siguientes relaciones, que no fueron encontradas por estudios anteriores o no obtuvieron una evaluación inequívoca. En primer lugar, se confirmó de forma convincente la correlación negativa entre el nivel de desarrollo / prosperidad y los sobornos. A diferencia de los trabajos anteriores, en los que esta dependencia no se encontró (Libman y Obydenkova, 2013), o se detectó con varias reservas (Sharafutdinova, 2010), el IPRC ha mostrado una fuerte correlación con el salario medio mensual tanto a nivel regional, como a nivel de empresas y ciudades. En el caso de las regiones, un aumento del salario medio mensual en una desviación estándar está correlacionado con la disminución del IPRC en un valor equivalente a 0,3 de su desviación estándar.

En segundo lugar, este estudio demuestra claramente la correlación negativa entre el tamaño del aparato estatal y la corrupción. Estudios anteriores han informado de la relación contraria (por ejemplo, Dininio y Orttung, 2005), o no han encontrado ninguna (Kisunko et al, 2013). El IPRC ha mostrado una correlación estable con la proporción de burocracia en la población activa en todos los niveles de cálculo. En el caso de las regiones, un aumento de la proporción de funcionarios estatales en el número total de empleados en una desviación estándar está correlacionado con la disminución del IPRC en 0,42 de

su desviación estándar. Así, se confirmó el punto de vista de varios investigadores (por ejemplo, Goel, Budak, 2006) de que en los regímenes no democráticos un crecimiento de la burocracia podría conducir a un aumento del control y a una disminución del abuso. En las democracias, numerosas instituciones públicas y políticas supervisan a los funcionarios, por lo que un aumento del número de funcionarios no refuerza tanto el control como el número de posibles sobornadores. Por el contrario, en los países de transito la actividad de supervisión de las instituciones sociales y políticas es escasa, y el crecimiento de la burocracia puede en realidad aumentar el único control sobre los potenciales abusadores.

En tercer lugar, los resultados del estudio revelaron una correlación positiva entre la participación del Estado en la economía y la corrupción. Un aumento de una desviación estándar de la proporción de empleados de las empresas estatales va acompañado de un aumento de 0,32 desviaciones estándar del IPRC. Esta dependencia se descubre para Rusia por primera vez y se confirma en los cálculos tanto a nivel de regiones como de empresas. No fue posible encontrarla sólo para las ciudades, pero esto puede atribuirse a la inexactitud de los datos, ya que las estadísticas oficiales para las ciudades no dan un indicador muy adecuado. La dependencia revelada es de gran importancia en relación con la creciente participación del Estado en la economía rusa. Da motivos para esperar que un mayor crecimiento del sector estatal estimulará la corrupción, ya que la gestión de los flujos de caja de las empresas con participación estatal está controlada por la burocracia.

En cuarto lugar, los resultados de un cálculo a nivel de ciudad encontraron una asociación negativa entre las industrias manufactureras y la corrupción. Esta correlación se ha descubierto por primera vez en Rusia. Sin embargo, no fue confirmada por cálculos básicos a nivel de regiones y empresas, lo que no permite considerar esta dependencia como probada. No obstante, es aconsejable seguir investigando esta cuestión, ya que el problema de las industrias extractivas de exportación sigue siendo extremadamente relevante para la economía rusa, y los intentos anteriores de identificar dicha relación no han tenido éxito (por ejemplo, Dininio y Orttung, 2005).

Además, en futuros estudios sería interesante comparar los resultados obtenidos para la percepción de la corrupción con los cálculos basados en los incidentes de corrupción. En este estudio, sólo una pregunta se encarga de evaluar la corrupción real, que originalmente debía incluirse en el índice integral general construido por el método ACP. Inicialmente estaba previsto equilibrar los posibles sesgos de la percepción de la corrupción con la experiencia personal de los encuestados. Sin embargo, siguiendo el ejemplo de investigadores anteriores que dividieron estrictamente la percepción y la experiencia personal en sus análisis, la pregunta relacionada con los incidentes de soborno se excluyó de la construcción del índice final.

El análisis de los datos de panel sobre la corrupción percibida y real es también un área interesante de investigación. Dichos datos pueden recogerse realizando una nueva encuesta similar a la realizada para este trabajo o a cualquiera de las anteriores (INDEM-TI, BEEPS o FOM). También se puede intentar analizar los datos de todas las encuestas enumeradas e identificar

resultados similares en ellas, a partir de los cuales será posible construir una aproximación a los datos reales de las series temporales.

References

1. Ades A., Di Tella R., (1999). Rents, competition, and corruption. *American Economic Review*. 89 (4), 982–93.
2. Aidt T., Dutta J., Sena V., (2008). Governance regimes, corruption and growth: theory and evidence. *Journal of Comparative Economics.* 36 (2), 195–220.
3. Alt J., Lassen D., (2003). The political economy of institutions and corruption in American States. *Journal of Theoretical Politics*. 15 (3), 341-365.
4. Anderson C., Tverdova Y., (2003). Corruption, Political Allegiances, and Attitudes Toward Government in Contemporary Democracies. *American Journal of Political Science*. Vol. 47, No. 1, Jan., 91–109.
5. Azfar O., Murrell P., (2009). Identifying Reticent Respondents: Assessing the Quality of Survey Data on Corruption and Values. *Economic Development and Cultural Change*. Vol. 57, No. 2, Jan., 387.
6. Belousova V., Goel R., Korhonen I., (2016). Corruption perceptions versus corruption incidence: Competition for rents across Russian regions. *Journal of Economy and Finance*. 40, 172–187.

7. Bhagwati J., (1982). Directly Unproductive, Profit-seeking (DUP) Activities. *Journal of Political Economy*. 90.
8. Bhattacharyya S., Hodler R., (2010). Natural resources, democracy and corruption. *European Economic Review.* 54 (4), 608–621.
9. Bose G., (2004). Bureaucratic delays and bribe-taking. *Journal of Economic Behavior and Organization*. Vol. 54, 313–320.
10. Chadee D., Roxas B., (2013). Institutional environment, innovation capacity and firm performance in Russia. *Critical perspectives on international business*. V9, N1/2, 19-39.
11. Charron N., (2010). The correlates of corruption in India: Analysis and evidence from the states. *Asian Journal of Political Science*. v18, n2 (August), 177-194.
12. Dang Q.V., (2016). The impact of corruption on provincial development performance in Vietnam. *Crime, Law and Social Change*. 65:325–350.
13. Del Monte A., Papagni E., (2007). The determinants of corruption in Italy: Regional panel data analysis. *European Journal of Political Economy*. 23: 379–396.
14. Diamond L., Plattner M., (1993). *The Global Resurgence of Democracy*. Johns Hopkins University Press, Baltimore.
15. Di Bella G., Dynnikova O., Slavov S., (2019). The Russian State's Size and its Footprint: Have They Increased? *IMF working papers.* N 19/53 [Online] IMF. [Viewed 20 August 2021]. Available from: https://www.imf.org/en/Publications/WP/Issues/2019/03/09/The-Russian-States-Size-and-its-Footprint-Have-They-Increased-46662

16. Dimant E., Krieger T., Meierrieks D., (2013). The effect of corruption on migration, 1985–2000. *Applied Economics Letters.* 20 (13), 1270–1274.
17. Dininio P., Orttung R., (2005). Explaining patterns of corruption in the Russian regions. *World Politics.* 57, 4 (Jul.).
18. Federal Antimonopoly Agency of Russia, (2019). The Report on Market Competition in Russian Federation in 2018 (in Russian). [Online] *Federal Antimonopoly Agency of Russia*. [Viewed 20 August 2021]. Available from: https://fas.gov.ru/documents/685117
19. Ferraz C., Finan F., (2008). Exposing Corrupt Politicians: The Effects of Brazil's Publicly Released Audits on Electoral Outcomes. *The Quarterly Journal of Economics*. Vol. 123, No. 2 (May), 703-745.
20. Fisman R., Gatti R., (2002). Decentralization and corruption: Evidence from U.S. federal transfer programs. *Public Choice*. 113: 25–35.
21. Freedom House, (2020). Freedom on the net 2018. Russia. [Online] *Freedom House*. [Viewed 20 August 2021]. Available from: https://freedomhouse.org/country/russia/freedom-net/2018
22. FOM – “Fond Obshestvenoe mnenie” (prepared for Ministry of Economic Development of Russia) (2010). State of domestic corruption in Russia (in Russian). [Online] *FOM*. [Viewed 20 August 2021]. Available from: http://old.economy.gov.ru/minec/resources/116f09004739f0c7a2a4eeb4415291f1/doklad_kor.pdf
23. Glaeser E., Saks R., (2006). Corruption in America. *Journal of Public Economics*. 90, 1053–1072.

24. Gylfason T., (2001). Nature, Power, and Growth. *Scottish Journal of Political Economy*. Vol. 48, N.5 (Nov).
25. Goel R., Mazhar U., Nelson M., (2016). Corruption across government occupations. *Journal of International Development*. 28, 1220–1234.
26. Goel R., Nelson M., (2010). Causes of corruption: history, geography and government. *Journal of Policy Modeling*. 32 (4), 433–447.
27. Goel R., Budak J., (2006). Corruption in transition economies: effects of government size, country size and economic reforms. *Journal of Economics and Finance*. Vol. 30, N. 2.
28. Enikolopov R., Petrova M., Sonin K., (2018). Social media and corruption. *American Economic Journal: Applied Economics*. 10 (1), 150-174.
29. Harding L., (2011). *Mafia State*. Guardian Books.
30. Hofstede G., (1980). *Culture's Consequences: International Differences in Work-Related Values*. Beverly Hills CA: Sage Publications.
31. Huntington S., (1968). *Political Order in Changing Societies*. New Haven, Conn.: Yale University Press.
32. Judge W., McNatt, D., Xu W., (2011). The antecedents and effects of national corruption: a meta-analysis. *Journal of World Business*. 46 (1), 93–103.
33. Karhunen P., Ledyaeva S., (2012). Corruption Distance, Anti-Corruption Laws and International Ownership Strategies in Russia. *Journal of International Management.* 18, 196-208.
34. Khlebnikov P., 2001. Gangster-free capitalism? *Forbes*. v168, n13 (Nov. 26), 107-114.

35. Kisunko G., Knack S., Roumeen I., Ponamariov B., 2013. Russian Federation - National and regional trends in regulatory burden and corruption. [Online] *World Bank.* [Viewed 20 August 2021]. Available from: http://documents.worldbank.org/curated/en/584111468092953347/Russian-Federation-National-and-regional-trends-in-regulatory-burden-and-corruption
36. Ko K., Samajdar A., (2010). Evaluation of international corruption indexes: Should we believe them or not? *The Social Science Journal*. 47(3), 508–540.
37. Kofanova E., Petukhov V., (2006). Public Opinion of Corruption in Russia. *Sociological Research*. V45, N5 (Sep–Oct), 50–72.
38. Kotera G., Okada K., Samreth S., (2012). Government size, democracy, and corruption: an empirical investigation. *Economic Modelling*. 29 (6), 2340–2348.
39. Krueger A., (1974). The Political Economy of the Rent-seeking Society. *American Economic Review.* 64, 291–303.
40. Kuzmina O., Volchkova N., Zueva T., (2014). Foreign Direct Investment and Governance Quality in Russia. *Journal of Comparative Economics*. 42, 874-891.
41. Lancaster T., Montinola G., (1997). Toward a methodology for the comparative study of political corruption. *Crime, Law & Social Change*. 27 (1), 185–206.

42. La Porta R., Lopez-de-Silanes F., Shleifer A., Vishny R., (1999). The quality of government. *Journal of Law, Economics and Organization*. 15 (1), 222–279.
43. Leite C., Weidmann J., (1999). Does mother nature corrupt? Natural resources, corruption, and economic growth. *Natural Resources, Corruption, and Economic Growth* (June). IMF Working Paper, 85.
44. Lensvelt-Mulders, Gerty J. L. M., Joop J. Hox, Peter G. M. van der Heijden, Cora J. M. Maas, (2005). "Meta-Analysis of Randomized Response Research: Thirty-Five Years of Validation." *Sociological Methods and Research.* 33 (Feb), 319–48.
45. Levada-Center, (2019). Corruption follows poverty (in Rus). [Online] *Levada-Center.* [Viewed 20 August 2021]. Available from: https://www.levada.ru/2019/02/27/za-bednostyu-sleduet-korruptsiya/
46. Libman A., Obydenkova A. (2013). Communism or communists? Soviet legacies and corruption in transition economies. *Economic Letters.* 119, 101-103.
47. Mauro P., (1995). Corruption and Growth. *The Quarterly Journal of Economics.* 110 (3), 681–712.
48. Mironov M., (2015). Should one hire a corrupt CEO in a corrupt country? *Journal of financial economics*. V117, N1, 29.
49. Mironov M., (2013). Taxes, Theft, and Firm Performance. *The Journal of Finance*. V68, N4, 1441.

50. Mironov M., Zhuravskaya E., (2016). Corruption in Procurement and the Political Cycle in Tunneling: Evidence from Financial Transactions Data. *American Economic Journal*. V8, N2, 287-321.
51. Mokhtary M., Grafova I., (2007). Corruption: Theory and evidence from the Russian Federation. *Economic Systems.* 31, 412–422.
52. Montinola G., Jackman R., (2002). Sources of Corruption: A Cross-Country Study. *British Journal of Political Science*, 32, 147-170.
53. Nielsen R., (2003). Corruption networks and implications for ethical corruption reforms. *Journal of Business Ethics*. Vol. 42, 125-149.
54. North M., Orman H., Gwin R., (2013). Religion, corruption, and the rule of law. *Journal of Money, Credit and Banking.* 45 (5), 757–779.
55. Nye J., (1967). Corruption and Political Development: A Cost-Benefit Analysis. *American Political Science Review.* Vol. 61 (2), 417-427.
56. Olken B., (2009). Corruption Perceptions vs. Corruption Reality. *Journal of Public Economics*, 93, 950–964.
57. Paldam M., (2002). The cross-country pattern of corruption: economics, culture and the seesaw dynamics. *European Journal of Political Economy*. Vol. 18, 215-240.
58. Pellegata A, Memoli V., (2016). Can Corruption Erode Confidence in Political Institutions Among European Countries? Comparing the Effects of Different Measures of Perceived Corruption. *Social Indicators Research.* V128, N1 (Aug), 391-412.
59. Pellegrini L., Gerlagh R., (2004). Corruption's effect on growth and its transmission channels. *Kyklos.* 57(3), 429–456.

60. Petrov N., (2015). Down the tunnel. *Russian Politics and Law.* Vol. 53, N. 4, 5–31.
61. Pinker S., (2018). *Enlightenment now: the case for reason, science, humanism and progress*. Penguin books. New York.
62. Pomerantsev P., (2014). *Nothing is true and everything is possible*. Public Affairs. US.
63. Popov O., (2004). Diagnosing Corruption in Russia: a Sociological Analysis. *Sociological Research*. Vol. 43, N. 4, (Jul–Aug), 39–56.
64. Prasad M., Martins da Silva M., Nickow A., (2019). Approaches to Corruption: a Synthesis of the Scholarship. *Studies in Comparative International Development*. 54, 1(Mar), 96-132.
65. Putnam R., (1993). *Making Democracy Work: Civic Traditions in Modern Italy.* Princeton University Press, Princeton.
66. Remington T., Yakovlev A., Ovchinnikova E., Chasovsky A., (2020). *Career Trajectories of Regional Officials: Russia and China Before and After 2012*. Working papers. Higher School of Economics. Moscow.
67. Rose-Ackerman S., (1997). *The Political Economy of Corruption; Corruption and the global economy*. Ed. Elliott K. A. Washington, DC: Institute for International Economics.
68. Russian General Prosecutor Office, (2019). Official statistics of registered crimes in Russian regions. [Online] *General Prosecutor Office*. [Viewed 20 August 2021]. Available from: http://crimestat.ru/regions_chart_total

69. Russian Statistic Agency (RosStat), (2020). Official regional and municipal statistics. [Online] *RosStat*. [Viewed 20 August 2021]. Available from: https://rosstat.gov.ru/regional_statistics
70. Sandholtz W., Koetzle W., (2000). Accounting for Corruption: Economic Structure, Democracy, and Trade. *International Studies Quarterly*. 44 (1), 31–50.
71. Sachs J., Warner A., (1997). Sources of slow growth in African economies. *Journal of African Economies.* 6 (3), 335–376.
72. Satarov G., (2002). *Diagnostics of Russian corruption: a sociological analysis.* INDEM, Russia.
73. Schulze G., Sjahrir B., Zakharov N., (2016). Corruption in Russia. *Journal of Law and Economics*. V59 (Feb).
74. Sharafutdinova G., (2010). What Explains Corruption Perceptions? The Dark Side of Political Competition in Russia's Regions. *Comparative Politics.* V42, N2 (Jan), 147-166.
75. Shleifer A., Vishny R., (1993). Corruption. *Quarterly Journal of Economics*. 108 (3), 599–617.
76. Sidorkin O., Vorobyev D., (2018). Political cycles and corruption in Russian regions. *European Journal of Political Economy*. 52, 55-74.
77. SocioDigger. 2021. December. Volume 2. Issue 10(15): *(Anti)corruption*. In Rus.
78. Tanzi V., (1998), Corruption around the world: causes, consequences, scope, and cures. *Staff Papers-International Monetary Fund.* 559–594.

79. The Economist Intelligence Unit, (2020). Democracy index 2020. [Online] *Intelligence Unit*. [Viewed 20 August 2021]. Available from: https://www.eiu.com/topic/democracy-index

80. Thomas M., (2010). What do Worldwide Governance Indicators Measure? *European Journal of Development Research*. 22, N1, 31-54.

81. Transparency International, (2020). Corruption perception index 2020. [Online] *Transparency International*. [Viewed 20 August 2021]. Available from: https://www.transparency.org/en/cpi/2020/index/

82. Transparency International, (2009). Anti-Corruption Plain Guides. [Online] *Transparency International*. [Viewed 20 August 2021]. Available from: https://www.transparency.org/whatwedo/publication/the_anti_corruption_plain_language_guide

83. Transparency International and INDEM, (2004). Dynamics of Russian Corruption. [Online] *INDEM*. [Viewed 20 August 2021]. Available from: www.indem.ru and [Online] *Transparency International*. [Viewed 20 August 2021]. Available from: https://web.archive.org/web/20040326055417/http://www.transparency.org.ru/proj_index.asp

84. Treisman D., (2000). The causes of corruption: a cross-national study. *Journal of Public Economics*. 76(3), 399–458.

85. Treisman D., (2007). What have we learned about the causes of corruption from ten years of cross-national empirical research? *Annual Review of Political Science*. 10, 211-244.

86. Truex R., (2011). Corruption, attitudes, and education: survey evidence from Nepal. *World Development.* 39 (7), 1133–1142.
87. Tullock G., (1967). The Welfare Costs of Tariffs, Monopolies and Theft, *Western Economic Journal.* 5, 224–32.
88. Van Rijckeghem C., Weder B., (2001). Bureaucratic corruption and the rate of temptation: do wages in the civil service affect corruption, and by how much? *Journal of Development Economics.* 65(2), 307–331.
89. World Bank (2000). *Anticorruption in Transition: A Contribution to the Policy Debate.* Washington, DC: World Bank.
90. UNDP (2009). Democratic Governance reader.
91. Yakovlev A., (2016). What is Russia trying to defend? *Russian Journal of Economics*. 2: 146–161.
92. Yakovlev A., (2011). *State-business relations in Russia in the 2000s: From the capture model to a variety of exchange models?* Discussion papers. Bank of Finland (BOFIT), Institute for Economies in Transition. Helsinki.
93. Yakovlev E., Zhuravskaya E, (2013). The unequal enforcement of liberalization: evidence from Russia's reform of business regulations. *Journal of European Economic Association*. 11 (4), 808-838.
94. Zubarevich N., (2018). The Center-Regions Relationship: What Has Changed in Four Years of Crisis? *Russian Politics & Law.* V.56, n3 (1102): 208-221.
95. Zubarevich N., (2010). *Regions of Russia: Inequality, Crisis, Modernization.* The Independent Institute of Social Policy. Moscow. In Rus.

Appendix

Table 4. Comparison between RCPI, FOM and official bribe statistics.

First column represents 37 regions included in three data sets (Yamalo-Nenets Autonomous Okrug and Kabardino-Balkar Republic are excluded, because they are not covered in FOM survey). Regions are located in ascending order of the RCPI rating (column 2). Column 3 displays region number in FOM rating after excluding all unmatched regions (FOM, 2010). Column 4 represents calculation results of officially registered bribe-taking crimes per 10000 inhabitants of the territory – sequence number of the ranking from best to worst (Russian General Prosecutor Office, 2019; RosStat, 2020).

Regions belonging to three samples after excluding unmatched territories	Region number in RCPI ranking	Region number in FOM ranking	Region number based on official bribe statistics
1	2	3	4
Kaliningrad Oblast	1	35	6
Novosibirsk Oblast	2	8	10
Khanty-Mansi AO	3	3	34
Primorsky Krai	4	17	17
Voronezh Oblast	5	36	24
Vologda Oblast	6	4	3
Omsk Oblast	7	5	14
Republic Bashkortostan	8	9	25
Nizhny Novgorod Oblast	9	20	5
Belgorod Oblast	10	21	1
Khabarovsk Krai	11	19	4
Krasnoyarsk Krai	12	14	28
Udmurt Republic	13	10	7
Irkutsk Oblast	14	22	2
Volgograd Oblast	15	11	13
Moscow Oblast	16	32	23
Tyumen Oblast	17	2	30
Republic of Tatarstan	18	15	21
Altai Krai	19	13	29
Tula Oblast	20	25	9
Ulyanovsk Oblast	21	23	18
Kemerovo Oblast	22	12	32
Samara Oblast	23	28	19

Chelyabinsk Oblast	24	16	31
Saratov Oblast	25	24	26
Saint-Petersburg	26	31	22
Perm Krai	27	7	8
Arkhangelsk Oblast	28	1	33
Krasnodar Krai	29	37	20
Moscow	30	29	15
Tver Oblast	31	30	16
Tomsk Oblast	32	6	37
Rostov Oblast	33	34	35
Stavropol Krai	34	33	27
Orenburg Oblast	35	26	36
Sverdlovsk Oblast	36	18	12
Vladimir Oblast	37	27	11

Table 10a. Regressions at regional level with geographic variable

The table demonstrates comparison of the results from Table 10 to similar calculation with additional geographic variable. Dependent variable is RCPIreg. Columns 1 and 2 show the calculations for regression with 5 initial independent variables from Table 10 using ordinary standard errors and heterogeneity robust standard errors methods respectively. Similarly, Columns 3 and 4 represent results for the same 5 independent variables plus additional "region size of the territory" variable with ordinary (Column 3) and robust errors (Column 4). In the table each cell displays the β-coefficient and corresponding t-statistics within parentheses. *, ** and *** indicate statistical significance at 90% and 95% level respectively.

Indep. Variables	**1**	**2**	**3**	**4**
Intercept	3.648*	3.648*	3.847*	3.847*
	(1.816)	(1.907)	(1,811)	(1.811)
Log of Salary_reg	-0.344*	-0.344*	-0.359*	-0.359*
	(-1.780)	(-1.886)	(-1,786)	(-1.829)
Officials_reg	-0.252**	-0.252**	-0.267**	-0.267**
	(-2.267)	(-2.333)	(-2,192)	(-2.070)
StateEmploy_reg	0.020**	0.020**	0.020**	0.020**
	(2.102)	(2.181)	(2,024)	(2.153)
Extractive	0.004	0.004	0.003	0.004
	(0.974)	(1.016)	(0,918)	(0.968)
Students	0.000	0.000	0.000	0.000
	(0.486)	(0.432)	(0,462)	(0.406)
Region Size			0.000	0.000
			(0,331)	(0.272)
Robust std.errors	No	Yes	No	Yes
N	39	39	39	39
Adj R^2	0.231	0.231	0.210	0.210

Table 10b. Regressions at regional level with and without Moscow

The table demonstrates comparison of the results from Table 10 to similar calculation without outlying region – Moscow city. Dependent variable is RCPIreg. Columns 1 and 2 show the calculations for 39 regions from Table 10 using ordinary standard errors and heterogeneity robust standard errors methods respectively. Similarly, Columns 3 and 4 represent results for 38 regions with ordinary (Column 3) and robust errors (Column 4). In the table each cell displays the β-coefficient and corresponding t-statistics within parentheses. *, ** and *** indicate statistical significance at 90% and 95% level respectively.

Indep. Variables	**1**	**2**	**3**	**4**
Intercept	3.648*	3.648*	4,643*	4.643**
	(1.816)	(1.907)	(1.884)	(2.145)
Log of Salary_reg	-0.344*	-0.344*	-0,442*	-0.442**
	(-1.780)	(-1.886)	(-1.851)	(-2.147)
Officials_reg	-0.252**	-0.252**	-0,224*	-0.224**
	(-2.267)	(-2.333)	(-1.886)	(-1.937)
StateEmploy_reg	0.020**	0.020**	0,019*	0.019*
	(2.102)	(2.181)	(1.884)	(1.912)
Extractive	0.004	0.004	0,004	0.004
	(0.974)	(1.016)	(1.060)	(1.144)
Students	0.000	0.000	0,000	0.000
	(0.486)	(0.432)	(0.326)	(0.269)
Robust std.errors	No	Yes	No	Yes
N	39	39	38	38
Adj R^2	0.231	0.231	0.225	0.225

Table 11a. Regression with standard errors clustered by regions

This table presents the results of company-level regressions with control variables. Dependent variable is RCPIfirm. All columns contain the same set of variables and controls. Only the calculation methods for standard errors are different. Column 1 presents results with ordinary standard errors, Column 2 – with heterogeneity robust standard errors, and Column 3 – with standard errors clustered by regions. In the table each cell displays the β-coefficient and corresponding t-statistics within parentheses. *, ** and *** indicate statistical significance at 90%, 95% and 99% level respectively.

Indep. Variables	**1**	**2**	**3**
Std. errors	***Ordinary***	***Robust***	***Clustered***
Intercept	3.772**	3.772**	3.772**
	(2.497)	(2.490)	(2.229)
Log of Salary_reg	-0.317**	-0.317**	-0.317**
	(-2.329)	(-2.327)	(-2.146)
Officials_reg	-0.219***	-0.219**	-0.219***
	(-2.678)	(-2.563)	(-2.728)
StateEmploy_reg	0.017**	0.017*	0.016**
	(2.101)	(1.895)	(2.397)
Extractive	0.000	0.000	0.000
	(0.099)	(0.095)	(0.088)
Students	-0.001	-0.001	-0.001
	(-0.523)	(-0.490)	(-0.490)
Controls	Yes	Yes	Yes
N	1051	1051	1051
Adj R^2	0.020	0.020	0.020