ISSN 0798 1015

REVISTA ESPACIOS

HOME Revista ESPACIOS ÍNDICES A LOS AUTORES

Vol. 39 (Number 14) Year 2018 • Page 32

Estimation of the impact of the driving forces of the informal employment on its size in the Russian regions

Estimación del impacto de fuerzas motrices del empleo informal en las Regiones Rusas

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Received: 10/01/2018 • Approved: 12/02/2018

Content

ABSTRACT:

The paper deals with the phenomenon of the non-observed economy (NOE) and the informal sector as one of its parts. Different foreign researches of the size and driving forces of the non-observed economy show that the driving forces of informality vary essentially in different countries: some of them dominate in highly developed countries, others – in developing and poor ones, but most of them coincide (in one or another interpretation) with those, given by Elgin and Schneider (2013). Using the main driving forces from Elgin and Schneider (2013) and the official and easily accessible statistical data the regions of Russia in 2005-2015 we estimated the impact of the driving forces on the level of the informal employment given officially by the Russian State Statistic Service. We used the Gretl econometric package. We constructed the Models for three groups of Russian regions: with the highest level of the informal sector, with the lowest and the average levels. Our analysis showed that the impact of driving forces is different in different groups but each group illustrated an increasing trend of the informal sector size over the period of analysis; the impact of GDP isn't significant, but has a positive sign,
Keywords: Non-observed economy (NOE), informal sector, MIMIC model, DGEmodel, driving forces of informality

RESUMEN:

El documento trata el fenómeno de la economía no observada (NOE) y el sector informal como una de sus partes. Diferentes investigaciones extranjeras sobre el tamaño y las fuerzas impulsoras de la economía no observada muestran que las fuerzas motrices de la informalidad varían esencialmente en diferentes países: algunos dominan en países altamente desarrollados, otros en países en desarrollo y pobres, pero la mayoría coincide. (en una u otra interpretación) con aquellos, dados por Elgin y Schneider (2013). Utilizando las principales fuerzas motrices de Elgin y Schneider (2013) y los datos estadísticos oficiales y de fácil acceso de las regiones de Rusia en 2005-2015 estimamos el impacto de las fuerzas impulsoras en el nivel del empleo informal otorgado oficialmente por la Estadística Estatal Rusa Servicio. Usamos el paquete econométrico de Gretl. Construimos los Modelos para tres grupos de regiones rusas: con el nivel más alto del sector informal, con los niveles más bajos y promedio. Nuestro análisis mostró que el impacto de las fuerzas motrices es diferente en los diferentes grupos, pero cada grupo ilustró una tendencia creciente del tamaño del sector informal durante el período de análisis; el impacto del PIB no es significativo, pero tiene un signo positivo,
Palabras clave: economía no observada (NOE), sector informal, modelo MIMIC, modelo DGE, fuerzas impulsoras de la informalidad

1. Introduction

In our paper, we are examining the informal sector in the Russians regions and our aims is to make the estimation of the factors (driving forces) of the informal employment.

It is a well-known fact that throughout a history along with the existence of a state with its laws, fiscal policy, its own lifestyle imposing certain obligations and restrictions on their citizens, there was always a shadow economy"… a set of economic activities that takes place outside the framework of bureaucratic public and private sector establishments" (Elgin and Schneider, 2013, p. 30).

The term shadow economyis no longer used in statistics owing to its criminal implications. So instead we use the term non-observed economy (NOE). There is NOE both in rich developed countries and in poor backward ones. This phenomenon doesn't depend on creeds, democracy or dictatorship, remoteness from the world financial centers or closeness to the ocean. This phenomenon has penetrated to all economic spheres and realized in different kinds and forms.

NOE includes various economic activities which are difficult to measure, because they are shadow, illegal, informal or they are households producing goods or there is a deficiency in the basic data collection system (OECD, 2002).

One of the main parts of NOE is an informal sector and we referthe term informal economy to all economic activities done by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements. Their activities are not included in the law, which means that they are operating outside the formal reach of the law; or they are not covered in practice, which means that – although they are operating within the formal reach of the law, the law is not applied or not enforced; or it is inappropriate, burdensome, or imposes excessive costs (ILO, 2002).

SNA 2008 states that"There is a large overlap between both concerns. However, while the NOE and the informal sector overlap, neither is a complete subset of the other" (System of National…, 2009). Thereafter, NOE includes not only the units of the informal sector but also some part of the activity of the enterprises of the formal economy. According to SNA 2008 National Statistic Services of most countries adjust the gross value added to the estimation of the NOE, which includes part of the informal sector.

However, independent experts estimate NOE size higher than statistical services. They make their calculations using indirect methods based on macroeconomic indicators. They often give rather high estimations, i.e. they characterize the top level of NOE, that is the reason for possible criticism towards incomplete estimation of this phenomena by the state statistical services. But still the indirect methods are actively used by many specialists.

The important merit of models developed during last decades in the group of indirect methods (MIMIC and DGE) is the fact that they can estimate NOE size as a % of GDP for the long period of time and for many countries.

MIMIC model (Multiple Indicators Multiple Causes model) or structural equation originates from the works of psychometrical analysis and then appears in economics through the models of latent variables Zellner (Zellner, 1970, p. 187) and Golberger (Goldberger, 1972, p. 13).

When MIMIC was used for the first time to measure the size of NOE Frey and Weck-Hannenmann (1984) researched set data collectedfrom 17 OECD countries (Frey and Weck-Hannemann, 1984, p. 44).

This idea was continued by Aigner, Schneider and Ghosh (1988) who made some corrections to the model and applied this method in the USA (Aigner et al., 1988, p. 14). Giles (1999) improved MIMIC approach a little and measured NOE in New Zealand (Giles, 1999, p. 18). Giles and Tedds (2002) described this approach in detail and applied it in Canada (Giles and Tedds, 2002, p. 112-115).

The critics of this method (Breusch (2005) point out that the estimation obtained using this model is a digital accident having little to do with the data indicators. So, he made a conclusion that this method lacks objective conceptions about variables used in the model (Breusch, 2005, p. 367-391).

Busato and Chiarini (2004), Elgin and Oztunali (2012) offered a new model to estimate the size of the NOE which is called a two-sector dynamic general equilibrium model (DGE) (Busato and Chiarini, 2004, p. 831-861). It is based on microeconomics and doesn't use econometric specifications and assumption as a MIMIC model does.

Buehn and Schneider (2012) calculated the size of the NOE using MIMIC model for 162 countries for the period of 9 years, from 1999 to 2007 (Buehn and Schneider, 2012, p. 139-171). Elgin and Oztunali's model (DGE) was used for constructing an annual unbalanced panel dataset of NOE size (as a % of GDP) for 161 countries in an annual basis for the 61 years between 1950 and 2010 (Elgin and Oztunali, 2012).

Elgin and Schneider compared panel dataset for 38 OCED countries calculated by Elgin and Oztunali (2012) and Buehn and Schneider (2012) using both the DGE and the MIMIC approaches. Besides the authors analyzed and compared relative impact of casual variables on the size and development of the NOE economies using two datasets.

Their analysis showed that there were similar levels of the NOE in different countries: world average level of the NOE was 20,6% according to the DGE model and 20,2% according to the MIMIC model. Both approaches

illustrate a declining trend of NOE size for the period of analysis. This fact confirms the viability of MIMIC model.

But there are some differences with respect to the impact of casual variables of NOE. Particularly, the estimates obtained by using the MIMIC model showed that all seven driving forces of NOE examined for the period from 1999 to 2010have similar effect on the size of NOE (from 13,8% personal income tax to 14,6% unemployment and self-employment).

According to the estimates constructed with the help of the DGE model GDP growth per capita had the largest effect (24,8%), followed by indirect taxes (18,5%), unemployment (18,2%), tax morale (17,1%), personal income tax (11,2%), self-employment (5,8%) and business freedom index (4,3%) (Elgin and Schneider, 2013, p. 30).

Such a big difference in the estimation of variables indicates that policy recommendations in both approaches are also different.But they came to conclusion that the estimation of driving forces has effect on the non-observed economy and characterizes a certain aspect of the development of the economy andmarkets. These factors are called the determinants of the NOE. They are very valuable for the characteristics of the informal economy.

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2. Definitions

It is interesting to note that the term "informal economy" was introduced by the British anthropologist K. Hart, who examined labor markets in African cities (Hart, 1973, p. 61-89). Then this term came into life and began actively used by International Label Organization (ILO) (International Labour Office, 1972).

If we refer to the Resolution of the 15th Conference of specialist in labor statistics we will find such concepts as an informal sector, informal employment and employment in the informal sector. Determining the borders of the informal sector the experts proceed from the features of operating production units in the economy. So, the informal sector is the number of uncorporated household enterprises, operating in production in the borders of production sphere (ILO, 1983). This approach is famous as a production approach.

Difficulties in using this approach resulted in introducing a new wider concept of informal employment according to which people engaged in formal or informal employment are characterized by the nature of labor relations (ILO, 2003). This approach is called a legalistic one.

It is the distinction in these approaches that determines the difference between explanation of the terms "informal employment" and "employment in the informal sector". The first one is always wider than the latter. And the latter is included in the additions to the national accounts in the frames of the non-observed economy.

For the comparison of the informal employment in different countries the ILO database is the largest. It contains the estimates of informal employment in 62 countries with the average and low GDP levels per capita (ILO, 2015). Besides this base has data about self-employment. In the last publications, a new methodology based on the data of the national household's surveys is used.

In 2013 ILO prepared a document "The Informal Economy and Decent Work: A Policy Resource Guide Supporting Transitions to Formality" where the drivers of informality a stated: poverty, poor absorption capacity of the industrial sector, the drive for flexibility, changing production structures, economic restructuring, the labour regulation debate, economic crises (ILO, 2013).

Many ILO documents and articles of different authors point out that the driving forces of informality differ essentially in different countries: some factors dominate in highly developed countries, others – in developing countries and the thirds – in poor ones. But most of them are like those given by Elgin and Schneider (2013).

Since employment in the informal sector is included in the estimation of the NOE we suppose that the estimation of the effect of those factors on the informal employment will help us to estimate the driving forces of the NOE in Russia as well.

Correction of gross domestic products for economic transactions not observed by direct statistical methods was 16,2% of gross domestic products in Russia in 2015, and 10,5% of them was the informal sector. Foreign researchers calculated the higher level of NOE. For example, Global Financial Integrity – 46% of GDP in 2011 (Russia: Illicit…, 2013). Schneider, Bueh and Montenegro (2010) – 40,6% of GDP in 2007 (Schneider et al., 2010, p. 24/4). Russia is a federal state consisting of 85 regions. These regions differ considerably in their level of social – economic development. For example, in 2015 the difference in Gross Regional Product (GRP) per capita was 15,7 times, the difference in average per capita personal incomes of the population was 5 times for the same period. These differences form several regional factors which determine the size of NOE on the whole and the level of the informal sector in particular and they are the result of the existence of the NOE at the same time.

You can find a lot of researches of NOE about Russia along and in comparison with other countries in domestic and foreign publications, where specialists concentrate on estimation of the informal sector in Russia. But there

are few works which consider regional differences within Russia.

The questions to be answered by the authors are: what economic factors determine the level of the employment in the informal sector and in NOE as well, and whether these factors work in the same way in all the regions of Russian Federation.

The further information in this paper is organized as follows: first, the description of the data used in our research, next the characteristics of the research methods used in our work and finally – the results obtained and conclusions.

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3. Data

The data of Federal State Statistic Service of Russian Federation (FSSS) between 2009 and 2015 are used (for the period of 7 years). This period was chosen based on comparability of the methodology for collecting the required indicators.

Russia has 85 regions united in 8 districts. But complete data are available only for 77 regions, that gives 539 observations. To use an unbalanced dataset panel of NOE size as % of GDP for all regions is supposed to be incorrect due to the lack of observations.

As a depended variable, we used the index Employed in the informal sector in % to total number of employed population in Russian regions. The data were taken from the results of the Population survey on employment issues. It is a monthly selective survey of households made by RSSS in all the regions of Russia according to ILO methodology. Annual selective number includes approximately 800000 people and accounts for 0,75% of all the population at the age of economic activity (15-72 years old). A various share of selection was used in different regions, it depended on the total number of population and relative variation of the index unemployment level (Russian Federation Federal State Statistic, 2016). Although the survey of labor force was made in every region separately, official RSSS documents present only the number of people employed in the informal sector according to their type of employment in absolute persons and in % of total employed population.

During the observed period persons engaged in the informal sector are those who are engaged at least in one of the production units of the informal sector, regardless of their employment status. It isn't important whether their job is full-time or part time. As a criterion for determining the units of the informal sector, we adopted the criterion of"lack of state registration as a legal entity", i.e. we adopted a production approach.

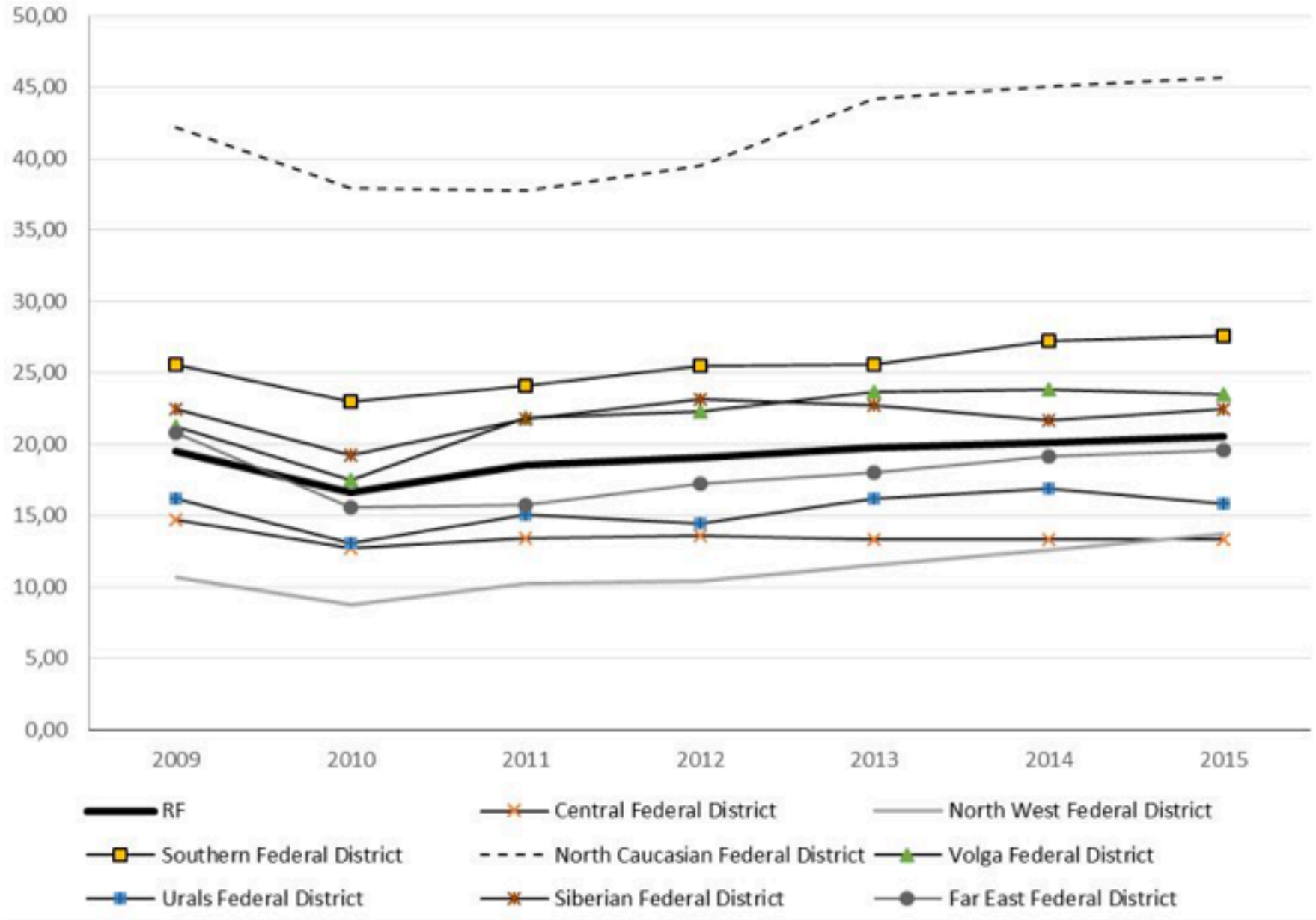
We included in the number of employed in the informal sector the following people:

1. persons engaged in business, regardless of whether they are registered as entrepreneurs;
2. person providing professional services (doctors, lawyers, etc.) regardless of whether they have a state registration;
3. members of peasant farms that are not registered as legal entities;
4. persons employed for the above categories of enterprises;
5. persons engaged in household producing goods and services for sale.

But persons employed by legal entities without an employment contract – informal workers of the enterprises of formal economy are not included in the informal sector (Russian Federation Federal State Statistic…, 2010).

All above things considered, the Russian national definition of persons engaged in the informal sector is consistent with that given in SNA 2008, and the estimation of the size of the informal sector is included in the institutional sector of household as a part of NOE. But it is important to note that the definition given by ILO is wider.

Figure 1
Dynamics of the informal sector size in federal districts
of Russia in % to total number of employed population



Source: Authors' calculations

That is why Russian data cannot be fully compared with the data about informal employment given in foreign surveys. However, these data fully comply with requirements of our study. According to RSSS data for 2015 14,8 million people were engaged in the informal sector in Russia and it accounted for 20,5% of the total number of employed people. Thus, the index of employed in the informal sector in % to the total number of employed people shows the size of the informal sector. Dynamics of the size of the informal sector in Russia and in the federal districts is shown in Figure 1.

The highest level of the informal sector is in the North-Caucasian Federal District, the lowest one is in the North-West Federal District.

The main reason for an essential decrease of the informal sector size in 2010 and its increase in 2015 was the fact that during those years FSSS made continuous survey of small and medium-sized enterprises activity. During such surveys, some enterprises stopped administratively registered activity or misreported. So, the number of individual entrepreneurs in Russia decreased to 1,9 million people by the end of 2010 as compared to 2,7 million people at the beginning of the year.

Table 1
The descriptive statistics of dependent variables
(the number of observations in the line is 77)

Dependent variables in the year	Average	Mean	Min	Max	Std. Dev.	Var
2009	22,39	22,22	2,56	46,88	8,60	0,38
2010	19,00	17,74	2,23	48,38	8,26	0,44
2011	21,27	19,74	2,16	51,97	8,60	0,40
2012	22,29	22,35	2,19	51,01	8,63	0,39
2013	23,06	22,60	2,77	56,14	9,18	0,40

2014	23,23	22,92	2,94	57,01	8,97	0,39
2015	23,50	22,69	3,89	56,47	9,14	0,39

Source: Here and further are authors' calculations

There were some entrepreneurs who had employed workers. This fact resulted in decreasing the size of the informal sector.

Descriptive statistics of the dependent variable given in Table 1 allows to follow the changes of variation according to years: the largest size of inter-group variation was in 2010, that confirms the above reason named by the authors.

When choosing explanatory variables, we proceeded from the list of driving forces of NOE used by Elgin and Schneider and drivers of informal activities formulated by ILO. Preference was given to economic drivers, but not to social ones.

As for the factors characterizing the specific features of labor demand in the region we attributed the density of individual entrepreneurs in the region, GDP per capita, ratio of average per capita incomes and cost of living in the region. As for labor supply, we took labor force participation level. Tax burden, a share of corporate income tax and a share of personal income tax separately in the GDP of the region were considered as the institutional factors.

We share the opinion of those authors who believe that the more jobs are in the formal sector the less ones are in the informal sector. Unfortunately, RSSS doesn't provide the continuous statistics about jobs in the formal and informal sectors in Russia.

That is why to characterize the job market we modeled the indicator that shows the ratio of the informal and formal sectors. For the informal sector, we will use thenumber of individual entrepreneurs administratively registered in the given region and those who really work. For the formal sector, we will use the number of administratively registered and really working enterprises. The ratio of the number of individual entrepreneurs to the number of administratively registered legal entities we called the density of the informal sector. The more legal entities the region has the more jobs are created for people and the less is the informal sector (Simutina, 2015, p. 925-929). In other words, the more the density of the informal sector the more its size. According to RSSS data about the number of individual entrepreneurs and the number of legal entities (Russian Federation Federal State…).

When comparing informal sectors in different countries the researches note a strong negative relationship between the size of the informal sector and GDP per capita. The GRP is intended to characterize the total amount of wealth created in the region, the volume of regional production. It is not correct to use GDP per capita as a direct measurement of the population's standard of living, but it can be used as an indirect characteristic. The data about GDP per capita are taken from the RSSS. The data about every Russian region are calculated in prices for 2008 with the help of GRP deflator.

A low personal income level of the population is also one of the driving forces to become informal. However Russian regions differ considerably not only in terms of income level but also in terms of price level and social welfare.

Cost of living is calculated in every region. It is the cost of minimum set of goods and services which are necessary for the life of a man, price level including. So, we use the ratio of average per capita incomes and the cost of living established in the region as a depended variable. All the data are taken from RSSS. In our study, we distance ourselves from the study of social and demographic structure of the informal sector. That is why speaking about labor supply we don't use the data, characterizing social-demographic structure of the region population.

We use the index "labor force participation level" which is calculated by RSSS for every region and is determined as the ratio of the number of labor force to the working-age population number (15-72 years old in Russia) (Russian Federation Federal State, p. 2016). The working force includes employed and unemployed people number (ILO, 2013).

To characterize the institutional aspects, we used the following indicators: tax burden, a share of corporate income tax on legal entities and a share of income tax on individuals in the GRP of the region.

Tax impact on the NOE and on the informal sector is twofold and is well explained by Laffer Curve. Entrepreneurs are always interested in increasing their business but up to a certain taxation level and despite the tax growth the informal sector may not being reduced. But essential loss of profit forces entrepreneurs to the decision to become informal (Stock and Watson, 2010, p. 34; Cameron and Trivedi, 2005, p. 82; Verbeek, 2003, p. 16).

Different kinds of taxes – direct and indirect taxes, taxes on legal entities and on individuals influence their

decision to work in shadow in different ways. According to Elgin and Schneider (2013) study it is indirect taxes that have the greatest effect on the NOE because they change the price level essentially and reduce the purchasing power of population. Indirect taxes in Russia are mostly VAT and excises. As our analysis showed tax revenues to the regional budget arenot the same because according to Russian laws the enterprises can reimburse VAT from the budget after export operations and after purchasing fixed assets. It is the acquisition of expensive fixed assets by several large enterprises that can lead to a negative value of indirect tax revenues in this region, therefore we didn`t include indirect taxes revenues in our research.

As for the corporate income tax revenues impact on the NOE we can consider it from two points of view. On the one hand, the more tax revenues the larger is the formal sector. On the other hand, too high corporate income taxes stimulate the transition of business to the informal economy. Corporate income tax in Russia is 20%.

Taxes and payments related to wages are one of the greatest motives for business to become informal. In Russia taxes on wages include personal income tax, payments to social funds. Russia has a "flat" scale of taxes, per income tax is 13% for everyone. Up to 2010 Russia had a unified social tax. Later it was changed for the insurance payments to social funds, rates being increased and now they are 30% on average. However, the social payment receipts are not given in the regional statistics after the unified social tax cancellation (Russian Federation Federal State…, 2013; Russian Federation Federal State…, 2016; Federal Tax Service of Russia…).

Table 2
The descriptive statistics of independent variables
(number of observations in a row 77x7, total 539)

Indicators	Average	Mean	Min	Max	Std. Dev.
Densityofindividual entrepreneurs per capita (ie_c)	77,30	73,11	4,93	351,73	35,89
GRP per capita (GDP_pc)	188010,00	159106,00	41315,00	848346,00	121200,00
Ratio ofaverage per capita incomesand costliving (pci_cl)	334,81	319,90	182,90	761,20	73,47
Labor force participation level (lpl)	67,97	67,90	56,54	83,87	3,74
Taxburden (tb)	18,33	14,49	3,62	141,99	16,33
Corporate incomes tax (ctb)	3,71	2,79	0,36	50,70	4,24
Personalincomestax (ptb)	5,43	4,64	1,26	32,44	3,93

The amount of penalties for the violation of the tax legislation characterizes business readiness to pay taxes. On the other hand, penalties reflect both the degree of the tax evasion and the results of the work of the fiscal bodies. The amount of penalties is insignificant therefore we didn`t consider them. All in all, we used the following indicators:

-tax burden as a receipt of all the above taxes in %;

-corporate income tax as a ratio of corporate income tax receipts to GRP;

-personal income tax as a ratio of personal income tax receipts to GRP in %; All the explanatory variables except GRP are expressed in %.

The largest variation is in indicators characterizing institutional aspects, i.e. In all the taxes. The smallest variation is labor force participation level.

4. Estimation methodology

The base equation to be estimated is

$$ies_{it} = b_0 + b_1\, ie\_c_{it} + b_2 \ln GRPpc_{it} + b_3\, pci\_cl_{it} + b_4\, lpl_{it} + b_5\, tb_{it} + b_6\, ctb_{it} + b_7 ptb_{it}, \quad (1)$$

where *iesit* – people engaged in the informal sector in % to the total number of engaged population. The other variables are in the table.

Every region included in the model is unique, it has its own specific and unobservable peculiarities, that is why we are using a fixed effect model (Geneva: International…, 2013)(Stock, Cameron, Verbeek):

$$Y_{it} = a_i + X_{it}\beta + \varepsilon_{it}\,, \quad (2)$$

whereai – unobservable specific effect of the object *i* which is not dependent on time *t; Xit* – vector-line of regressors; εit – normally distributed random reminder.

Fixed effect model reduces the effect of unobserved variables and endogeneity. F-test and Housman test confirm the rightfulness of using the given model over pooled regression and random effect model.

To exclude the impact of intergroup changes in time we construct Model 2 taking into consideration the time trend.

In Model 3 we introduce fictitious variables taking into consideration every year of our study to see time dynamics.

As it is shown in Fig.2 and in Table 1 the variation of the informal sector is rather large. On the other hand, a high level of informal employment may be due to forced entrepreneurship and the reasons of the informal employment may be different for rich and poor districts. To estimate the factors in the regions with high and low size of the informal sector we regulated our selection by this indicator for 2015 and divided it into quadrants. For the upper and lower quadrants models, analogous to those described were estimated. The robust to heteroscedasticity errors were used.

5. Estimation results

As it was mentioned above three models are estimated. They differ from each other by the time factor. Estimation results for all 77 regions are presented in Table 3. Estimation results of the selection of individual quadrants are presented in Tables 4-6.

In the specification that doesn`t take into consideration the time effects (Model 1) the coefficients of the variables Ratio of average income per capita and cost living, Tax burden, Personal incomeⅡ turned out to be insignificant. Involving the time factor into the model has changed the situation, since it explained the great part of the variation between the regions. Density of individual entrepreneurs became significant on the 1% level, corporate tax and personal income tax became significant on the 5% level.

Although GRP per capita in Model 2 became insignificant, the coefficient remained positive, i.e. if GRP per capita grows, the informal sector increases, though this increase is insignificant. The result obtained agrees with the conclusions of the other authors who also pointed out that economic growth in theregion didn`t lead to a decrease, as one could expect but to an increase of the share of the informal sector.The result that the density of the individual entrepreneurs has a positive influence on the informal sector was expected. Indeed, the more individual entrepreneurs and the less legal entities work in the region the more the informal sector is developing. The impact of taxes on the informality in the regions is ambiguous and will be described below.

Table 3

The results of estimating of the model of the dependence of the informal sector size in all the RF regions included in this research (77 regions, for the period of 7 years, 539 observations total)

Indicators	Model 1	Model 2	Model 3
	−134,344***	−16,516	−9,976

Const	(30,43)	(33,836)	(34,902)
Density of individual entrepreneurs per capita	0,019 **	0,028***	0,009
(ie_c)	(0,008)	(0,010)	(0,009)
	11,352 ***	1,717	1,645
GRP percapita (GDPpc)	(2,607)	(2,796)	(2,822)
Ratio of average per capita incomes and cost	−0,012	−0,011	−0,014
living (pci_cl)	(0,009)	(0,009)	(0,010)
	0,309 *	0,222	0,233
Labor force participation level (lpl)	(0,157)	(0,156)	(0,149)
	0,039	0,019	0,0004
Taxburden (tb)	(0,030)	(0,026)	(0,027)
	−0,242***	−0,183**	−0,092*
Corporateincomestax (ctb)	(0,091)	(0,076)	(0,048)
	0,321	0,483**	0,139
Personalincomestax (ptb)	(0,208)	(0,208)	(0,230)
		0,530***	
Time		(0,118)	
			−3,109***
t2			(0,519)
			−0,988
t3			(0,608)
			0,141
t4			(0,732)
			0,904
t5			(0,778)
			0,906
t6			(0,773)
			1,023

t7			(0,812)
LSDV R-squared	0,915	0,920	0,931
F-test	8,131	8,587	3,489
p-value	2,33e-007	2,94e-008	0,0027

Note: robust standard errors are indicated in brackets; *** p<0,01; ** p<0,05; *p<0,1

In Model 3, as it was expected, the second period in Fig.1 turned out to be significant. It was in 2010 when a continuous statistical survey of small business took place. Next year the growth didn`t reach the level of 2009. And then we see the annual growth of the informal sector, although the coefficients are insignificant.

Table 4
The results of estimating of the model of the dependence of the informal sector size in the regions with the highest level of the informal sector (the number of regions – 19, time period – 7 years, 133 observations total).

Indicators	Model 4	Model 5	Model 6
	−163,101**	−34,038	−43,814
Const	(60,268)	(55,444)	(57,553)
Density of individual entrepreneurs per capita	0,015**	0,028**	0,020*
(ie_c)	(0,007)	(0,010)	(0,010)
	14,172**	3,366	4,241
GRP percapita (GDPpc)	(5,628)	(5,074)	(5,162)
Ratio of average per capita incomes and cost	−0,018***	−0,022***	−0,016
living (pci_cl)	(0,006)	(0,007)	(0,010)
	0,457**	0,335*	0,360**
Labor force participation level (lpl)	(0,179)	(0,174)	(0,162)
	0,631***	0,606***	0,536***
Taxburden (tb)	(0,146)	(0,142)	(0,149)
	−1,601***	−1,358***	−1,080**
Corporateincomestax (ctb)	(0,422)	(0,294)	(0,424)
	−0,078	−0,004	−0,050
Personalincomestax (ptb)	(0,362)	(0,349)	(0,434)
		0,697***	
Time		(0,209)	

			−2,150
t2			(1,269)
			−0,383
t3			(1,336)
			0,236
t4			(1,504)
			1,574
t5			(1,562)
			1,779
t6			(1,566)
			2,754
t7			(1,626)
LSDV R-squared	0,904	0,915	0,923
F-test	19,70	44,894	14,169
p-value	3,146e-007	2,478e-010	3,725e-006

Note: Robust standard errors are indicated in brackets; *** p<0,01; ** p<0,05; *p<0,1

The selection of the regions with the highest level of the informal sector had 19 regions, with the lowest– 20 ones. The rest 38 regions comprised a group of regions with an average size of the informal sector, where the minimum value of the share of the engaged population was 18,2 % and the maximum – 27,6 %.

Table 5

The results of estimating of the model of the dependence of the informal sector size in the regions with the lowest level of the informal sector (the number of regions – 20, time period – 7 years, 140 observations total).

Indicators	Model 7	Model 8	Model 9
Const	−99,123	40,283	56,665
	(60,966)	(50,580)	(52,464)
Density of individual entrepreneurs per capita (ie_c)	0,051***	0,042**	0,011
	(0,016)	(0,016)	(0,017)
GRP percapita (GDPpc)	11,232*	0,841	0,257
	(6,445)	(4,828)	(5,092)
Ratio of average per capita incomes and cost living (pci_cl)	−0,012	−0,006	−0,009
	(0,009)	(0,008)	(0,008)

	−0,392	−0,596*	−0,631**
Labor force participation level (lpl)	(0,311)	(0,305)	(0,290)
	−0,004	−0,091	−0,038
Taxburden (tb)	(0,210)	(0,178)	(0,164)
	−0,095	−0,023	−0,011
Corporateincomestax (ctb)	(0,290)	(0,222)	(0,188)
	0,280)	0,684*	0,204
Personalincomestax (ptb)	(0,359)	(0,380)	(0,322)
		0,548***	
Time		(0,161)	
			−2,230***
t2			(0,734)
			−0,272
t3			(0,643)
			0,591
t4			(0,605)
			1,255*
t5			(0,642)
			1,699**
t6			(0,626)
			1,471
t7			(0,943)
LSDV R-squared	0,860	0,880	0,899
F-test	3,058	4,011	2,498
p-value	0,025	0,006	0,053

Note: Robust standard errors are indicated in brackets; *** p<0,01; ** p<0,05; *p<0,1

In the base Model 4 for the regions with a high level of informality all explanatory variables turned out to be significant, except Personal income tax.

Involving the time factor into Model 5 made again the GRP indicator to be insignificant, that is the basic part of the GRP variation is due to differences of tendencies between regions, but within every region the changes are insignificant.

Table 6

The results of estimating of the model of the dependence of the informal sector size in the regions with the average size of the informal sector (the number of regions – 38, time period – 7 years, 266 observations total)

Indicators	Model 10	Model 11	Model 12
Const	−135,955***	−2,808	7,040
	(49,435)	58,952	(66,980)
Density of individual entrepreneurs per capita (ie_c)	0,051**	0,076***	0,023
	(0,022)	(0,024)	(0,038)
GRP percapita (GDPpc)	11,831***	0,669	0,840
	(3,721)	4,735	(5,122)
Ratio of average per capita incomes and cost living (pci_cl)	−0,014	−0,015	−0,022
	(0,018)	(0,017)	(0,020)
Labor force participation level (lpl)	0,211	0,158	0,154
	(0,220)	(0,205)	(0,232)
Taxburden (tb)	0,051	0,029	−0,014
	(0,053)	(0,050)	(0,044)
Corporateincomestax (ctb)	−0,171	−0,092	−0,053
	(0,130)	(0,117)	(0,097)
Personalincomestax (ptb)	0,466	0,511	0,121
	(0,414)	(0,402)	(0,390)
Time		0,609**	
		(0,229)	
t2			−3,618***
			(1,006)
t3			−1,197
			(1,083)
t4			0,463
			(1,418)
			1,212

t5			(1,549)
t6			0,781 (1,540)
t7			0,897 (1,659)
LSDV R-squared	0,583	0,605	0,663
F-test	7,465	13,541	4,469
p-value	1,340e-005	6,374e-009	0,001

Note: Robust standard errors are indicated in brackets; *** p<0,01; ** p<0,05; *p<0,1

As it was expected, the indicator Ratio of personal income tax and cost of living‖ turned out to be significant for this group of regions.

For other groups of the regions there are some other factors.

In Model 8 as well as in Model 11 The density of the individual entrepreneurs and The time factor‖ turned out to be significant. The latter gives the most essential change in the group of the regions with a low level of the informal sector. This is the evidence that the informal sector increase is more significant in the regions with a small informal sector than in other groups.

It is interesting to note that in Models 7,8,9 the sign of the variable Labor participation level has changed to a negative one, i.e. the more labor force in the region the smaller is the informal sector.

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6. Conclusion

In this paper, we estimated the dependence of the size of the informal sector on various economic factors in the Russian regions. Almost all models showed that in regions where new enterprises are set up and new jobs are created the size of the informal sector is reducing. The density of the individual entrepreneurs has a positive and important impact on the informal employment although correlation between these indicators is 0.49. In other words, the informal sector increases in response to a reduction of the formal sector.

In recent years the size of the informal sector is increasing almost in all the regions that relates to the crisis phenomena in the economy.

For the regions with a large informal sector the ratio of average personal income per capita and cost living is significant: the more this indicator the less is the informal sector.

All the taxes considered we found out that a corporate tax which has a negative sign in the models has the greatest impact on the size of the informal sector: the more are corporate income taxes the less is the informal sector. What type of conclusion can we draw from this result?

First, the corporate tax rate 20% is rather low and lies on the ascending part of the LafferCurve; second, the development of the formal sector causes the reduction of the informal one.

As for a personal income tax, we couldn`t find an unambiguous answer about the impact of this factor on the informal sector. The explanation is that because of the lack of data not all the taxes on labor levied in Russia were considered in the model. Therefore, more careful study is supposed to be done to try to find the instrumental variables reflecting this problem.

We compared our results with the estimation results of the driving forces of NOE made by Elgin and Schneider and found out that in Russian regions these factors work in the other way: growth in GRP per capita doesn`t cause a decline in the informal sector; the greatest impact on the informal sector has self-employment in response to a lack of jobs in the formal sector.

This study is important for understanding general trends and differences in the factors contributing to the reduction of the informal sector and for taking some adequate measures both on the federal and on the regional levels.

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Revista ESPACIOS. ISSN 0798 1015
Vol. 39 (Number 14) Year 2018

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