

Quality of the Administration of Value-Added Tax in OECD countries and Russia

By

Alexander Knobel

Head of International Trade Department, Gaidar Institute for Economic Policy
(Moscow, Russia)

Sergey Sinelnikov-Muryliov

Rector, Russian Foreign Trade Academy under the RF Ministry of Economic
Development (Moscow, Russia)

Academic Director, Gaidar Institute for Economic Policy (Moscow, Russia)

Ilya Sokolov

Head of Budget Policy Department, Gaidar Institute for Economic Policy
(Moscow, Russia)

This paper presents an analysis of the quality of VAT administration in OECD countries and Russia. Econometric analysis of the factors which influence the quality of VAT administration, demonstrate a positive effect of the level of institutional development on the efficiency of tax collection. However this tendency takes place only when there are no additional tax exemptions being implemented alongside the economic development where exemptions, in addition to causing a direct loss, complicate the taxation system and lower the quality of its administration.

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1. Introduction

Reform of value-added tax (VAT) has been continuously discussed in Russia in recent years. Amongst the proposed options for VAT reform the most frequently discussed issues are: significant reduction of the tax rate, replacing VAT with a sales tax and the transition to VAT collection on the basis of a balance method. Arguments supporting the need for reform of the VAT system commonly include the known difficulties relating to VAT administration, which reduce its efficiency not only in Russia but also in other countries. These are: problems with VAT refunds and the justifications for tax deductions, use of various illegal tax minimization schemes, illegal tax refunds from the budget in the case of ‘false exports’, high administration costs and the possibilities of evading import VAT.

Where obvious problems exist with VAT administration we should not forget that this tax raises a substantial part of the budget revenues (5.3% of Russian GDP in 2009). VAT, being less susceptible to fluctuations in the world prices for oil and energy resources than income tax, mineral extraction tax and the unified social tax which existed until 2010¹, is able to ensure the stability of the entire system of state finances in the long run. This is why any steps for tax reform should be thoroughly analyzed from the point of view of the potential benefits and costs.

2. VAT in the budget systems of OECD countries and Russia

For the last 50 years the scope of VAT application has grown considerably as part of the system of consumption taxes and has almost entirely replaced sales tax. Whilst in 1965 VAT was introduced in only three OECD (Organization for Economic Co-operation and Development) countries, today it is applied by 29 out of the 30 OECD countries (with the exception of the USA). Along with the increase in the share of budget revenues of OECD countries raised by VAT², almost all these countries have faced complications in the VAT administration system, mainly through the use of tax preferences which, in turn, has led to a loss of part of the tax revenues and an increase in administration costs and VAT collection risks.

¹ See (Kazakova et al., 2009).

² See the OECD website <http://stats.oecd.org/Index.aspx>.

At the moment VAT represents a major part of the tax revenues in 136 countries and accounts for about 25% of global tax levies³. There is active discussion on the influence on welfare of the transition from foreign trade taxes to VAT⁴. All other conditions being equal, economic administration costs are less for VAT (due to the wider tax base) than for other taxes. Even if increasing the tax rate does not lead to an increase of tax revenues⁵, for developing and transitional economies it is one of the most reliable ways to increase state budget revenues.

In countries with a high VAT tax burden, for example, Denmark and Sweden, where the basic rate is set at 25%, the average tax revenues for the period 2000-2007 were about 9.8% and 8.9% of GDP (respectively), i.e. each percentage point (p.p.) of the tax rate ensured 0.36-0.39% of GDP. In the leading countries of the European economy the level of the basic rate is close to that in Russia (16-20%). For example, in Germany where the rate is 16% average tax revenues were 6.5% of GDP, in Great Britain where the rate is 20% revenues were 6.8%, in France where the rate is 19.6% — 7.2% of GDP, in Austria where the rate is 20% — 8.0% of GDP. The above data show an almost equivalent value of revenues for each percentage point of the rate equal to 0.36-0.40% of GDP (as in the Scandinavian countries).

In Russia for the period of 2000-2009 the amount of tax revenues per 1 percentage point of the rate remained practically unchanged, being 0.34% of GDP. In 2000-2001 VAT budget revenues increased and reached their historical maximum of 7.17% of GDP. From 2002 there has been a tendency towards an annual decrease in VAT revenues, resulting in a reduction in VAT budget income by 2 p.p. of GDP (or by almost 30%) in 2008 compared to the 2001 level (see Table 1).

Table 1. Trends of VAT revenues in the budget system of the RF in 2000-2009, % of GDP

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
VAT, total	6.25	7.17	6.96	6.66	6.30	6.18*	5.68	6.13*	5.17	5.25
Including VAT levied on goods sold in the territory of the RF	4.87	5.34	4.92	4.67	4.42	4.11*	3.47	3.49*	2.42	3.01
Including VAT levied on goods imported into the RF	1.38	1.83	2.04	1.98	1.89	2.07	2.20	2.64	2.75	2.24

* Without taking into account proceeds from the OJSC Oil Company YUKOS

Source: Rosstat (Russian Statistics Agency), calculations carried out by the authors based on the data on VAT levies provided by the Federal Treasury and the Federal Customs Service.

³ See detailed description in (Ebrill et al., 2001).

⁴ In the paper (Emran, Stiglitz, 2005) the authors came to the conclusion that benefits from a transition to VAT are quite doubtful if the share of the shadow economy is relatively high. In (Baunsgaard, Keen, 2005) it is shown that in developing countries the benefit from transition to VAT in the case of the liberalization of foreign trade is just 50 cents per dollar lost due to the reduction of customs duties and in underdeveloped countries the benefit is even more insignificant.

⁵ For example, we could compare the effects of the tax rate increase in Mexico (Pagan et al., 2001) with effects of the less successful tax rate increase in Jamaica (Edmiston, Bird, 2004).

The structure of VAT revenues in the 2000s shows a considerable reduction in the proportion of VAT for internal sales from 77.8% in 2000 to 57.3% in 2009 with a simultaneous increase in proceeds from the tax levied on imported goods. The reduction of budget revenues from the VAT may, in many respects, be explained by changes in legislation. The most important innovations in tax law relate to the second half of the 2000s and may be arbitrarily divided into two groups:

- changes affecting the level of the tax burden on an ongoing basis. The most significant changes in this group are: the reduction of the base rate of VAT from 20% to 18%, the transition to mandatory determination of the date when the obligation to pay VAT on an accrual basis arises for all taxpayers and the abolition of tax exemptions;
- changes which generally have a temporary effect on the level of tax revenues: the establishment of a common procedure for the acceptance of the VAT amounts for deduction in the case of capital investments, the transition to a quarterly period for internal VAT payments, etc.

An assessment of the effects of the most important legislative changes on VAT revenues is shown in Table 2.

Table 2. Effects of the reforms on VAT revenues in the 2000s

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
VAT revenues as % of GDP	6.25	7.17	6.96	6.66	6.30	6.18*	5.68	6.13*	5.17	5.25
Component of the reform										
1. Abolition of tax exemptions benefits in 2001		+0.33	+0.32	+0.31	+0.29	+0.28	+0.26	+0.32	+0.24	+0.24
2. Modification of the procedure for reimbursement of material expenses relating to commissioned capital construction objects and expansion of the range of products subject to VAT at 10%		-0.49	-0.09	-0.03	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
3. Reduction of the basic tax rate from 20% to 18%					-0.54	-0.64	-0.59	-0.64	-0.54	-0.55
4. Introduction of the principle of the “country of destination” for CIS countries						-0.25	-0.36	-0.31	-0.35	-0.36
5. Transfer to a mandatory determination of the date when the obligation to pay VAT on an accrual basis arises for all taxpayers							-0.90	-0.92	-0.84	-0.95
6. Establishment of a common procedure for deducting VAT on the amount of capital investments							-0.47	-0.35	-0.15	–
7. Transition to a quarterly payment period for domestic VAT									-0.69	–
Total effect of the tax reforms		-0.16	0.23	0.28	-0.26	-0.62	-2.07	-1.91	-2.34	-1.63
VAT returns which would have been obtained if the reform had not been implemented, % of GDP	6.25	7.33	6.73	6.38	6.56	6.80*	7.75	8.04*	7.51	6.88

* Without taking into account proceeds from the OJSC Oil Company YUKOS

Source: calculations carried out by the authors based on tax statistics, while explanatory notes on the projects of the federal budget and the assessment of lost revenues are according to data from the Federal Tax Service.

3. Approaches to assessing the quality of VAT administration

A basic theoretical model for the quality of VAT administration has been proposed (Cukierman et al., 1992) and further developed (Aizenman, Jinjark, 2005). These authors showed that the efficiency of the tax system depends directly on the stability of the political system and differences in the existing policy for the selection of public goods. This model predicts a high quality of tax administration in economic systems with a high level of institutional development.

The efficiency of VAT is influenced by many factors which not only vary greatly between countries but are also assessed statistically in different ways in individual countries. Therefore, the problem of obtaining comparable and reliable statistical information is one of the main reasons why there have been so few cross-country empirical studies devoted to the analysis of the quality of VAT administration.

Underlying all the empirical studies set out below is the indicator for the assessment of VAT administration quality: in some papers it is called the effective tax base, in others - the *Ci-efficiency*, or VAT efficiency. Despite discrepancies in the terminology used and minor differences in the calculations it is essentially the same indicator (hereinafter we use both of the two synonyms: effective tax base and *Ci-efficiency*, to characterize the quality of VAT administration), which can be interpreted in two ways.

1) The *Ci-efficiency* is equal to

VAT returns

VAT rate X (final consumption), shows the proportion of the base which is taxed effectively.

2) The *Ci-efficiency* shows the amount of VAT revenue as a proportion of the base which accounts for 1 percentage point on the basic tax rate.

If we use data from tax returns as a nominal tax base in calculating *Ci-efficiency*, the effective base will be different from the nominal base only because of the structure of the VAT rates and exemptions. In order to take into account the administration efficiency in the *Ci-efficiency*, including that involved in combating tax evasion, we must use an indicator representing the true tax base, i.e. the base which includes the part not declared in tax returns and therefore related to tax evasion. As such, we use the final consumption, assuming that it represents an estimate of the true value of the VAT base.

The use of *Ci-efficiency* for the comparison of the quality of VAT administration is justified only in the case of countries with equivalent tax bases and rate structures. Therefore, for cross-country analysis it is necessary to control the *Ci-efficiency* using variables that determine these characteristics. Since comparable data for the determination of tax bases may not always be available, in interpreting results, one should take into account that the *Ci-efficiency* reflects more than just the administration efficiency.

Based on a sample from 40 to 89 countries, a group of researchers from the IMF⁶ obtained the following results. Firstly, VAT *Ci*-efficiency decreases as the basic rate increases, which may be explained by an increase in the number of exemptions and preferential rates applied, a growth in the shadow economy, and other factors which complicate tax administration in the case of high rates. Secondly, the effective VAT base is higher in countries where external trade represents a greater proportion of their GDP, perhaps, due to the simplicity of collection of VAT on imports compared to other goods subject to VAT. Thirdly, an effective VAT base is positively, although weakly, bound to the length of the VAT application period in the country which, perhaps, reflects the positive impact of the experience of fiscal authorities on tax revenues.

In a paper (Edmiston, Bird, 2004), based on the results of a comparison of administration efficiency in a range of countries⁷, it was concluded that there is no direct interdependence between the effective tax base and the level of economic development. Thus, if the level of economic development itself does not explain the quality of VAT administration, the question arises as to which variables could be responsible. The paper (McCarten, 2005) shows that factors such as the openness of the economy, the literacy level of the population and the expenses relating to new business start-ups may explain about 40% of the *Ci*-efficiency dispersion. Moreover, by using a relatively small sample of transitional economies, the author showed that the level of corruption in the economy negatively affects the VAT efficiency.

An unbalanced panel of 44 countries for the period of 1970-1999 was used in (Aizenman, Jinjarak, 2005) for the identification of factors affecting the effective VAT base. It was found that VAT efficiency positively depends on the level of per capita GDP, the degree of urbanization, the openness of the economy and political stability. At the same time, there was a negative relationship between the effective VAT base and the share of the agricultural sector in the economy.

In general, it should be noted that the main result of the empirical studies analyzed is the identification of fairly large variations between countries in the efficiency of VAT collection and this is due to a relatively large number of factors explaining both the quality of administration in the different economies and determining the tax base width and the base rate.

⁶ See (Ebrill et al., 2001).

⁷ In the paper (Jenkins et al., 2003) the assessment of VAT efficiency for Singapore of over 1 was obtained. The authors explain this fact by the substantial taxes levied on tourists in this country.

4. Economic analysis of the quality of VAT administration

As an indicator of the efficiency of tax collection we also use the *Ci-efficiency*⁸, the values of which for individual countries are shown in figure 1. It is not hard to see that the distribution of countries in terms of their *Ci-efficiency* does not correspond to the distribution in terms of their level of economic development which, as was mentioned above, is explained by the existence of other factors affecting the quality of tax administration and cross-country differences in the tax bases and rates.

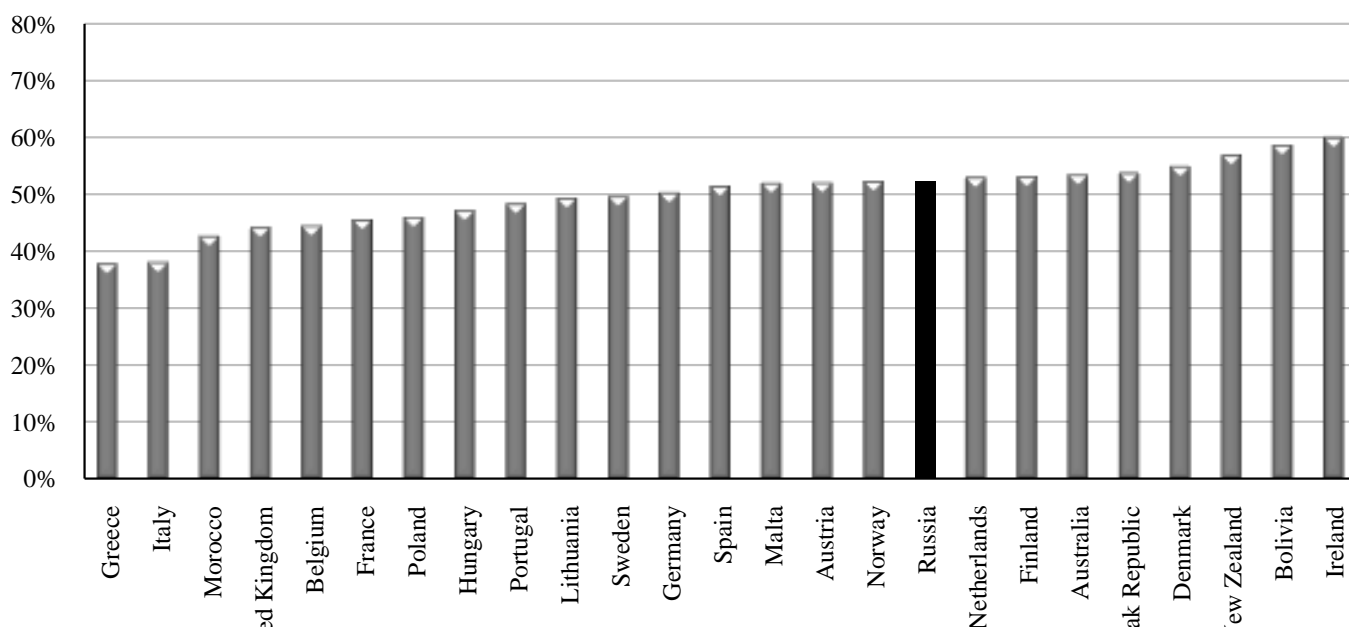


Figure 1. Ci-efficiency (average values for 2005-2006)

(Source: IMF, World Bank, authors' calculations)

The basic hypothesis of our study is that an improvement in the quality of institutions which, quite arbitrarily, may be characterized by the per capita GDP, will result in an increase of VAT collection efficiency. At the same time, it is necessary to take into account the effects of other variables which reflect differences in the structure of the tax bases and rates.

In the light of the above, the *Ci-efficiency* should be modeled with regard to national peculiarities in the tax base structure, the quantity and scope of the application of preferential rates, the size of the shadow sector, the quality of public institutions, etc. Below we set out the formulations of main the hypotheses (in bold) which are to be empirically verified, and a description of the indicators used in building the regression equations.

1) **The level of institutional development determines the quality of tax administration; the more developed the institutions, the higher the *Ci-efficiency*.** Although differences in the per capita GDP

⁸ In our study, for the calculation of *Ci-efficiency* we used data on VAT revenues obtained from the GFS database of the International Monetary Fund and final consumption values from the WDI database of the World Bank.

may not alone explain the difference in *Ci-efficiency*, this indicator (all other conditions being equal) should be statistically significant. In order to verify the hypothesis we use a variable of per capita GDP at PPP (purchasing power parity) for 2005 prices (*gdppc*).

2) **All other things being equal, the VAT rate (*rate*) should negatively affect the *Ci-efficiency*.** Firstly, in practice a high base rate of VAT usually implies a narrower tax base because many goods are subject to VAT at a reduced rate or are exempt from VAT. Secondly, higher tax rates create more incentives for tax evasion (Yitzhaki, 1974; Sandmo, 1987; Aizenman, Jinjark, 2005; McCarten, 2005), which directly affects the efficiency of administration.

3) **A positive interdependence between the import orientation of the economy and the *Ci-efficiency* may be assumed (all other conditions being equal).** Due to the simplicity of collecting VAT on imports, tax revenues should be higher for countries with a higher proportion of imports in their GDP in the final consumption. The ratio of total imports to final consumption is used as an indicator of an import-oriented economy (*imp_cons*).

4) **The higher the share of the shadow economy and corruption, the greater the level of tax evasion and the lower the quality of VAT administration.** To determine the size of the shadow economy is quite difficult. Schneider in his study (Schneider, 2005) presented data on the share of the shadow economy in the GDP for a range of countries for particular years; however, the paper is based on a limited number of observations. Below we use the index of corruption from the Heritage Foundation database. The index values vary from 0 to 100: the higher the index, the better is the performance of the anti-corruption institutions. A scatter diagram for the shadow economy index (the higher the index, the lower the share of the shadow economy in the GDP) and the corruption index is presented in figure 2. The correlation between the corruption index and Schneider's data is 82%, so the use of this index allows us to characterize both the corruption level and the size of the shadow economy.

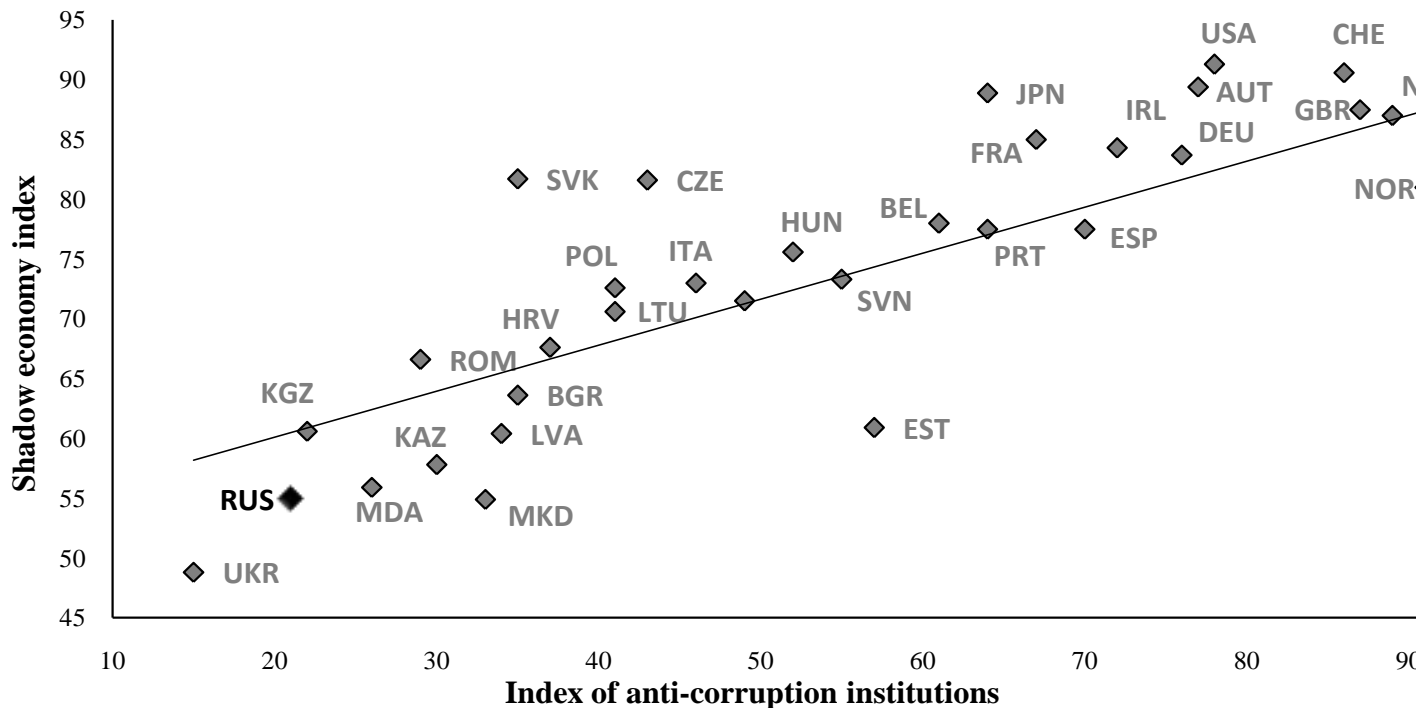


Figure 2. Scatter diagram for 2002, showing corruption index (based on data from the Heritage Foundation) and shadow economy index (based on data from Schneider, 2005)
 (Source: Heritage Foundation, (Schneider, 2005), authors' calculations)

- 5) **The period for which VAT has been applied (*age*) should positively affect the quality of administration** due to the accumulation of working experience by the fiscal authorities and taxpayers.
- 6) In the financial sector a major proportion of the transactions is not subject to VAT, which implies a negative effect of the “*share of financial assets in GDP*” variable on tax revenues. At the same time the level of development of financial institutions should correlated with the level of development of other public institutions, including that of the institutions for tax administration. Our hypothesis is that, all other conditions being equal (with the remaining variables controlled) there should be a dominant positive effect of the financial sector on the administration quality. In order to characterize the financial sector in the GDP structure, the proportion of the assets of the banking sector in GDP (*assets_share*) is used⁹.
- 7) **The proportion of agriculture in the GDP (*agriculture*) should negatively affect the level of the *Ci-efficiency*.** Firstly, in this sector, tax legislation usually provides many advantages (preferential rates and exemptions) while tax collection here is hampered due to the subsistence economy. Secondly, high

⁹ International Finance Statistics database of the International Monetary Fund.

values of this indicator suggest a predominantly agrarian economy, which implies less well developed public institutions¹⁰.

The sample studied includes data from 33 countries¹¹, over the observation period: 1995-2007, the panel is unbalanced. Table 3 presents a correlation matrix of coupled variables from the analysis. We can see from this table that the *Ci-efficiency* most strongly correlates with the proportion of imports in final consumption and the share of the banking sector assets in the GDP. These variables are also strongly correlated. The strongest correlation in the absolute value (−0.84) was observed between the proportion of agriculture in the GDP and the logarithm of per capita GDP.

Table 3. Matrix of paired correlations of the variables used in assessing the determinants of the efficiency of VAT collection

	<i>Ci-efficiency</i>	$\ln gdppc$	<i>rate</i>	<i>imp_cons</i>	<i>corruption</i>	<i>agriculture</i>	<i>assets_share</i>	<i>age</i>
<i>Ci-efficiency</i>	1							
$\ln gdppc$	0.18	1						
<i>Rate</i>	−0.19	0.08	1					
<i>imp_cons</i>	0.55	0.30	−0.07	1				
<i>corruption</i>	0.30	0.73	0.19	0.14	1			
<i>agriculture</i>	−0.20	−0.84	−0.04	−0.25	−0.60	1		
<i>assets_share</i>	0.45	0.42	−0.25	0.80	0.25	−0.28	1	
<i>Age</i>	0.16	0.37	0.10	0.18	0.37	−0.38	0.31	1

Source: IMF, World Bank, Heritage Foundation, authors' calculations

To verify the hypotheses the following econometric models were estimated:

$$Ci - efficiency_{i,t} = \beta_0 + \beta_1 \ln gdppc_{i,t} + \beta_2 rate_{i,t} + \beta_3 imp_cons_{i,t} + \beta_4 corrupt_{i,t} + \beta_5 age_{i,t} + \xi_{i,t}, \quad (1)$$

$$Ci - efficiency_{i,t} = \beta_0 + \beta_1 \ln gdppc_{i,t} + \beta_2 rate_{i,t} + \beta_3 imp_cons_{i,t} + \beta_4 corrupt_{i,t} + \beta_5 age_{i,t} + \beta_6 assets_share_{i,t} + \beta_7 agriculture_{i,t} + \xi_{i,t} \quad (2)$$

$$Ci - efficiency_{i,t} = \beta_i + \beta_1 \ln gdppc_{i,t} + \beta_2 rate_{i,t} + \beta_3 imp_cons_{i,t} + \beta_4 corrupt_{i,t} + \beta_5 age_{i,t} + \xi_{i,t}, \quad (3)$$

$$Ci - efficiency_{i,t} = \beta_i + \beta_1 \ln gdppc_{i,t} + \beta_2 rate_{i,t} + \beta_3 imp_cons_{i,t} + \beta_4 corrupt_{i,t} + \beta_5 age_{i,t} + \beta_6 assets_share_{i,t} + \beta_7 agriculture_{i,t} + \xi_{i,t}, \quad (4)$$

where:

$gdppc_{i,t}$ — the value of per capita GDP at PPP in constant 2005 prices for i -th country in t -th year (basic hypothesis: factor $\beta_1 > 0$);

¹⁰ The ratio of GDP to final consumption, per capita GDP at PPP in prices of 2005 and the share of agriculture in GDP were taken from the World Development Indicators database of the World Bank.

¹¹ Argentina, Australia, Austria, Belgium, Bolivia, Chile, Colombia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Lithuania, Luxembourg, Malta, Morocco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russia, Slovakia, Spain, Sweden, United Kingdom.

$rate_{i,t}$ — basic VAT rate in i -th country in t -th year (basic hypothesis: $\beta_2 > 0$);

$imp_cons_{i,t}$ — import orientation of the tax base (the ratio of imports of the i -th country in the t -th year to the final consumption value of the same country in the same year), basic hypothesis: $\beta_3 > 0$;

$corrupt_{i,t}$ — corruption index value for i -th country in t -th year (basic hypothesis: $\beta_4 > 0$);

$age_{i,t}$ — duration of VAT application for i -th country in t -th year, i.e. the period of time from the introduction of the tax to the t -th year (basic hypothesis: $\beta_5 > 0$);

$assets_share_{i,t}$ — share of assets of the banking sector in GDP for i -th country in t -th year (basic hypothesis: $\beta_6 > 0$);

$agriculture_{i,t}$ — proportion of agriculture in the GDP for i -th country in t -th year (basic hypothesis: $\beta_7 > 0$).

Equations (1) and (2) are evaluated on the basis of pooled data but in equation (2) two additional variables were included beyond those in equation (1): the proportion of banking sector assets in the GDP and the proportion of agriculture in the GDP. Evaluating the model with or without these variables is justified by their strong correlation (modulo of correlation coefficients is greater than 0.8) with the proportion of imports in final consumption with the log of the per capita GDP, respectively. Equations (3) and (4) are evaluated in the form of a model with individual fixed effects. Fixed (rather than random) individual effects are used because each country has a specific individual characteristic which distinguishes it from other countries.

The following conclusions may be drawn, based on evaluating the equations¹²:

1) The hypothesis of the equality to zero of the coefficients of the log of per capita GDP is rejected in three specifications out of four. In specification (4) this hypothesis is not rejected, perhaps, due to the strong co-linearity of the variable of per capita GDP and the proportion of agriculture in the GDP. Elimination of insignificant variables from (4) (corruption index, duration of VAT application, proportion of banking sector assets in the GDP) and the regression estimate

$$Ci - efficiency_{i,t} = \beta_i + \beta_1 \ln gdppc_{i,t} + \beta_2 rate_{i,t} + \beta_3 imp_cons_{i,t} + \beta_7 agriculture_{i,t} + \xi_{i,t} \quad (5)$$

shows that the hypothesis of equality to zero of the coefficient at the average value of the log of per capita GDP in specification (5) is rejected at the 10% level.

Thus, the coefficient is negative in the specifications of the pooled-regressions (significant at the 1% level) and positive in the specifications (3) (significant at the 5% level) and (5) (significant at the 10% level). Hence, only models with individual fixed effects favor the hypothesis of a positive effect of the level of economic development on the quality of VAT administration. Apparently, this may be explained

¹² Results of assessments of these and other regression equations are presented in the Annex.

by the fact that countries with a higher per capita GDP may have a lesser *Ci-efficiency*, not due to lower administration quality, but due to differences in the rates and the structure of the tax base. At the same time, if we consider the growth of per capita output over time in each individual country, i.e. a model with individual fixed effects, this will be accompanied by a growth in the *Ci-efficiency*. The above is proved by the regression variable estimates averaged over time (*between* estimates):

$$\overline{Ci-efficiency}_i = \beta_0 + \beta_1 \overline{\ln gdp}_{pc_i} + \beta_2 \overline{rate}_i + \beta_3 \overline{imp_cons}_i + \beta_4 \overline{corrupt}_i + \beta_5 \overline{age}_i + \varepsilon_i, \quad (6)$$

$$\begin{aligned} \overline{Ci-efficiency}_i = \beta_0 + \beta_1 \overline{\ln gdp}_{pc_i} + \beta_2 \overline{rate}_i + \beta_3 \overline{imp_cons}_i + \beta_4 \overline{corrupt}_i + \\ \beta_5 \overline{age}_i + \beta_6 \overline{assets_share}_i + \beta_7 \overline{agriculture}_i + \varepsilon_i. \end{aligned} \quad (7)$$

Analysis of cross-country variations in the *Ci-efficiency*, using the variation of the values of explanatory variables averaged over time, shows that the hypothesis of equality to zero of the coefficient at the average value of the log of per capita GDP is rejected. The coefficient is negative and significant at the 5% level. This means that in this sample the higher the average per capita GDP in one country compared to another country, the lower the *Ci-efficiency*. It can be concluded that each country has certain individual characteristics relating, apparently, to the differences in the determination of the tax base and the structure of preferential rates which are not taken into account in the regressions (1) and (2). These individual characteristics, fixed for each country, predetermine the difference in the *Ci-efficiency* indicator, so that cross-country analysis shows a negative dependence, i.e. the higher the GDP, the lower the proportion of consumption which is subject to value-added tax.

Figure 3 presents a pair scatter diagram for *Ci-efficiency* regression residuals on all variables from regression (2), other than the log of per capita GDP, and the regression residuals of the log of per capita GDP on the remaining variables (for specification (2), i.e. for pool-regression). This helps to illustrate the effects on the *Ci-efficiency*, when cleared of the influence of all variables, other than the log of the per capita GDP, of the log of per capita GDP itself, the variation of which is cleared from variations in other variables¹³. The figure illustrates the differences in cross-country and inter-temporal effects (for each country) of the level of economic development on the *Ci-efficiency*. In this figure the line with the negative slope is the estimate of the coefficient of the log of the per capita GDP in the specification of pool-regression (2), whilst the many lines with positive slopes (individual markers for each country) show the estimate of the coefficient of the log of per capita GDP in the specifications of the individual fixed-effect regressions (3).

¹³ In this case we may make substantial conclusions in terms of the levels of variables and not just the regression residual due to the application of the well-known theorem of Frisch-Waugh-Lovell.

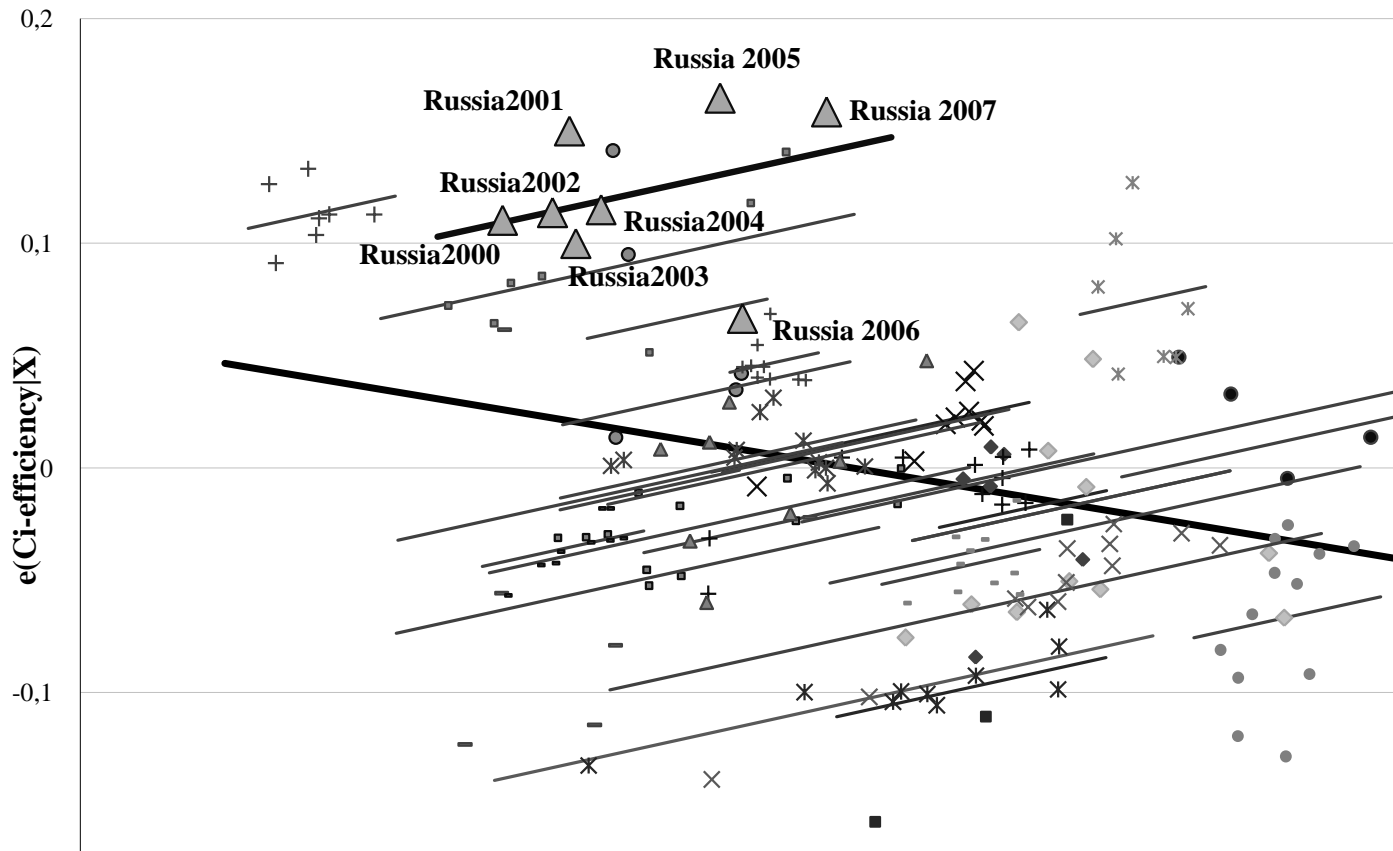


Figure 3. Scatter diagram for *Ci-efficiency* regression residuals on all variables from regression (2), other than the log of per capita GDP, and the regression residuals of the log of per capita GDP on the remaining variables of this regression (*Source:* authors' calculations)

According to a theoretical estimate based on the pooled regression, the unexplained part (residuals from the *Ci-efficiency* regression in the predatory factors) of the *Ci-efficiency* for Russia was the result of a positive and substantially high proportion of imports in final consumption, the corruption level, the VAT rate, the level of economic development, the VAT application period, the share of agriculture and the banking sector assets in GDP observed in 2000-2007. Thus, the level of the *Ci-efficiency* was constantly above its theoretical value. It follows herefrom that, within the framework of the model in question, the situation with VAT collection in Russia is not as well explained as in other countries. We can distinguish four reasons why there are cross-country and inter-temporal differences in the *Ci-efficiency*:

- differences in the fundamental indicators (the predatory variables of the model);
- differences in the methods of VAT assessment which were impossible to take into account using the predatory variables (in the model using individual effects, these differences are partially taken into account);
- differences in the efficiency of tax administration which were impossible to take into account using the predatory variables;

- random errors.

As we consider the random errors to be small, the significant changes over time in the deviations of the actual *Ci-efficiency* value from the theoretical one for the RF (i.e. explained by the fundamental factors) may be explained by changes in the tax legislation, i.e. the methods of tax collection, or changes in the quality of administration not taken into account in the model, or to both.

If there is a reduction of the positive error occurring when the tax legislation remains unchanged, this could be interpreted as a reduction in the quality of tax administration (assuming the absence of any factor which was ignored but had initially improved the situation but later stopped working). Any significant changes in errors in the model may be matched to legislative changes, as the efficiency of tax administration is hardly likely to increase or decrease sharply.

The remainder of the *Ci-efficiency* regression in the predatory factors was significantly high in 2002-2005 but then dropped sharply in 2006. This reduction may, to a large degree, be explained by amendments made to the Tax Code (see table 2). According to calculations set out in table 4, the considerable reduction of budget revenues from this tax observed in 2006 (down to 5.68% of GDP in 2006 against 6.82% of GDP in 2005, i.e. by 1.14% of GDP) is explained by the changes in tax assessment. Therefore this result does not characterize a decline in the quality of VAT administration but was caused by changes in the legislation, not taken into account by the predatory variables of the model.

2) The hypothesis of equality to zero of the coefficient for a variable “VAT rate” is rejected. The coefficient is negative and significant at the 1% level in all specifications, which favors the hypothesis that the value of the nominal tax rate negatively affects the *Ci-efficiency*.

3) The hypothesis of equality to zero of the coefficient of the ratio of imports to final consumption is rejected at the significance level of 1% in all specifications (the coefficient is positive). The results support the hypothesis that the higher the value of this ratio, the higher the tax revenues will be, all other conditions being equal.

4) The hypothesis of the equality to zero of the coefficient of the corruption index is rejected only in models without individual fixed effects, in which this coefficient is positive and significant at the level of 1%. Thus, the predictions of the model without individual effects, supports the hypothesis that there is positive influence on the *Ci-efficiency* by anti-corruption institutions (having a negative influence of the scale of the shadow economy). Perhaps, this is connected with the fact that the corruption index changes little over time for most countries and this is why its influence is eliminated with the introduction of individual effects into the regression, due to significant co-linearity with them. Indeed, as a result of evaluating equations (6) and (7), the hypothesis of equality to zero of the coefficient of corruption index averaged over time is rejected. The coefficient is positive and significant at the level of 1%. Thus, the influence of a

change in the corruption index on a change of *Ci-efficiency* is observed in the case of cross-country comparison, but is not observed in inter-temporal comparisons due to the shortness of the time interval.

5) The hypothesis of equality to zero of the coefficient for the duration of the period of VAT application is not rejected in all specifications, i.e. the hypothesis that there is no effect resulting from the influence of the experience and traditions of levying VAT on the quality of its administration is in agreement with the empirical data. Perhaps, this is explained by the general logic of the mechanisms of catch-up development: those countries which implemented VAT later than others did not have to follow the whole path of improvement in its administration. The implementation of VAT in such countries constituted an adoption of ready-made systems from countries which had already developed (to a certain extent) relevant methods for its administration.

6) The hypothesis of equality to zero of the coefficient of the proportion of banking sector assets in GDP is not rejected in all specifications. At the same time, the *Ci-efficiency* correlation factor and the ratio of banking sector assets to GDP is 0.45. The insignificance of the influence of this variable may, perhaps, be explained by its large correlation with the ratio of the proportion of imports to final consumption (0.80). Indeed, the estimate of the initial models (1) and (3), in which the ratio of the proportion of imports to final consumption is replaced by the proportion of the banking sector assets in the GDP, i.e. the estimate of regression

$$Ci - efficiency_{i,t} = \beta_0 + \beta_1 \ln gdppc_{i,t} + \beta_2 rate_{i,t} + \beta_3 assets_share_{i,t} + \beta_4 corrupt_{i,t} + \beta_5 age_{i,t} + \xi_{i,t}, \quad (8)$$

$$Ci - efficiency_{i,t} = \beta_i + \beta_1 \ln gdppc_{i,t} + \beta_2 rate_{i,t} + \beta_3 assets_share_{i,t} + \beta_4 corrupt_{i,t} + \beta_5 age_{i,t} + \xi_{i,t}, \quad (9)$$

shows that the hypothesis of equality to zero of the coefficient of the share of banking sector assets in GDP is rejected, unless the regression has an imports-to-final consumption ratio strongly correlated with this share. Such a result proves the hypothesis that the positive influence of the level of development of financial institutions (characterizing the general level of development of institutions in the country) on the quality of VAT administration dominates over the negative influence of the share of banking sector assets in the GDP which occurs because the majority of transactions are not subject to VAT in the financial sector, in general, and the banking sector, in particular. .

7) The hypothesis of equality to zero of the coefficient of the share of agriculture in the GDP is rejected in both model (2) and model (4). In specification (2) the coefficient is negative and significant at the level of 5%, in specification (4) it is negative and significant at the level of 1%. This proves the hypothesis of the negative link between the size of the agrarian sector and the quality of VAT administration.

Based on the econometric analysis carried out we can conclude that the actual data, in general, favors the formulated theoretical hypotheses with respect to the influence of various factors on the *Ci-*

efficiency. The summary below contains substantive conclusive statements based on the results of the empirical estimates.

5. Conclusion

The main conclusion from the econometric analysis carried out is the existence of two mechanisms for the effects of the level of institutional development (which we approximate by the value of the true per capita GDP) on the quality of administration identified by using two different approaches: cross-country and inter-temporal analyses.

The cross-country analysis (based on regressions *between* countries) demonstrates a negative dependence of the *Ci-efficiency* on per capita GDP. If we assume a corresponding dependency in time and space for the relationships investigated (an approach based on pooled regressions), the dependence will also be negative. Such a result may be explained by the complexity of the VAT collection systems which accompany the development of individual countries. This leads to an increase in the number of tax deductions and tax rates and a corresponding reduction of the tax base and a worsening of its quality of administration.

An analysis of the dynamics of the variables over time (an approach based on regressions with individual fixed effects) proves the hypothesis of a positive influence of institutional development on the quality of VAT administration. This result is formally associated with the presence in the model of fixed characteristics of individual countries (which reflect differences in tax design), which have not changed drastically for the time period concerned (1995-2007). Significantly, the results of evaluations *within* the models prove the main hypothesis discussed in this paper: the positive influence of the level of institutional development on the quality of tax administration. If the analysis were to include data for a longer period (30-40 years), it would be possible to verify a hypothesis of a change in these 'fixed characteristics' over time (i.e. the existence of a consistent pattern in the dynamics of tax design in the case of changes in the level of economic development comparable with differences in the level of development of the countries included in the cross-country analysis). Perhaps the results obtained from different approaches over such a longer period would be equivalent.

The model with individual fixed effects does not allow for comparison of the effectiveness of VAT administration in the Russian Federation with that in other countries, nor for making long-term forecasts. This approach makes it possible to average the influence of the predictory variables (slope of regression) over all countries and to forecast their short-term dynamics. In contrast, cross-country models makes it possible to draw some conclusions regarding long-term dependences. In such modeling it is assumed that the patterns analyzed are the same for countries with different levels of development. This is why, if we

predetermine the predictory values at the level of countries which are ahead of Russia in terms of development, we may forecast the efficiency of VAT administration until the point when the predetermined values of the predictory variables are reached.

Taking into account the dynamics of Russian growth of real per capita GDP in PPP for 1999-2007 (from 7,832 to 13,911 USD, or 6.6% per year), it can be assumed that at such a rate Russia will reach the 2007 average GDP level of the OECD countries (about 32,663 USD) in 15 years. If we consider a more conservative scenario of the real GDP growth (around 4% per year), the country will reach the 2007 average GDP level of the OECD countries in 20-25 years. Based on the above, in order to forecast changes in the effective tax base provided that the average OECD level is reached, it is expedient to use pooled models for characterizing the long-term dependences.

Table 4 presents estimates of the growth of the effective VAT base¹⁴ in the case of Russia reaching the OECD average values of the predictory factors.

Table 4. Possible changes in the effective VAT base in when Russia reaches the OECD average values of the predictory factors under 2007 conditions

		according to model (1)	according to model (8)
1. Actual <i>Ci-efficiency</i> in 2007		56.08 p.p.	56.08 p.p.
2. Theoretical <i>Ci-efficiency</i> in 2007 at actual values of predictory variables		40.05 p.p.	42.42 p.p.
3. Theoretical <i>Ci-efficiency</i> at values of predictory variables at the average OECD level (2+5)		44.46 p.p.	46.85 p.p.
4. Theoretical <i>Ci-efficiency</i> at values of predictory variables at the average OECD level with the 2007 positive error remaining the same (1+5 or 3+1-2)		60.49 p.p.	60.51 p.p.
5. Change in <i>Ci-efficiency</i> , total:		4.41 p.p.	4.43 p.p.
	Including:		
	Predictory factor	Values of predictory factor under 2007 conditions	
		Average for OECD countries	Russia
Per capita GDP at PPP in 2005 prices, USD	32,663	13,911	-4.69 p.p.
VAT base rate	19.6%	18%	-1.12 p.p.
Share of Imports in final consumption	35%	32%	0.29 p.p.
Anti-corruption institutions index	71	25	9.94 p.p.
Share of banking sector assets in GDP	45%	7.2%	0.60 p.p.

Source: authors' calculations.

According to estimates obtained, the actual *Ci-efficiency* value for Russia exceeds the theoretical value predicted on the basis of pooled regression at the actual values of the predictory factors in 2007 by about 15 p.p. The calculations show that the ability of Russia to reach the level of economic and institu-

¹⁴ Calculations were carried out on the basis of models (1) and (8). For more details of the models used, see the Annex.

tional development of the world's leading countries may be accompanied by a specific legislative system for VAT collection approximating to that of the developed countries. The adoption of a VAT design typical of OECD countries and characterized by a great variety of tax exemptions and preferential rates may lead to a serious reduction in tax revenues and an increase in administration expenses. Possible changes in *Ci-efficiency* could result from opposing tendencies. A growth of per capita GDP and of the basic rate of tax, together with a reduction of the tax base, would result in a decrease in *Ci-efficiency*. At the same time, an increase in the openness of the economy, the development of the financial sector and, most importantly, a reduction in corruption would lead to the growth of the effective VAT base. If Russia repeats the path of the developed countries, provided that the predatory variables reach the average OECD level, the value of the effective tax base will be 40-42% of the aggregate final consumption, i.e. a considerable reduction of the effective VAT base compared with today's level.

As seen from table 4, the growth of per capita GDP to the 2007 average OECD level will result in a reduction of the effective tax base by 4.1-4.7 p.p. (depending on the model). An increase in the basic rate would lead to a reduction of the effective base by 1.0-1.1 p.p. However, the effective tax base growth will be due to the change in values of other predatory variables: growth of the share of imports in final consumption by 0.3 p.p., growth of the share of the banking sector assets in GDP by 0.6 p.p. and a reduction of corruption by 8.9-9.9 p.p. In general, the potential for improving the quality of VAT administration in Russia under the condition of achievement of the average level of economic and institutional development of the OECD countries is about 4.4 percentage points (line 5) compared to the theoretical value for 2007 (line 2). As a result, a possible *Ci-efficiency* value in Russia, provided that the average development level of the OECD countries is reached and that their structure of tax rates and tax base is adopted, will be 44.5-46.8% of final consumption, which is considerably lower than the actual 2007 level.

Thus, the estimates show that an increase in the efficiency of anti-corruption institutions will be the driver for increasing VAT revenues. This is why measures for the reduction of corruption and the share of the shadow sector in the Russian economy should be viewed as the priorities of the social and economic policy of the country which will, amongst other things, have significant tax effects.

Important steps in improving tax administration institutions and aimed at reducing corruption legislation are: increase in the neutrality and efficiency of VAT collection, in particular, harmonisation and simplification of the VAT refund procedure when using a zero rate, the introduction of voluntary registration of VAT taxpayers, licensing of taxpayers and applying special tax regimes to allow them to participate in VAT turnover, the creation of neutral procedure for VAT taxation in the case of transactions carried out for internal purposes, the formation of transparent tax legislation for VAT in e-commerce together with other measures.

Along with the forecast resulting from the models, another scenario can be proposed, under which Russia, in catching up with the OECD countries in terms of the factors included in the model, will continue using the existing VAT system or even improve it by focusing on best-practice examples. In terms of the model this would mean the preservation of a positive error which, as we assume, is associated with the rational structure of the tax rates and relatively broad-based tax base (which is not fully reflected in the predictory variables) if the average OECD values of the model predictor factors are reached. In this case it is possible to forecast a considerably higher value of the *Ci-efficiency* indicator, which will reach not 44-47% of final consumption (line 3) but about 60% (line 4). If a negative influence of GDP growth and a rate increase are not taken into account in forecasting, the efficiency value may rise by 9.5-10.2 p.p., which corresponds to a final consumption level of 50.3-51.9%¹⁵.

In order to ensure that growth in the level of development of the country does not result in a *Ci-efficiency* reduction in the long run, a range of measures to improve tax design, in addition to the above mentioned areas of improvement in tax administration should be taken, including elimination of the reduced rate and the limitation of the list of exemptions to those which are “standard”¹⁶ for the OECD.

Thus, this analysis of the factors affecting the quality of VAT administration in Russia has allowed us to identify the positive effect of the level of institutional development on the efficiency of tax collection. However, this trend takes place only if simultaneous with economic development which results in an improvement in the performance of the institutions; there should be no additional tax deductions which, in addition to their direct costs, complicate the design of the tax system and would reduce its quality of administration.

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¹⁵ If we use as a 2007 *Ci-efficiency* value not the actual value 56.1 p.p., but that forecast on the basis of the models with fixed effects (3) and (9) (55.8 p.p. and 57.4 p.p., respectively), the achievement of the effective tax base level of 60.4-61.8% of the aggregate consumption may be forecast, provided that the current administration efficiency is maintained, which corresponds to the forecast presented in table 4.

¹⁶ Standard VAT exemptions are applied as is common practice due to the fact that, in particular, under certain transactions (for example, financial) it is impossible, from the tax administration perspective, to determine correctly if the tax obligations, or administrative costs exceed the expected benefits.

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ANNEX

Results of evaluations with models (1)-(9) of the efficiency of VAT collection

Dependent variable: quality of administration <i>Ci-efficiency</i>									
	OLS (pooled regression)			OLS, FE				OLS, BE	
	(1)	(2)	(8)	(3)	(4)	(5)	(9)	(6)	(7)
Log of per capita GDP	-0.0554*** (0.0102)	-0.0717*** (0.0148)	-0.0482*** (0.0115)	0.0943*** (0.0363)	0.0550 (0.0432)	0.0572* (0.0324)	0.127*** (0.0376)	-0.0627** (0.0306)	-0.0883* (0.0484)
VAT basic rate	-0.00737*** (0.00115)	-0.00602*** (0.00127)	-0.00577*** (0.00134)	-0.0122*** (0.00266)	-0.0099*** (0.00317)	-0.00951*** (0.00292)	-0.0139*** (0.00278)	-0.00741** (0.00330)	-0.00506* (0.00330)
Ratio of import to final consumption	0.102*** (0.00976)	0.122*** (0.0157)		0.134*** (0.0281)	0.141*** (0.0297)	0.140*** (0.0271)		0.108*** (0.0292)	0.130** (0.0292)
Anti-corruption institution index	0.00216*** (0.000257)	0.00199*** (0.000253)	0.00193*** (0.000285)	0.000166 (0.000282)	-0.0000867 (0.000303)		0.000884*** (0.000305)	0.00294*** (0.000841)	0.00258*** (0.000866)
VAT application period	0.000289 (0.000415)	0.000173 (0.000423)	0.000194 (0.000469)	0.00105 (0.00120)	-0.000159 (0.00129)		0.00150 (0.00129)	-0.000804 (0.00124)	-0.000837 (0.00135)
Share of banking sector assets in GDP		-0.00421 (0.00406)	0.0161*** (0.00266)		-0.000465 (0.00716)		0.0135** (0.00646)		-0.00443 (0.0133)
Share of agriculture in GDP		-0.00444** (0.00217)			-0.0110*** (0.00400)	-0.0105*** (0.00385)			-0.00632 (0.00659)
Adjusted R^2	0.43	0.46	0.30					0.43	0.42
R^2 within				0.41	0.40	0.40	0.36		
Number of observations	277	255	272	277	255	263	272	33	30

Source: authors' calculations. Standards errors are specified in brackets; ***, **, * — significance at the 1%, 5%, 10% level; OLS — ordinary least squares; OLS, FE — ordinary least squares with fixed effects; OLS, BE — ordinary least squares in “between” regression.