

Impact of Value Added Tax on Macro-Economic Parameters of the Russian Economy

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ABSTRACT

In 2019, in Russia the standard VAT rate was raised from 18% to 20%, which resulted in a broad discussion about the possible negative effects of this measure such as falling consumer spending, producers' revenues and profits, imports and exports. The purpose of this study is to test the widely spread views about the impact of VAT on macro-economic parameters such as final consumption, gross profit and gross mixed income, fixed capital investment and export volume. To this end, we formulated three hypotheses, which we tested by using correlation, dispersion and regression analysis based on the data of the system of national accounts and reports of tax authorities in Russia. We built four dual linear regression equations and one multiple regression equation; estimated the significance of these equations (determination coefficient, F-statistic, average approximation error) and their coefficients (Student's *t*-test, *p*-value). The resulting equations were shown to accurately represent the relationship between the criterion variables and predictors. The hypothesis about the negative correlation between VAT and consumer spending was refuted in the case of Russia. VAT revenues to the consolidated budget have a direct influence on consumer spending in the ratio of 1:12.605 and a direct influence on the tax index on consumption, index of spending and index of final consumption in the ratio of 1:0.276. There is also evidence that VAT does not have a significant negative impact on the country's economic performance on the macro-level. VAT revenues to the consolidated budget have a direct influence on gross profit and mixed income in the ratio of 1:8.455. VAT refunds to exporters stimulate fixed capital investment and exports (VAT refunds have a direct influence on fixed capital investment in the ratio of 1:6.543 and on exports, in the ratio of 1:11.117). The positive dependencies demonstrate the neutral influence of VAT on economic growth in Russia and need to be taken into account by VAT policy-makers.

KEYWORDS

value added tax, tax regulation, regression model, final consumption expenditures, gross profit, export, fixed capital investment, VAT refund

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Влияние налога на добавленную стоимость на макроэкономические параметры российской экономики

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АННОТАЦИЯ

В России с 2019 г. базовая ставка НДС была повышена с 18 до 20%. Исследователи активно анализируют возможные отрицательные эффекты повышения ставки: падение потребительских расходов, выручки и прибыли производителей, объемов внешнеэкономической деятельности. Цель данного исследования –

верифицировать наиболее популярные представления, бытующие в научных исследованиях, о влиянии НДС на макроэкономические параметры на примере российской экономики. Были сформулированы три гипотезы, отражающие устойчивые представления о влиянии НДС на конечное потребление; валовую прибыль и смешанные доходы экономики; инвестиции в основной капитал и объем экспорта. Для проверки гипотез были проведены корреляционный, дисперсионный и регрессионный анализ по показателям системы национальных счетов и поступлений НДС. В результате были построены четыре уравнения парной линейной регрессии и одно уравнение множественной регрессии; проведена оценка значимости уравнений (коэффициент детерминации, *F*-критерия Фишера, средняя ошибка аппроксимации) и их коэффициентов (*t*-критерий Стьюдента, *p*-значение). Полученные уравнения признаны достоверно отражающими взаимосвязь между анализируемыми критериальными переменными и предикторами. Отрицательная зависимость между НДС и потребительскими расходами по эмпирическим данным российской экономики не подтвердилась. Выявлено прямое влияние НДС, поступившего в консолидированный бюджет, на потребительские расходы в пропорции 1:12.605, а также прямое влияние индекса налогов на потребление на индекс расходов на конечное потребление в пропорции 1:0.276. Получила подтверждение гипотеза об отсутствии значимого негативного влияния НДС на результативность экономики на макроуровне. НДС, поступивший в консолидированный бюджет, прямо влияет на валовую прибыль и валовые смешанные доходы в пропорции 1:8.455. Доказана стимулирующая роль возврата НДС экспортерам в повышении объемов инвестиций в основной капитал и экспорта. Выявлено прямое влияние величины возмещения НДС на объем инвестиций в основной капитал в пропорции 1:6.543; а также на объем экспорта в пропорции 1:11.117. Полученные положительные зависимости подкрепляют доводы в пользу утверждения о нейтральном характере влияния НДС на экономический рост и могут быть использованы при обосновании предложений о внесении изменений в порядок исчисления и уплаты НДС в России.

КЛЮЧЕВЫЕ СЛОВА

налог на добавленную стоимость, налоговое регулирование, регрессионная модель, расходы на конечное потребление, валовая прибыль, экспорт, инвестиции в основной капитал, возмещение НДС

Research relevance

VAT makes up a considerable amount of budget revenues in Russia, ranking fourth (after mineral extraction tax, corporate tax and income tax) in terms of the tax revenues to the consolidated budget and second in the structure of the federal budget revenues. As preliminary estimates of VAT revenues to the consolidated budget in 2019 have shown, with the amount of 7023.5 billion roubles, its contribution to the GDP grew from 5.79% in 2018 to 6.4% due to the 2% increase in the standard rate. Nevertheless, this figure is still lower than the average level in OECD countries in 2018 – 7.1%.

The important role that VAT plays in budget systems of OECD countries results from the increase in standard tax rates after the global recession of 2008, which allowed the governments to close their budget gaps. VAT is generally seen as a rich source

of funding to cover state expenditures on the development of human potential and improvement in standards of living. Furthermore, an increase in the share of VAT in state budgets has enabled a number of countries to reduce the burden of direct taxes on corporate profits and labour and thus enhance the neutrality of tax systems.

Developed countries are less likely to rely on VAT as an instrument of economic regulation. In accordance with the neo-liberal principles, for efficient VAT administration and VAT harmonization in the EU, it is necessary to get rid of the majority of tax preferences and exemptions since they tend to distort the imputation system. The effect of VAT is considered to be the least detrimental to economic growth since it does not affect the interests of producers of goods, works and services, including the spheres with high value added, and does not influence investment in the real sector.

In 2019, the Russian government, following the line of reasoning described above, raised the standard VAT rate from 18% to 20%. The growth in VAT revenue provided extra funds for the national projects launched in 2018 – ‘Human Capital’, ‘Comfortable Living Environment’, and ‘Economic Growth’. This measure, however, also aroused heated debates among experts and wider public concerning its possible negative effects on prices, consumer expenditures, in particular those of low-income households, and business activities.

In Russian research literature on taxation, there is a widely spread view that VAT plays a key role in the regulation of demand (consumption) of goods (works and services), especially socially significant ones, and foreign economic activity, which is the reason why the list of zero-rated goods (works and services) or those to which reduced VAT rates are applied is regularly expanded. Moreover, suggestions are made to stimulate investment and innovation with the help of VAT. The most severely criticized aspect of taxation in Russia is the role that VAT plays in stimulation of exports: export of goods is exempted from VAT, which leads to significant budget losses and increase in tax abuse.

Comparatively few studies, however, model the impact of VAT on macro-economic parameters of the Russian economy due to the limited accessibility of the statistical data about VAT structure. As a rule, studies of the role VAT plays in economic development use general scientific methods such as elementary methods of economic analysis, logical analysis and cause-and-effect analysis.

Thus, the relevance of this research stems from the important fiscal role of VAT in the Russian state budget and the lack of agreement concerning the regulating role of this tax. This study also aims to bridge the research gap regarding the impact of VAT on parameters of the Russian economy.

We are going to test the widely spread views about the impact of VAT on macro-economic parameters by focusing on the case of the Russian economy.

To this end, we have formulated the following hypotheses:

1) VAT has a negative impact on consumer spending as it is included into prices of goods (works, services);

2) VAT is an indirect tax and, as a result, it does not negatively affect economic activities of businesses and enterprises (producers of goods, works and services) because the tax burden is shifted to consumers;

3) the current system of VAT refunds to exporters and the zero rate of VAT on exports stimulates exports and enhances fixed capital investment.

Literature review

Since the 2000s, there have been active debates among researchers and politicians of OECD countries about the tax maneuver involving a change in the structure of direct and indirect taxes. An increase in the share of indirect taxes, in particular VAT, was justified by a number of factors. First, modelling of the tax structure’s impact on GDP showed that lowering the labour tax by 1%, which is expected to be compensated by the corresponding increase in consumption taxes (including VAT), would lead to a rise in employment by 0.54% in the long term and to GDP growth by 0.30%. Second, VAT provides a way to distribute the tax burden among the employed and unemployed population, that is, reduce the burden on the labour force. Third, an increase in VAT does not have a direct negative impact on foreign trade. Finally, in the long run, an increase in consumption taxes is likely to contribute to a rise in savings and enhance capital accumulation.

As for the key arguments against this maneuver, these include the following: a rise in prices is likely to result in shrinking consumption, including imports, which, in its turn, will lead to slower economic growth and reduce the equilibrium exchange rate. Another argument is that, due to the regressive nature of VAT, such measure would negatively affect income redistribution. Moreover, since the gross tax burden will remain the same, such measure is unlikely to have a significant

influence on the labour supply. It is also highly likely that the positive effects of this reform will be neutralized by the introduction of a compensatory social policy¹.

After the recession of 2008, many developed countries raised VAT rates while reducing the tax burden on business and labour by cutting social security payments and lowering corporate and income tax rates. There is vast research literature discussing the effects of this measure.

One of the most actively debated questions is the impact of VAT on factors of economic growth. M. Konopczynski uses the data on Poland to demonstrate that acceleration of economic growth can be achieved by raising the expenditure tax rates and lowering the income tax rates, which would not change the total amount of tax revenues [1]. The data on Germany show that the shift of taxes from labour income (personal income tax (PIT) and social security contributions (SSCs)) to consumption (VAT) in the short term contributes to an increase in aggregate labor supply, resulting from higher work incentives and to a reduction in economic inequality [2]. The analysis of different types of panel data models (random effects model, dynamic panel and panel vector-autoregression) over 1995–2015 revealed a positive impact of the standard VAT rate on economic growth in five Central and Eastern European countries (CEE-5) (Bulgaria, Czech Republic, Hungary, Poland and Romania) [3].

A study that covered 115 countries demonstrated that the VAT system enhances the impact of government spending efficiency [4]. There is also evidence that in Japan, unfunded public pensions financed by VAT have a stronger positive effect on economic growth than those financed by the payroll tax [5].

Similar measures are taken in developing countries. For example, the government of Vietnam is recommended

to raise the standard VAT rate to 12% to optimize the tax structure and lower the corporate income tax (CIT) to 17% and thus shift the tax burden from capitalists to consumers [6].

In developing countries, however, the effects of VAT increase are less positive: the increase in VAT rate in South Africa on 1 April 2008 from 14% to 15% as a way to partially fund the budget deficit not only raised the cost of living but also the short-term expenditures of employers. The influence of VAT increase on GDP varies depending on the region but in general it is negative [7].

In developing countries, an indirect tax reform is likely to have a low impact on welfare growth, which can be explained by the strong substitutability in consumption between formal and informal commodities. Only when designed in a consumption-neutral fashion, indirect tax reforms can improve welfare [8].

The negative influence of VAT on economic growth may include falling consumer spending, which rises from the moment when the government announces its plans to increase VAT in the short-term and falls as soon as these plans are put into practice. In Spain, this situation led to a decline in investment, production and employment [9].

The data on fifteen EU countries in 1961–2005 show that a 1% rise in the consumption tax rate can lead to a fall in aggregate consumption by approximately the same figure in the short term and to a slightly larger decline in the long term [10].

In the Czech Republic, a 1%-increase in the VAT rate would cause a decrease in the demand for food of an average Czech household by 0.4652%, which is less than in the case of an increase in the physical person's income tax – 0.6899% [11]. Low-income households are the most susceptible to the effect of a VAT increase. For example, in Ireland, when the VAT rate was raised in 2013–2014, the most vulnerable were the households in the first income decile, households in rural areas, 6-person households and households containing a single adult with children [12]. In Germany, low-income households and

¹ Macroeconomic Effects of a Shift from Direct to Indirect Taxation: a Simulation for 15 EU Member States. Note presented by the European Commission services (DG TAXUD) at the 72nd meeting of the OECD. Working Party No. 2 on Tax Policy Analysis and Tax Statistics, Paris, November 14–16, 2006. Available at: <https://www.oecd.org/ctp/tax-policy/39494151.pdf>

households with children would be hit the hardest by a VAT increase [13].

Thus, the discussion about the impact of VAT on consumption mostly concerns the optimal amount and the scale of the VAT rate in the light of the possible shift of the tax to business. From the neoliberal perspective, the most effective option is the VAT flat rate scheme without exemptions and exempt transactions, which distort the operation of the imputation system. In research literature there is evidence supporting the advantages of the flat rate scheme: for instance, it is shown that the effects of a general and uniform VAT system covering all goods and services is welfare superior to the differentiated VAT rate system [14].

The studies focusing on those groups of goods and services to which reduced VAT rates are applied demonstrate that differentiated VAT rates may be quite effective for regulating consumption and enhancing equity. For example, for Norway it was recommended to adjust VAT rates to promote healthier diets of households. A VAT increase was found to be more effective in reducing purchases of unhealthy foods than a VAT removal, in increasing the purchases of healthy foods [15].

The econometric model based on the data for Kosovo for the period of 2013–2016 has shown that the VAT reduction from 16% to 8% for basic products and the increase in VAT from 16% to 18% on luxury products had a positive effect on budget revenues and GDP [16].

A decreased VAT rate on selected groceries has allowed Slovakia to rank among the countries with the lowest income differences and the average household expenditures on non-durable goods, while tax revenues were not significantly affected by the reform [17].

The VAT reform in China resulted in certain redistribution effects mainly due to lowering of the average tax burden and reducing the inequality within the lowest-income group. Compared with the overall rate reduction, a greater relief for necessity items could improve the redistribution effects of the future VAT system more effectively [18].

In practice, however, differentiation of VAT rates does not always result in the drop in prices for specific groups of goods, services and works. For instance, in Poland, the VAT rate on groceries was reduced from 7% to 5%, in January 2011, but this measure did not result in lower prices for consumers for a number of behavioural and psychological reasons [19].

The negative effects of VAT reforms can stem from partial shifting of the tax burden to producers [20]. A considerable VAT rate dispersion in China had a negative effect on the total factor productivity and resulted in a loss of 7.9% of GDP on average in the period from 2000 to 2007 [21]. Modelling based on the panel data for different Chinese provinces in the period of 2012–2017 showed the negative impact of VAT rebates on China's mechanical goods exports. In particular, it was found that on average, a one-percentage-point increase in the VAT rebate rate decreases exports by 2.07% [22]. Another study demonstrated an insignificant impact and asymmetrical effect of VAT pilot expansion on the corporate tax burden of general taxpayers in some Chinese provinces in 2012 [23].

Moreover, there is evidence that in China, VAT rebates to exporters have a positive impact on exports and China's competitiveness on world markets [24]. For the period of 2003–2012, a 1%-increase in VAT rebates lead to a rise in exports by 7% [25]. On the level of individual firms, every extra dollar spent on VAT refunds increased Chinese exports by 4.7 dollars [26].

To sum up, in research literature there is no universal agreement on the impact of VAT reforms on macro-economic parameters and there are no unified guidelines for optimization of the structure of VAT revenues and VAT rates in different countries. The majority of these studies focus on the experience of OECD countries and some developing countries while there is not much research investigating these questions in the context of the Russian economy. All of the above makes it pertinent to consider the impact of VAT on macro-economic parameters of the Russian economy and thus explore the potential of VAT as an instrument of economic regulation.

Methodology

This study focuses on the cause-and-effect relations between the macro-economic parameters of the Russian economy and parameters of the structure of VAT revenues to the consolidated budget.

Conceptually, the study relies on the theories that consider taxation as an effective instrument of economic regulation (Keynesian economics, social market economy theory, supply-side economics, neoclassical synthesis, public choice theory and so on). The methodological framework includes general scientific methods and econometric methods (correlation, dispersion and regression analysis) using MS Excel. The study relies on the official data of the Federal State Statistics Service (system of national accounts, statistical yearbook 'Finance' covering the main parameters of the Russian consolidated budget) and the statistical data reported by the Russian tax authorities.

To evaluate the effects, we conducted correlation, dispersion and regression analysis:

- the data of the national accounts system (provided by the Federal State Statistics Service) and the data on VAT revenues and structure (provided by the Federal Tax Service) for the period of 2006–2018 were used to build a single-factor model

(13 yearly observations) and for the period of 01.04.2006–01.01.2019, a multiple regression (52 quarterly observations);

- the data of the national accounts system and the data on product taxes, including net taxes (provided by the Federal State Statistics Service) for the period of 1995–2018 were used to build two-factor regression models (24 yearly observations) and for the period of 01.04.1998–01.01.2019, a multiple regression (84 quarterly observations).

Our choice of macro-economic parameters as effective indicators was determined by previous research using forecasting and factor analysis of VAT revenues to the consolidated budget and by the hypotheses we formulated for our study.

Out of all the resulting regression models, we are going to discuss in more detail four dual linear regression equations and one multiple regression equation. The statistical significance of these equations was tested by using the coefficient of determination, F-test, average approximation error, Student's t-test, and *p*-value.

Results

To test the hypotheses described above, we built dual linear regression equations and multiple regression equations. Table 1 shows the statistical data for selected mac-

Table 1

Effective (Y) and factorial (X) indicators, bln rbs						
Year	Y ₁	Y ₂	Y ₃	Y ₄	X ₁	X ₂
2006	17809.7	9544.6	4730.0	9079.3	1511.1	585.6
2007	21968.6	11387.1	6716.2	10028.8	2261.7	1011.4
2008	27543.5	13498.7	8781.6	12923.6	2132.5	922.1
2009	29269.6	11921.1	7976.0	10842.0	2050.3	1109.7
2010	32514.7	15093.7	9152.1	13529.3	2498.6	1121.7
2011	40692.2	25148.9	11035.7	16865.2	3250.8	1254.4
2012	46895.8	28132.0	12586.1	18324.8	3546.1	1557.7
2013	52274.3	29279.3	13450.2	18863.4	3539.4	1720.4
2014	56418.2	30623.8	13902.6	21425.9	3940.2	1840.2
2015	58240.5	34077.8	13897.2	23854.1	4233.9	1936.1
2016	61389.8	35350.0	14748.8	22137.6	4571.4	2077.6
2017	65165.4	38231.5	16027.3	23994.3	5137.6	2253.3
2018	69333.0	43406.5	17595.0	31932.6	6017.0	2489.7

Note: compiled by the author on the basis of the data of the Federal State Statistics Service 'National Accounts'. Available at: http://old.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/; data of the Federal Tax Service of Russia 'Report on the Structure of VAT Revenue – 1-VAT'. Available at: https://www.nalog.ru/rn13/related_activities/statistics_and_analytics/forms/

roeconomic indicators (based on the data of the national accounts system) and VAT structure (the statistical data reported by tax authorities), which were used as effective and factorial indicators:

- 1) effective indicators:
 - final consumption expenditures (Y_1);
 - gross profit of economy and gross mixed income (Y_2);

- fixed capital investment (Y_3);
- export volume (Y_4);
- 2) factorial indicators:
 - VAT revenues to the consolidated budget (X_1);
 - amount of VAT refunds (X_2)

Based on the data in Table 1, we built four one-factor regression models (see Figs. 1-4).

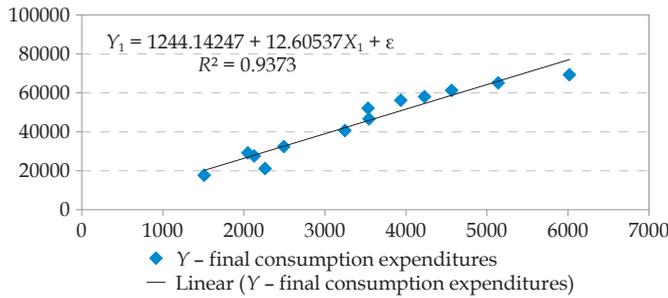


Fig. 1. Regression model of the dependency of final consumption expenditures on VAT revenues to the consolidated budget

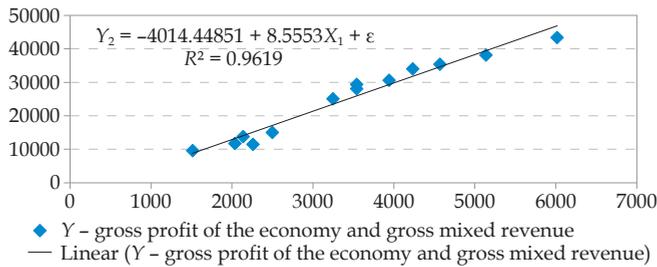


Fig. 2. Regression model of the dependency of gross profit on gross mixed revenue of VAT to the consolidated budget

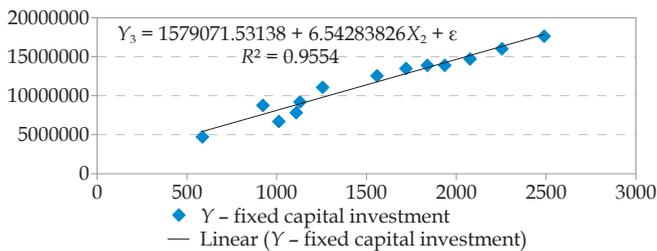


Fig. 3. Regression model of the dependency of fixed capital investment on VAT refunds

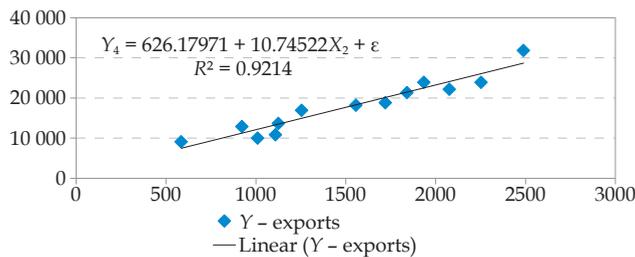


Fig. 4. Regression model of the dependency of exports on VAT refunds

We tested the regression equations for validity (see Table 2 for results).

In Table 2, the values that do not correspond to the criterion parameters are indicated in bold.

All the models demonstrate a high level of correlation between the effective and factorial indicator (multiple correlation coefficient $R - 0.95-0.98$) and a large share of dispersion of the dependent variable, explained by the model in question (determination coefficient $R^2 - 0.92-0.96$).

The F -test was conducted by comparing the actual F statistic with the critical value of the corresponding F -distribution at the level of significance 0.05 and 0.01. The F -test confirms the statistical significance of the regression equations.

Student's t test for the regression coefficient a_1 confirms the validity of all the models since the calculated value exceeds the critical value with the levels of significance 0.05 and 0.01. For the constant term (a_0), however, the t -value is higher than the critical level only in two equations. In the other two, the t -value for the constant term (a_0) is below the critical level.

P -value is the probability of obtaining results for a model of distribution of random values as extreme (or more extreme) as the results actually observed during the test, given that the null hypothesis is true. In other words, p -value is the probability that the results showing the relationship between the indicators were produced by random chance alone. A low p -value suggests that there is little likelihood that the regression results occurred

by chance, which allows us to reject the null hypothesis. P -value is usually compared with the generally accepted levels of significance 0.05; 0.01 and 0.005. In all the regression equations, the p -value of correlation coefficient a_1 is much lower than 0.005, which demonstrates the significance of these equations. The p -value for constant term (a_0), however, was below the significance level of 0.05 only in the second (Y_2) and third (Y_3) equations. In the other two, the p -value for constant term (a_0) is below the critical level.

Thus, in two equations (Y_1 and Y_4), the constant term is statistically insignificant in the t -test and for p -value. Having a constant term in the equation provides us with a more accurate picture of the dependency. From the economic perspective, the constant term reflects the impact of other factors left out of the model. Therefore, we can keep the constant term in the models despite its statistical insignificance. For the dual linear regression we need to analyze the statistical significance of coefficient a_1 , since this coefficient contains the influence of explanatory variable X on dependent variable Y .

To evaluate the quality of the models, we calculated the average approximation error (\bar{A}), measured as a relative divergence for each observation. The average approximation error shows how many theoretical values, that is, those resulting from the regression equation, on average deviate from empirical values. The permissible average approximation error limit is 8-10%. All the regression equations have \bar{A} less than 10%.

Table 2

Parameters of the statistical significance of the dual linear regression equations

Model	R	R ²	F	t		p		\bar{A} , %
				a_0	a_1	a_0	a_1	
$Y_1 = 1244.14247 + 12.60537X_1 + \varepsilon$	0.97	0.94	164.6	0.35	12.8	0.74	5.84E-08	8.48
$Y_2 = -4014.44851 + 8.45553X_1 + \varepsilon$	0.98	0.96	278.0	-2.16	16.67	0.05	3.72E-09	9.22
$Y_3 = 1579071.53138 + 6.54284X_2 + \varepsilon$	0.98	0.96	235.9	2.28	15.4	0.04	8.88E-09	7.41
$Y_4 = 626.17971 + 10.74522X_2 + \varepsilon$	0.95	0.92	128.9	0.62	11.35	0.55	2.05E-07	9.79

R - correlation coefficient (0-1);

R² - determination coefficient (0.8);

F - F-statistic (greater than the critical values);

Student's t -test (greater than the critical values);

P-value (< 0.005);

\bar{A} - average approximation error (< 10%).

Among the multiple regressions, the most statistically significant and accurate is the model of the dependency of final consumption expenditures on compensation of employees and product taxes in 1995–2018. To exclude multicollinearity of the factors, this model was built by using chain indices rather than absolute values (see Table 3).

In accordance with the system of national accounts, taxes on products are levied as a percentage of the price or quantity of goods and services produced,

sold or imported by residents (VAT, excise duties, import duties, etc). In other words, product taxes include not only VAT but also other indirect taxes.

The resulting model and the parameters of its statistical significance and adequacy are shown in Table 4.

The model was tested for statistical significance and for adequacy. The average approximation error was just 3.03% (the acceptable level is 10%). The fifth model can be interpreted the following way: the index of final consumption ex-

Table 3
Dynamics of macroeconomic indicators and product taxes, in current prices (mln rbs)

Year	Final consumption expenditures		Compensation of employees		Product taxes	
	sum	index (Y ₅)	sum	index (X ₃)	sum	index (X ₄)
1995	1016594.3	–	647875.8	–	184071.2	–
1996	1435869.8	141.2431	1022643.3	157.8456	269095.0	146.1907
1997	1776137.6	123.6977	1202900.5	117.6266	320255.8	119.0122
1998	2003790.1	112.8173	1263046.8	105.0001	338824.5	105.7981
1999	3285678.1	163.9732	1933606.1	153.0906	613854.6	181.1718
2000	4476850.9	136.2535	2937229.9	151.9043	980880.4	159.7903
2001	5886860.6	131.4956	3848398.3	131.0214	1268911.4	129.3645
2002	7484115.5	127.1325	5065100.6	131.6158	1415153.0	111.5250
2003	9058687.6	121.0389	6231387.9	123.0259	1775123.2	125.4368
2004	11477849.6	126.7054	7845036.7	125.8955	2352124.6	132.5049
2005	14438149.2	125.7914	9474266.7	120.7677	3248224.8	138.0975
2006	17809740.7	123.3520	11985905.6	126.5101	4090102.5	125.9181
2007	21968579.5	123.3515	15526114.7	129.5364	4977558.7	121.6977
2008	27543511.4	125.3768	19559761.0	125.9798	6323848.4	127.0472
2009	29269625.1	106.2669	20411614.4	104.3551	5202132.9	82.2621
2010	32514673.2	111.0867	22995635.9	112.6596	6462567.9	124.2292
2011	40692217.7	125.1503	26386675.4	114.7464	8413321.9	130.1854
2012	46895780.1	115.2451	30201161.5	114.4561	9411798.2	111.8678
2013	52274283.6	111.4691	33792282.2	111.8907	9510857.9	101.0525
2014	56418220.9	107.9273	37430458.0	110.7663	10550847.9	110.9348
2015	58240533.5	103.2000	39745493.0	106.1849	8738499.6	82.8227
2016	61389774.1	105.4073	41245363.8	103.7737	8817205.9	100.9007
2017	65165442.1	106.1503	43884319.8	106.3982	9264512.5	105.0731
2018	69332988.5	106.3953	48244368.2	109.9353	11404173.9	123.0952

Source: Federal State Statistics Service 'National Accounts'. Available at: http://old.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/

Table 4
Parameters of statistical significance of the regression model of the dependence of final consumption expenditures on compensation of employees and product taxes

Model	R	R ²	F	t		p		\bar{A} , %
				a ₀	a ₁ /a ₂	a ₀	a ₁ /a ₂	
Y ₅ = 27.79 + 0.490X ₃ + 0.276X ₄ + ε	0.94	0.88	72.3	3.15	3.86/ 3.07	0.005	0.001/0.006	3.03

penditures (Y_2) will increase together with the increase in the index of compensation of employees (X_3) and product taxes (X_4).

The resulting equations, as the statistical tests showed, accurately reflected the relationship between the criterion parameters and predictors. They can be used to predict values of the variables (Y) with the help of independent variables (X) and to find the contributions of specific independent variables to the variation of the dependent variable.

Discussion

The regression equation of the dependence of final consumption expenditures on VAT does not confirm the first hypothesis, that is, on the macro-level, an increase in VAT does not have a negative influence on consumer spending. This model can be interpreted in the following way: an increase in VAT revenues to the consolidated budget by 1 billion roubles causes a rise in consumer spending by 12.605 billion roubles.

The fifth multiple regression model shows a direct dependence between consumer spending and consumption-type taxes. These results can be interpreted the following way: a 1%-increase in the index of compensation of employees will result in a drop in the index of final consumption expenditures by 0.490%, while a 1% increase in the consumption tax index will lead to a rise in the index of final consumption expenditures by 0.276%. If we consider final consumption expenditures as the main source of VAT, then this dependence is easy to explain: the higher are the consumption expenditures, the more VAT is paid to the budget. There is every reason to believe that analysis of the dependency of consumer spending on VAT for groups of goods with different elasticity of demand will confirm this hypothesis. As we know, the higher is the price elasticity of demand for goods, the more it will fall in response to VAT increase. Unfortunately, we were unable to conduct regression analysis for specific groups of goods due to the lack of detailed tax statistics.

Due to different price elasticity of demand, we cannot completely exclude the

possibility that VAT has an influence on VAT-paying producers of goods, services and works. The time lag between purchasing material assets necessary for production process and VAT refunds also means that a certain sum of money will be withdrawn from the turnover. If the price elasticity of demand is high, producers might be losing their revenue and profit due to the fall in sales. This logic underpins our choice of factors for the second model. We supposed that VAT may have a negative influence on gross profit and gross mixed income. However, this hypothesis was refuted. As the regression model has shown, an increase in VAT revenues to the consolidated budget by 1 billion roubles leads to a rise in gross profit and gross mixed income by 8.4555 billion roubles, that is, there is a positive dependency between these two indicators, which supports the second hypothesis. VAT is an indirect tax and, therefore, it does not have a considerable negative influence on businesses (producers of goods, works and services) since it is shifted to consumers of these goods, works and services. On the micro-level, the influence of VAT depends on profitability of businesses and value added: the higher is the share of profit in value added, the lower is the ratio of VAT paid to profit. The higher is the profitability (capital intensity), the lower is the influence of VAT [27].

The final (third) hypothesis was fully confirmed by the third and fourth regression models, which show that VAT refunds to exporters stimulate exports and fixed capital investment. The third model can be interpreted the following way: an increase in VAT refunds by 1 billion roubles will lead to a growth in fixed capital investment by 6.543 billion roubles. Such a high regression coefficient may signify the efficiency of the currently used VAT refund mechanism, even though it is widely criticized by taxation experts and the public. Furthermore, there is evidence that VAT refunds to exporters enhance exports.

The fourth model can be interpreted as follows: an increase in VAT refunds by 1 billion roubles will lead to a growth

in exports by 11.117 billion roubles. This positive relationship, however, does not provide a solution to the problem of the prevalence of raw materials in Russia's export structure. Elimination of VAT refunds, however, is unlikely to result in greater differentiation of exports due to the expansion of the segments other than raw materials but will instead lead to a decline in exports and fixed capital investment made by exporters.

Conclusions

Our study is based on the Russian economic data and contributes to the discussion about the impact of VAT on macro-economic parameters.

The results of modelling of the impact that VAT has on consumer spending showed no negative relationship between the former and the latter. This can be explained by the following: first, the standard VAT rate remained the same throughout the given period; second, an introduction of an automated control system led to an increase in VAT collection rate; and, finally, there was a decrease in Russia's shadow economy².

The hypothesis about the absence of negative effects of VAT on the country's economic performance on the macro-level was confirmed. Such effects, however, are possible on the micro-level, that is, on the level of specific economic entities. This may happen because of the dependence of the degree of VAT shifting on the price elasticity of demand for goods (services, works); the time lag between paying VAT on goods purchased and the finished goods being sold; different levels of profitability of specific firms and the share of value added in revenue.

The hypothesis about the positive role of VAT refund to exporters in enhancing fixed capital investment and exports was confirmed, which may be an argument for keeping the already existing system of export tax refunds and rebates.

We believe that the positive dependencies we found support the idea that VAT exhibits a neutral influence on economic growth and can be used for regulating economic activity. The dual linear regression equations based on the data of the Russian economy in 2006–2018 and multiple regression equations based on the data for 1995–2018 demonstrate the following:

1) direct influence of VAT revenues to the consolidated budget on consumer spending in the ratio of 1:12.605 billion roubles;

2) direct influence of VAT revenues to the consolidated budget on gross profit and gross mixed income in the ratio of 1:8.4555 billion roubles;

3) direct influence of VAT refunds on fixed capital investment in the ratio of 1:6,543 and on exports in the ratio of 1:11.117 billion roubles;

4) direct influence of the consumption tax index on the final consumption index in the ratio of 1:0.276%

The resulting equations, as the statistical tests showed, accurately reflect the relationship between the criterion parameters and predictors. Therefore, they can be used for predicting the values of dependent variables (Y) with the help of independent variables (X) and for estimating the contribution of specific independent variables to variance of a dependent variable. It should be noted, however, that in 2014–2018 in Russia, VAT grew faster than the macro-economic parameters corresponding to its base (volume of final consumption on the domestic market, retail turnover) due to a significant increase in VAT administration efficiency. In our opinion, this fact generated an upward bias of the coefficients in the regression models.

We believe that the positive dependencies support the idea that VAT exhibits a neutral influence on economic growth and can be used for economic regulation.

The use of VAT as an instrument of economic regulation should follow certain principles:

1) it is necessary to minimize the gaps in the taxation of value-adding chains by optimizing the list of tax preferences and

² The shadow economy in Russia, according to the Federal Financial Monitoring Service, is shrinking: in 2018, it was about 20% of GDP in comparison with 28% in 2015–2016.

eliminating other factors contributing to such gaps;

2) taxpayers should be provided with a choice between the preferential and traditional procedures of VAT calculation and payment;

3) measures should be taken to avoid the risks of double taxation and unintended non-taxation;

4) it is possible to introduce VAT exemptions and reduced VAT rates depending on the price elasticity of demand for goods (works, services), in particular reduced VAT rates should be set for merit goods, that is, the goods with price inelastic demand that are highly significant for ensuring social harmony and justice in society and development of human capital. Reduced rates can be applied to other types of goods (works, services), for instance, innovative goods, only in exceptional circumstances;

5) tax preferences can be offered to taxpayers operating in spheres with low profitability and price elastic demand for

goods (works, services) in order to minimize the negative impact of tax burden shifting from consumer to producer;

6) taxpayers should be offered tax preferences for a limited period of time provided that their activities conform with certain requirements and that they assume certain obligations.

Our findings can be useful for VAT policy-makers in Russia, especially in matters concerning VAT computation and payment procedures.

Avenues for further research include evaluation of the dependency between VAT and macro-economic effects in different sectors of economy, for different groups of consumers and types of consumer expenditures. An essential task, in our view, is to investigate the results of the tax reform of 1 January 2019 – an increase in the standard VAT rate from 18% to 20%. Such analysis could be useful in devising guidelines and recommendations for optimization of the tax structure and VAT preferences in Russia.

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