Estimation of Profit Taxation Effect on Russian Companies' Investments

S.G. Belev[1,2] , **E.O. Matveev[1,3]** ✉, **N.S. Moguchev[1]**

[1] *Russian Presidential Academy of National Economy and Public Administration, Moscow, Russian Federation*

[2] *Ye.T. Gaidar Institute for Economic Policy, Moscow, Russian Federation*

[3] *Lomonosov Moscow State University, Moscow, Russian Federation*

✉ *matveev-eo@ranepa.ru*

ABSTRACT

Lak of investments in fixed assets which stimulate economic growth is one of the problems of the modern Russian economy. According to the main hypothesis of the research, that corporate profit taxation decreases companies' investment level, we aimed to assess the level of impact of profit taxation on investments in fixed assets. To test the hypothesis, we estimate the empirical investment equation, using the indicator of tax burden as one of the factors affecting investment. The theoretical basis of the research is the neoclassical cash-flow model. The marginal effective tax rate (METR) was used as an indicator of the tax burden. The empirical equation was estimated using a random effects model on the panel microdata, which includes financial statistics of 4,000 Russian companies for the period 2014–2018. The sample companies represent 78 regions of Russia and about 50 types of economic activity. We assumed heterogeneous effect of profit taxation and estimated the model separately for each of the three groups of companies differing in the degree of financial constraints. According to the results obtained, for the entire sample, for the entire period under review, we observe a negative impact of the marginal effective rate on the level of investment, significant at the 1% level. In aggregate, if the marginal effective tax rate falls by 1 percentage point, the investment level will increase by 0.05 percentage points. We obtained the following main results: profit taxation has a significant negative effect on the level of investment for companies that are not financially constrained, and the effect is not observed for financially constrained companies; younger companies are more sensitive to changes in profit taxation. However, general sensitivity of investment to profit taxation is quite modest.

KEYWORDS

Investment, profit taxation, tax burden, effective marginal tax rate, loss carry forward, financial constraints.

JEL H25, H32, C13

Оценка влияния налогообложения прибыли на инвестиции российских компаний

С.Г. Белев[1,2] , **Е.О. Матвеев[1,3]** ✉, **Н.С. Могучев[1]**

[1] *Российская академия народного хозяйства и государственной службы при Президенте Российской Федерации, г. Москва, Россия*

[2] *Институт экономической политики имени Е.Т. Гайдара, г. Москва, Россия*

[3] *Московский государственный университет имени М. В. Ломоносова, г. Москва, Россия*

✉ *matveev-eo@ranepa.ru*

АННОТАЦИЯ

Одной из самых острых проблем современной российской экономики является низкий уровень инвестиционной активности бизнеса. Согласно неоклассической теории инвестиций, низкая инвестиционная активность российских

компаний может объясняться высокой налоговой нагрузкой. В данной работе оценивается масштаб влияния налогообложения прибыли на инвестиции в основные фонды. Основная гипотеза заключается в том, что налогообложение прибыли снижает уровень инвестиций. Теоретической основой исследования является неоклассическая модель потоков денежных средств. В качестве индикатора налоговой нагрузки для эмпирической оценки инвестиционной функции использовалась предельная эффективная ставка налога (METR), которая представляет собой ставку налога на предельную единицу прибыли и позволяет оценить влияние налогообложения прибыли на интенсивное развитие компании, в том числе на наращивание инвестиционной активности. Эмпирическое уравнение оценивалось с помощью модели случайных эффектов на панельных микроданных по финансовым показателям 4000 российских компаний за период 2014-2018 гг. В предположении о неоднородности эффекта налогообложения прибыли, модель оценивалась отдельно для трех групп компаний, различающихся степенью финансовых ограничений. Получены следующие основные результаты: налогообложение прибыли оказывает значимое отрицательное влияние на уровень инвестиций компаний, не ограниченных в финансовых ресурсах; инвестиции финансово ограниченных компаний оказываются не чувствительны к изменению налоговой нагрузки; более молодые компании чувствительнее к изменениям в налогообложении прибыли. Однако общая чувствительность инвестиций к налогообложению прибыли достаточно умеренная.

КЛЮЧЕВЫЕ СЛОВА

инвестиции, налогообложение прибыли, налоговая нагрузка, предельная эффективная ставка налога, перенос убытков прошлых периодов, финансовые ограничения

1. Introduction

One of the most acute problems of the modern Russian economy is the low level of business investment activity. Investments in fixed assets are necessary in order to stimulate economic growth. One of the possible incentive factors could be a reduction in the level of taxation of corporate profits, since according to the neoclassical theory of investment, taxation of corporate profits increases the cost of capital resources and, accordingly, capital return requirements, which negatively affects investments in fixed assets [1; 2].

According to the World Bank, the total effective rate of all taxes and contributions levied on firms (in % of profits) in Russia exceeds 45% (as of the beginning of 2020), which is significantly higher than the level in the OECD countries and the countries of Europe and Central Asia. Thus, it can be assumed that the high level of tax burden is the reason for the low level of investment activity of Russian companies.

The purpose of this work is to assess the level of impact of profit taxation on investments in fixed assets. Thus, the main hypothesis of the research is that corporate profit taxation decreases companies' level of investment.

To test the hypothesis, we estimate the empirical investment equation, using the indicator of tax burden as one of the factors affecting investment. Most authors use marco-level, regional or, rarely, industry-level data to estimate the investment equation. In this research we use company-level microdata, which allows us for the additional variation in tax burden. The empirical problems that we consider are the choice and calculation of profit tax burden indicator and accounting for companies' heterogeneity in the degree of financial constraints.

The paper is structured as follows: in the "literature review" section we present the experience of solving the problems in estimating tax effects on investments; in the next section we describe specific methods and data used; in the "results and discussion" section we present the results of empirical investment equation estimation and interpret it; in the last section we make concluding remarks.

2. Theoretical basis

One of the most challenging problems in assessing the impact of profit taxation on the behavior of companies is the choice tax burden indicator. In most empirical studies authors usually use the following corporate income tax indicators:

− legally established income tax rate (statutory tax rate – STR);

− average income tax rate (ATR);

− average effective income tax rate (AETR);

− marginal effective income tax rate (Marginal ETR – METR).

The statutory corporate income tax rate is the simplest indicator, but at the same time also the least accurate. This indicator is not applicable in cross-country studies, because it does not consider the specifics of determining the tax base. In addition, the profit taxation system usually includes many various benefits, deductions, etc., which are not considered in the legally established income tax rate. Since the corporate income tax rate is a stable indicator over time, it is almost impossible to use it for in-country research.

The average corporate income tax rate and the effective corporate income tax rate are the result of applying two different approaches to calculating the empirical indicator of profit taxation: the backward-looking approach and the forward-looking approach [3].

The average corporate income tax rate is based on historical data and is calculated as the ratio of accrued income tax to profit before tax. For example, in the work [4] the issue of the impact of profit taxation on the investment activity of companies in Russia is investigated. The average rate was used to evaluate the tax burden at the regional level.

The variation of the rate is provided by the presence of various tax benefits: accelerated depreciation [5–7], investment tax credit [8], tax loss carryforward [9] and other tax deductions [10].

However, best indicator to assess the impact of taxation on the investment behavior of companies the is still the effective corporate income tax rate.

The effective corporate income tax rate is based on an assessment of the potential future profitability of investment projects (investments in capital). The effective tax rate shows how much taxation reduces the return on investment. At the same time, the average effective tax rate is an indicator on average for all investments, and the marginal effective tax rate is an indicator for an additional unit of investment. In other words, the marginal effective tax rate shows how much taxation increases the pre-tax rate of return required by investors to reach the break-even point [11]. It can also be said that the marginal effective tax rate is the tax rate per marginal unit of profit (~per additional ruble of profit).

The method of calculating the effective tax rate is based on the cost of using capital, introduced in [2]. The method of estimating the effective tax rate itself was introduced in the study [12]. The method was improved by including in the calculations various types of assets, sources of financing and methods of depreciation (including various benefits, such as accelerated depreciation or investment tax credit) [13–15].

In [16], an attempt was made to estimate the marginal effective tax rate on microdata, and the authors also estimated the elasticity of the tax base at the marginal effective tax rate. In [17], they propose a unified approach to the assessment of the marginal effective tax rate, which is used by OECD specialists. The authors of the study [18] include labor taxes and indirect taxes in the assessment of the marginal effective tax rate and examine the influence of the presence of monopoly power on the determination of the marginal effective tax rate.

So, the average effective tax rate allows us to assess the impact of the tax system on investment projects that bring economic rent. Like the usual average tax rate, the average effective tax rate is more suitable for assessing the impact of profit taxation on the extensive development of a firm (for example, the choice of jurisdiction for a branch of an international company) [17].

The marginal effective tax rate, in turn, allows us to assess the impact of profit taxation on the intensive development of the firm, including incentives to increase investment activity [19]. Thus, for the purposes of the current study, the most appropriate empirical indicator of profit taxation is the marginal effective corporate income tax rate. However, the calculation of this indicator requires precise data on companies' asset and finance structure, especially on microlevel.

On the other hand, the authors of many theoretical papers note that if the capital structure of a firm changes slightly, and the tax system is arranged in such a way that benefits do not affect the tax base (only the rate), then the marginal effective tax rate differs slightly from the average corporate income tax rate [20]. The most common benefit affecting the tax base is the tax loss carryforward. In this regard, it is this benefit that can be considered the main factor in the existence of differences between the marginal effective rate and the average corporate income tax rate in Russia. The marginal effective rate is calculated further based on this conclusion.

Another challenge is to choose other factors, that affect investments, so-called control variables. Various studies identify several factors that, under certain conditions, can affect the level of investment. In [21], the authors consider an extended formulation of the model with the possibility of debt financing. The model introduces the probability of bankruptcy and the loan rate, which depend on the volume of borrowings. The authors conclude that the equilibrium level of investment negatively depends on the debt burden of the firm.

The authors of [22] investigate the impact of financial constraints on the investment behavior of firms within the framework of the cash flow model. The costs of external financing are introduced into the model. The authors conclude that investments are positively related to the stock of the company's own funds.

In several other works, special indices were used as indicators of the presence of financial constraints in firms. For example,

the KZ index in [23], which considers both the parameters of the difficulty of attracting external financing and the parameters of the availability of own funds. The authors of the study [24] propose a WW index, which is supplemented by industry indicators. The study [25] uses the HP index, which is based on the size and age of the company. The parameters of these indices were evaluated on samples in which there were companies that obviously have financial constraints. Thus, many authors note the importance of factors of accessibility of investment sources, i.e. factors of financial constraints of companies, which determines, among other things, the cost of using capital.

However, several more modern works [26; 27] note the imperfection of indicators of financial constraints of firms. In particular, it is important to understand that financial constraints can not only directly affect a firm's investment decisions, but also change its sensitivity to changes in other factors. In addition, some factors, such as the debt-to-capital ratio and the individual interest rate, may be endogenous in relation to the level of investment, i.e. for example, if a firm finances most of its investments with debt, with an increase in investments, there will be an increase in the level of debt, and, as a result, other things being equal, an increase in the average interest rate on the firm's borrowings.

Thus, one of the possible approaches to solve some of the emerging empirical problems is to divide the initial sample into groups according to the parameters responsible for the financial constraints of the firm. After that, the model is evaluated separately for each selected group, and the grouping parameters are excluded from the equation. For example, in [28] the result was obtained that small-sized firms are almost twice as sensitive to changes in the marginal effective tax rate due to changes in depreciation than large firms.

Some studies note the importance of such factors as the volume of investments in other industries [29], uncertainty [30], information asymmetry [31], the choice of the source of investment financing [32]. However, given the availability and struc-

ture of the data, it is not possible to assess the impact of these factors.

So, according to the literature review, the most appropriate indicator to assess the impact of taxation on the investment behavior of companies is the marginal effective tax rate. In certain conditions this indicator can be calculated based on the average corporate income tax rate. To account for companies' heterogeneity in the access to financial resources, the one should divide the initial sample into corresponding groups. We use these conclusions in the next section and describe specific methods and data of the research.

3. Method and Data

The theoretical basis of the work is the neoclassical theory of investments and the cash-flow model of Jorgenson [1; 2]. According to this model, the optimal level of capital that a firm chooses positively depends on the parameters of the production, the company's revenue, and negatively on the marginal cost of using capital, which in turn is determined by the alternative cost of capital (the level of income that could be obtained without acquiring an additional unit of capital). The higher the cost of using capital, the higher the tax burden on the income that a unit of capital brings. In other words, the cost of using capital depends on the marginal effective tax rate. In turn, net investments (excluding recovery investments) determine the change in the company's capital.

Thus, investments, as a change in capital, will depend on changes in revenue and the marginal cost of using capital, including the marginal effective tax rate. The basic specification of the empirical equation of the investment of firm I in the period t in this case looks like this:

$$\frac{I_{i,t}}{K_{i,t}} = \beta_1 \cdot \frac{\Delta pQ_{i,t}}{pQ_{i,t}} + \beta_2 \cdot METR_{i,t} + \\ + \beta_3 \cdot X_{i,t} + \theta_t + \mu_i + \varepsilon_{i,t}, \quad (1)$$

where $I_{i,t}/K_{i,t}$ – investments relative to capital; $\Delta pQ_{i,t}/pQ_{i,t}$ – relative change in revenue; $METR_{i,t}$ – marginal effective income tax rate; $X_{i,t}$ – a set of control variables, which include factors of the cost of

using capital that change over time. For example, the lower the cost of using capital, the higher the return on capital. Therefore, it would be reasonable to include in the equation the return on assets at the end of the previous period; θ_t – fixed time effects that include factors common to all firms, but changing over time; μ_i – fixed firm effects that include factors that do not change over time; $\varepsilon_{i,t}$ – a random error of the model.

3.1. Description of the data

To evaluate the obtained empirical specification, panel microdata was collected on the financial statements of 4000 Russian companies for the period 2014–2018. Data on companies was obtained from the SPARK database[1]. The sample companies represent 78 regions of Russia and about 50 types of economic activity (according to OKVED-2). The sample contains the following financial reporting indicators:

– assets – an indicator of the company's total (equity and debt) capital (K);
– deferred tax assets;
– deferred tax liabilities;
– revenue – (pQ);
– profit (loss) before taxation;
– current income tax;
– net profit (loss);

In addition, the sample contains data on the age of the company, return on assets, the due diligence index (shows the probability that the firm is a "fly-by-night" or "one-day" company) and the financial risk index (reflects the probability of the company's insolvency). The last two indicators are calculated by the SPARK system.

The Table 1 shows some descriptive statistics of the resulting sample.

Let's look at how the key variables of the empirical specification were calculated:

– $\Delta pQ_{i,t}/pQ_{i,t}$ – increase in the "Revenue" indicator compared to the previous period;

– $I_{i,t}/K_{i,t}$ – the ratio of the change in the indicator "Assets" to assets at the end of the previous period.

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[1] SPARK database. Available at: http://www.spark-interfax.ru/

The value of the company's assets was chosen as the indicator responsible for capital (a variable that allows moving to a single scale in the empirical equation). An alternative to this indicator is the indicator of the company's Fixed assets. However, the importance of physical capital may differ significantly depending on the type of activity of the company, and therefore the indicator of the company's assets seems to be a more relevant choice.

It is necessary to consider in more details how the indicator of the marginal effective interest rate was calculated.

3.2. The marginal effective interest rate

As noted earlier, under certain conditions, the marginal effective income tax rate can be calculated based on the average tax rate, taking into account certain adjustments. Considering the specifics of Russian tax legislation, the most important adjustment is the adjustment for transferable losses, the absence of which can lead to significant discrepancies between the marginal effective and average income tax rates (for more information

about changes in legislation regarding the regulation of tax loss carryforward and the effects of this rule, see [33]). Consider the following example (Table 2).

The table above describes two cases with a 50% loss transfer limit (in accordance with current legislation, the restriction was introduced on January 1, 2017). In the first case, the company has a significant accumulated loss exceeding the size of its current profit. Then the additional unit of profit in calculating the tax base will also be reduced by 50% due to the losses carried over, and the marginal income tax rate will not differ from the average. In the second case, the accumulated loss is less than 50% of the company's current profit. Then the additional unit of profit when calculating the tax base will not be reduced, and the marginal rate will be higher than the average.

Thus, let τ be the "base" rate (taking into account benefits), and γ be the loss transfer limitation coefficient, then:

– If the accumulated losses are greater $EBT \cdot \gamma$, то $ATR = MTR = (1 - \gamma) \cdot \tau < \tau$;

– If the accumulated losses are less $EBT \cdot \gamma$, то $ATR < MTR = \tau$.

Table 1

The average values of some indicators for the sample of companies under consideration

Indicators	2014	2015	2016	2017	2018
The age of the company, years	12	13	14	15	16
Revenue, million rubles	461.99	519.58	596.76	677.70	791.42
Assets, million rubles	417.83	491.36	577.33	666.19	764.87
Current income tax, million rubles	4.01	5.09	6.82	8.73	12.05
Carryforward losses, million rubles	–19.74	–37.42	–50.35	–52.90	–72.77
Investments (change in capital), million rubles	31.35	28.34	32.47	37.36	35.85

Source: calculations of the authors of the study.

Table 2

A numerical example with a limit of 50% for tax loss carryforward

Indicators	Case 1 (Accumulated loss = 50)		Case 2 (Accumulated loss =10)	
	X	$x + \Delta$	x	$x + \Delta$
Profit before tax (EBT)	40	41	40	41
Losses reducing the tax base	20	20,5	10	10
Tax base	20	20,5	30	31
Income tax	4	4.1	6	6.2
Average Rate (ATR), %	10	10	15	15
Marginal Rate (MTR), %	10		20	

Source: compiled by the authors of the study.

The Table 3 shows an example based on real data.

Thus, due to the presence of transferable losses incurred in 2016, the marginal income tax rate in 2017 differs from the average.

To correct this discrepancy, data on accumulated losses of the companies included in the sample were collected. If the company had accumulated losses, then the tax base (Profit before tax indicator) decreased by the amount of min (0.5* Profit before tax; Accumulated loss). Further, the Current income tax indicator was adjusted for deferred tax assets and liabilities (Current income tax-ΔDeferred tax assets+-ΔDeferred tax liabilities). To obtain an indicator of the marginal effective income tax rate, the adjusted income tax was related to the adjusted tax base (Figure 1).

According to Figure 1, there is a fairly significant variation in the marginal income tax rate for companies in the sample with certain peaks in the area of zero and maximum rates.

Thus, due to the panel data structure and the need to take into account time effects and individual effects of companies, panel data models will be used to evaluate the equations. From the point of view of theory, since the sample of companies considered in this paper is a random sample from the general number of Russian companies, the most appropriate model would be with a model with random effects with the inclusion of fictitious variables of time periods.

Table 3

An example of the existence of differences between the average and marginal income tax rates

LLC	2014	2015	2016	2017	2018
Revenue, rubles	1,301,901,000	1,395,373,000	1,283,247,000	1,486,830,000	1,654,942,000
Profit before taxation, rubles	243,551,000	283,165,000	–49,614,000	107,713,000	209,123,000
Current income tax, rubles	47,827,000	46,764,000	4,668,000	9,175,000	34,425,000
Profitability before taxation, %	18.7	20.3	–3.9	7.2	12.6
Profitability after taxation, %	15.0	16.9	–4.2	6.6	10.6
ATR, %	19.6	16.5	–	*8.5*	16.5
MTR, %	19.6	16.5	–	*15.79*	16.5

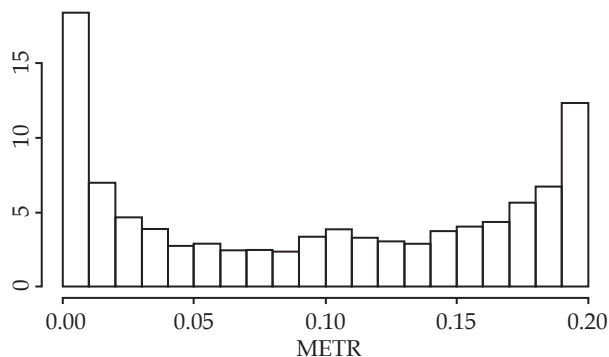*Source*: compiled by the authors of the study.

Figure 1. Frequency distribution of the marginal effective income tax rate for the sample companies in 2018

Source: calculations of the authors of the study

3.3. Clustering of observations

Before proceeding to the evaluation of the model equation, it is necessary to divide the sample companies into groups according to factors related to the financial constraints of the companies.

Based on the theoretical literature discussed above, we selected 4 key indicators for clustering companies: age (years), size (value of assets), due diligence index (shows the probability that the company is a "one-day firm") and financial risk index (probability of insolvency of the company). For clustering, the corresponding indicators were standardized (reduced by the average value and divided by the standard deviation) in order to eliminate the scale effect.

Clustering was carried out on the basis of the k-means method. The number of clusters was selected based on two criteria: reduction of intra-group variance and economic interpretability of clusters. The choice was made in favor of 5 clusters.
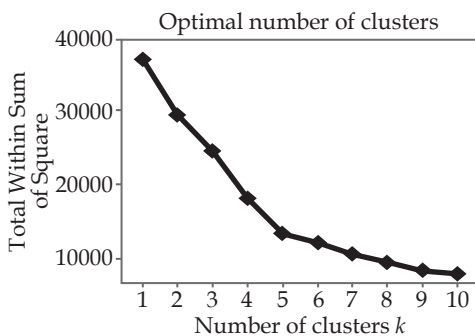

Figure 2. **The sum of intra-group sums of squares depending on the number of clusters**

Source: calculations of the authors of the study

According to Figure 2, the addition of more than 5 clusters significantly reduces intra-group variation. On the other hand, the economic interpretability of clusters is falling.

Table 4 shows the results of dividing the sample of companies into clusters.

Thus, 5 clusters of companies were obtained. Cluster 3 includes the so-called one-day firms. Usually, such firms are created not for the purpose of conducting real economic activity, but for the purpose of implementing various schemes for the redistribution of funds, often illegal from the point of view of tax legislation. In any case, the study of the investment behavior of such firms is not of particular interest. The second cluster includes large companies. Obviously, the effect of changing the marginal tax rate on the investment behavior of large corporations will differ from the corresponding effect for the average company. Large corporations have more tax optimization schemes available and we can expect less sensitivity of investments of large companies to changes in the marginal tax rate. However, due to the small number of the resulting cluster, it is difficult to obtain quantitative estimates of the studied effect.

Next, the results of the evaluation of the empirical model for clusters 1, 4 and 5 will be presented. According to Table 4, it can be assumed that the group of "Old middle-sized" and "Reliable middle-sized" are not limited in funding, because they have low IDO and IGF values. The "Risky middle-sized" group, on the contrary, should be considered as limited in funding.

Table 4

The result of clustering of the sample of companies under consideration by the k–means method

Number of cluster	Size	IGF	IDO	Age	Number of employees	The name of the cluster
1	−0.08	−0.48	−0.24	1.03	3151	Old middle-sized
2	12.47	0.69	−0.28	−0.68	32	Large
3	−0.26	0.52	5.33	−0.87	209	One-day
4	0.03	1.63	−0.03	−0.20	1978	Risky middle-sized
5	−0.04	−0.49	−0.08	−0.69	3815	Reliable middle-sized

Note: IGF – financial risk index; IDO – due diligence index. The cells represent the average values of the standardized corresponding indicators.

Source: calculations of the authors of the study.

4. Results and discussion

Empirical equation (1) was evaluated using a random effects model for selected groups of observations. The equation also included an indicator of the marginal effective tax rate with a lag in 1 period. It is assumed that investment decisions may be made with a delay, and therefore the marginal effective rate of the previous period may be decisive.

In addition, as noted earlier, starting from 2017, in Russia the tax loss carryforward had been limited to 50% of the current period's profit. In conditions of limited benefits, the effect of changes in the marginal effective interest rate may become more pronounced starting in 2017. In this regard, the model was separately evaluated for the entire sample and for the period from 2017 to 2018. In addition, it allows you to evaluate the stability of the conclusions over time. The evaluation results are presented in Table 5.

According to the results obtained, for the entire sample, for the entire period under review, we observe a negative impact of the marginal effective rate on the level of investment, significant at the 1% level. Moreover, the effect is observed both for the bet in the current period and for the lag of the bet. In aggregate, if the margi-

nal effective tax rate falls by 1 percentage point, the investment level will increase by 0.05 percentage points. At the same time, the results are preserved separately for the period 17–18, the effect of reducing the tax rate becomes more pronounced, especially the effect of the current rate. Control variables, such as revenue growth and return on assets, do not have a particularly significant effect when evaluating the entire sample.

Model estimates separately for groups without financial constraints, i.e. for "Old middle-sized" and "Reliable middle-sized", correspond to estimates for the entire sample in terms of the impact of the marginal effective rate. The cumulative effect of a 1 percentage point drop in the tax rate for the "Old middle-sized" is 0.044 percentage points of growth in the level of investment for the entire period, and 0.068 percentage points for 17–18 years. For "Reliable middle-sized" – 0.082 percentage points and 0.106 percentage points, respectively.

Thus, for reliable, younger firms, the effect of changing the marginal effective tax rate is more pronounced. In other words, younger companies are more sensitive to changes in the tax rate. This may be due to the greater flexibility of young companies and a more active investment

Table 5

**The results of the evaluation of the empirical model using a model with random effects.
The dependent variable is the ratio of investments to capital**

Indicators	Full info		Old middle-sized		Risky middle-sized		Reliable middle-sized	
	Whole period	17–18 yy.	Whole period	17–18 yy.	Whole period	17–18 yy.	Whole period	17–18 yy.
METR	–0.03***	–0.045***	–0.024***	–0.048***	–0.002	0.004	–0.058***	–0.077***
METR(-1)	–0.02***	–0.02***	–0.02***	–0.02**	0.01	0.01	–0.024***	–0.029***
Revenue growth	3e-09	–8e-010	3e-09***	3e-09***	–3e-09	–4e-08**	1e-08	6e-08
ROA(-1)	0.0005	0.0004*	0.06***	0.08***	0.004*	–7.6e-05	0.0003**	0.0003**
Temporary effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	25495	13134	8689	4298	5221	2749	10557	5518
Logarithm of likelihood	17910	8011	9279	4370	2792	1240	7927	4132

Note: * denotes significance at the 10 percent level; ** denotes significance at the 5 percent level; *** denotes significance at the 1 percent level.
Source: calculations of the authors of the study.

policy. In addition, it is possible to note a positive significant impact of return on assets on investments for both groups under consideration, but for "Reliable middle-sized" companies it is less pronounced.

Also, the level of investment of "Old middle-sized" firms has a weak significant positive impact on revenue growth, it can be concluded that older companies are more focused on changes in demand, which reflects changes in revenue, and non-tax factors of the cost of using capital. For younger firms, all capital cost factors are important. This may be due to the fact that older firms have a better tax optimization system.

As for the "Risky middle-sized" firms, the evaluation of the model for this group does not reveal a significant impact of the marginal effective tax rate on their investment behavior. "Risky middle-sized" companies are financially limited, i.e. they do not have the opportunity to finance existing investment projects. In this case, indicators that affect the return on investment (such as METR) do not have a significant impact on the level of investment. Moreover, this effect is stable both for the entire sample period and for the period of 17–18 years.

In all the results shown in Table 5, binary variables of time periods were used as control variables to account for time effects. The exclusion of these variables does not lead to significant changes in the evaluation results, i.e. the results are resistant to the inclusion of these variables.

5. Conclusion

From the point of view of the theory, corporate income tax is not optimal, because it distorts the decisions made by the firm, including investment decisions. When deciding whether to introduce or change an income tax, government officials should compare the benefits, such as replenishing budgets and financing government projects, and the costs of collecting of income tax.

In this paper, an attempt was made to assess the scale of the distorting effect of profit taxation on investment decisions of firms in Russia. For this purpose, an empirical model was built and evaluated on the data.

According to existing research, the most accurate empirical indicator of the tax burden for assessing the impact on investment decisions is the marginal effective income tax rate. It is necessary to consider the company's capital structure, depreciation rules for various types of capital, investment tax credits and other benefits. However, under certain conditions, the marginal effective rate can be calculated based on the average rate, which was done in the framework of this article. The reason for such an approach is limitations in the availability of data. Micro-level data on the capital structure and tax benefits of companies in Russia are not publicly available.

The latest publications note the need to consider the availability of financing when assessing the investment behavior of firms. In this case, one of the possible solutions may be to divide companies into groups with varying degrees of financial limitations. In this paper, groups without financial constraints were identified – "reliable middle-sized" and "old middle-sized" companies, as well as a group with restrictions – "risky middle-sized" companies.

Thus, based on model estimation for various groups, the following conclusions can be made:

– in general, profit taxation do have negative effect on companies' level of investment in fixed assets, which confirms the main hypothesis;

– the marginal effective corporate income tax rate has a significant negative impact on the level of investments of firms that are not limited in financial resources;

– financially limited companies do not have the opportunity to finance existing profitable investment projects and any available funds will be used to increase investments regardless of the tax rate, i.e. the marginal effective corporate income tax rate does not have a significant impact on their investment behavior;

– younger firms are more sensitive to changes in the marginal effective corpo-

rate income tax rate, and older firms are more focused on changes in demand for products;

– the cumulative change in the level of investments relative to the company's assets in response to a one-time change in the marginal effective corporate income tax rate by 1 percentage point is in the range from 0.044 percentage points to 0.106 percentage points, i.e. the effect is quite moderate. Nevertheless, the effect is consistently significant for young firms, which should be considered for tax policy's purposes.

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Acknowledgements

Information about the authors

Sergei G. Belev – Cand. Sci. (Econ.), Associate Professor, Senior Researcher of the Budget Policy Research Laboratory of the Applied Economic Research Institute, Russian Presidential Academy of National Economy and Public Administration (82/1 Vernadsky ave., Moscow, 119571, Russian Federation); Head of Budget Policy Laboratory "Macroeconomics and Finance" Research Area, Ye.T. Gaidar Institute for Economic Policy (3-5 Gazetny lane, Moscow, 125993, Russian Federation); ORCID: https://orcid.org/0000-0003-3962-7428; e-mail: belev@ranepa.ru

Evgenii O. Matveev – Researcher of the Budget Policy Research Laboratory of the Applied Economic Research Institute, Russian Presidential Academy of National Economy and Public Administration (82/1 Vernadsky ave., Moscow, 119571, Russian Federation); Assistant of the Mathematical Methods of Economic Analysis Department, Economics Faculty, Lomonosov Moscow State University (GSP-1, Leninskie Gory, Moscow, 119991, , Russian Federation); ORCID: https://orcid.org/0000-0002-4732-8818; e-mail: matveev-eo@ranepa.ru

Nikita S. Moguchev – Researcher of Budget Policy Laboratory, Ye.T. Gaidar Institute for Economic Policy (3-5 Gazetny lane, Moscow, 125993, Russian Federation); ORCID: https://orcid.org/0000-0002-2727-6192; e-mail: moguchev@iep.ru

Journal of Tax Reform. 2022;8(2):127–139

Информация об авторах

Белев Сергей Геннадьевич – кандидат экономических наук, доцент, старший научный сотрудник лаборатории исследований бюджетной политики Института прикладных экономических исследований, Российская академия народного хозяйства и государственной службы при Президенте Российской Федерации (119571, Россия, г. Москва, пр-т Вернадского, 82, стр. 1); заведующий лабораторией бюджетной политики Научного направления «Макроэкономика и финансы», Институт экономической политики имени Е.Т. Гайдара (125993, Россия, г. Москва, Газетный пер., 3–5, стр. 1); ORCID: https://orcid.org/0000-0003-3962-7428; e-mail: belev@ranepa.ru

Матвеев Евгений Олегович – научный сотрудник лаборатории исследований бюджетной политики Института прикладных экономических исследований, Российская академия народного хозяйства и государственной службы при Президенте Российской Федерации (119571, Россия, г. Москва, пр-т Вернадского, 82, стр. 1); ассистент кафедры математических методов анализа экономики экономического факультета, Московский государственный университет имени М.В. Ломоносова (119991, Россия, г. Москва, Ленинские горы, д. 1); ORCID: https://orcid.org/0000-0002-4732-8818; e-mail: matveev-eo@ranepa.ru

Могучев Никита Сергеевич – научный сотрудник лабораторией бюджетной политики, Институт экономической политики имени Е.Т. Гайдара (125993, Россия, г. Москва, Газетный пер., 3–5, стр. 1); ORCID: ORCID: https://orcid.org/0000-0002-2727-6192; e-mail: moguchev@iep.ru