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Taxation and Capital Structure: Evidence from Russian Companies

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Abstract

This paper presents a study of the impact of taxation on the capital structure of Russian companies, based on the Graham model. The study revealed that it is more appropriate to include the effective tax rate in the model, rather than use the marginal tax rate since it is more applicable for the Russian companies.

Keywords: Taxation, Capital structure, Russian companies, Bankruptcy probability, Effective tax rate, Debt.
JEL Classification: G32, G38 and R3.

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1. Introduction

To date, the possibility of having a definitive capital structure for each company, by itself, has caused much controversy, as well as the question: do the companies, issuing debt or equity, try to make their ratio unified, or do they only have instantaneous motifs and pay attention to exogenous factors that change with time?

Considering that companies, by virtue of their nature, are economically rational, it is supposed that, by taking one or another decision, the company aspires to maximize its price. Hence these considerations also define the decision about their capital structure. In this respect, it isn't surprising that this question is widely discussed among the economists in different countries, since it is the key to understand the companies' motivation, as well as to develop a definitive strategy assuring the best results.

As early as in 1958, Modigliani and Miller (1958) put forward a hypothesis that the company's price didn't depend on the corporate securities' structure (the equity to debt ratio), with allowance for a «perfect capital market», absence of information asymmetry, corporate and individual income taxes, transaction costs etc. But soon the researchers published another scientific effort (Modigliani and Miller, 1963), aimed at amending the previous one, where they introduced the pre-condition about corporate income taxes. This time, they came to the conclusion that taxes influence directly the capital structure of the company, because when using debt, the so-called tax shield appears that appreciates the company's price, being directly dependent on the amount of debt. The present conclusion implies that in theory every company should omit the ownership equity and convert to debt financing, in an effort to increase their price. However, that was not the case in reality. From this point on, many researchers have tried to loosen the original terms of the Modigliani – Miller hypothesis by indicating the imperfections in the model, such as individual income taxes, costs of financial distress, caused by the usage of debt etc. Most of the theories, however, couldn't explain and, what's the most important, establish a prognosis for the amount of used debt for different companies. The influence of corporate income taxes on the capital structure is, nevertheless, is indubitable, which is why the majority of the researchers were guided exactly by this condition, when trying to explain the choice of the company's capital structure. This work presents the approach of different researchers to this issue, it follows the scientific thought in its effort to explain empirical observations, and thoroughly examines the model, created by Graham (1996), as well as gives the own approach, based on Graham's concept.

2. Literature Review

Graham put a lot of effort (Graham, 1996; 2000) trying to show the influence of tax factors on the company's strategy about changing of its capital structure. In particular, he concluded that companies with high taxation rate resort to debt more frequently than the other ones.

As the main tax factor, Graham uses the marginal tax rate (MTR) that fairly defines the taxable status of the company. By the marginal tax rate we mean present tax value the company should pay additionally during the running and the forward period, in case of a $1 increase in income in the running period. In contrast to effective tax rate, calculated as ratio of effective paid taxes to the taxable base for a certain period, the MTR can't take negative values. It also depends on such specific factors of the tax system, as tax loss carryforward/carryback, investment tax credits, and the alternative minimum tax, considered below. If the company has enough similar non-debt tax shields (NDTS) to decrease the estimated MTR, the company will issue less debt, than a similar company that doesn't take advantage of NDTS.

The author uses incremental changes in the debt, in contrast to the cumulative level. To illustrate it, he gives us the following example: the company that doesn't use debt faces a high MTR and decides to issue debt for further use of interest deductions. At that, the dependency between the tax rate and the debt option takes a positive value, as is evident. At the same time, increase of debt obligations reduces the expected marginal rate, because the probability goes higher that the company is at a loss and won't pay out the debt. The result is that the observations can contribute to finding the inaccurate negative dependency between the tax rate and the MTR.

The principle of tax loss carryforward/carryback says that if the company has a negative profit in the running period, it has the right to offset losses against taxable gains for the last 3 years (until all the losses are offset against gains), thereby refunding the tax on income from the budget. If a part of losses still remains after the setoff, it can be carried forward in the following 15 years. So, tax loss carryforward is only possible if there are no possibilities for its carryback. The dependency between losses and the MTR can take positive value. For example, the company's losses in the running period are exactly the same as the amount of gains for the last 3 years. In this case, one earned dollar reduces the amount of refunded taxes for the prior periods by the amount t_c (corporate income tax rate). In other words, the MTR can be high, even if there are losses in the running period. Reverse situation is also possible, when the company is profit-making in the running period but expects losses in the forward periods, so the taxes for the running period will be refunded from the budget during the next period. In this case the MTR equals the difference between t_c and t_c, discounted for one period, namely in absolute terms it's a relatively low rate, in spite of positive profit in the running period.

One of allowances specific for the American tax system is the investment allowance. It is based on the principle, according to which the company can offset 7% of capital costs for the first $25 000 of the tax and for 85% of the amount of tax over $25 000. The present allowances can be also carried back/forward during 3 (15) years. Later on, the particularities of this legislative act have changed, but, as the Graham's research concentrates on the period from 1980 to 1992, the present provisions seriously influence the MTR.

Speaking about the alternative minimum tax (AMT), introduced during the 1986 tax reform, the present principle was used to make sure that companies with positive profits pay the taxes anyway. For such tax, the taxable base was calculated a bit differently for such tax, and the tax rate amounted to 20% at the time. Furthermore, the companies were obliged to pay out the biggest amount out of two – the effective income tax or the alternative minimum tax, calculated according to the specified method. It was evident that companies with profits being about zero were the most often subjects to this principle.

The option of tax loss carryforward/carryback brings us to rational examination of profits during the 18 year period for each particular company, to calculate the MTR more objectively. To forecast taxable profit, Graham judges on the observed average profit changes in the sample, as well as on a normally distributed random variable with expected value 0 and a dispersion equivalent to the one in the sample of average changes.

When calculating the MTR for the running period, in the first place you should find the anticipated levels of taxable profit in the next 18 periods. Then you take into account the tax loss carryforward/carryback and calculate the effective income tax liability in each of the 3 periods prior to the running period, and of the 18 periods following. The tax liabilities, due to be paid out after the running period, are discounted according to the average yield rate of corporate bonds. Then you proceed to conversion of present value of payable taxes, due to adding $1 to the running period's profits. The difference between the two values is exactly the marginal tax rate for the company, for the present period, based on the simulation of profits. This procedure is performed 50 times to generate different variations of the estimated profit in following periods. Later on, you calculate the average rate basing on the 50 previously generated, which is exactly the estimated MTR for the company, for the present period.

2.1. The Dependent Variable

The author uses change in the book cost of the long-term debt for the running period, divided by the sum of the company's market price for the previous period, as the dependent variable. The company's market price is the sum of book cost of debt and the market price of the stockholders equity.

2.2. Explanatory Variable: Marginal Tax Rate

MTR is used as one of the explanatory variables. The technology for its calculation has been described earlier. What is more, to avoid the situation when the debt changes reduce the marginal tax rate by artificial means, which can affect the faithfulness of the results, the author resorts to isolated lag for the MTR.

Income volatility also impacts the debt policy, which is very relevant for companies facing the nonresidue of interest expenditures. Volatility reduces the MTR of the companies that can't exclude interest expenditures because of the loss carryforward. In this case, a high standard deviation of the MTR can be indicative of higher tax payable, and provoke a more aggressive debt policy (in other words, the coefficient before the $\boldsymbol{\sigma_{MTR}}$ should take positive value).

At last, Graham uses the difference between the active and the marginal tax rate for the previous period as explanatory variable, explaining that the managers of certain companies, while choosing the financial policy, draw on the active, official tax rate. So, for companies with higher difference between these two rates, the probability of debt issue is higher than for companies with equal marginal and fixed rates.

2.3. Explanatory Variables: Individual Tax Assessment

This variable adds to the dependency the investor's attitude towards the debt, namely his estimates for profitability of different kinds of securities. To return to the earlier described works of Miller (1977), DeAngelo and Masulis (1980), for an investor who doesn't care for choice of securities, the condition of the balance:

$$\left(1-\tau_{PB}^{i}\right)=\left(1-\tau_{PE}^{i}\right)(1-MTR^{*}) \qquad [1]$$

where the MTR* is the marginal tax rate, so that it doesn't matter for the company, which kind of securities should be issued.

So, if the effective MTR is higher than MTR*, the company has the motivation to issue debt, in contrast to issuing securities.

To include this effect into the model, Graham uses the ADVDEBT variable, defined as:

$$\frac{\left(1-\tau_{PB}^{t}\right)}{\left(1-\tau_{PE}^{t}\right)\left(1-MTR^{t-1}\right)} \qquad [2]$$

τ_{PB}^{t} is the difference between the annualized gain for the municipal and taxable securities for the previous period, τ_{PE}^{t} is the income tax rate for capital gains for the previous period.

2.4. Explanatory Variables: Probability of Bankruptcy

As a variable defining the probability of the situation when the company can't be liable, the author resorts to the approach of Altman (1968), namely the ZPROB variable:

$$ZPROB=\frac{Total\ assets}{3.3*EBIT+Sales+1.4*Retained\ earnings+1.2*WC} \qquad [3]$$

As a certain element of bankruptcy is already included into the MTR variable in terms of probable nonresidue of interest expenditures, the ZPROB variable can show other direct and indirect expenditures connected with bankruptcy, such as costs of legal services, running out of credit for suppliers and clients, managing time expenditures, agency costs etc.

As an alternative way to calculate the probability of bankruptcy, the author suggests introducing a variable that shows the carryforward of losses. As a rule, the attitude of creditors and suppliers towards such companies is rather cautious, because they are distressed that the company can't be liable again. So it is an additional disincentive for issuing the debt. For this purpose, the author includes dummy-variables into the regression: the MTR_{NOL}, equal to the MTR in case of tax carryforward/carryback, and equal to 0 otherwise, and the MTR $_{non\ NOL}$ with reverse values. Furthermore, to exclude multicollinearity of the variables, Graham includes these variables into the supplementary regression, which doesn't include the MTR.

At last, contrary to the approach of DeAngelo and Masulis (1980), who claimed that the non-debt tax shield (NDTS) drives out the profits from deduction of interest and, therefore, has an adverse effect on the debt, the author claims that large and profitable companies won't necessarily follow that logic. So a high NDTS will have a negative

impact on debt, only when the probability of bankruptcy (ZPROB) is high (for example, a company that has used up all the possible ways of deduction, provided by the NDTS, are very unlikely to use debt, as the interest expenditures will be driven out by the NDTS). To include this factor, the author, following the logic of MacKie-Mason (1990), includes the NDTS*ZPROB factor into regression.

2.5. Explanatory Variables: Other Variables

Among other variables, important for choosing the debt policy, the author includes into regression the so-called control variables that define free cash flow[1], investment opportunities[2], amount [3], R&D spending[4], advertising expenditures [5], materiality of assets[6] etc.[7]. What is more, some variables are presented in the form of the first difference, to maintain the consistency with the dependent variable.

To make a sample for the regression analysis, the author chose 10,240 companies from the statistics of Compustat, and, respectively, 54,181 observations from the period from 1973 to 1992. The sample didn't include financial companies, due to their tax regime, which differed from the standard taxation scheme. The sample also didn't include the companies with changes in debt or in other variables being larger in in absolute terms than the market price of the company for the previous period.

2.6. Results

Having shown debt linearly depending from the above-described factors, Graham concluded that the variables presented by him can explain 5% of the variation in the debt level (judging from the adjusted R^2). P-value was less than 1%, which, altogether, confirms the significance of the equation. Every valuable, explaining tax factors, except for the ZPROB, is statistically significant at a level of 5%.

The coefficient before the MTR is positive. That corresponds to the put forward hypothesis about the complete association between the debt and the tax rate. The positive coefficient before the valuable, explaining the difference between the effective and the marginal tax rates, also answers expectations, as it is evident that not many companies generate the marginal tax rate when taking decisions about the financing. Some of them consider only the fixed rate active for the moment. The coefficient before the standard deviation of the MTR also takes positive value, which confirms the speculations about complete association of tax payable and the issue of debt. The coefficient before the ADVDEBT, depicting the influence of personal income taxes, has the value other than supposed, which can be possibly due to relative advantages of debt being already included into the coefficient before the MTR. Indeed, when calculating the auxiliary regression without the MTR factor, the coefficient before the ADVDEBT takes a positive value, though the explicative power of the regression decreases in general. The author nevertheless comes to the conclusion that the tax assessment for the ownership equity and debt capital on the investors' level is not substantial for the finance policy of the company in the way it was originally supposed. The values of the coefficients before the ZPROB and the NDTS*ZPROB, are negative, as it is thought to be, the coefficients themselves being though virtually non-significant.

Also a regression for observations has been made, in which the absolute change in debt was more than 2% of the market value of the company, thereby eliminating the possibility of interference in the data. As a result, the number of cases decreased by almost half, but the explanatory power of the regression almost doubled (new, adjusted R2 is 0,113).

Furthermore, additional regressions have been made, in which the variable MTR was replaced by two dummy variables, the earlier described MTRNOL and MTRnonNOL. In additional regressions, the results were almost identical to the basic regression, but the explanatory power was slightly higher. The inclusion of dummy variables showed that the companies are more sensible to tax status when they have losses that can be carried forward, in contrast to the ones that do not have such losses. Thus, empirical analysis detected the statistical significance of the relationship between financial decisions and the tax status. In order to compare explanatory degree brought up by the tax factors, the author made a regression of the relationship between the level of debt and all other factors, except for tax factors. The comparison of the adjusted determination coefficients showed that tax factors add about 14,7% explanatory power of the regression (16,3% if the MTR is replaced by two dummy variables).

3. Data and Empirical Methodology

To study the given problem, it was decided to build a special model, based on the above-described Graham's theory. The question, whether the taxes impact the financial policy of Russian companies, or is the choice of capital structure subject to other, non-systematic factors, is of particular interest.

The main question is, whether it is possible to claim that Russian companies are guided in their financial decisions by the same motives as the Western ones. And if it is true, how much stronger or weaker is the tax influence on the debt policy for Russian companies.

In this case, the results can be completely unpredictable, because the level of political and economic stability in the country, the country's investment rating, and some other factors also play a considerable role. However, before citing any differences between countries and starting to build a model based on the study of Graham, it is necessary to analyze the differences in the 90s tax system of the USA and the current Russian tax system.

Both countries have the same approach to defining the tax base, namely, only those revenues are subject to corporative income tax that were earned in the country or from Russian sources (such as dividends, capital gains,

[1] FREE – free cash flow before taxes, interest charges, free from investments and cash flows, connected with issuing and acquitting debt/ stockholders equity
[2] ΔMATURITY – the change in book cost of the assets, divided by the company's market price
[3] ΔSALES – the change in the sales logarithm
[4] ΔRD – the change in the amount of R&D spending, divided by the sales level
[5] ΔAD – the change in the amount of advertising expenditures, divided by the sales level
[6] ΔINTAN – the change in the intangible assets, divided by the total assets
[7] ΔPLANT – the change in machinery and equipment, divided by the total assets, ΔNDTS – the change in the non-debt tax shields, divided by the company's market price.

etc.). Just as in the US, interest charges are deductible from the tax base for the purposes of the income tax, i.e., the concept of use of debt increasing the tax benefits due to the reduction in taxes payable, is still relevant for the Russian market.

The corporate income tax rate in Russia currently is 20% (up to 2010 it has been 24%). However, for different regions with certain market conditions, the tax rate can be reduced to 13,5%. Also dividends received from foreign and Russian sources have a different tax rate (9 and 15%, respectively). Moreover, the Russian tax system also offers the possibility of tax loss carry-forward (similar to the above-mentioned tax loss carryforward system in the United States). However, the conditions are somewhat different from that of US law. First of all, the Russian tax system makes it impossible to carry the losses to prior periods, reducing the tax payable for previous periods and demanding refund from the budget. In accordance with Art. 283 of the Tax Code, losses may be carried and offset against future profits for ten years after the loss occurrence (as opposed to 15 years in the US tax system).

As for tax incentives for capital investments, such rules (i.e. the option to offset a certain share of capital investments against the tax payable) in Russia are absent in the form, in which they existed in the 90s tax system of the USA. In return, there is a preferential tax treatment in case of acquisition of fixed assets or investments into the capital in the form of specific bonus depreciation. In accordance with the Russian tax system, the cost of fixed assets purchased should be offset straight-line, judging from the calculated depreciation period, however, for depreciable property, a one-time bonus depreciation of 10% (30% - for certain types of property) is allowed, which sometimes can significantly reduce the taxable base in the period under report.

Thus, we can conclude that the tax system in Russia is a bit more straight-line than the American system. In this regard, it was decided not to refer to marginal tax rate in the model, as defined by Graham. The decision was also due to the technically demanding estimation of the expected net profit, a large number of iterations to forecast deviations from the average profit value.

The study will be based on the assumption that there is no optimal level of debt, to which the company tends infinitely. In each specific case the company decides on the capital structure, judging from the conditions, available at the time.

All variables in the model are adjusted to the same scale through dividing by the assets/company's price (depending on the message), taking natural logarithms, etc. Thus, the risk of exceedingly lengthy coefficients in the summary data is eliminated. Also, to maintain consistency between the dependent and explanatory variables, all factors in absolute terms are represented in form of the change for the corresponding period.

The explanatory variable, in the same manner as Graham used it, is the change in the level of long-term liabilities, in relation to the company's price (ΔDebt). In this case, the value of debt cash flow is more informative than the sum of debt at specified date, as it includes the change in debt for the period, caused by a number of factors, while the cumulated sum of debt is much harder to explain.

The foremost purpose of this research is to prove the existence of the tax factor impact on the company's capital structure change. Therefore, the tax rate is considered as the primary variable. It has been decided to replace the marginal tax rate with the company's effective tax rate (Ef Rate) since the latter can be extracted from the financial statements, it is quite demonstrative (the company's effective tax rate is slightly varying and commonly remains almost the same), and it allows to predict the effective tax rate, which would be applied by the company after the estimation of all losses (including income taxable at different rates). Furthermore, the main advantage of the effective tax rate variable is the fact that due to its simplicity and straightforwardness it is more likely to be analyzed by the manager while making financial decisions.

Taking into consideration the fact that in the decision-making process regarding a period the manager has the information of only the previous period, the effective rate shall be calculated with a measurement error.

Hypothesis 1: Effective tax rate has a positive impact on the debt issuance.

The next explanatory variable to be used is bankruptcy probability (defined by Altman (1968)) as opposed to the interest deduction profits:

$$ZProb = \frac{Total\ assets}{3.3*EBIT+Sales+1.4*Retained\ earnings+1.2*WC} \qquad [4]$$

It is the same variable that was used in Graham model analyzed earlier. This research is not aimed at analyzing Altman's paper Altman (1968) in which the aforementioned formula was derived and proved, therefore, this formula is regarded as given.

The main advantage of this variable is that it is easily calculated, as far as the financial statements (balance sheet and profit and loss statement) contain all the necessary data.

Supposedly, the greater bankruptcy probability is, the lesser debt the company shall issue since the adoption of additional debt obligations will lead to even greater risk of the future insolvency.

Hypothesis 2: Bankruptcy probability has a negative impact on the debt issuance.

Another factor influencing the debt issuance is the company's sales change (ΔSales). It is important to mention that the model operates the difference in the sales natural logarithms to reach the common scale. This variable was also analyzed in the initial Graham model where it was regarded as the company's size indicator. Greater company's size implies to the fact that fewer information gaps on debt issuance will occur. Besides, bigger companies face financial instability costs less frequently and have lesser bankruptcy probability as far as they are diversified at a greater extent.

Hence it can be said that greater amount of the company's revenue demands for more debts.

Hypothesis 3: Sales change has a positive impact on the debt issuance.

One more variable was included in the model. It reflects intangible assets change (patents, projects) (ΔIntan). This variable is a kind of growth indicator, i.e. the more the company invests in intangible assets, the greater growth probability it has, so, by analogy with the previous factor, the higher its demand for the debt equity is. To reach the common scale the intangible assets changes were divided by the amount of the total assets.

Hypothesis 4: Intangible assets changes have a positive impact on the debt issuance.

The fifth and the last explanatory variable is the company's fixed assets changes (ΔFixed Assets)/total assets ratio. The companies with the great amount of the assets for debt usually may have preferential terms of demand for debt equity. Fixed assets include real estate, automobiles, and equipment.

Hypothesis 5: Increase of fixed assets has a positive impact on the debt issuance.

Thus, the model under consideration is as follows:

$$\Delta Debt = a * EfRate + b * ZProb + c * \Delta Sales + d * \Delta Intan + e * \Delta FixedAssets + \varepsilon \quad [5]$$

Since the model [5] does not show the debt change in full (or does not show it at all), the determination coefficient is expected to be not sufficient. As it has been already said, in the Graham's research the adjusted R^2 equals 0.051, and after excluding from the sample all the elements with disproportionately high debt changes, this variable becomes equal 0.114.

3.1. Search and Analysis of Baseline Data

The baseline data has been collected from the Ruslana database (the database of Russian companies analogous to the Amadeus database. Both databases are provided by the information agency Bureau van Dijk).

We focus on the non-financial private sector in Russia. The companies with the previous year revenue less than RUB 13 mln were also eliminated, hence all the small private companies with low turnover are eliminated, because their demand for debt is not caused by financial planning, but by the current need for money. As it can be seen 971 Russian companies meet the criteria.

Moreover, the corresponding data concern the available information of three recent years (2011, 2012, and 2013). It means that the total number of sample elements equals 1950.

The search for corresponding elements for the sample is reduced to 1050 elements since most of them do not have certain data and thus cannot be included in the sample.

The explanatory variables for the regression were pre-research analyzed. The analysis results can be seen in the table 1.

The comparative statistics shows that the mean value of the effective tax rate equals 26.4%, and that is more than 24% applicable at the time of the research is made. This can be explained by the fact that the earnings specified in the profit and loss statements and the taxable profit have different calculation procedures. The calculation procedure for fiscal accounting is frequently stricter than the book keeping procedure since there are certain types of expenditures that are not deductible for tax purposes (for instance, the cost of consulting services). The same reason stands for the presence of negative tax rate values, i.e. the cases when the book keeping profit is negative, but the taxable profit is positive, and the company pays the income tax. The presence of abnormally high rates (maximum value - 2105.6%) can be explained by the analogous considerations.

Nevertheless the median value is 19.8% which means that the majority of companies face the rate which is lower than the effective tax rate. This fact can be explained by the presence of losses offset against profits of the current fiscal period and income taxable at a rate lower than 24% (for instance, dividends and capital investments income).

The bankruptcy probability mean value for the given sample is approximately 20%. At the same time for the companies under consideration this variable can be both equal zero and as well as be 30%.

The sales natural logarithms changes are 22% on the average; the median value is 14.8%. This fact characterizes the positive dynamics of the Russian economy development. Particularly, some companies reached sixteen-fold sales growth.

The fixed assets dynamics of the analyzed companies is negligible. The fixed assets value was increased by 5% on the average. At the same time the median value equals 2%, it means that half of the companies faced the growth lower than 2%.

The intangible fixed assets value of the analyzed companies remained practically unchanged. The mean and median values are less than 0.01% of the total assets value, wherein changes in intangible assets range from (0.228) to 0.274. The total intangible assets change of the entire sample is negligible.

The next point to discuss is the data characterizing the debt change for a period. The mean value is 33.7%, though the median value is lower (which is 13.9%), this can be explained by the fact that the sample contains only a small number of the companies with a significant debt change. In this case the median value is regarded as more demonstrative, i.e. the majority of companies of the sample faced the long-term debt increase at the rate of 10-15%.

The Table 2 demonstrate pair correlations of the explanatory variables. The check of the variables for pair correlations identified three significant dependences (more than 0.1). For illustrative purposes the table 2 below shows the pair correlations:

1) Positive dependence between the sales and fixed assets levels, which is quite obvious, since both indicators to some extent characterize the size of the company. A significant increase in the number of the equipment, tools, machines, etc. reasonably presumes the increase in revenues due to the growth of the company's activities scale.

2) Positive dependence between the fixed assets change and the bankruptcy probability, which is probably caused by the principle of deriving the ZProb variable, where the numerator is the total assets value.

3) Negative dependence between the sales change and the bankruptcy probability, which also might be caused by the ZProb calculation procedure, since the denominator of the bankruptcy probability formula includes the level of sales.

3.2. Analysis of Results

The Table 3 repots the estimation results. As is evident from the data obtained, the regression in the model 1 is significant (the F value below any reasonable level of significance). In addition, our assumption of a low but significant level of adjusted R2 proved to be correct, it is 0,049, slightly lower than that in the study of Graham. Thus, the presented study factors explain the behavior of Russian firms in the financial policy slightly less than 5%.

This result answers expectations, since, in fact, the decision to raise the debt is defined by an infinite number of factors, and all of them can't be taken into account at once. The significance of the regression suggests that the factors represented in the model really have an impact on the level of debt.

An exception is the rate of change in intangible assets. His P-value of 0,85, which means that the variable has no effect on the debt.

A similar result can be explained by the absence of significant changes in intangible assets in the companies under review, and, consequently, by a small growth potential for new patents/inventions.

The insignificant factor was excluded from the model as "excessive", and the regression was rebuilt. The new model 2 looks as follows:

$$\Delta Debt = a * EfRate + b * ZProb + c * \Delta Sales + e * \Delta FixedAssets + \varepsilon \quad [6]$$

Without intangible assets the adjusted R2 increased to 0,05, i.e., the explanatory power of the regression increased, which once again confirms that intangible assets have no effect on the unknown variable. At the same time, this change almost doesn't affect other indicators.

To find the impact of the tax factor, represented by the effective tax rate, a regression of dependence of changes in debt from all other non-tax factors. For this purpose, we used the following model 3:

$$\Delta Debt = b * ZProb + c * \Delta Sales + e * \Delta FixedAssets + \varepsilon \quad [7]$$

In this case, the adjusted R2 has dropped by more than 2 times (to 0,024). Consequently, the inclusion of effective tax rate increased the explanatory power of the regression by 108%. This indicator is significantly different from the one in the model of Graham, where tax factors increased the power of the regression by approximately 15%. Detailed regression results are represented as the table 3 model 3.

Thus, although the chosen model 3 has a lower explanatory power as a whole than the study of Graham, among the used variables the tax factor has a much more impact on the level of debt. Such an unexpected result may be associated with a more correct choice of variables that characterize the tax component. As stated before, the managers, when deciding on issue of debt, are more likely to draw on the effective tax rate, which is "on the surface", rather than on the marginal tax rate, the calculation of which may seem too difficult and time consuming for many.

As for the marks before the variables, the coefficient before the tax rate is positive, as expected. The higher it is, the greater the benefits the company will receive from debt as a source of financing (due to the possibility of deducting the cost of debt servicing). This conclusion doesn't come under strong criticism from the economic community because of its obviousness and transparency. Thus, the 1st hypothesis is not rejected.

The coefficient of the probability of bankruptcy is negative, which is also reasonable. The higher the probability is that the firm can no longer be liable, the less of additional risks it will take, and, therefore, the less it will use debt. This conclusion also conforms to the results obtained by Graham. The 2nd hypothesis is not rejected.

The change in sales, contrary to our predictions, affects negatively the dynamics of debt, and this factor is significant.

The initial reasoning drew on the fact that high sales is descriptive of the company's size, and that, by virtue of its scale and diversification, it may raise debt with favorable conditions, without colliding with the high costs of financial uncertainty. Perhaps the initial reasoning was not entirely correct, because the factor of changes in sales is not as revealing, as the absolute value of revenues. Theoretically, small companies can raise large loans, and large companies - not resort to debt in general, so in this case, the logic is wrong. A possible explanation for the negative dependence between changes in sales and raising debt may be the fact that the higher the sales of the firm are, the larger are retained earnings, and hence the probability of funding for the company's own funds. So the 3rd hypothesis is rejected. The next factor to consider, the change in intangible assets, is insignificant, as detailed earlier, so it was excluded from the regression, which increased its explanatory power. The reason is probably the fact that small changes in patents/licenses do not provide sufficient additional growth potential to say that raising debt is profitable. The 4th hypothesis is rejected. The coefficient before the last factor, showing the change in fixed assets, has a predictable positive sign. Our estimate about the influence of powerful software on creating favorable conditions to raise the debt proves to be true. Slight contradiction arises due to high correlation between the property assets and sales, as it turned out, both factors have the opposite effect on the dynamics of raising debt. However, given such a low importance of the coefficient (the P-value is 0,1), these discrepancies are not necessary to be taken into account, because in the case of a higher level of importance, this factor would be excluded from the model. The 5th hypothesis shouldn't be rejected. So, the present model is a good analogue to the one presented by Graham. It has nearly the same explanatory power, but the effect of the tax factor in our model is much higher. The inclusion of the effective tax rate increased the explanatory power more than 2-fold, which significantly exceeds the same result of Graham, with his 15%. It can be concluded that the study was successful. It prove that taxes really affect a company's debt policy, giving the comparison of the tax factor with other factors, and confirming a higher relative impact of taxes compared to the similar study in the West.

4. Conclusions

The main part of this work includes the study based on the model of Graham, but with a slightly different set of factors. In particular, the marginal tax rate was replaced by the effective interest rate, which is supposed to be more convenient for financial managers. In addition, the model includes the probability of bankruptcy, change in fixed assets, changes in intangible assets, and changes in sales. The results showed that including the effective tax rate is appropriate, because this factor plays a significant role, and in terms of its contribution to the explanatory power of the regression it is comparable with all other factors combined. At the same time, the impact of changes in intangible assets has proven to be insignificant, which is most probably related to changes being too insignificant to cause growth potential and increase levels of debt. The overall results of the study were positive, almost all the coefficients were significant, most of the hypotheses were confirmed, namely, the hypothesis about the influence of probability of bankruptcy, fixed assets and the effective tax rate. Hypotheses about the impact of changes in sales and intangible assets have been rejected, with the reasons for the inconformity explained. Also, you should consider that in reality

companies issuing debt are often guided by other motives, such as the ability to transfer profits to shareholders abroad with minimal losses. Raising debt capital, in certain cases, is a more attractive way of financing than issuing securities, as it is possible to deduct the interest expenses from the tax base, which is not the case of dividends. Many companies use debt issued by parent companies to transfer funds to a higher level of ownership structure at appropriate rate. Tax authorities, considering such practice, bring in restrictive measures to avoid abuse of duty. Among such measures there is the "thin capitalization" principle, limiting the deduction of interest on debts from affiliated persons. Another way to struggle with such structures is setting limits on interest payments. In general, there are many factors affecting a company's financial policy, some of them measurable and verifiable, some not, however, it's not deniable that the taxes affect directly the choice of debt, and that the influence of the tax factor is probably underestimated by the economic community of nowadays.

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Table-1. Summary Statistics

	LR Debt	Efrate	Zprob	Delta Sales	Delta FA	Delta Intan
Mean	0.337	0.264	0.191	0.22	0.053	0
Standard Error	0.083	0.034	0.002	0.028	0.004	0
Median	0.139	0.198	0.203	0.148	0.019	0
Standard Deviation	2.945	1.097	0.061	0.904	0.128	0.016
Sample Variance	8.675	1.204	0.004	0.816	0.016	0
Minimum	(35.4)	(4.524)	0	(4.955)	(0.657)	(0.228)
Maximum	42.95	21.056	0.303	16.941	0.997	0.274
Sum	426.062	276,899	200.772	230.546	55.872	0.426
Count	1050	1050	1050	1050	1050	1050

Table-2. Pair correlations of the explanatory variables

	Efrate	Zprob	Delta Sales	Delta FA	Delta Intan
Efrate	1				
Zprob	(0.00832)	1			
deltaSales	(0.01448)	-0.1434	1		
deltaFA	0.013201	0.198914	0.303292	1	
deltaIntan	(0.00494)	0.01987	(0.01562)	0.011384	1

Table-3. Regression Analysis

Independent Variables	Dependent Variable: (Debt)		
	Model 1	Model 2	Model 3
Intercept	2.091** (1.96)	2.091** (1.94)	2.399845** (4.34)
Efrate	0.975** (6.71)	0.975** (6.58)	-
Zprob	-14.207** (2.97)	-14.216** (2.91)	-14.507** (2.57)
deltaSale	-0.951** (5.21)	-0.951** (5.22)	-0.979** (3.93)
deltaIntan	-2.274	-	-
deltaFA	2.679* (10.83)	2.676* (10.86)	2.874* (8.9)
Observations	1500	1500	1500
R^2	0.049	0.050	0.024

Asterisks represent statistical significance at 1 percent (**), 10 percent (*) levels.