

# Analysis of the Telecommunication Companies' Capital and its Structure Optimization

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**Abstract:** The search for optimal capital structure of a company is an important task of the strategic financial management.

The paper given is a natural continuation of a series of author's publications on the study of problems connected with building an optimal capital structure of a company (Ageev and Filonova, 2017), (Filonova ES, 2017). The practical part of the research conducted deals with the leaders of the Russian telecommunication market «Rostelecom», «MTS», «MegaFon», «Vimpel-Communications» and there were some attempts to build an optimal capital structure in the strategic group of competitors, based on the materials of accounting (financial) reports of these companies as at 2014 and 2015.

The present paper contains the analysis of the actual capital structure of the companies mentioned above based on studying their balance sheets, made as at the end of 2016, and gives the results of the search for optimal capital structure based on the data in the new accounting period.

**Keywords:** Capital structure of a company, own capital, borrowed capital, capital cost, capital structure optimization, optimization model.

There are many theories describing different approaches to building an optimal capital structure of a company (Modigliani and Miller, 1999), (Brusov and Filatova, 2014; Brusov and Filatova, 2011; Brusov and Filatova, 2011; Brusov and Filatova, 2011; Filatova et al., 2008). The paper (Ageev and Filonova, 2017) gives a brief overview of the most famous modern approaches and models which have a serious impact on both the development of capital structure and the choice of financing sources.

However, the problem of building an optimal capital structure of a company does not have a unique solution. The search for such a structure is a *crucial* task of the strategic financial management and owners of a company.

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Optimal capital structure implies a ratio of the company's own and borrowed funds under which the greatest effect between the financial profitability and financial stability of a company is achieved. Following this principle, in the previous publications, the optimization model was designed and implemented, which included both an optimality criterion and certain constraint conditions, which means the achievement of permissible values of a particular set of financial stability ratios.

The process of a company's capital structure optimization, as a rule, precedes the analysis of its capital, which main purpose is to identify the trends in the dynamics of capital volume and capital structure and their impact on the financial stability and efficiency of capital.

Tables 1, 2 show the capital structure and cost of capital of the telecommunication companies as at 2015 and 2016.

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**Table 1: The Capital Structure of the Telecommunication Companies and its Cost as at 2015\***

Indicators	Indicators		Capital cost %
	Balance, RUB, in thousands	Share, %	
<b>PJSC «Rostelecom»</b>			
Owned capital and reserves	271004658.5	58,67	6,05
Borrowed funds	190929444.5	41,33	9,04
Total capital	461934103	100	7,29
<b>PJSC «Mobile TeleSystems»</b>			
Owned capital and reserves	58473251.5	14,12	67,72
Borrowed funds	355546890.5	85,88	8,55
Total capital	414020142	100	16,91
<b>PJSC «Megafon»</b>			
Owned capital and reserves	165533000	43,58	18,12
Borrowed funds	214305000	56,42	6,73
Total capital	379838000	100	11,69
<b>PJSC «Vimpel-Communications»</b>			
Owned capital and reserves	79466745.5	16,02	22,02
Borrowed funds	416579825.5	83,98	6,88
Total capital	496046571	100	9,3

\*Author's calculations on the accounting balance sheets as at 2015.

**Table 2: The Capital Structure of the Telecommunication Companies and its Cost as at 2016\***

Indicators	Indicators		Capital cost %
	Balance, RUB, in thousands	Share, %	
<b>PJSC «Rostelecom»</b>			
Owned capital and reserves	277188965.5	59,1	5,4
Borrowed funds	191595368.5	40,9	8,4
Total capital	468784334	100	6,6
<b>PJSC «Mobile TeleSystems»</b>			
Owned capital and reserves	35259575	8,4	88,5
Borrowed funds	382655119.5	91,6	8,2
Total capital	417914694.5	100	15
<b>PJSC «Megafon»</b>			
Owned capital and reserves	156373000	40,7	12,8
Borrowed funds	227737000	59,3	8,5
Total capital	384110000	100	10,2
<b>PJSC «Vimpel-Communications»</b>			
Owned capital and reserves	113853093	29,9	29,4
Borrowed funds	266741709	70,1	8,9
Total capital	380594802	100	15

\*Author's calculations on the accounting balance sheets as at 2016.

Comparing the figures in Tables 1, 2, we can say that their values in 2016 changed insignificantly as compared to 2015. Now the company «MTS» has a large share of borrowed funds – more than 90%. The

own capital of the company decreased by approximately 6%, which caused the increase of the share of borrowed funds. The loss of own sources of financing, obviously, creates a threat to the financial independence of the company.

It should also be noted that compared to 2015 the actual capital structure of the PJSC «VimpelCom» changed significantly. The changes occurred in increasing own and reducing borrowed capital by approximately 14%.

Thus, the trend in large Russian companies' capital structure change which were found out in the paper (Sharikova OV, 2013), manifesting in the steady growth of the share of borrowed capital in the structure of company's total capital, remains and is better seen only in «MTS».

The cost of all companies' capital decreased slightly, except for «VimpelCom», the capital of which increased by approximately 6%, which automatically decreases the cost of the company itself.

**Table 3: Company's Financial Stability Ratios\***

Ratios/ Companies	2015	2016
<b>Equity to Total Assets <math>k_1</math> (not less than 0,5)</b>		
PJSC «Rostelecom»	0,59	0,59
PJSC «Mobile TeleSystems»	0,14	0,08
PJSC «Megafon»	0,44	0,41
PJSC «Vimpel-Communications»	0,21	0,27
<b>Long term borrowing funds ratio <math>k_2</math> (not more than 0,5)</b>		
PJSC «Rostelecom»	0,22	0,22
PJSC «Mobile TeleSystems»	0,71	0,8
PJSC «Megafon»	0,34	0,37
PJSC «Vimpel-Communications»	0,6	0,6
<b>Financial stability ratio, <math>k_3</math> (not less than 0,6)</b>		
PJSC «Rostelecom»	0,75	0,75
PJSC «Mobile TeleSystems»	0,49	0,45
PJSC «Megafon»	0,66	0,64
PJSC «Vimpel-Communications»	0,53	0,68
<b>Working capital financed by equity to total assets ratio, <math>k_4</math> (not negative)</b>		
PJSC «Rostelecom»	-3,95	-3,49
PJSC «Mobile TeleSystems»	-2,69	-8,59
PJSC «Megafon»	-2,95	-3,05
PJSC «Vimpel-Communications»	-3,28	-3,1
<b>Current assets to equity ratio, <math>k_5</math> (not negative)</b>		
PJSC «Rostelecom»	-0,88	-0,84
PJSC «Mobile TeleSystems»	-5,99	-11,46
PJSC «Megafon»	-1,34	-1,49
PJSC «Vimpel-Communications»	-2,78	-2,26
<b>Borrowed and own funds ratio, (not more than 1,5)</b>		
PJSC «Rostelecom»	0,71	0,69
PJSC «Mobile TeleSystems»	6,08	10,85
PJSC «Megafon»	1,29	1,46
PJSC «Vimpel-Communications»	5,24	2,34

\*Author's calculations. The ratios values corresponding to the specified constraints are given in bold.

Now we discuss the system of financial stability ratios determined by the companies' capital structure (Table 3).

The analysis of the quantitative information shown in Table 3 allows to draw the following conclusions:

- 1) most of the financial stability ratios of the company «Rostelecom» conforms to specified constraints;
- 2) the company «MegaFon» has got only three ratios out of six in the specified constraints; these three favorable ratios include the borrowed to own funds ratio, which doesn't exceed the maximum permissible value of 1.5, that indicates an appropriate company's capital structure for the two periods under consideration;
- 3) the companies «MTS» and «VimpelCom» are the «negative characters» in Table 3; in this case, if the company «VimpelCom» in 2016, according to some indicators, had a positive trend (the specified constraint had a financial stability ratio and the borrowed to own funds ratio was halved), then practically all the indicators of the financial stability in the company «MTS» became less (for example, in 2016 a ruble of the company's own funds equaled 10.85

rubles of the company's borrowed funds, which indicates the company's financial instability);

- 4) it should be noted that all examined companies have inappropriate negative values of the current assets to equity ratio and working capital financed by equity to total assets ratio.

We complete the analysis of the actual financial condition of the companies with the calculation of profitability ratios which depend on the own to borrowed funds ratio (Table 4).

Analysis of Table 4 allows to draw the following conclusions:

- 1) in 2016 the company «Rostelecom» underwent a decrease in profitability ratios; negative values of DFL for the two accounting periods indicate that the profit level generated by the assets of the company is below the average interest rate for a credit used, and therefore the borrowed funds are used inefficiently: the part of the profits is spent on servicing the used borrowed capital; thus, the use of the borrowed capital by the company has a negative effect;
- 2) financial indicators dependent on the own to borrowed funds ratio in the companies

**Table 4: Financial Indicators that Depend on the Ratio of Own to Borrowed Funds\***

Indicators	2015 r.	2016 r.
<b>PJSC «Rostelecom»</b>		
Return on assets, ROA	6,08	4,23
Degree of financial leverage, DFL	-1,67	-2,31
Return on equity, ROE	7,06	4
<b>PJSC «Mobile TeleSystems»</b>		
Return on assets, ROA	5,71	14,83
Degree of financial leverage, DFL	-13,8	57,27
Return on equity, ROE	19,7	141
<b>PJSC «Megafon»</b>		
Return on assets, ROA	12,32	11,23
Degree of financial leverage, DFL	5,79	3,18
Return on equity, ROE	27,3	24
<b>PJSC «Vimpel-Communications»</b>		
Return on assets, ROA	9,51	8,68
Degree of financial leverage, DFL	8,78	6,28
Return on equity, ROE	26,6	29,6

\*Author's calculations.

«Megaphone» and «Vimpel-Communications» in 2016 as compared to 2015 changed slightly; the values of DFL in the two accounting periods are positive, which indicates the efficient use of the borrowed funds; however, we should note that values of DFL in 2016 in both companies declined by approximately 2.5%;

- 3) the company «MTS» is a special representative in Table 4; the values of all the three financial indicators in 2016 increased sharply, especially ROE and DFL; more than 140% of return on equity are explained in the accounting balance sheets by the excess of the net income in the volume of 50658752 thousand RUB over the company's own funds in the volume of 350255971 thousand RUB; as it was mentioned above, the company's capital structure in 2016 changed towards the increase of borrowed funds, which in 2015 were rather significant; based on the results of the analysis of Table 3, we can conclude that the increase in the share of borrowed funds in the company's capital structure dramatically increased the profitability ratios of its activity and at the same time worsened the low indicators of its financial stability.

Completing the analysis of the actual capital structure of the telecommunication companies in 2015 and 2016, we can draw a number of conclusions that determine trends in the dynamics of capital amount and capital structure and their impact on financial stability and efficiency of the capital:

- 1) the capital structure of the companies «Rostelecom» and «MegaFon» in general, ensures their financial stability, but the borrowed funds of «Rostelecom» are used inefficiently;
- 2) the company «VimpelCom» has the positive trend of the financial stability in some indicators due to the decrease in the share of the borrowed funds and increase in the share of the own funds in 2016;
- 3) the management and owners of the company «MTS» carry out an aggressive financial policy by increasing the share of the borrowed funds in the capital structure to more than 90%.

There result of it is a dramatic increase in the profitability ratios of the company's activity and at the same time a decrease of the low values of its financial stability.

Let's consider the next part of our work - the search for the optimal capital structure of the companies, which could find such a balance between borrowed and own funds that ensures the most effective proportionality between the financial profitability and financial stability of a company.

Next, we consider the structure of the optimization model and present the results of its implementation using the data from the accounting balance sheets as at 2016.

As the optimality criterion in the model the maximum rate of the return on equity (ROE) was used, because it determines the income growth of the owners of the company per unit of their investments. Its formula contains not only the financial performance of the company and the amount of own and borrowed funds used to finance the activity, but also the amount of the company's interest payments on borrowings.

As a condition that will allow to accomplish a goal while maintaining a certain level of financial security, the compliance of the required capital structure to a certain level of risk, which is characterized by acceptable values of financial stability ratio is necessary. At first let's consider the following three factors:

- the financial independence ratio (autonomy), calculated as the ratio of own capital to the amount of own and borrowed funds, the recommended value of which is not less than 0.5;
- the long - term borrowing ratio, showing what part of the financing sources of non-current assets is accounted for long-term borrowed capital, and what part is accounted for long-term borrowings (calculated as the ratio of long-term borrowed funds to the sum of long-term own and borrowed capital of an enterprise); the value of the ratio is not more than 0.5; to justify the share of long-term borrowing sources we make the assumption of the necessity of their employment in the amount of 40 % of the total borrowed capital (Muraviyova and Talalaeva, 2016);
- the financial stability ratio showing what part of the assets is financed from the sustainable sources and is calculated as the ratio of the sum of own capital and long-term liabilities to the sum of own and borrowed funds; the value of the ratio is not less than 0.6.

**Table 5: The Results of the Implementation of the Optimization Model in Comparison to the Actual Balance Indicators**

Indicators	Values of Indicators							
	PJSC «Rostelecom»		«PJSC «Mobile TeleSystems»		PJSC «Megafon»		PJSC «Vimpel-Communications»	
	model	balance	model	balance	model	balance	model	balance
Target function, ROE, %	5	4	29	141	21	24	15	29,6
Equity ratio, $x$	1	0,59	0,5	0,08	0,5	0,41	0,5	0,3
Equity to debt ratio, $1-x$	0	0,41	0,5	0,92	0,5	0,59	0,5	0,7
$k_1$	1	0,59	0,5	0,08	0,5	0,41	0,5	0,27
$k_1$ not less	0,5							
$k_2$	0	0,22	0,29	0,8	0,29	0,37	0,29	0,6
$k_2$ no greater	0,5							
$k_3$	1	0,75	0,7	0,45	0,7	0,64	0,7	0,68
$k_3$ not less	0,6							

Each of these factors is a certain characteristic of a multifaceted concept of the financial stability, which is an indicator of the financial security of the company's activity. It should be noted that the system of indicators given is not exhaustive.

Our optimization model will have the following variables:

$x$  – the share of the own capital in its structure;

$1-x$  – the share of the capital borrowed,

$K$  - the total value of capital used.

As a result of all introduced notations and constraints, the optimization model is:

$$ROE = \left[ \frac{\Pi_3}{K \cdot x + K \cdot (1-x)} + \left( \frac{\Pi_3}{K \cdot x + K \cdot (1-x)} - r \right) \cdot \frac{K \cdot (1-x)}{K \cdot x} \right] \cdot (1-N) \rightarrow \max$$

$$k_1 = \frac{K \cdot x}{K \cdot x + K \cdot (1-x)} \geq 0.5$$

$$k_2 = \frac{K \cdot (1-x) \cdot 0.4}{K \cdot x + K \cdot (1-x) \cdot 0.4} \leq 0.5$$

$$k_3 = \frac{K \cdot x + K \cdot (1-x) \cdot 0.4}{K \cdot x + K \cdot (1-x)} \geq 0.6$$

$$x \geq 0, 1-x \geq 0.$$

To implement this model the add-in Excel spreadsheet «Search for solutions» was used towards the non-linear optimization. Table 5 presents the results of the optimization model for 2016 as compared

to the balance values of certain financial indicators in the accounting period.

The conclusions on the information of Table 5:

- 1) «Rostelecom» – under the condition of using only its own funds, its profitability will increase slightly as compared to the balance values; the actual capital structure (approximately 60 to 40%) also satisfies our constraints.
- 2) «MTS» - as it was noted earlier; its actual capital structure (with a larger amount of borrowings) leads to a violation of the given constraints for all three indicators of financial stability, so it is not optimal, despite the significantly greater than 100% value of ROE; the capital structure represented by its own and borrowed funds in equal shares is considered to be optimal, giving 29% of ROE (this is almost three times more than model values in 2015 in (Ageev and Filonova, 2017; Filonova ES, 2017) and values of indicators of financial stability which meet the corresponding specified constraints;
- 3) «Megaphone», «VimpelCom» have an optimal capital structure, represented by its own and borrowed funds in equal shares, not significantly different from the actual structure and from the results obtained as at 2015; it should be noted that under the actual capital structure of the company «VimpelCom», ROE is almost twice higher, but all the indicators of its financial stability are not within the desired constraints;

4) the companies «MTS» and «MegaFon» showed the highest model value of ROE.

Thus, the given optimal capital structure of all companies in the strategic group is typical: 50% – own funds and 50% – borrowed funds. This corresponds exactly to the results in 2015, (Ageev and Filonova, 2017; Filonova ES, 2017). Here we must make a remark about the capital structure of the company «Rostelecom» with the inefficient use of borrowed funds and low profitability.

If the company uses the proposed capital structure, the company's management will have to develop the measures, aimed the increase of its level of profitability. Otherwise, the company should use only their own funds, and our model has demonstrated it.

The attempts to improve the model built consisted in extension of the constraint system by introducing two additional stability and inequalities coefficients:

1) constrains for the working capital financed by equity to total assets ratio,  $k_4$

$$k_4 = \frac{k \cdot x - BA}{OA} \geq 0,$$

where  $BA$  and  $OA$  - non-current and current assets respectively;

2)  $k_5$  - constraints for current assets to equity ratio

$$k_5 = \frac{K \cdot x - BA}{K \cdot x} \geq 0.$$

The results of the optimization with an extended constraint system for the four examined companies in 2016 are given in Table 6.

Analysis of Table 6 allows to conclude that the capital structure with an extended constraint system, as in 2015, became uniform and is represented by own funds mostly. We should note that for the company «MTS» a model with an extended constraint system was insoluble.

## CONCLUSION

The first part of the paper analyzes the capital structure of leading telecommunication companies of Russia to find out the trends in the capital volume and capital structure and their impact on the financial stability and efficiency of the capital use. The following results were obtained:

1) the capital structure of the companies «Rostelecom» and «MegaFon», in general, ensures their financial stability but the borrowed funds in «Rostelecom» are used inefficiently;

**Table 6: The Results of the Implementation of Optimization Models with an Extended Constraint System**

Indicators	Values of indicators							
	PJSC «Rostelecom»		PJSC «Mobile TeleSystems»		PJSC «Megafon»		PJSC «Vimpel-Communications»	
	model	balance	model	balance	model	balance	model	balance
Target function, ROE, %	5 (5)*	4	- (29)	141	13 (21)	24	11 (15)	29,6
Equity ratio, x	1	0,59	-	0,08	1	0,41	0,88	0,3
Equity to debt ratio, 1-x	0	0,41	-	0,92	0	0,59	0,12	0,7
$k_1$	1	0,59	-	0,08	1	0,41	0,88	0,27
$k_1$ not less	0,5							
$k_2$	0	0,22	-	0,8	0	0,37	0,05	0,6
$k_2$ no greater than	0,5							
$k_3$	1	0,75	-	0,45	1	0,64	0,93	0,68
$k_3$ not less	0,6							

\*The previous values of ROE are given in parentheses.

- 2) the company «VimpelCom» has the positive trend of the financial stability in some indicators due to the decrease in the share of borrowed funds in 2016;
- 3) the management and owners of «MTS» carry out an aggressive financial policy increasing the share of borrowed funds in the capital structure to more than 90%. The result of it is a dramatic increase in the profitability ratios of the company's activity and at the same time a decrease of the low values of its financial stability.

The second part of the paper deals with the implementation of the optimization model to find the optimal capital structure of the companies. The search for the optimal structure was conducted on the data of accounting balance sheets as at December 31, 2016.

The result of the model implementation allows to draw the following conclusions:

- 1) if the management of companies pursues the improvement of their financial stability in different sectors, the own funds of a company must substantially prevail in the capital structure;
- 2) if the priority of a company consists in maximizing the return on equity, the own and borrowed funds can be used approximately in equal shares.

In conclusion, we should emphasize again that there are no unique algorithms to search for optimal capital structure of a company. There are certain objective and subjective factors, ensuring the most efficient use of capital for each company (Capital structure optimization, 2017).

Solving the problem of building the optimal capital structure for several companies of the same industry, the most important factors will obviously be the industry-specific features of the companies' operating activity. So, the companies with a high capital-output ratio of production of goods and services due to the high share of non-current assets usually have a lower credit rating and are forced to focus their activity on the use of its own capital.

Another important factor is the financial mentality of the company's owners and managers. The desire to

prevent high levels of risks forms a conservative approach of owners and managers to finance the company's development. Under this approach the basis for the financing is the own funds. Conversely, the desire to get the highest return on equity in any way, despite the high levels of risks, forms an aggressive approach to financing development of the company. Under this approach, the borrowed funds are used at most. The financial policy of the company «MTS» is an example of such an approach.

A promising direction for further research in this field is the search and a more detailed study of the conditions that would encourage the most efficient use of capital. In author's opinion, it can become an important step in solving the problem of building an optimal structure.

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