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The development of company's debt portfolio

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Abstract: Goal: Although companies use actively the potentials of a debt capital market and debt financial instruments market to finance their activities, the development of company's debt portfolio for the strategic perspective remains a relevant issue. The goal of this paper is to create a model for the development of the optimal debt portfolio aimed at implementing company's corporate strategy.

Methods: We have created an optimization model for creating company's debt portfolio based on G. Markowitz's portfolio theory within a framework of our research. To develop a target function, we have used the maximum contingent income from the attraction of loans. We have created a system of restrictions based on financial risks diversification. To implement the model, we have used the MS Excel environment and the packet of applied programs MathCAD

Results: We have elaborated the model for creating company's debt portfolio for the strategic perspective. We have chosen the maximization of contingent benefits of attracting loan capital from different sources of debt financing as a target criterion of the model. The model's restrictions enable to diversify financial risks. They encompass the following terms: the achievement of the goal structure of capital, the provision of financial risks diversification in choosing the strategy for financing company's assets; the optimization a financial leverage effect; the diversification of the risks of losing ability to pay and reducing financial stability. To analyze the possible utilization of the model, we have considered the development of the debt portfolio of a construction company, which provides the strategy for company's development over the next 5 years. The results of the research have enabled to develop company's optimal debt portfolio that complies with the terms of financial risks diversification and to define the optimal sources of loans at each moment of time.

Conclusions: Our model for the development of company's debt portfolio enables to model the structure of the sources of loan financing depending on the needs for loan capital at each moment of time and maximum amounts that a company may attract from each source of debt financing. Changes in the terms of granting loan capital and changes in the situation in product and financial markets may lead to structural shifts in the content of financing sources; therefore, the process of modelling the optimal structure of debt financing should be a continuous. The obtained results of modeling the structure of a debt portfolio enable a company to make more informed decisions in attracting loan financing.

JEL Classifications: H63

Keywords: Debt portfolio, methods of optimization, model for developing a debt portfolio, target structure of capital, strategy for attracting loan capital

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1. Introduction

The strategy for attracting company's loan financing should mostly focus on the optimization of mobilized resources due to the attraction of finances in the debt capital market and securities market by issuing securities and working with them, the attraction of credits in financial and state sectors, active cooperation with foreign banks, funds and organizations, the efficient use of free economic areas and various forms of private and state partnership. The attraction of loan capital enables to enlarge substantially the amount of company's strategic financial resources and to provide the efficiency of a corporate strategy. Finally, it is financial strategic decisions in attracting loan financing that make a crucial impact on the growth of company's cost in the strategic perspective.

Focusing the strategy for attracting loan financing on the creation of company's cost, we need to define basic financial factors to create company's cost - the correlation between long-term and short-term loans, the effect of a financial leverage and destructive financial factors - company's financial cycle and current liability ratio (Geraschenko, 2009). The analysis of these factors shows that the main objectives of creating the optimal strategy for attracting company's loan financing are:

- to attract long-term sources for financing non-current assets and to ensure the efficient implementation of company's investment strategy;
- to minimize the cost of attracted loan sources of financing and, thereby, to minimize the financial costs of debt amortization;
- to use accounts payable efficiently for reducing the term of company's financial cycle.

In elaborating the strategy for attracting loan financing, we should analyze a whole range of external and internal factors that influence the strategic decisions on attracting loans and to forecast their possible effects on company's strategic development. In creating the space of possible sources of loans, we should first of all take into account the dynamics of the development of a debt capital market and a debt securities market in the strategic perspective, the dynamics of the development of a company itself and its investment attractiveness for external investors.

The development of a debt financing market is a crucial issue in the developing market, and this is not only because of the modern situation the Russian financial market. The thing is that borrowers in the Russian market always had access only to a very few number of creditors. This affected the amount, availability and cost of loan capital. The share of loans in the target structure of the sources of companies financing had been decreasing since 2010 and reached 48.2% by 2016 (Russia in Figures, 2017); however, the percentage of companies with long-term liabilities exceeding short-term liabilities was small even among large companies (no more than 30%) (Grechenyuk, A. & Grechenyuk, O., 2015; Leevik & Nasedkina, 2016). The peculiarity of the created structure of loans in the Russian companies is that now, many companies are operating on their own negative working capital (WC), since short-term liabilities exceed company's current assets (Balyuk, 2016). In recent years, the activity of the Russian banks increases; however, their share in the structure of attracted companies' resources does not exceed 16% (Table 1) (Russia in Figures, 2017; Russian statistical yearbook, 2012). Interestingly, the basic share of banks' debt portfolio is represented by short-term credits.

TABLE 1. THE DYNAMICS OF THE STRUCTURE OF ATTRACTED RESOURCES, %

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
The credits of Russian banks	14.60	14.55	11.29	11.36	11.74	12.97	16.24	14.76	12.85	15.77
The credits of foreign banks	2.85	4.96	5.09	3.90	2.94	2.16	2.01	4.80	3.41	6.02
Loans of other organizations	11.91	10.25	11.76	10.34	10.02	10.99	11.31	11.81	13.45	11.20
Budgetary resources	36.07	34.55	34.82	33.05	32.64	32.25	34.67	31.37	36.75	33.20
Other	34.56	35.70	37.04	41.36	42.66	41.62	35.77	37.27	33.53	33.82

Source: Russia in figures (2017, p. 641)6 Russian statistical yearbook (2016, p. 27).

Deficit, high cost and small duration of debt resources inside the country make Russian companies enter the external market of loan financing. Starting from 2000, large Russian

companies are active in the external market of cheaper debt resources; therefore, the share of foreign credits in the total amount of attracted capital is rapidly growing. Thus, during the crisis of 2008 - 2009, the share of debt resources of foreign banks in the Russian companies increased up to 5% of the total amount of attracted resources (Table 1). Starting from 2010, we see a downturn in the amount of attracted credits of foreign banks; however, in 2016, the tendency has changed - about 28% of all the credits were attracted from foreign banks, this is the highest index, starting from 2009 (Russia in Figures, 2017).

In parallel, Russian companies begin to enter a debt securities market. They start with the foreign market by placing euro bonds in the European and American fund markets and then enter the domestic market. Thus, in 2007, 360 issues of corporate bonds amounting to 941.7 billion rubles with the returns of 8.5-9% and the average duration of 2.5 years were registered in the domestic market, while in 2016, the volume of corporate bonds emission reached 2,187.8 billion of rubles with the rate of return at the level of 8-11%. The amount in the circulation of corporate bonds was about 9.44 trillion rubles by the end of 2016. This is 16.98% higher than at the beginning of 2016. The share of bonds in the volume of a corporate debt increased from 31% in 2010 to 37% in 2016 r. (MSE, 2016).

Although companies use actively the potentials of a debt capital market and a debt financial instruments market to finance their activities, the creation of company's debt portfolio for the strategic perspective remains a relevant issue. It depends on the needs for loan capital at each moment of time and maximum amounts that a company may attract from each source of debt financing and diversification of financial risks of attracting loan capital. Therefore, the goal of this paper is to elaborate a model for developing a debt portfolio using the method of portfolio analysis based on Markowitz's approach (Markowitz, 1991) and to prove the advantage of a portfolio approach for choosing the sources of loan capital and developing company's debt portfolio as a financial component in a long-term corporate strategy. To achieve this goal from the positions of a portfolio approach, we have defined a general objective. We have used Markowitz's model as a methodological basis for the study. We have chosen the maximization of contingent benefits of attracting loan capital from different sources of debt financing as a target criterion of the model for developing a debt portfolio. The model's restrictions enable to diversify financial risks.

We should mention that the development of the model of company's debt portfolio is discussed in the works of Melnikova (2014), Postupinskiy (2016), Korotin, Ulchenkov, & Islamov (2014; 2016), Ekhilevskaya (2011), Mekhedov (2011), Sedova, (1999). However, the obtained models enable to finance rather company's current activities or particular investment projects than a corporate strategy over a long period. Therefore, our model is relevant, since it provides an efficient corporate strategy.

2. Materials and methods

To create a company's debt portfolio, we should assess the availability of various sources of loan financing, terms, under which a company may start attracting loan capital from external sources, and rank the sources of loan capital depending on the availability and reliability of a source of loan capital and maximum amounts of attraction.

The *assessment of the availability of different sources* of loan financing should be based on the analysis of the situation in the debt financing market and credit rating, and, therefore, the investment attractiveness of a company itself. The analysis of the situation in the debt

financing market should involve a full list of the sources of debt financing and terms of receiving finances from this source for companies including, first of all, maximum loan term; the level of a loan financing rate; the form and type of a loan financing rate; maximum amount receivable; forms of security; terms of debt service payments; transaction expenses; requirements to a borrower; fines and penalties for the violation of repayment terms etc.

The assessment of company's own credit rating is based on the assessment of company's ability to pay in the implementation of a corporate strategy and its credit history. Delayed payments to a source of loan capital, judgmental enforcements of debts and claims in the amount that exceeds 30% of company's balance cost, as well as complaints from tax authorities have a negative influence on company's credit rating. Therefore, a company should repay its debts timely, manage loan capital efficiently and be able to distance from previous failures in its policy of attracting loan financing. A well-worked out corporate strategy and the rational structure of company's capital based on non-payment risks hedging and reduced possibility of bankruptcy are very important for increasing company's rating. However, the most important thing in attracting loan capital is the work of company's financial managers in financial marketing aimed at improving the "investment attraction" of their company. A clear presentation of strategic perspectives, the assessment of future results of activities with account for many random factors, focus on more informational transparency, active promotion of a company in both the product and financial market show that a company has a competent financial manager. Moreover, it is indicative of the high-quality and efficient management, which targets a company at the efficient work over a long period. As we know, credit ratings directly depend on company's high-quality management and information transparency.

The assessment of the terms, under which a company may start attracting loan capital from external sources, should be based on the analysis of company's losses due to frozen strategic decisions and financial expenses of obtaining a necessary volume of loan capital. The basic restriction that might work here is a positive differential of the financial leverage effect (Teplova, 2016):

$$Df = ROA - \overline{r}_D > 0,$$

where Df is a differential of financial leverage; $ROA = \frac{EBIT}{TA}$ is overall return on assets; $EBIT$ is earnings before interest and taxes; TA (Total Assets) is the average cost of assets; $\overline{r}_D$ is the average cost of loan capital defined as a correlation between all debt expenses and the overall amount of debt resources.

Besides, we should assess company's possible losses:

$$FL = \sum_{t=1}^{m} \frac{NOPAT_S - NOPAT_0}{(1+i)^t} + \sum_{t=1}^{m} \frac{T \cdot 1{,}1 \cdot RE \cdot D}{(1+i)^t},$$

where FL are financial losses; $NOPAT_S$, $NOPAT_0$ are net operating profits after taxes; i is a discount rate, m is a period of financial decisions delay; RE is a refinancing rate; D is the volume of loan capital;

and possible financial costs of attracting loan capital on disadvantageous terms:

$$FC = PV(FD) - W = \sum_{t=1}^{m} \frac{\gamma_t \cdot V_{t-1} \cdot p_t}{(1+i)^t} - \left(D - \sum_{t=1}^{T} \frac{Y_t}{(1+i)^t} \right),$$

where FC are financial costs; $PV(FD)$ are the presented costs of financial instability (Altman, 1984); W is a grand element of loan financing attraction (in case of disadvantageous terms $W<0$); γ_t is the presented assessment of the share of the cost lost due to the loss of financial stability; p_t is a probability of financial difficulties; V_{t-1} is company's cost at the $(t-1)$ period; Y_t are debt payments including interest payments and principal payments.

If financial costs of attracting loan capital exceed financial losses due to delayed strategic decisions $FC > FL$, we should postpone the implementation of a corporate strategy or start to implement it partially without attracting loan capital or with a limited use of loan capital.

The optimal scheme of using different sources of debt financing should be based on *external sources rating*. The rating should involve:

- the attraction period for loan capital: long-term and short-term sources;
- the reliability and stability of a source of loan capital;
- the maximum amount of attraction from this source.

Rating should be calculated by a company's financial manager. He analyzes the situation in the financial market, creates ratings of the sources of external debt financing and elaborates the optimal scheme of developing loan capital with account for the amount of financing, target structure of capital, the goal of attracting loan financing and availability of a certain source of debt financing.

Having ranked the sourced of loan capital depending on their availability, reliability and a maximum amount of attraction, a company may start developing the strategy for attracting loan capital for the financial provision of a corporate strategy over a long period.

The process of creating the optimal strategy for attracting loan capital has the following stages:

1. To define the goals of attracting loan capital in the forthcoming periods.
2. To create a temporary structure of a need for loan capital, to define the correlation between the amounts of short-term and long-term loans.
3. To define the maximum amount of attracting loan capital depending on temporal horizons of investment.

4. To assess the efficient cost of attracting loan capital from different sources;
5. To define company's optimal debt portfolio at different stages of a corporate strategy: to model basic forms and amounts of attracting loan capital and the structure of basic lenders.
6. To put the finishing touches on the terms of attracting loan capital for minimizing the financial costs of using external debt sources.
7. To provide the efficient use of attracted loan capital.
8. To make the plans of debt amortization and to provide timely repayment.
9. To provide a constant monitoring of company's ability to pay and structural shifts in the sources of debt financing.

To provide the efficient use of loan capital, we should attract it only on an **ad hoc** basis. From the viewpoint of strategic debt decisions, we need to define the following goals:

-to update tangible non-current assets;

-to acquire intangible assets;

-to replenish constant and variable parts of current assets.

If we define the goal of attracting loan capital, we will be able to create a *temporal structure of a need* for short-term and long-term loan sources of financing and to define maximum amounts for each source of financing. When defining the maximum amounts of attracting loan capital, we should take into account the amount of financing from company's own sources at this time period and the target structure of company's capital.

The *efficient cost* of loan capital is the basic criterion of attractiveness of a source of loans for a company (Evdokimova & Bondarenko, 2017). The efficient cost is defined as a discount rate from the equity of the actual amount of attracted money from this source and the amount of discounted interest payments, commission payments and other financial costs of attracting and maintaining loan capital from this source of financing:

$$D_k = \sum_{t=1}^{n} \frac{Int_{kt} + CC_{kt} + FC_{kt}}{\left(1 + r_k\right)^t},$$

where r_k is the efficient cost of the k source of debt financing; Int_{kt} are loan capital interests at the t moment of time; $CC_{k\mathrm{e}}$ are commission expenses at the t moment of time; $FC_{k\mathrm{e}}$ are financial expenses of attracting and maintaining a loan liability at the t moment of time; n is the term of loan capital attraction; D_k is the volume of financing from the k source of loan capital.

A company can assess interest and commission payments by using its own practice of working with this loan source of financing and the experience of similar companies. A starting point in the assessment of these financial costs is the offers of banks, financial and credit companies and analytical reviews of fund markets. To obtain an accurate picture, we should reassess this information taking into account the perspectives of the development of the debt financing market and company's credit rating.

Financial costs of attracting and maintaining loan capital encompass obligatory activities for attracting loan capital and the cost of maintaining debt obligations. Financial costs of attraction encompass the preliminary assessment of security assets; records from the state register, schemes, stage-be-stage plans of real estate items, plot plans; state registration of the agreement on the pledging of immovable property; a pledge agreement with preliminary insurance of pledged property, costs at the stage of elaborating a bond loan, registration costs of a prospectus for bond issue, costs in case of primary placement of bonds and other similar activities. The cost of loan liability service encompasses the costs under the agreement; facility payment; expenses for providing coupon bond payments; costs of opening and maintaining a loan account; financial losses due to the conversion of loan liabilities in foreign currency; and additional tax payment pursuant to the Tax Code.

The calculation of the efficient cost enables to range the sources of loan financing according to their attractiveness for companies taking into account the term of debt capital.

The next stage in creating the strategy for the development of financial resources is *to create the optimal debt portfolio* of a company. The basis for modelling the structure of loan sources of financing is providing the most efficient forms and terms of attraction, i.e. their diversification. The diversification of sources enables to ensure the optimal level of the costs of attracting loan capital, the acceptable level of financial risks and the sufficient level of company's liquidity and ability to pay during debt obligations service.

We offer to use a grand element as a target function. The absolute grand element W is often used for assessing the terms of bank lending in the aspect of credit types. Besides, it is used as a target function for creating a target structure of company's capital (Geraschenko, 2009). A grand element enables to compare contingent benefits of attracting debt capital from different sources of loan financing on the terms of particular financial and commercial organizations, banks, and investment funds with the average terms of crediting in the market. It describes the size of company's contingent benefit, if debt payments from this source of loan capital presented with account for the average market value of similar financial instruments at the initial moment of time are less than the amount of attracted resources from this source. The higher the contingent benefit from attracting this source of loan financing is, the more efficient the strategy for attracting company's loan financing is. The simplest formula of the grand element for *k* source of loan financing at the *t* moment of time is defined by the formula:

$$W_{kt} = D_{kt} - \sum_{t=1}^{n_k} \frac{Y_{kt}}{(1+\bar{i}_r)^t}, \qquad (1)$$

where Y_t are debt expenses based on the actual cost of loan capital with account for interests, commission payments and principal payments; $\bar{i}_r$ is the average market interest rate.

To define the grant element, we take into account all the costs of attracting and maintaining this source of financing, i.e. the amounts of debt obligation payments based only on an interest rate or a coupon rate do not reflect a real cost of debt funds.

When creating a debt portfolio from the k sources, the target function of the grand-element of a portfolio will be as follows:

$$\sum_{k=1}^{S} W_{kt} \cdot d_{kt} + \sum_{k=S+1}^{L} W_{kt} \cdot d_{kt} \to \max, \quad (2)$$

where d_{kt} is the share of the *k* source of loan financing in the *t* period of time in company's debt portfolio; W_{kt} is the grand element of the *k* source of loan financing at the *t* moment of time; $k = \overline{1,S}$ are the sources of short-term loans; $k = \overline{S+1,L}$ are the sources of long-term loans; $(L+S)$ is the amount of sources of long-term and short-term loans.

To diversify the risks, we should add the following things to the system of restrictions for our model:

1. *The requirement to create the optimal structure of company's capital.* This requirement reflects the idea of creating and maintaining the target capital structure *(TCS)* in a company. We should note that a company should take into account the strategic objective of reducing the total cost of attracted capital over a long period in choosing the optimal schemes of financing. Besides, it should change the target structure of capital depending on the changes in the situation in financial, product and investment markets. Therefore, the target structure of capital in the strategic perspective may change. Besides, we should take into account the structural shifts in the target structure of capital during the creation of a temporal structure of the sources of loan financing (Zadorozhnaya, 2015). Overall, the restriction for the target structure of capital is as follows:

$$\frac{D_{tL} + D_{tS} + \sum_{k=1}^{S} D_{kt} \cdot d_{kt} + \sum_{k=S+1}^{L} D_{kt} \cdot d_{kt}}{E_t + D_{tL} + D_{tS} + \sum_{k=1}^{S} D_{kt} \cdot d_{kt} + \sum_{k=S+1}^{L} D_{kt} \cdot d_{kt}} \le TGS_t, \quad (3)$$

where D_{tL}, D_{tS} is company's long-term and short-term debt at the beginning of the *t* period; D_{kt} is the maximum amount of company's debt from the k source of loan financing at the t moment of time; E_t is the amount of financing from the company's sources at the t moment of time; TCS_t is the target (optimal) capital structure at the t moment of time.

Therefore, this restriction (2) defines the maximum amount of debt financing, which a company can afford at the t time interval of a corporate strategy, if agency expenses and losses of financial stability are minimized.

2. *The requirement to development the optimal structure of loan capital depending on the minimization of the financial risks level.* This restriction relates to a differentiated choice of the sources of financing different components of company's assets. Therefore, company's assets are divided into noncurrent assets (*NCA)* and current assets (*CA).* Current assets comprise a constant (system) part of current assets (CCA), which is a permanent part of current assets that does not depend on seasonal or market fluctuations**,** and a variable part of current assets (VCA), which is a varying part of current assets. The constant part of current assets is defined as the irreducible (insurance) minimum of current assets, which a company needs for current operational activities. A company may influence greatly the reduction of the precautionary balance of current assets using the strategy for reducing an operational cycle. A variable part of company's current assets relates to the seasonal increase in the amount of product sales and the need for creating commodity stocks of seasonal storage and preschedule shipment of raw materials**.** A variable part of company's current assets usually encompasses maximum and average need for them.

Company's managers can choose different basic approaches to asset financing depending on their attitude to financial risks. This may be a conservative approach, when long-term sources (company's equity capital and long-term sources of loan capital) are used to finance noncurrent assets and a constant part of current assets as well as an average need for a variable part of current assets. Another option is a give and take approach, when long-term sources finance noncurrent assets and a constant part of current assets, while short-term sources of loan capital are used to finance a variable part of current assets. The aggressive policy of asset financing implies that the entire variable part and a large portion of a constant part should be financed from short-term sources of loan capital.

We assume that a company should extend the share of long-term sources of loan capital to increase its cost. Therefore, we establish a restriction in the structure of loan capital from the perspective of a give and take approach as a starting point in modelling the structure of loan capital.

$$\frac{E_t + D_{tL} + \sum_{k=S+1}^{L} D_{kt} \cdot d_{kt}}{D_{tS} + \sum_{k=1}^{S} D_{kt} \cdot d_{kt}} \geq \frac{NCA_t + CCA_t}{VCA_t}, \qquad (4)$$

where NCA_t is the amount of noncurrent assets at the t moment of time; VCA_t is a variable part of current assets at the t moment of time; CCA_t is a constant part of current assets at the t moment of time;

The modelling of the optimal structure of loan capital implies the reduction of the correlation $\frac{NCA_t + CCA_t}{VCA_t}$ toward the aggressive policy of financing company's assets, if the amounts of long-term sources of financing are not enough to cover noncurrent assets and a constant (system) part of current assets, which may become reality, since long-term sources of financing are unavailable now.

3. *The requirements to optimize the effect of a financial leverage.* The effect of a financial leverage is one of the factors to create company's cost. Sometimes, it is not reasonable to increase

this index from the standpoint of growing contradictions between agencies, higher risks of losing financial stability and the correlation between investment return and the cost of attracted debt finances. For companies with low potentials of growth, a high financial leverage, which restricts investment possibilities, is an efficient instrument for creating the cost, i.e. it makes managers more disciplined and restricts them in the inefficient use of a free money flow. In case of low investment potential, there is often a positive correlation between leverage and company's cost (Berger, Ofek, & Yermac, 1997; Lang, Ofek, & Stulz, 1996). A negative correlation between investments and the financial leverage from the standpoint of cost is diagnosed only in firms with high potentials of growth. They should choose a low financial leverage for increasing company's cost through strategic investments. This is confirmed by empirical research (Teplova, 2016; Berger et al., 1997), which shows that companies with high potentials of growth often use a low financial leverage, mostly due to a small financial leverage ratio.

Let us use the simplest formula of the effect of a financial leverage to optimize the effect of company's financial leverage:

$$EFL = (1-T)\cdot(ROA-\overline{r_D})\cdot\frac{D}{E},$$

where EFL is the effect of financial leverage; T is the rate of income tax; D, E are company's loan capital and company's equity capital.

Tax optimization can increase a tax corrector $(1-T)$ as much as possible depending on the calculation of the efficient tax rate. The creation a target structure of company's capital enables to fix a financial leverage ratio at the level TCS. It means that at the stage of creating company's optimal debt portfolio, the basic restriction that enables to optimize the value of the financial leverage effect relates to the financial leverage differential:

$$ROA-\overline{r_D}>0,$$

More detailed analysis of the formula of the financial leverage effect enables to divide the influence of short-term and long-term sources of financing into the financial leverage differential. Let us represent a financial leverage ratio as follows:

$$\frac{D}{E}=\frac{(SDMAP)+AP+LD}{E}=\frac{SDMAP}{E}+\frac{AP}{E}+\frac{LD}{E},$$

where AP is accounts payable; $SDMAP$ is short-term debt minus accounts payable; and LD is long-term debt.

Then, we can define the effect of financial leverage as follows:

$$EFL = \left[(1-T)\cdot ROA - (1-T)\cdot \sum_{k=1}^{L+S} r_k \cdot d_k \right] \cdot \left[\frac{LD}{E} + \frac{SDMAP}{E} + \frac{AP}{E} \right],$$

where r_k is the efficient cost of the k source of debt financing;

If we define the net return on assets (NROA) as:

$$(1-T)\cdot ROA = \frac{(1-T)\cdot EBIT}{TA} = \frac{NOPAT}{TA} = NROA,$$

where TA (Total Assets) is the average cost of assets,

and reveal the part of tax-free interests, we will get the following formula:

$$EFL = \left[NROA - 1{,}1\cdot RE\cdot(1-T) - \left(\sum_{k=1}^{S+L-1} r_k \cdot d_k - 1{,}1\cdot RE \right) - r_{AP}\cdot d_{AP} \right] \times \left[\frac{SDMAP}{E} + \frac{LD}{E} + \frac{AP}{E} \right]$$

where r_{AP}, d_{AP} is the efficient cost and a share of accounts payable in the overall structure of a debt portfolio.

If we divide the influence of the cost of long-term and short-term assets into the value of a differential, we finally get the following formula for the effect of the financial leverage:

$$EFL = \left[\begin{array}{c} NROA - 1{,}1\cdot RE\cdot(1-T) - \left(\sum_{k=1}^{S-1} r_k \cdot d_k - 1{,}1\cdot RE \right) - \\ - \left(\sum_{k=S+1}^{L} r_k \cdot d_k - 1{,}1\cdot RE \right) - r_{AP}\cdot d_{AP} \end{array} \right] \times \left[\frac{SDMAP}{E} + \frac{LD}{E} + \frac{AP}{E} \right]$$

Therefore, the restriction for the optimal effect of the financial leverage will be as follows:

$$NROA - 1{,}1 \cdot RE \cdot (1 - T) - \left(\sum_{k=1}^{S-1} r_k \cdot d_k - 1{,}1 \cdot RE \right) - \\ - \left(\sum_{k=S+1}^{L} r_k \cdot d_k - 1{,}1 \cdot RE \right) - r_{AP} \cdot d_{AP} > 0 \quad (5)$$

This restriction enables to reveal the sources of debt financing that have the least and the greatest effect on the financial leverage differential when modelling the structure of loan capital.

Comparing the components of the formula, we can analyze the optimal structure of long-term and short-term sources of loan financing from the standpoint of creating company's cost. The analysis of the financial leverage differential in the practice of the Russian tax policy enables to define basic points for enhancing its functions as a creator of company's cost through the efficient management of four strategic areas in the activities of company's management:

- the increase in the operational benefits of strategic decisions, which are quantitatively assessed by the NROA index;
- the efficiency of financial decisions in attracting fee-paying and contingently free sources of debt financing assessed by the spread of a financial leverage expressed through the difference between net returns on company's assets and a post-tax rate $(\bar{r} - 1{,}1 \cdot RE)$ in company's borrowings. Accounts payable are treated as a contingently free source;
- the choice of optimal proportions between long-term and short-term loan capital, and between fee-paying and contingently free liabilities;
- changes in the strategy for attracting loan financing in managing formally free sources of debt financing.

4. *The requirement to diversify the risk of reducing company's ability to pay.* To minimize the risk of losing ability to pay when modeling the structure of loan capital, we take into account two ratios: interest coverage ratio (ICR) and debt service ratio (DSR).

Interest coverage ratio is the correlation between the source of payments of interests on debt and the amount of interest payments at a certain period of time. In practice, $EBIT$ or $EBITDA$ are usually treated as the source of interest payments:

$$ICR = \frac{EBITDA_t}{Int_0 + \sum_{k=1}^{L+S} r_{kt} \cdot D_{kt} \cdot d_{kt}}$$

where Int_0 are company's interest payments for loan capital before the implementation of a corporate strategy; r_{kt} is the efficient cost of the k source of debt financing at the t moment of time.

However, if interest payments including bond coupons that are not quoted in the market, are paid from a net income in some country, this ratio should be treated as a correlation between a net income and interest payments. Practice shows that if this ratio is more than 2, a company can cope with current debt payments and the risk of reducing the ability to pay is diversified (Teplova, 2016). Companies and lenders usually focus on the value of this ratio no less than 3. Therefore, the restriction in the interests cover ratio can be formalized as follows:

$$ICR_{min} \le \frac{EBITDA_t}{Int_0 + \sum_{k=1}^{L+S} r_{kt} \cdot D_{kt} \cdot d_{kt}} \le ICR_{max} \quad (6)$$

where ICR_{min} и ICR_{max} are maximum amounts of the interest cover ratio.

The debt service ratio (DSR) describes the ability of the project to pay both interests and a principal debt. It is largely interpreted like the interest cover ratio and is calculated by the formula:

$$DSR = \frac{EBITDA_t}{Int_t + \frac{PD_t}{(1-T)}} = \frac{(1-T) \cdot EBITDA_t}{1{,}1RE \cdot (1-T) + \sum_{k=1}^{S+L} (r_{kt} - 1{,}1 \cdot RE) \cdot d_{kt} \cdot D_{kt} + PD_t}$$

where PD_t is the size of principal debt payments at the t period.

If the value of this ratio is more than 1, we have succeeded in hedging the risk of losing ability to pay. If this index is lower than 1, a company cannot serve its debt and, therefore, it should resort to additional funds from its equity capital or change its debt repayment plan. Therefore, the restriction in the debt service ratio can be formalized as follows:

$$DSR_{min} \le \frac{(1-T) \cdot EBITDA_t}{1{,}1RE \cdot (1-T) + \sum_{k=1}^{S+L} (r_{kt} - 1{,}1 \cdot RE) \cdot d_{kt} \cdot D_{kt} + PD_t} \le DSR_{max} \quad (7)$$

where DSR_{min} и DSR_{max} are the maximum amounts of the debt service ratio.

5. *The requirement of a closed structure of the debt portfolio.* This restriction is imposed on the temporal structure of company's need for loan capital and provides the 100% filing of the structure of loan capital. It can be generally represented as an equity:

$$\sum_{k=1}^{S+L} d_{kt} = 1 \quad (8)$$

6. *The requirement of nonnegative variables.* This is a mathematical term for making the optimal decision acceptable from the standpoint of practical implementation of the structure of loan capital:

$$d_{kt} \geq 0 \tag{9}$$

3. Results

Therefore, the analysis of the above criteria and restrictions enables to create a model for developing company's debt portfolio to diversify the financial risks of losing ability to pay and reducing company's financial stability.

The target function of our model of debt portfolio is to maximize the contingent benefits of attracting loan capital from different sources of debt financing compared to average market terms:

$$\sum_{k=1}^{S} W_{kt} \cdot d_{kt} + \sum_{k=S+1}^{L} W_{kt} \cdot d_{kt} \rightarrow \max, \tag{2}$$

The restrictions of the model enable to diversify financial risks in financing the strategic decisions of a company. They should involve:

- a term of achieving the target structure of capital:

$$\frac{D_{tL} + D_{tS} + \sum_{k=1}^{S} D_{kt} \cdot d_{kt} + \sum_{k=S+1}^{L} D_{kt} \cdot d_{kt}}{E_t + D_{tL} + D_{tS} + \sum_{k=1}^{S} D_{kt} \cdot d_{kt} + \sum_{k=S+1}^{L} D_{kt} \cdot d_{kt}} \leq TGS_t, \tag{3}$$

- a term of providing the diversification of financial risks in choosing the strategy for financing company's assets:

$$\frac{E_t + D_{tL} + \sum_{k=S+1}^{L} D_{kt} \cdot d_{kt}}{D_{tS} + \sum_{k=1}^{S} D_{kt} \cdot d_{kt}} \geq \frac{NCA_t + CCA_t}{VCA_t}, \tag{4}$$

- a term of optimizing the effect of a financial leverage that leads to the increase of company's cost and enables to diversify the financial risks of company's economic

activities by increasing the spread of a financial leverage:

$$NROA - 1{,}1 \cdot RE \cdot (1-T) - \left(\sum_{k=1}^{S-1} r_k \cdot d_k - 1{,}1 \cdot RE \right) - \\ - \left(\sum_{k=S+1}^{L} r_k \cdot d_k - 1{,}1 \cdot RE \right) - r_{AP} \cdot d_{AP} > 0 \quad (5)$$

- a term of diversifying the risks of losing ability to pay and reducing financial stability:

$$ICR_{min} \le \frac{EBITDA_t}{Int_0 + \sum_{k=1}^{L+S} r_{kt} \cdot D_{kt} \cdot d_{kt}} \le ICR_{max} \quad (6)$$

or

$$DSR_{min} \le \frac{(1-T) \cdot EBITDA_t}{1{,}1RE \cdot (1-T) + \sum_{k=1}^{S+L} (r_{kt} - 1{,}1 \cdot RE) \cdot d_{kt} \cdot D_{kt} + PD_t} \le DSR_{max} \quad (7)$$

- mathematical terms of solving the task of optimization:

$$\sum_{k=1}^{S+L} d_{kt} = 1 \quad (8)$$

$$d_{kt} \ge 0 \quad (9)$$

Our model for optimizing the structure of loan capital enables to model the structure of the sources of loan financing relying on the needs for loan capital at each moment of time and the maximum amounts that a company may attract from each source of debt financing.

To approbate our model for creating a debt portfolio, we have considered a five-year strategy for financing a large construction company. We have studied the following sources of debt financing:

- non-budgetary (long-term - bank credits, leasing, bond loan; short-term - accounts payable, facility, factoring);
- budgetary (the benefits of private and state partnership).

We have chosen the comparison rate at the level of 15.08% to calculate the represented value of costs of loan capital service. The contingent benefits of attracting a credit have been calculated by the formula (1).

Long-term bank credits

We have chosen the terms of credit attraction in six large Russian banks for the analysis: Gazprombank PJSC(1), Sberbank PJSC(2), Primsotsbank PJSC (3), ALFA-bank JSC (4), OTP Bank JSC (5), LOCKO-Bank JSC (6). The calculation of contingent benefits of credit attraction is represented in Table 2. We have taken into account amortization costs when analyzing the terms of attracting bank credits. The analysis of the contingent benefits of credit attraction PV (COC) shows that Gazprombank PJSC and LOCKO-bank JSC have the most attractive terms of crediting.

TABLE 2. THE CALCULATION OF THE CONTINGENT BENEFITS OF A LONG-TERM CREDIT

Bank	1	2	3	4	5	6
PV(COC), thousand rubles	9,401.9	10, 380.7	10, 479.4	10, 224.7	11, 037.3	9, 259.5
W, thousand rubles	**598.1**	-380.7	-479.4	-224.7	-1 037.3	**740.5**

Leasing

The calculation of the contingent benefits of leasing attraction is represented in Table 3. We have chosen 4 leasing companies for the analysis: Gazprombank Leasing JSC (1), Primsotsbank (2), LOCKO-Bank (3), and Bank UralSib (4). Amortization charges have been calculated by three methods: linear (L), accelerated (A), and delayed (D). The subject matter of leasing has been referred to the company's balance. The analysis of contingent benefits of leasing attraction PV(COL) shows that Gazprom Leasing JSC has the most attractive terms of leasing in case of linear and delayed methods of amortization calculation, while LOKO-Bank has the most attractive terms of leasing in case of a linear method of amortization calculation.

TABLE 3. THE CALCULATION OF THE CONTINGENT BENEFITS OF LEASING

Leasing companies	1			2	3		4	
Methods of amortization	L	A	D	L	L	A	L	D
PV(COC), thousand rubles	9,724.2	10,099.	9,690.3	10,313	9,742.4	10,117	10,331	10,191
W, thousand rubles	**275.8**	-99.4	**309.6**	-313.1	**257.6**	-117.2	-331.2	-191.6

Bond loan

The efficiency of emission has been assessed for uncertificated bonds with a purchase option in three years; a coupon rate is defined at the level of 10.15%, quarterly payments. The costs of state registration of emission securities issue will be 0.2% of the nominal amount of issue. To place bonds, a company should attract a mediator. The cost of his services is 1% of the amount of emission at nominal cost. Therefore, a company will need resources to pay 100 thousand rubles for consultant's services. Besides, it will have to pay

0.2 % of emission amount for the services of an advertising company. The contingent benefits of bond emission are 841.19 thousand rubles.

Benefits of private and state partnership

If a company buys equipment for innovative production (for example, pre-stressed concrete), it can count on subsidizing a credit rate up to 5 p.p. from regional government for 3 years. This will allow reducing credit or leasing costs.

Accounts payable

Accounts payable to suppliers and contractors under supply agreements do not imply a discount in case of prepayment; therefore, the efficient cost of accounts payable to suppliers is close to 0%. The efficient cost of taxes and duties accounts payable, accounts payable to the budget and state non-budgetary funds can be calculated by the value of penalty for taxes payable, i.e. $r = 365 \cdot \mathrm{RE}/300$, where *RE* is a refinancing rate. Contingent benefits of accounts payable in case the average period of debt circulation does not exceed 90 days are 1,527.72 thousand rubles.

Facility

We have analyzed a 10 million rubles facility, interests are paid every month, the debt is repaid in three months. The calculation of the contingent benefits of attracting a facility PV(COC) is represented in Table 4. We have taken into account the costs of debt amortization when analyzing the terms of attraction. The analysis of the contingent benefits of attracting facility shows that Gazprombank (JSC) and LOCKO-Bank (JSC) have the most attractive terms of crediting.

TABLE 4. THE CALCULATION OF THE CONTINGENT BENEFITS OF A FACILITY

Bank	1	3	5	6
PV(COC), thousand rubles	25,963.1	26,020.4	25,983.1	25,928.2
W, thousand rubles	**543.8**	420.5	532.1	**620.4**

Factoring

The amount of factoring is assessed in 10 million rubles per quarter, the turnover of accounts receivable does not exceed 90 days. The calculation of the contingent benefits of factoring attraction are represented in Table 5, the analysis is based on the offers of Gazpronbank PJSC (1), Primsotsbank JSC (3), Alfa Bank JSC (4), LOCKO-Bank JSC (6), and Bank NFK JSC (7). The analysis of the contingent benefits of factoring attraction shows that LOKO-Bank JSC and Bank NFK JSC have the most attractive terms.

TABLE 5. THE CALCULATION OF THE CONTINGENT BENEFITS OF FACTORING

	1	3	4	6	7
PV (COFA), thousand rubles	39,973.8	39,871.1	40,178.1	39,855.9	39,841.2
W, thousand rubles	**26.2**	**128.9**	-178.1	**144.1**	**158.8**

The creation of company's optimal debt portfolio

When creating of the optimal debt portfolio, we have taken into account only the sources of loans with a positive value of contingent benefits. Optimization has been conducted on an annual basis (Table 6). During the first and the second year, a company cannot attract long-term loans due to low net margin of investments. As for short-term loans, the accounts payable and facility of LOCKO-Bank JSC are preferred. A company will be able to attract long-term loans only during the third year. As for long-term sources of financing, a bond loan and leasing in Gazprombank Leasing JSC are preferred. We should note that a company cannot achieve a target structure of financing without increasing its own capital in the strategic period.

TABLE 6. THE OPTIMAL DEBT PORTFOLIO ON AN ANNUAL BASIS

THE SOURCES OF DEBT FINANCING	d_1, %	d_2, %	d_3, %	d_4, %	d_5, %
Gazprombank Leasing	0	0	17.5	0	0
Bond loan	0	0	22.5	0	0
Accounts payable	80	70	60	60	60
LOCKO-Bank facility	20	30	0	40	40
Contingent benefits of attracting loans	15,86.26	1,465.54	1,415.48	1,344.81	1,344.81
Financial leverage differential, %	0.9	0	0	2.2	0
A term of losing ability to pay (ICR_{min}>2)	2.17	3.22	2.51	4.32	5.19
Structure of capital (target structure 57.07%), %	66	63	63	62	62

Therefore, we have defined the structure of loan capital and the sources of financing. At the stage of financial strategy development, the structure of a debt portfolio may change; therefore, company's average weighted contingent benefits of attracting loan capital may diminish.

4. Discussion

The profitableness of operating activities is crucial in modelling the optimal structure of loan capital. All the financial risks of attracting loan capital are directly associated with this index; therefore, the optimization of a financial leverage differential plays a special role in modelling the structure of capital. Here, we should define clearly a target correlation between long-term loans and conditionally free sources of financing to reduce company's financial cycle and to increase the spread of a financial leverage. Besides, we should reveal the correlation between long-term loans and short-term loans.

We should note that sometimes, we cannot find an optimal solution for the model, especially at some stages of the strategic horizon of planning. Thus, the restriction to diversify financial risks in choosing the strategy for financing company's assets can limit quite strongly the available amount of attracted loan capital at certain stages. Loans are limited due to the weakness of the Russian fund market as well as the incompleteness and asymmetry of information; therefore, underinvestment is a big challenge for the Russian companies (Teplova, 2007).

Overall, the process of developing company's debt portfolio in compliance with our model is a multi-step and dynamic procedure. At the first step, we define the restrictions

of the model for company's debt portfolio. At the second step, we establish the rational sources of loan financing and define their terms and maximum amounts of attraction. At the third step, we model the structure of a debt portfolio. At the fourth step, we analyze the structure of the obtained portfolio and assess the efficient cost. Besides, we define whether the amount of attracted loans is sufficient. At the fifth step, we introduce changes in the structure of sources, maximum amounts and the operation of resources if the amount of attraction is insufficient. At the sixth stage, we develop a debt portfolio one again and then, at the seventh stage, we analyze the sufficiency of the amount of loan resources. Then, steps 5-7 may be repeated several times until the necessary amount of loans is developed or the decision to change initial restrictions is made, for example, to increase the risk of financial losses, to refuse from some investment projects, to shift investment projects in time for providing their cross-subsidizing (Limitovskiy, 2008, p. 284), and to increase company's equity capital. After the restrictions have been changed, the process of modelling is repeated again until a necessary amount of loan resources is developed.

We should note that the calculation of the initial structure of loan financing is not final. It may change during further elaboration of the terms of attracting loan capital from different sources of debt financing. The definition of the optimal structure of debt obligations based on preliminary assessed and predicted values should be improved at the stage of practical implementation of the strategy for attracting loan financing, when a company should focus on optimizing the terms of attracting loan capital from different sources. Specialists in debt financing assume that "having made a lot of efforts to find the appropriate types and sources of financing, many entrepreneurs are sometimes so grateful to everyone who says 'yes' to them that they forget about further negotiations on the bargain" (Parks, 2006). Therefore, we should remember that everything may become a subject matter of negotiations: an interest rate, terms of payment, the size of commission payments and other payments, prepayment fines and security for debt obligation. That is why we should make as many efforts as possible to obtain the most profitable terms of attracting loan financing for a company.

The attracted loan capital should be used efficiently in full compliance with the goals of attraction (Zorina & Dontsova, 2016). The criterion of the efficient use of loan capital is its returns and turnover ratios. To ensure timely repayment of debt obligations, a company plans for debt amortization in compliance with the applicable financial agreements governing payments. To provide the amortization of the largest credits and loans, a company may reserve special repayment funds beforehand. The payments for debt obligation service are included in company's payment schedule. They are controlled during the monitoring of financial activities.

Overall, the process of modelling and implementation of the strategy for attracting company's loan financing is a dynamic. The changes in the terms of granting loan capital and in the situation in the product and financial markets may alter the optimal structure of debt financing. Therefore, constant monitoring of the temporal structure of loan financing is one of the most important functions of a company. A constant analysis of the situation in the loan financing market, innovative sources and schemes of financing, as well as the structure of the market of potential lenders and investors is the essential component of a successful optimal strategy for attracting company's loan financing.

5. Conclusion

Our research has shown that the efficiency of a corporate strategy irrespective of its involvement in a certain economic sector is defined by the intentional development of loan financial resources for company's sustainable strategic development over a long period and its goals.

To create the optimal structure of the debt financing of strategic decisions, we have offered a model for developing a debt portfolio based on the maximization of financial contingent benefits of attracting loan capital and diversification of the risks of losing ability to pay and reducing financial stability. Our model for the development of company's debt portfolio enables to model the structure of the sources of loan financing depending on the needs for loan capital at each moment of time and maximum amounts that a company may attract from each source of debt financing.

To analyze the utilization of the model, we have considered the development of the debt portfolio of a construction company, which provides the strategy for company's development for the nearest 5 years. The results of the research have enabled to develop company's optimal debt portfolio that complies with the terms of financial risks diversification and to define the optimal sources of loans at each moment of time. The model's utility in the practice of strategic projecting is indicative of its reliability and accuracy.

The paper highlights that changes in loan terms and changes in the situation in the product and financial markets may lead to structural shifts in the sources of financing; therefore, the process of modelling the optimal structure of debt financing should be continuous. The obtained results of modeling the structure of a debt portfolio enable a company to make more informed decisions in the field of attracting loan financing. Besides, companies may choose some of these restrictions to implement a model: the achievement of the target structure of capital, the provision of the diversification of financial risks, optimization of the effect of financial leverage and diversification of the risks of losing ability to pay. However, it refers only to the restrictions that a company has to perform at a certain moment of the strategic period of development. This will enable to develop a multi-variant practice of using this model in strategic design.

6. Recommendations

The model for developing a debt portfolio will be useful for companies' financial managers and financial analysts engaged in elaborating the financial component of a corporate strategy. Besides, the model can be used in the current activities to model the structure of loan capital and to choose the optimal sources of loan financing with account for contingent benefits of attracting loan capital and diversification of the risks of losing ability to pay as well as reducing financial stability.

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