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Methodical Approaches to Determine the Level of Risk Associated with the Formation of the Capital Structure in Conditions of Unsteady Economy

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ABSTRACT

The relevance of the problem stated in the article is that in conditions of nonstationary economy the modification of existing approaches and methods is necessary during the formation of the capital. These methods allow taking into account the heterogeneity of factors' change in time and the purpose of the development of a particular company, thereby ensuring higher market value of the business. The purpose of this article is to develop a methodology for determining the risk associated with the formation of the capital structure in conditions of nonstationary economy. During the study, the authors used the methods of economic-statistical and factor analysis, economic and mathematical modeling, allowing to consider the problem as a purposeful and organized process and form the capital structure with the objectives of business development, the dynamics of changes in each component of the cost of capital, minimize total financial costs and risks to attract sources for the foreseeable future and to maximize the market value of the company. The methodology includes five stages: creation of a dynamic database of key macro and microeconomic indicators; the formation of the matrix of the risk reasons associated with the price of capital, the calculation and comparative analysis of factors affecting the cost of capital in a period of time; establishing a weighted average cost of capital and its components for the planning period and determining the degree of influence of each component on the price change of capital and total risk level. The proposed methodology of the evaluation of the capital structure can be used in conditions of nonstationary economy for companies engaged in activities at the expense of their own and borrowed funds, considering the cost of capital by the current time

Introduction

The use of recognized foreign models of management of the capital structure of business entities in Russia do not always yield positive results. It is not only that there is not enough resources, or experience of implementing management

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decisions. The main reason is that the Russian economy is different, not like the West, namely, nonstationary. The idea of the expansion of the Russian economy arises in the analysis of the dynamics of the main macroeconomic indicators when it becomes apparent that they are independent from time, and exactly this kind of indicators behavior in the natural Sciences is called nonstationary relationship. In addition, the stationarity of the system refers to its ability to maintain a steady dynamic development. As V.N. Livshits (2014) proves in his article that for the Russian economy in the post-reform period, this ability is not typical. Thus, we can assume that the Russian economy in early XXI century is not stationary and has a significant influence on the management of the capital structure of the business entities.

To the greatest extent our understanding of the non-stationary economy corresponds to the following disclosure of its content by the Russian economist V.N. Livshits (2013): "Under the nonstationary economy will be understood economic system, which has a rather sharp and poorly predictable changes in many macroeconomic indicators and parameters, the levels of the state and dynamics of which do not meet the stationary regime of the economy and a normal market cycle, but rather inherent to the transitional crisis or post-crisis economic processes." In general, if we consider the method proposed by V. N. Kostyuk (2013) and to speak about the specifics of nonstationary economic systems compared with the stationary, then their characteristics will be manifested in the following six factors: in the nature of dynamics of macroeconomic indicators; in the functioning and efficiency of the tax system; in the structure of risks and their predictability; in the speculation of the stock markets; in the level and nature of the inflation dynamics; in the stability of the monetary system. Reasoning the characteristic of the condition of the modern Russian economy as a nonstationary one, the manifestation of each of the six listed factors of nonstationarity in modern conditions in Russia will be further discussed in this article. Firstly, the manifestation of the instability of the modern Russian economy is shown in the character of irregular, sometimes chaotic dynamics of such macroeconomic indicators as gross domestic product (current prices, base year process, in % to the previous year), the index of goods and services output by basic economic activities (table 1).

Table 1. Dynamics of macroeconomic indicators that illustrates the nonstationarity of the Russian economy in the period of 2011-2016 years

Name of the indicator, features of calculation, units of measurement	The value of the index by years				
	2011	2012	2013	2014	2015
Gross domestic product(current prices, billion rubles)	59698,1	66926,9	71016,7	77945,1	80804,3
Gross domestic product (in prices of 2011., billion rubles)	59698,1	61798,3	62588,9	63031,1	60682,1
Physical volume indices of Gross domestic product in % to the previous year)	-	103,5	101,3	100,7	96,3
The output index of goods and services by the basic economic activities (at constant prices, 2011).	-	103,2	101,1	100,7	95,9

Compiled by the authors based on the data of the official website of Federal state statistics service"

It is obvious from the dynamics of key macroeconomic indicators of the Russian economy that they do not have the homogeneous variability in the time, although there is a clear economic connection with each other, which means the nonstationarity. It is possible that one of the main causes of the instability of the Russian economy is the relationship between economic ideas and policy, about which R. Skidelsky (2016) writes: "Whilst economics may be able to discuss bargaining power and market power, it fails to explore the reciprocal connections between economic ideas and politics: the political power of economic ideas on the one side, and the influence of power structures on economic thought on the other". In these circumstances, it is difficult to make predictions about what kinds of economic activities should be developed, which resources should be accumulated, and which, on the contrary, should be got rid of. Moreover, as E.A. Dzhandzhugazova et al. (2015) noted this is true not only for large industrial enterprises, as it is noted in the works of A.A. Lubnina et al. (2016), N.A Vinogradskaya and A.Y Ocheret (2010), but also for small companies in the field of service and hospitality. The presence of such trends confuse the management of the allocation of capital in the assets of the company, as well as in the areas of investment funds, making complex forecasting revenues to invest in business capital. In addition, it negatively affects the organization of the process of the state regulation of regional markets of goods and services, as it is noted in the work of K.G Erdyneeva (2016).

Secondly, another factor of the expansion of the modern Russian economy are such features in the functioning of the tax system as complexity, inefficiency and instability. As evidence we can mention the following:- quite a big number of taxes in the Russian modern tax system, both for legal and for physical persons, plus various tax regimes;

- the repeated assessment of one object (for example, the turn of rental property of individuals be legal entities, income from financial investments at a rate exceeding the rate of refinancing) and so on;

- frequent, almost quarterly, change in tax legislation.Since tax costs are the most significant ones in the formation of own capital, their high level and variability create difficulties in determining the price of equity capital of the organization, which in the conditions of difficult accessibility of the borrowed funds is the main source of the functioning and the development of the business (Ibragimov 2008).

Thirdly, nonstationarity of the Russian economy is evident in the structure of risks and their predictability that is the unpredictable non-systematic risks, such as political, criminal, etc. It is clear that this greatly increases the cost of borrowed sources of financing because the increased fee for the risk included in the interest rates. This makes the attraction of capital, especially for the long-term excessively expensive and, consequently, for most organizations with a normal economic return on capital inappropriate. In Western countries, on the contrary, a decrease in the cost of capital, for example, in 2015 the weighted average cost of capital used by one of the largest foreign companies in the production of potash fertilizers "PotashCorp" (Annual Integrated Report, 2015) in 2015 was 7.3%, whereas in 2014 was 9.2%. For most of Russian companies in the production sector, borrowed sources of funding are becoming less accessible.

Fourthly, nonstationarity of the modern Russian economy is evident in the speculation of the stock markets that is a possible deviation of the market value

of financial instruments from the "fair value." It means that besides the objective reasons for the growth of Bank interest, subjective reasons take place, which also reduces the availability of credit capital for both for the expansion of a business and for its maintenance if it is necessary.

Fifthly, nonstationarity of the Russian economy is also seen in the relatively high level of inflation, significant fluctuations and significant differences in price changes for various goods, works and services. When calculating the cost of capital for investments in the modernization projects, technical re-equipment and just business development, it is impossible to determine clearly the payback period of the project, and sometimes the payback itself.

Sixthly, the work of the monetary system can be described as an unstable due to: a significant depreciation of the value of the ruble against the currencies of the developed countries; the decline in the interest rates on financial investments and the rising cost of borrowed capital; termination of the access to cheap funds from foreign financial markets. The decrease was seen not only in the availability of borrowed capital, but also in the appropriateness of placement of temporarily free funds in the financial markets, which actually worsened the possibility of capital flows between sectors of the national economy. In these conditions, the role of the own capital is increasing and the empowerment of its attraction is rising both for enterprises and for investors, and in fact the role of the financial market is reducing.

To summarize what has been said, the Russian economy in modern conditions is nonstationary, we note that for stationary economies there are such situations when their condition is not stationary. However, we see that all the signs of nonstationarity are evident, and each of them imposes certain constraints on the management of the capital structure of Russian business entities and non-commercial activity in the modern conditions.

Methodological Framework

According to R. Braley and S. Myers (2008), "any generally accepted coherent theory of capital structure does not still exist". In conditions of nonstationary economy focused capital management must take into account not only existing approaches and methods to the formation of capital structure, but also the possibility of their modification taking into account the heterogeneity of the changes and the purpose of development of the concrete enterprise that will ensure the growth of the market value of the business.

During the research the following methods were used: the study and generalization of experience of assessing the cost of capital, methods of economic-statistical and factor analysis, economic and mathematical modeling. The application of these methods allowed us to offer a methodical approach to determine the risk level associated with the formation of capital structure in nonstationary economies as a deliberate and organized process with regard to the objectives of business development, the dynamics of changes in each component of cost of the capital, minimize total financial costs and risks to attract sources for the foreseeable future and to maximize the market value of the company.

Results

Approaches to the evaluation of the cost of capital, taking into account its structure, the price of each source and the tax rate

As previously pointed out one of the authors of this article (Petrovskaya & Vasilieva, 2010), each component is characterized by a certain amount of capital (V), financial costs (FI), associated with their use. The financial cost of the own capital: dividends that are paid out of the net profits of the enterprise, the costs for the issue of securities. Financial costs on borrowings: interest rates, which according to the contract you must pay to the credit organization, maintenance costs, etc.

According to this information, we can calculate the approximate price (cost) of the source of capital (Ck):

$Ck = FIk: Vk$

Ck determines the minimum operating margin, the greater the value is, the more the source of financing costs, therefore, the market value of capital is less.

As noted earlier, the price of the capital of the enterprise depends on the influence of nonstationarity and internal environment factors mentioned above: industry characteristics, the duration of the operational and financial cycle, the share of own funds in the sources of financing, operating profitability of the enterprise, and others.

Thus, the price of the source of "a long-term bank loan" in international practice is determined by the formula:

$Cltl = Rateltl \times (1 - ITR)$

Where Rateltl - the rate of interest on long-term loan, ITR - income tax rate.

The cost of equity is determined using the CAPM model:

$Reo = Rf + \Box s \times (Rmc - Rf)$

where Rf - the interest rate without risk;

Rmc is the mean market rate of return for a specific class of securities;

(Rms - Rf) - risk premium (excess return) required from the investment in the risky asset in excess of the unperilous investment yield.

The cost of capital, taking into account its structure, the price of each source and the tax rate can be calculated using the weighted average cost of capital (WACC). This indicator shows the relative level of total expenditure on the maintenance of the chosen capital structure, shows the minimum level of profitability of the funds invested in the company's activity for a specific period of time (one year) and determines the level of aggregate financial risk associated with the formation of the capital structure.

WACC should be used for management decision-making in the selection of a rational variant of financing of fixed and circulating capital, a comparative assessment of the activity of enterprises, the formation of the investment portfolio, profitability assessment and the market value of the company, the investment risk level, etc.

The main stages of applying the definition of the level of risk associated with the capital structure formation under nonstationary economy

The authors of the article proposed method of determining the risk associated with the formation of the capital structure in a nonstationary economy. This technique allows for an assessment of ways of forming the capital structure, the goals of business development, the dynamics of change of each component of the capital price, to minimize the total financial costs and risks to attract sources for the next period, and to maximize the market value of the company's capital.

The technique consists of five successive phases.

Stage 1. The creation of a dynamic database (DB) of the basic macro and micro-economic indicators.

DB = (Ft, CRt), t = 1, ..., T

Where Ft - factors affecting the price of capital and business performance at the time t

F = (F k), k = 1, ..., F

CRt - the main causes of the risk associated with the equity price at time t

The main indicators, which can be used in the dynamic database are offered to include:

- Absolute indicators: assets (As), investment (Inv), including its own capital (Ownc), financial costs (the Fc), net income (NI), etc.

- the relative indicators: return on assets (ROA), return on own funds (ROE), the leverage ratio (Lr), internal growth rate (Igr) return on invested capital (the ROI), economic value added (Economic value added), the level of financial leverage (Fl) etc.

Each indicator characterizes the effectiveness of a particular aspect of the activity. So, ROE and ROA characterize the effectiveness of its own funds and assets in the course of all activities. Lr characterizes the share of net profit of the reporting period, aimed at business development.

EVA determines how the company managed to earn additional income from their activities compared to a situation where it would be sold and transferred to other capital projects under a certain rate of return which reflects the addition value to the standard investment. EVA allows to assess the main aspects of the company: planning of investments, setting goals and motivating top managers, to compare the effectiveness of the business units and identify unprofitable divisions.

Igr determines the maximum sales volume growth for the next period, while retaining the structure of funding sources.

Fl indicator reflects the feasibility of using borrowed funds. If the factor is positive, efficiency of own funds is growing, despite the payment for borrowing.

For the express assessment of the economic value of the enterprise we should take into account the cost of capital (WACC), the forecast sales volumes by main activity, net cash flow from operating activities over the period (CF1) and the growth rate in the future (gn) for a set number of years (N).

Depending on the time period (t = 1, N) the calculation of the economic value of the enterprise is carried out using the following formulas:

ECcap = CF 1: WACC, if not taken into account the growth rate Ncf

ECcap = CF1: (WACC - gn), if taken into account the growth rate of net cash flow (gn)

ECcap = Σ CF t: (WACC - gn) t + CF n + 1 :(WACC - gn) x [1: (1 + WACC) N]

Stage 2. The formation of the causes of risk matrix associated with capital costs.

At this stage the matrix of the main reasons for the occurrence of the underlying risks is forming, which during the process of functioning is expanding. The matrix includes the k underlying risks, relevant factors affecting the price of capital and the first basic of their causes:

Wt= (Wlkt)

where Wlkt – the frequency of occurrence of the l-th reason for risk factor k for a period of time from 1 to T.

Stage 3. The calculation and comparative analysis of factors affecting the cost of capital in the time period t (Fpkt).

Based on the data of the enterprise the values of absolute and relative indicators listed in stage 2 and their dynamics are determined. The calculated values are compared with the average values in time period t consistent with the local standards (Fcokt).

If Fpkt≥ Fcokt, the business efficiency is increased and Vice versa.

Stage 4. The establishment of the weighted average cost of capital and its components for the planning period.

In the formation of capital structure for the next period (t +1), the company must determine the weighted average cost of capital:

WACCc = (∑WACCt × t) : ∑t, t = 1, T

Doc = ∑Doct×t : ∑t, Dbc = ∑Dbct×t : ∑t,

Cocs = ∑Coct×t : ∑t, Cbc = ∑Cbct×t : ∑t,

WACCc characterizes the average level of risk t – th period,

WACCt – weighted average cost of capital in the t – th period,

T – total number of periods considered.

The weighted average cost of capital and its components should be the benchmark in establishing the range of change of prices of capital market value of the company and the relevant risk.

The market value of the company for the next period can be determined according to the formula:

EVAt+1 = RASt+1 – WACCc ×AКt+1

5 stage. Determination of the degree of influence of each component on the change of capital and the total risk level.

Deterministic factor analysis should be done:

ΔWACCt = WACCt – WACC t-1

ΔWACCt(Dbc) =(Dbct – Dbct-1) × Cbct-1 × (1 – ITR t-1),

ΔWACCt(FHC) =Dbct × (Cbct - Cbct-1)× (1 – ITR t-1)

ΔWACCt(Doc) =(Doct - Doct-1) × Coct-1

ΔWACCt(Coc) =Doct × (Coct - Coct-1)

ΔWACC (ITR) Dbct × Cbct × (ITR t-1 - ITR t)

The results of the analysis will allow to detect negative changes and to establish their causes, maintain a database of the frequency of occurrence of specific risk using the matrix of "factor - the reason":

W=(Wlk), Wlk =1,...,Z

where Wlk is the frequency of occurrence of the 1 –th reason in the result of the change factor k.

In conditions of unsteady economy, this matrix will take into account the probability of each cause (Pl) and the probability of change of each factor (Pk) in time period t.

Pl(t)=∑ Wlk/K, k=1,K

Pk(t)=∑ Wlk/L, l=1,L

By specifying certain descriptors that characterize the level of risk, you can set the range of risk estimated by the consequences of negative causes and possible losses of the enterprise related to capital structure.

Generally, the occurrence of one or another reason obeys the law of normal distribution of random variables. If the economic value added by the forecast is less than the actual, then there is a loss.

Average loss caused by the impact of each cause, the range of loss and the level of risk with parameters: mean value (Lossc), variance (D), standard deviation (σloss), the probability that the random variable in the interval (XC – 3σ; XC +3σ):

Lossск = ∑ PK× Losskp, D = ∑ (Losspk – Lossck)2 × PK , σloss = D 1/2

To determine whether the calculated average value of the loss risk is quite objective based on the data provided, it is recommended to use the coefficient of variation: CV = σloss/ Lossck

If the value of CV < 0.10, the deviation loss from the average value will be negligible, if of 0.10 ≤ CV ≤ 0,25, the deviation is moderate, with CV ≥ 0, 25 increases the probability of significant deviations of the predicted value of the loss from the average value. The higher the value of coefficient of variation is, the higher the level of the underlying (total) risk.

Discussions

The theoretical basis of the theory of capital structure, taking into account the cost of each source and the rate of tax laid in the basement of F. Modigliani & M. Miller (1958, 1963) works.

The study carried out by the authors showed that there are many studies in which great attention is paid to questions of formation of optimum capital structure of companies. This issue is devoted to the works by V. Bansal and J. Marshall (1998), Z. Bodie, A. Kane & A. Marcus (2002). R. Braley & S. Myers (2008), K. Van Horn (2003), A. Damodaran (2004), V.K Frank and V.K Goyal,. (2009) etc., In these studies investigates the determinants of capital structure in developed capital markets.

The principles of trade-off theory, the influence of the tax factor and the costs of financial instability are analyzed in the works of E.A. Altman (1984), T.C. Opler and S. Titman (1994) Development of the dynamic aspects of trade-off

theory of capital structure related to the research of E.O. Fischer et al..(1989) and S. Titman and R. Wessels, (1988), etc.

However, they don't take into account the characteristics that determine the level of risk associated with the capital structure in conditions of unsteady economy.

The research conducted by the authors of this article, is fundamentally different from the existing approaches to estimating the cost of capital, that takes into account the level of risk associated with the formation of capital structure in non-stationary economies. The proposed method takes into account the most effective approaches in this area and allows you to set the range of risk, to estimate consequences of negative causes and possible losses of the enterprise related to capital structure.

Conclusion

The implementation of the proposed techniques in nonstationary economy of Russia will allow to:

- track the dynamics of changes in the macro and micro factors that affect the cost of capital;

- to consider the degree of influence of each component on the change of capital and total risk level;

- to establish the relationship between the factors and causes of risks;

- the possible loss, associated with financial costs and capital structure.

The technique of evaluation of capital structure can be used in conditions of unsteady economy for companies engaged in activities at the expense of own and borrowed funds, considering the current time, the cost of capital.

Disclosure statement

No potential conflict of interest was reported by the authors.

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