Rating: New Approach

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Abstract: The paper suggests a new approach to rating methodology, key factors of which are: 1) The adequate use of discounting of financial flows virtually not used in existing rating methodologies, 2) The incorporation of rating parameters (financial "ratios") into the modern theory of capital structure (Brusov–Filatova–Orekhova (BFO) theory) (Brusov P, Filatova T, Orehova N, Eskindarov M, 2015) (for beginning into its perpetuity limit). This on the one hand allows use the powerful tools of this theory in the rating, and on the other hand it ensures the correct discount rates when discounting of financial flows. We discuss also the interplay between rating ratios and leverage level which can be quite important in rating. All these create a new base for rating methodologies.

Keywords: Rating, rating methodology, discounting of financial flows, Brusov–Filatova–Orekhova theory, coverage ratios, leverage ratios.

INTRODUCTION

Rating agencies play a very important role in economics. Their analysis of issuer's state, generated credit ratings of issuers help investors make reasonable investment decision, as well as help issuers with good enough ratings get credits on lower rates etc.

But from time to time we listen about scandals involved rating agencies and their credit ratings: let us just remind the situation with sovereign rating of the USA in 2011 and of the Russia in 2015.

Were these ratings an objective? And how objective could be issued credit ratings in principal?

To answer this question, we need to understand how rating agencies (RA) consider, evaluate, analyze. But this is the secret behind the seven seals: rating agencies stand to the death, but did not reveal their secrets, even under the threat of multibillion–dollar sanctions.

Thus, rating agencies represent some "black boxes", about which information on the methods of work is almost completely absent.

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1. THE CLOSENESS OF THE RATING AGENCIES

The closeness of the rating agencies is caused by multiple causes.

1. The desire to preserve their "know how". Rating agencies get big enough money for generated ratings (mostly from issuers) to replicate its methodology.
2. On the other hand closeness of rating agencies is caused by the desire to avoid public discussion of the ratings with anyone, including the issuer. It is very convenient position – rating agency "a priori" removes himself from beneath any criticism of generated ratings.
3. The absence of any external control and external analysis of the methodologies is resulted in the fact that shortcomings of methodologies are not subjected to serious critical analysis and stored long enough.

The illustration of the closeness of rating agencies is the behavior of the S&P (Standard & Poor’s) Director after declining of the sovereign rating of United States, who left his position but has not opened the methodology used.

But even in this situation, it is still possible some analysis of the activities and findings of the rating agencies, based on knowledge and understanding of

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existing methods of evaluation. Rating agencies cannot use methods other than developed up to now by leading economists and financiers.

2. THE USE OF DISCOUNTING IN THE RATING

One of the major flaws of all existing rating methodologies is a failure or a very narrow use of discounting. But even in those rare cases where it is used, it is not quite correct, since the discount rate when discounting financial flows is chosen incorrectly.

The need to take into account the time factor in terms of discounting is obvious, because it is associated with the time value of money. The financial part of the rating is based on a comparison of generated income with the value of the debt and the interest payable. Because income and disbursement of debt and interest are separated in time, the use of discounting when comparing revenues with the value of debt and interest is absolutely necessary for assigning credit ratings for issuers.

This raises the question about the value of discount rate. This question has always been one of the major and extremely difficult in many areas of Finance: corporate finance, investment, it is particularly important in business valuation, where a slight change in the discount rate leads to a significant change in the assessment of company capitalization, that is used by unscrupulous appraisers for artificial bankruptcy of the company. And the value of discount rate is extremely essential as well in rating.

3. INCORPORATION OF PARAMETERS, USING IN RATINGS, INTO PERPETUITY LIMIT OF MODERN THEORY OF CAPITAL STRUCTURE BY BRUSOV–FILATOVA–OREKHOVA

In quantification of the creditworthiness of the issuers the crucial role belongs to the so–called financial "ratios", constitute a direct and inverse ratios of various generated cash flows to debt values and interest ones. We could mention such ratios as $DCF/Debt$, $FFO/Debt$, $CFO/Debt$, $FOCF/Debt$, $FFO/cash\ \ interest$, $EBITDA/interest$, $Interests/EBITDA$, $Debt/EBITDA$ and some others.

We incorporate these rating parameters (financial "ratios") into the modern theory of capital structure – BFO theory (for beginning into its perpetuity limit). The importance of such incorporation, which has been done by us for the first time, is in using of this theory as a powerful tools when discounting of financial flows using the correct discounting rate in rating. Only this theory allow valuate adequately the weighted average cost of capital *WACC* and equity cost of capital k_e used when discounting of financial flows.

Use of the tools of well developed theories in rating opens completely new horizons in the rating industry, which could go from the mainly use of qualitative methods of the evaluation of the creditworthiness of issuers to a predominantly quantitative evaluation methods that will certainly enhance the quality and correctness of the rating.

Currently, rating agencies just directly use financial ratios, while the new methodology will allow (knowing the values of these "ratios" (and parameter k_0)) determine the correct values of discount rates (*WACC* and k_e) that should be used when discounting the various financial flows, both in terms of their timing and forecasting.

This has required the modification of the BFO theory (and its perpetuity limit – Modigliani – Miller theory), as used in financial management the concept of "leverage" as the ratio of debt value to the equity value substantially differs from the concept of "leverage" in the rating, where it is understood as the ratio of the debt value to the generated cash flow values (income, profit, etc.). The authors introduced some additional ratios, allowing more fully characterize the issuer's ability to repay debts and to pay interest thereon.

Thus the bridge is building between the discount rates (*WACC*, *ke*) used when discounting of financial flows, and "ratios" in the rating methodology. The algorithm for finding the discount rates for given ratio values is developed.

4. MODELS

Two kind of models of the evaluation of the creditworthiness of issuers, accounting the discounting of financial flows could be used in rating: one–period model and multi–period model.

4.1. One–Period Model

One–period model is described by the following formula (see Figure **1**)

$$CF(1+i)^{t_2-t} \geq D + k_d D(1+i)^{t_2-t_1}$$
$$CF(1+i)^{t_2-t} \geq D\left[1 + k_d(1+i)^{t_2-t_1}\right] \qquad (1)$$

Here *CF* is value of income for period, *D* is debt value, t, t_1, t_2 the moments of income, payment of interest and payment of debt consequently, *i* is the discount rate, k_d is credit rate and k_dD is interest on credit.

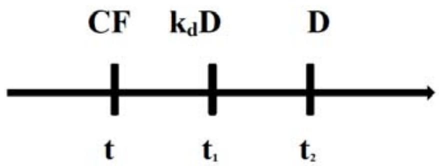

Figure 1: One–period model.

4.2. Multi–Period Model

One–period model of the evaluation of the creditworthiness of issuers, accounting the discounting of financial flows could be generalized for more interesting multi–period case.

Multi–period model is described by the following formula

$$\sum_j CF_j \left(1+i_j\right)^{t_{2j}-t_j} \geq \sum_j D_j \left[1+k_{dj}\left(1+i_j\right)^{t_{2j}-t_{1j}}\right] \quad (2)$$

Here CF_j is income for *j*–st period, D_j is debt value in *j*–st period, t_j, t_{1j}, t_{2j} the moments of income, payment of interests and payment of debt consequently in *j*–st period, i_j is the discount rate in *j*–st period, k_{dj} is credit rate in *j*–st period.

There are several options to work with these models:

1. One can check the creditworthiness of the issuer, knowing parameters $CF_j, D_j, t_j, t_{1j}, t_{2j}, k_{dj}$ and defining discount rate *i* by the method described below.
2. When the preset $D_j, t_j, t_{1j}, t_{2j}, k_{dj}$, one can determine which income CF_j the issuer would require to ensure its creditworthiness.
3. When the preset $D_j, t_j, t_{1j}, t_{2j}, k_{dj}$ one can define an acceptable level of debt financing (including the credit value D_j and credit rates k_{dj}) when issuer retains its creditworthiness.

5. THEORY OF INCORPORATION OF PARAMETERS, USING IN RATINGS, INTO PERPETUITY LIMIT OF MODERN THEORY OF CAPITAL STRUCTURE BY BRUSOV–FILATOVA–OREKHOVA

For the first time we incorporate below the parameters, using in ratings, into perpetuity limit of modern theory of capital structure by Brusov–Filatova–Orekhova (BFO theory).

We'll consider two kind of ratios: coverage ratios and leverage ratios.

Let us start from the coverage ratios.

5.1. Coverage Ratios

We will consider three kind of coverage ratios: coverage ratios of debt, coverage ratios of interest on the credit and coverage ratios of debt and interest on the credit.

5.1.1. Coverage Ratios of Debt

Here

$$i_1 = CF/D \quad (3)$$

Modigliani – Miller theorem for case with corporate taxes (Modigliani F, Miller M 1958, 1963) tells that capitalization of leveraged company, V_L, is equal to the capitalization of unleveraged company, V_0, plus tax shield for perpetuity time, *Dt*,

$$V_L = V_0 + Dt \quad (4)$$

Substituting the expressions for both capitalizations, one has

$$\frac{CF}{WACC} = \frac{CF}{k_0} + Dt$$

Dividing both parts by *D* one gets

$$\frac{i_1}{WACC} = \frac{i_1}{k_0} + t$$
$$WACC = \frac{i_1 k_0}{i_1 + tk_0} \quad (5)$$

This ratio (i_1) can be used to assess of the following parameters used in rating, $DCF/Debt$, $FFO/Debt$, $CFO/Debt$, $FOCF/Debt$ and some others. We will use last formula to build a curve of dependence $WACC(i_1)$.

5.1.2. Coverage Ratios of Interest on the Credit

Here $i_2 = CF/k_dD$ (6)

Using the Modigliani – Miller theorem for case with corporate taxes

$$V_L = V_0 + Dt,$$

we derive the expression for $WACC(i_2)$

$$\frac{CF}{WACC} = \frac{CF}{k_0} + Dt$$
$$\frac{i_2}{WACC} = \frac{i_2}{k_0} + \frac{i_2}{k_d} \quad (7)$$
$$WACC = \frac{i_2 k_0 k_d}{i_2 k_d + t k_0}$$

This ratio (i_2) can be used to assess of the following parameters, used in rating, $FFO/cash\ interest$, $EBITDA/interest$ and some others. We will use last formula to build a curve of dependence $WACC(i_2)$.

5.1.3. Coverage Ratios of Debt and Interest on the Credit (New Ratios)

Let us consider the coverage ratios of debt and interest on the credit simultaneously: this is new ratio, introduced by us for the first time here.

Here

$$i_3 = \frac{CF}{D(1+k_d)} \quad (8)$$

Using as above the Modigliani – Miller theorem for case with corporate taxes

$$V_L = V_0 + Dt$$

one gets the expression for $WACC(i_3)$

$$\frac{CF}{WACC} = \frac{CF}{k_0} + Dt$$
$$\frac{i_3}{WACC} = \frac{i_3}{k_0} + \frac{t}{1+k_d} \quad (9)$$
$$WACC = \frac{i_3 k_0 (1+k_d)}{i_3(1+k_d) + t k_0}$$

Table 1:

t	i1	k0	kd	WACC
0,2	0	0,12	0,06	0
0,2	1	0,12	0,06	0,1171875
0,2	2	0,12	0,06	0,1185771
0,2	3	0,12	0,06	0,1190476
0,2	4	0,12	0,06	0,1192843
0,2	5	0,12	0,06	0,1194268
0,2	6	0,12	0,06	0,1195219
0,2	7	0,12	0,06	0,11959
0,2	8	0,12	0,06	0,1196411
0,2	9	0,12	0,06	0,1196809
0,2	10	0,12	0,06	0,1197127

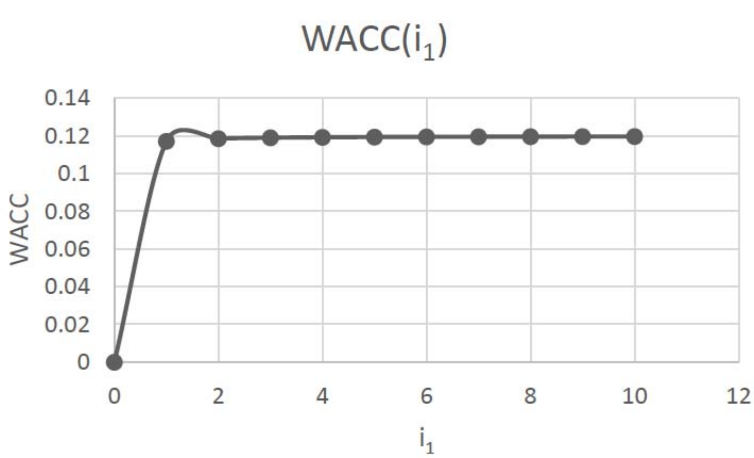

Figure 2: The dependence of company's weighted average cost of capital (WACC) on the coverage ratio on debt i_1.

Table 2:

t	i2	k0	kd	WACC
0,2	0	0,12	0,06	0
0,2	1	0,12	0,06	0,085714
0,2	2	0,12	0,06	0,1
0,2	3	0,12	0,06	0,105882
0,2	4	0,12	0,06	0,109091
0,2	5	0,12	0,06	0,111111
0,2	6	0,12	0,06	0,1125
0,2	7	0,12	0,06	0,113514
0,2	8	0,12	0,06	0,114286
0,2	9	0,12	0,06	0,114894
0,2	10	0,12	0,06	0,115385

This ratio (i_3) can be used to assess of the following parameters used in rating, $FFO/Debt + interest$, $EBITDA/Debt + interest$ and some others. We will use last formula to build a curve of dependence $WACC(i_3)$.

Let us analyze the dependence of company's weighted average cost of capital (WACC) on the coverage ratios on debt i_1, on interest on the credit i_2 and on coverage ratios on debt and interest on the

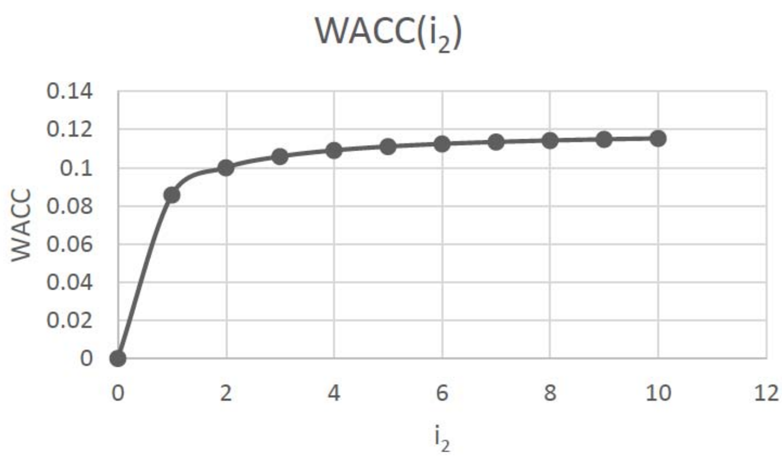

Figure 3: The dependence of company's weighted average cost of capital (WACC) on the coverage ratio on interest on the credit i_2

Table 3:

t	i3	k0	kd	WACC
0,2	0	0,12	0,06	0
0,2	1	0,12	0,06	0,1173432
0,2	2	0,12	0,06	0,1186567
0,2	3	0,12	0,06	0,1191011
0,2	4	0,12	0,06	0,1193246
0,2	5	0,12	0,06	0,1194591
0,2	6	0,12	0,06	0,1195489
0,2	7	0,12	0,06	0,1196131
0,2	8	0,12	0,06	0,1196613
0,2	9	0,12	0,06	0,1196989
0,2	10	0,12	0,06	0,1197289

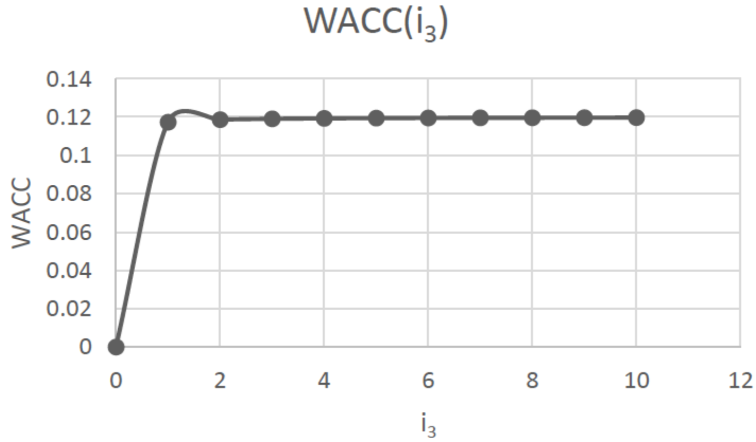

Figure 4: The dependence of company's weighted average cost of capital (WACC) on the coverage ratio on debt and interest on the credit i_3.

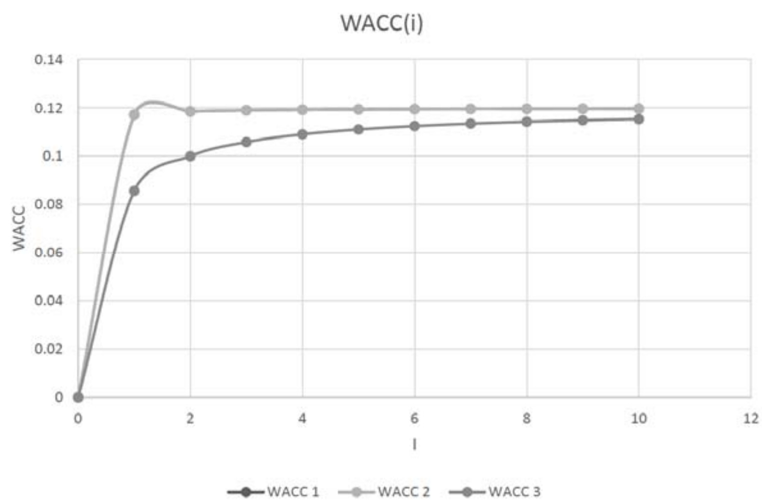

Figure 5: The dependence of company's weighted average cost of capital (WACC) on the coverage ratio on debt i_1, on interest on the credit i_2, and on debt and interest on the credit i_3.

credit with the following data: k_0 = 12 %; k_d = 6 %; t = 20%; i_j run from 0 up to 10.

The dependence of company's weighted average cost of capital (WACC) on the coverage ratio on interest on the credit i_2 is presented at Figure **3**.

The dependence of company's weighted average cost of capital (WACC) on the coverage ratio on debt and interest on the credit i_2 is presented at Figure **4**.

The dependence of company's weighted average cost of capital (WACC) on the coverage ratio on debt i_1, on interest on the credit i_2, and on debt and interest on the credit i_3 is presented at Figure **5**.

It is seen from the Figures **2-5** that *WACC*(i_j) is increasing function on i_j with saturation around i_j value of order 1 for ratios i_1 and i_3 and of order 4 or 5 for ratios i_2. At saturation *WACC* reaches the value k_0 (equity value at zero leverage level). This means that for high values of i_j one can choose k_0 as a discount rate with a good accuracy. Thus the role of parameter k_0 increases drastically. The method of determination of parameter k_0 has been developed by Anastasiya Brusova [Brusova A (2011)]. So, parameter k_0 is the discount rate for limit case of high values of i_j (see however below more detailed consideration).

It is clear from the Figures **2-5** that case of low values of i_j requires more detailed consideration. Let us consider the situation with low values of i_j which seems to be the case of the most interest.

5.2. More Detailed Consideration

Below we consider the case of low values of i_j with more details. i_j will vary from zero up to 1 with all other parameters to be the same.

Table 4:

i1	Ko	Kd	t	WACC(i1)
0	0,12	0,06	0,2	0,0000
0,1	0,12	0,06	0,2	0,0117
0,2	0,12	0,06	0,2	0,0234
0,3	0,12	0,06	0,2	0,0352
0,4	0,12	0,06	0,2	0,0469
0,5	0,12	0,06	0,2	0,0586
0,6	0,12	0,06	0,2	0,0703
0,7	0,12	0,06	0,2	0,0820
0,8	0,12	0,06	0,2	0,0938
0,9	0,12	0,06	0,2	0,1055
1	0,12	0,06	0,2	0,1172

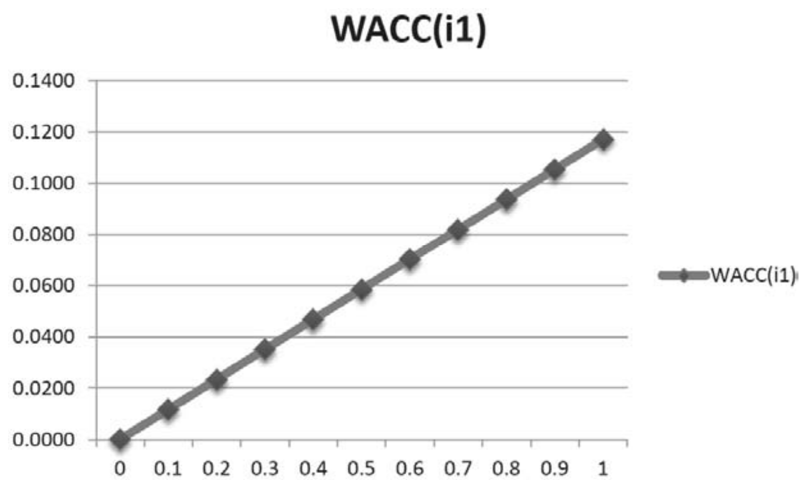

Figure 6: The dependence of company's weighted average cost of capital (WACC) on the coverage ratio on debt and interest on the credit i_1.

Table 5:

i2	Ko	Kd	t	WACC(i2)
0	0,12	0,06	0,2	0,0000
0,1	0,12	0,06	0,2	0,0240
0,2	0,12	0,06	0,2	0,0400
0,3	0,12	0,06	0,2	0,0514
0,4	0,12	0,06	0,2	0,0600
0,5	0,12	0,06	0,2	0,0667
0,6	0,12	0,06	0,2	0,0720
0,7	0,12	0,06	0,2	0,0764
0,8	0,12	0,06	0,2	0,0800
0,9	0,12	0,06	0,2	0,0831
1	0,12	0,06	0,2	0,0857

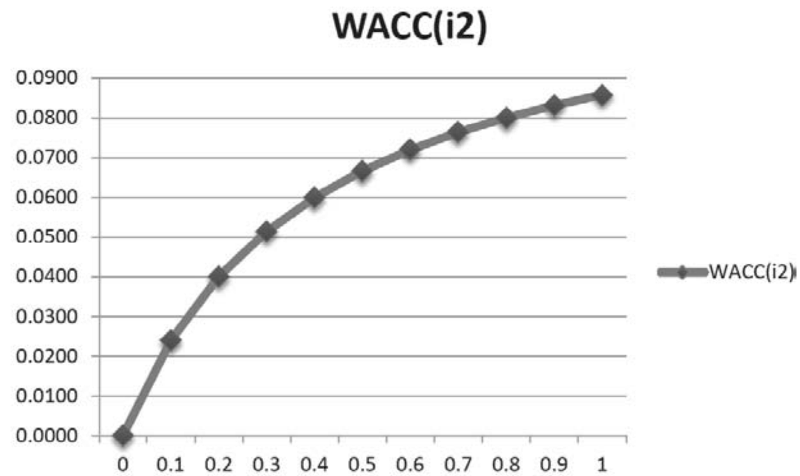

Figure 7: The dependence of company's weighted average cost of capital (WACC) on the coverage ratio on debt and interest on the credit i_2.

Table 6:

i3	Ko	Kd	t	WACC(i3)
0	0,12	0,06	0,2	0,0000
0,1	0,12	0,06	0,2	0,0978
0,2	0,12	0,06	0,2	0,1078
0,3	0,12	0,06	0,2	0,1116
0,4	0,12	0,06	0,2	0,1136
0,5	0,12	0,06	0,2	0,1148
0,6	0,12	0,06	0,2	0,1156
0,7	0,12	0,06	0,2	0,1162
0,8	0,12	0,06	0,2	0,1167
0,9	0,12	0,06	0,2	0,1171
1	0,12	0,06	0,2	0,1173

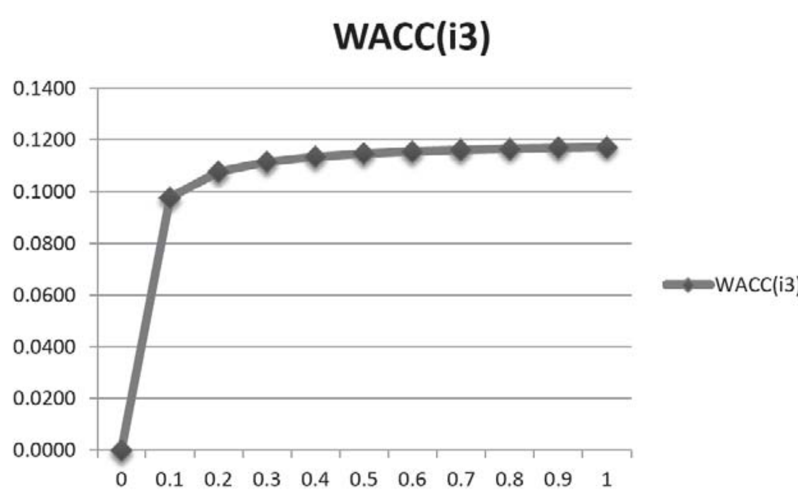

Figure 8: The dependence of company's weighted average cost of capital (WACC) on the coverage ratio on debt and interest on the credit i_3.

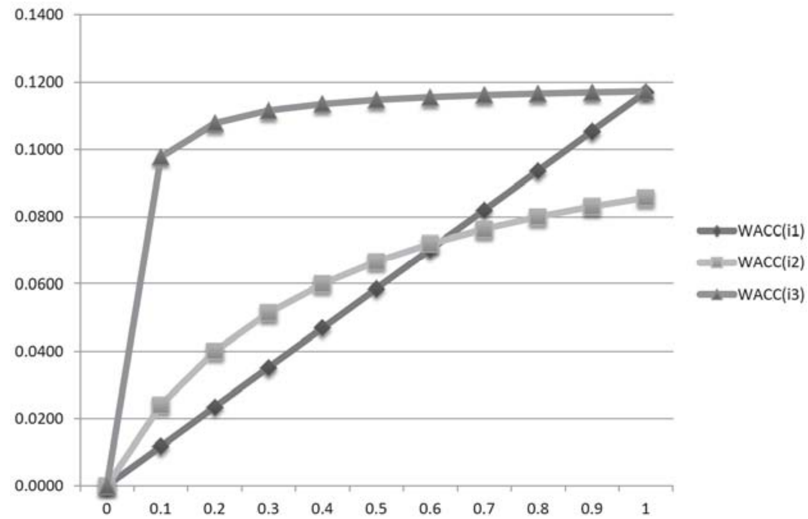

Figure 9: The dependence of company's weighted average cost of capital (WACC) on the coverage ratio on debt i_1, on interest on the credit i_2, and on debt and interest on the credit i_3.

More detailed consideration leads us to following conclusions:

1. In case of coverage ratio on debt and interest on the credit i_3 WACC goes to saturation very fast: with accuracy of 20% at i_3 =0.15 and with accuracy of 5% at i_3 =0.5.

2. In case of coverage ratio on debt i_1, WACC practically linearly increases with parameter i_1 and goes to saturation at i_1 =0.1.

3. In case of coverage ratio on interest on the credit i_2 WACC increases with parameter i_2 much more slowly than in two previous cases and goes to saturation at high values of i_2: with accuracy of 10% at i_2 =4.

5.3. Leverage Ratios

Let us consider now the leverage ratios. We will consider three kind of leverage ratios: leverage ratios of debt, leverage ratios of interest on the credit and leverage ratios of debt and interest on the credit.

5.3.1. Leverage Ratios for Debt

Here

$$l_1 = D/CF \tag{10}$$

As above for coverage ratios we use the Modigliani – Miller theorem for case with corporate taxes

$$V_L = V_0 + Dt \ ,$$

we derive the expression for $WACC(l_1)$

$$\begin{aligned} \frac{CF}{WACC} &= \frac{CF}{k_0} + Dt \\ \frac{1}{WACC} &= \frac{1}{k_0} + l_1 t \\ WACC &= \frac{k_0}{1 + t l_1 k_0} \end{aligned} \tag{11}$$

This ratio (l_1) can be used to assess of the following parameters used in rating, $Debt/EBITDA$ and some others. We will use last formula to build a curve of dependence $WACC(l_1)$.

5.3.2. Leverage Ratios for Interest on Credit

Here

$$l_2 = k_d D/CF \tag{12}$$

We use again the Modigliani – Miller theorem for case with corporate taxes

$$V_L = V_0 + Dt \ ,$$

we derive the expression for $WACC(l_2)$

$$\begin{aligned} \frac{CF}{WACC} &= \frac{CF}{k_0} + Dt \\ \frac{1}{WACC} &= \frac{1}{k_0} + \frac{l_2 t}{k_d} \\ WACC &= \frac{k_0 k_d}{k_d + t l_2 k_0} \end{aligned} \tag{13}$$

This ratio (l_2) can be used to assess of the following parameters used in rating, $Interests/EBITDA$ and some others. We will use last formula to build a curve of dependence $WACC(l_2)$.

5.3.3. Leverage Ratios for Debt and Interest on Credit

Here

$$l_3 = D\left(1+k_d\right)/CF \quad (14)$$

Using the Modigliani – Miller theorem for case with corporate taxes

$$V_L = V_0 + Dt \ ,$$

we derive the expression for *WACC*(l_3)

$$\frac{CF}{WACC} = \frac{CF}{k_0} + Dt$$

$$\frac{1}{WACC} = \frac{1}{k_0} + \frac{l_3 t}{1+k_d} \quad (15)$$

$$WACC = \frac{k_0\left(1+k_d\right)}{1+k_d+tl_3k_0}$$

This ratio (l_3) can be used to assess of the following parameters used in rating, *Debt+interest / FFO*, *Debt+interest / EBIT*, *Debt+interest / EBITDA(R)*, and some others. We will use last formula to build a curve of dependence *WACC*(l_3).

Let us analyze the dependence of company's weighted average cost of capital (WACC) on the leverage ratios with the following data: k_0 = 12 %; k_d = 6 %; t = 20%; l_i runs from 0 up to 10.

The dependence of company's weighted average cost of capital (WACC) on the leverage ratio on debt l_1 is presented at Figure **10**.

The dependence of company's weighted average cost of capital (WACC) on the leverage ratio on interest on credit l_2 is presented at Figure **11**.

The dependence of company's weighted average cost of capital (WACC) on the leverage ratio on debt and interest on credit l_3 is presented at Figure **12**.

Table 7:

t	l_1	k0	kd	WACC
0,2	0	0,12	0,06	0,12
0,2	1	0,12	0,06	0,117188
0,2	2	0,12	0,06	0,114504
0,2	3	0,12	0,06	0,11194
0,2	4	0,12	0,06	0,109489
0,2	5	0,12	0,06	0,107143
0,2	6	0,12	0,06	0,104895
0,2	7	0,12	0,06	0,10274
0,2	8	0,12	0,06	0,100671
0,2	9	0,12	0,06	0,098684
0,2	10	0,12	0,06	0,096774

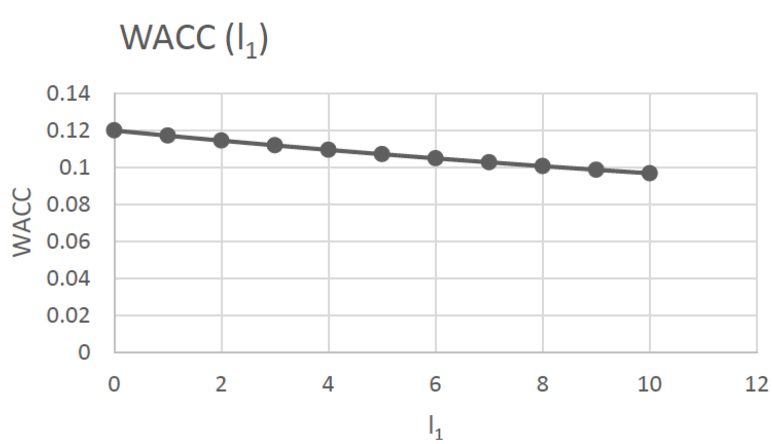

Figure 10: The dependence of company's weighted average cost of capital (WACC) on the leverage ratio on debt l_1.

Table 8:

t	l2	k0	kd	WACC
0,2	0	0,12	0,06	0,12
0,2	1	0,12	0,06	0,085714
0,2	2	0,12	0,06	0,066667
0,2	3	0,12	0,06	0,054545
0,2	4	0,12	0,06	0,046154
0,2	5	0,12	0,06	0,04
0,2	6	0,12	0,06	0,035294
0,2	7	0,12	0,06	0,031579
0,2	8	0,12	0,06	0,028571
0,2	9	0,12	0,06	0,026087
0,2	10	0,12	0,06	0,024

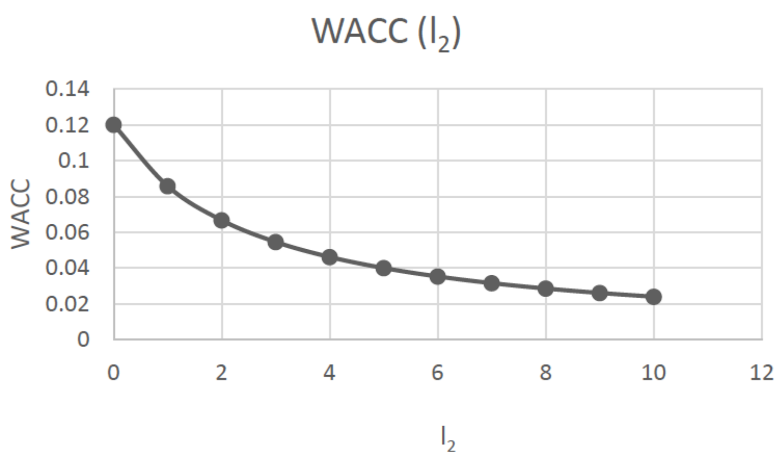

Figure 11: The dependence of company's weighted average cost of capital (WACC) on the leverage ratio on interest on credit l_2.

Table 9:

t	l3	k0	kd	WACC
0,2	0	0,12	0,06	0,12
0,2	1	0,12	0,06	0,117353
0,2	2	0,12	0,06	0,114819
0,2	3	0,12	0,06	0,112393
0,2	4	0,12	0,06	0,110068
0,2	5	0,12	0,06	0,107836
0,2	6	0,12	0,06	0,105693
0,2	7	0,12	0,06	0,103634
0,2	8	0,12	0,06	0,101654
0,2	9	0,12	0,06	0,099747
0,2	10	0,12	0,06	0,097911

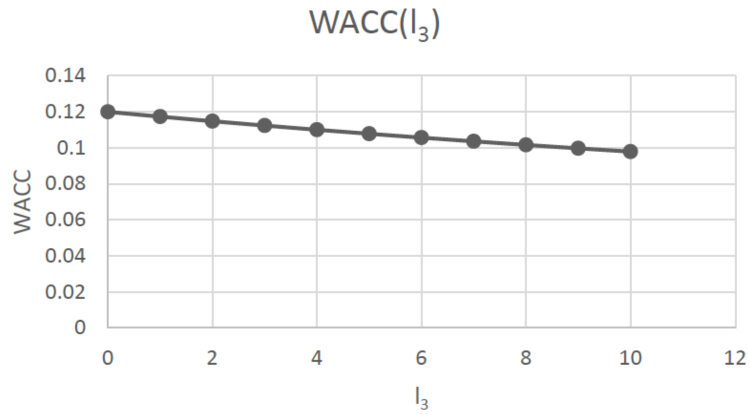

Figure 12: The dependence of company's weighted average cost of capital (WACC) on the leverage ratio on debt and interest on credit l_3.

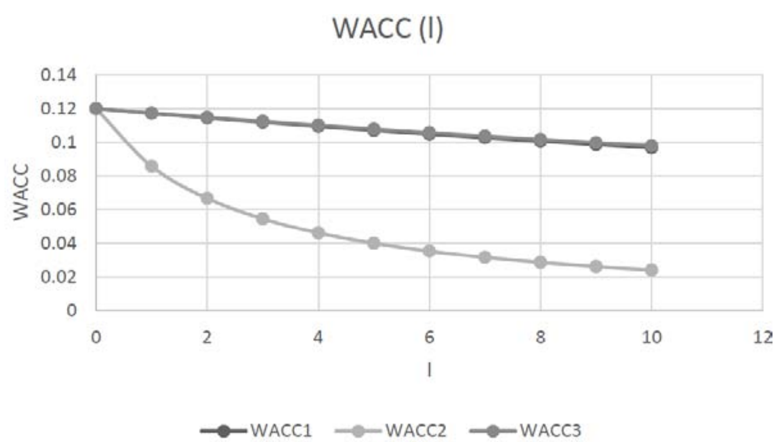

Figure 13: The dependence of company's weighted average cost of capital (*WACC*) on the leverage ratio on debt, l_1, on interest on credit, l_2, and on debt and on interest on credit, l_3 simultaneously.

The dependence of company's weighted average cost of capital (WACC) on the leverage ratio on debt, l_1, on interest on credit, l_2, and on debt and interest on credit, l_3 simultaneously is presented at Figure **13**.

Analysis of the dependences of company's weighted average cost of capital (*WACC*) on the leverage ratio on debt, l_1, on interest on credit, l_2, and on debt and interest on credit, l_3 shows the following: for all leverage ratios weighted average cost of capital (*WACC*) decreases with leverage ratios. For leverage ratio on debt l_1 and leverage ratio on debt and interest on credit l_3 *WACC* decreases very similar and practically linearly from k_0 =12% at $l_{1,3}$=0 up to 9,7% at $l_{1,3}$ =10. For leverage ratio on interest on credit l_2 *WACC* decreases nonlinearly and much faster from k_0 =12% at l_2=0 up to 2,4% at l_2=10.

6. EQUITY COST

Equity cost plays a very important role in economy and finance because it is the essence of the dividend policy of companies, which should be accounted in rating. A modern approach to the dividend policy of companies, based on the real value of their equity capital cost, compared to its efficiency of planned investment is suggested in the article (Brusov P, Filatova T, Orehova N, Brusov P.P., Brusova A. 2012). This allows return to the economic essence of dividends, as the payment to shareholders for the use of equity capital.

Equity cost k_e determines the economically reasonable dividend value. Rating agencies will be able compare payable dividend value with economically reasonable dividend level and make conclusion about the adequacy of the dividend policy of companies and its influence on company's credit rating.

For finding of the dependence of equity cost k_e on coverage ratios and leverage ratios we consider consistently the dependence of equity cost k_e on ratios i_1, i_2, i_3, l_1, l_2, l_3, using the following formula, which couples weighted average cost of capital WACC (calculated by us above: see Tables **1-9**) and equity cost k_e

$$k_e = WACC(1+L) - Lk_d(1-t) \quad (16)$$

The dependence of equity cost k_e on coverage ratios i_1, i_2, i_3.

Let us study the dependence of equity cost k_e on coverage ratios i_1, i_2, i_3 for the same set of parameters as used above and for leverage levels L=1 and L=2.

We could make some conclusions, based on Tables **13-15** and Figures **14-16**. In all three cases equity cost k_e increases with coverage ratios and goes to saturation at high values of coverage ratios. Saturation values increases with leverage level from 19% at L=1 up to value above 26% at L=2. Note, that for coverage ratios i_1 and i_2 the saturation takes place at values $i_{1,2}$ of order unit, while for coverage ratio i_3 the saturation takes place at much higher i_3 values of order 6 or 7.

Equity cost k_e should be used as discount rate for unleveraged (financially independent) companies. For coverage ratios i_1 and i_2 saturation values of equity cost k_e could be used as discount rate above unit, while for coverage ratio i_3 saturation values of equity cost k_e could be used as discount rate at i_3 value above 6 or 7.

The dependence of equity cost k_e on leverage ratios l_1, l_2, l_3.

We study below the dependence of equity cost k_e on leverage ratios l_1, l_2, l_3 for the same set of

Table 10:

L	i_1	WACC(i_1)	Kd	t	Ke
1	0	0,00000	0,06	0,2	–0,0480
1	1	0,11719	0,06	0,2	0,1864
1	2	0,11858	0,06	0,2	0,1892
1	3	0,11905	0,06	0,2	0,1901
1	4	0,11928	0,06	0,2	0,1906
1	5	0,11943	0,06	0,2	0,1909
1	6	0,11952	0,06	0,2	0,1910
1	7	0,11959	0,06	0,2	0,1912
1	8	0,11964	0,06	0,2	0,1913
1	9	0,11968	0,06	0,2	0,1914
1	10	0,11971	0,06	0,2	0,1914

Table 11:

L	i_1	WACC(i_1)	Kd	t	Ke
2	0	0,00000	0,06	0,2	–0,0960
2	1	0,11719	0,06	0,2	0,2556
2	2	0,11858	0,06	0,2	0,2597
2	3	0,11905	0,06	0,2	0,2611
2	4	0,11928	0,06	0,2	0,2619
2	5	0,11943	0,06	0,2	0,2623
2	6	0,11952	0,06	0,2	0,2626
2	7	0,11959	0,06	0,2	0,2628
2	8	0,11964	0,06	0,2	0,2629
2	9	0,11968	0,06	0,2	0,2630
2	10	0,11971	0,06	0,2	0,2631

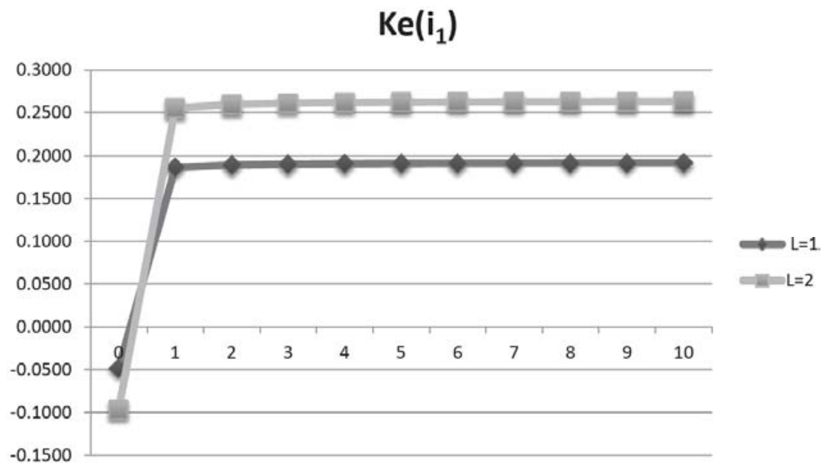

Figure 14: The dependence of equity cost k_e on coverage ratio i_1 at two leverage level values L=1 and L=2.

Table 12:

L	i_2	WACC(i_2)	Kd	t	Ke
1	0	0,00000	0,06	0,2	–0,0480
1	1	0,11734	0,06	0,2	0,1867
1	2	0,11866	0,06	0,2	0,1893
1	3	0,11910	0,06	0,2	0,1902
1	4	0,11932	0,06	0,2	0,1906
1	5	0,11946	0,06	0,2	0,1909
1	6	0,11955	0,06	0,2	0,1911
1	7	0,11961	0,06	0,2	0,1912
1	8	0,11966	0,06	0,2	0,1913
1	9	0,11970	0,06	0,2	0,1914
1	10	0,11973	0,06	0,2	0,1915

Table 13:

L	i_2	WACC(i_2)	Kd	t	Ke
2	0	0,00000	0,06	0,2	–0,0960
2	1	0,11734	0,06	0,2	0,2560
2	2	0,11866	0,06	0,2	0,2600
2	3	0,11910	0,06	0,2	0,2613
2	4	0,11932	0,06	0,2	0,2620
2	5	0,11946	0,06	0,2	0,2624
2	6	0,11955	0,06	0,2	0,2626
2	7	0,11961	0,06	0,2	0,2628
2	8	0,11966	0,06	0,2	0,2630
2	9	0,11970	0,06	0,2	0,2631
2	10	0,11973	0,06	0,2	0,2632

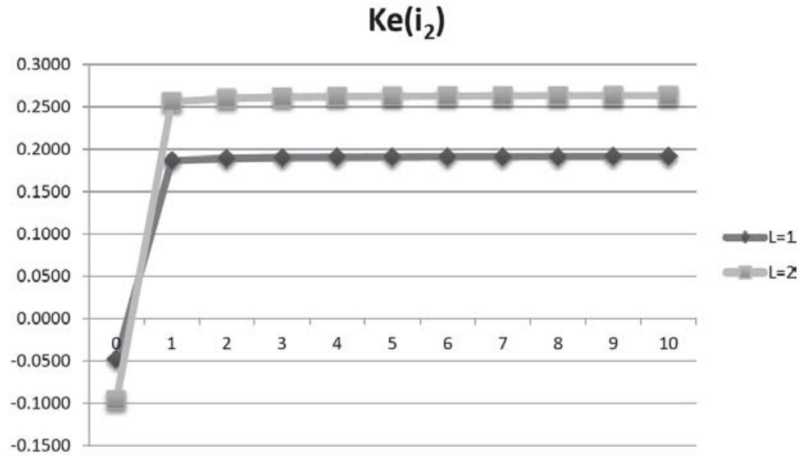

Figure 15: The dependence of equity cost k_e on coverage ratio i_2 at two leverage level values L=1 and L=2.

Table 14:

1) L=1

L	i_3	WACC(i_3)	Kd	t	Ke
1	0	0,00000	0,06	0,2	–0,0480
1	1	0,08571	0,06	0,2	0,1234
1	2	0,10000	0,06	0,2	0,1520
1	3	0,10588	0,06	0,2	0,1638
1	4	0,10909	0,06	0,2	0,1702
1	5	0,11111	0,06	0,2	0,1742
1	6	0,11250	0,06	0,2	0,1770
1	7	0,11351	0,06	0,2	0,1790
1	8	0,11429	0,06	0,2	0,1806
1	9	0,11489	0,06	0,2	0,1818
1	10	0,11538	0,06	0,2	0,1828

Table 15:

2) L=2

L	i_3	WACC(i_3)	Kd	t	Ke
2	0	0,00000	0,06	0,2	–0,0960
2	1	0,08571	0,06	0,2	0,1611
2	2	0,10000	0,06	0,2	0,2040
2	3	0,10588	0,06	0,2	0,2216
2	4	0,10909	0,06	0,2	0,2313
2	5	0,11111	0,06	0,2	0,2373
2	6	0,11250	0,06	0,2	0,2415
2	7	0,11351	0,06	0,2	0,2445
2	8	0,11429	0,06	0,2	0,2469
2	9	0,11489	0,06	0,2	0,2487
2	10	0,11538	0,06	0,2	0,2502

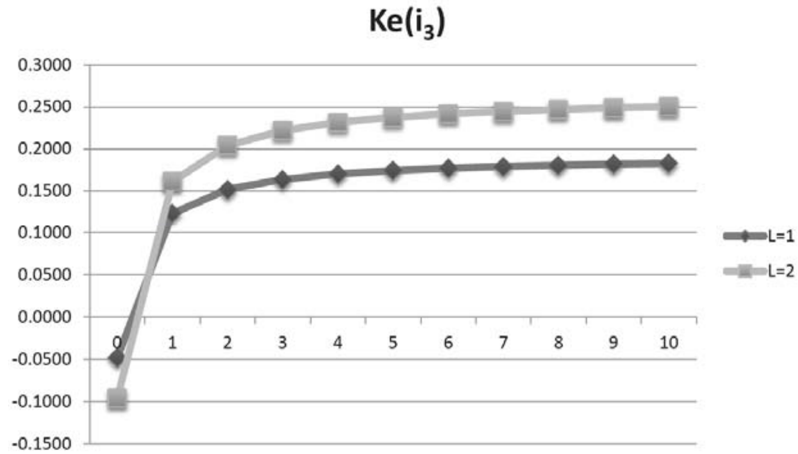

Figure 16: The dependence of equity cost k_e on coverage ratio i_3 at two leverage level values *L*=1 and *L*=2.

The dependence of equity cost k_e on leverage ratios l_1

1) L=1

Table 16:

L	l_1	WACC(l_1)	Kd	t	Ke
1	0	0,12000	0,06	0,2	0,1920
1	1	0,11719	0,06	0,2	0,1864
1	2	0,11450	0,06	0,2	0,1810
1	3	0,11194	0,06	0,2	0,1759
1	4	0,10949	0,06	0,2	0,1710
1	5	0,10714	0,06	0,2	0,1663
1	6	0,10490	0,06	0,2	0,1618
1	7	0,10274	0,06	0,2	0,1575
1	8	0,10067	0,06	0,2	0,1533
1	9	0,09868	0,06	0,2	0,1494
1	10	0,09677	0,06	0,2	0,1455

***2)* L=2**

Table 17:

L	l_1	WACC(l_1)	Kd	t	Ke
2	0	0,12000	0,06	0,2	0,2640
2	1	0,11719	0,06	0,2	0,2556
2	2	0,11450	0,06	0,2	0,2475
2	3	0,11194	0,06	0,2	0,2398
2	4	0,10949	0,06	0,2	0,2325
2	5	0,10714	0,06	0,2	0,2254
2	6	0,10490	0,06	0,2	0,2187
2	7	0,10274	0,06	0,2	0,2122
2	8	0,10067	0,06	0,2	0,2060
2	9	0,09868	0,06	0,2	0,2001
2	10	0,09677	0,06	0,2	0,1943

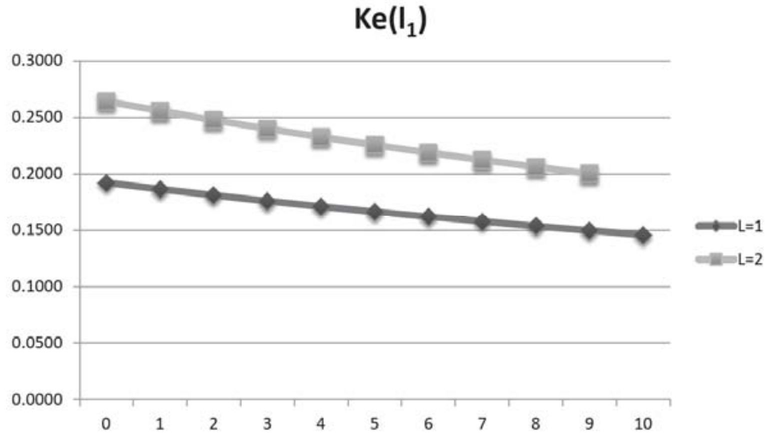

Figure 17: The dependence of equity cost k_e on leverage ratio l_1 at two leverage level values L=1 and L=2.

The dependence of equity cost k_e on leverage ratios l_2

1) L=1

Table 18:

L	l_2	WACC(l_2)	Kd	t	Ke
1	0	0,12000	0,06	0,2	0,1920
1	1	0,08571	0,06	0,2	0,1234
1	2	0,06667	0,06	0,2	0,0853
1	3	0,05455	0,06	0,2	0,0611
1	4	0,04615	0,06	0,2	0,0443
1	5	0,04000	0,06	0,2	0,0320
1	6	0,03529	0,06	0,2	0,0226
1	7	0,03158	0,06	0,2	0,0152
1	8	0,02857	0,06	0,2	0,0091
1	9	0,02609	0,06	0,2	0,0042
1	10	0,02400	0,06	0,2	0,0000

2) L=2

Table 19:

L	l_2	WACC(l_2)	Kd	t	Ke
2	0	0,12000	0,06	0,2	0,2640
2	1	0,08571	0,06	0,2	0,1611
2	2	0,06667	0,06	0,2	0,1040
2	3	0,05455	0,06	0,2	0,0676
2	4	0,04615	0,06	0,2	0,0425
2	5	0,04000	0,06	0,2	0,0240
2	6	0,03529	0,06	0,2	0,0099
2	7	0,03158	0,06	0,2	–0,0013
2	8	0,02857	0,06	0,2	–0,0103
2	9	0,02609	0,06	0,2	–0,0177
2	10	0,02400	0,06	0,2	–0,0240

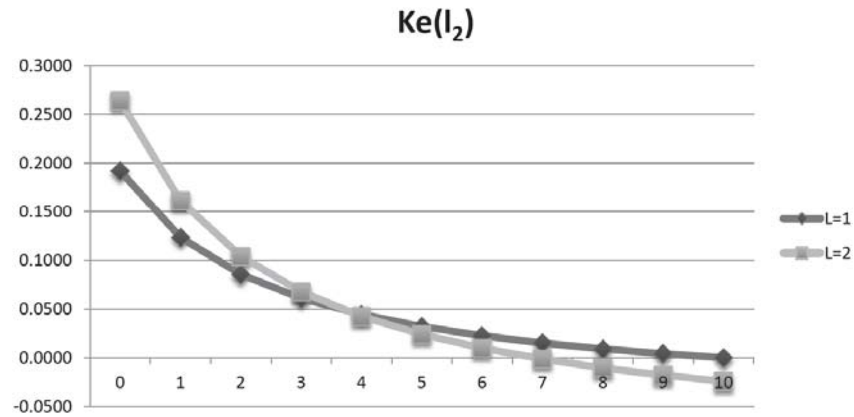

Figure 18: The dependence of equity cost k_e on leverage ratio l_2 at two leverage level values L=1 and L=2.

The dependence of equity cost k_e on leverage ratios l_3

1) L=1

Table 20:

L	l_3	WACC(l_3)	Kd	t	Ke
1	0	0,12000	0,06	0,2	0,1920
1	1	0,11735	0,06	0,2	0,1867
1	2	0,11482	0,06	0,2	0,1816
1	3	0,11239	0,06	0,2	0,1768
1	4	0,11007	0,06	0,2	0,1721
1	5	0,10784	0,06	0,2	0,1677
1	6	0,10569	0,06	0,2	0,1634
1	7	0,10363	0,06	0,2	0,1593
1	8	0,10165	0,06	0,2	0,1553
1	9	0,09975	0,06	0,2	0,1515
1	10	0,09791	0,06	0,2	0,1478

2) L=2

Table 21:

L	l_3	WACC(l_3)	Kd	t	Ke
2	0	0,12000	0,06	0,2	0,2640
2	1	0,11735	0,06	0,2	0,2561
2	2	0,11482	0,06	0,2	0,2485
2	3	0,11239	0,06	0,2	0,2412
2	4	0,11007	0,06	0,2	0,2342
2	5	0,10784	0,06	0,2	0,2275
2	6	0,10569	0,06	0,2	0,2211
2	7	0,10363	0,06	0,2	0,2149
2	8	0,10165	0,06	0,2	0,2090
2	9	0,09975	0,06	0,2	0,2032
2	10	0,09791	0,06	0,2	0,1977

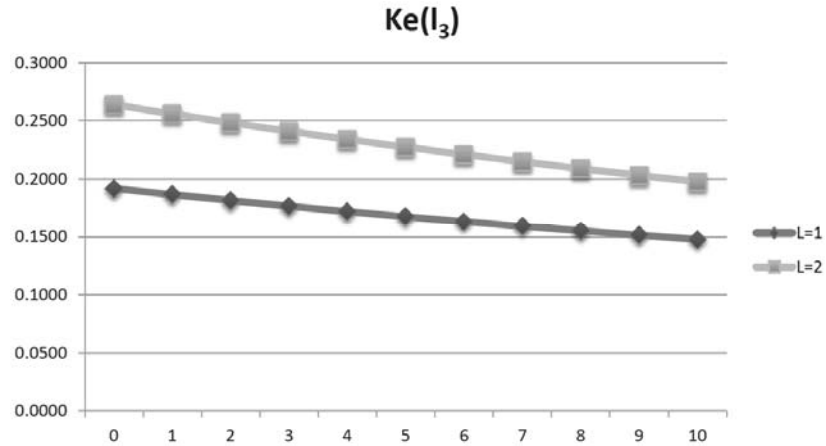

Figure 19: The dependence of equity cost k_e on leverage ratio l_3 at two leverage level values L=1 and L=2.

parameters as used above and for leverage levels L=1 and L=2.

7. HOW TO EVALUATE THE DISCOUNT RATE?

Let us discuss now the algorithm of valuation of the discount rate, if we know one or a few ratios (coverage or leverage ones). The developed above method allow estimate discount rate with the best accuracy characteristic for used theory of capital structure (perpetuity limit).

7.1. Using One Ratio

If one know one ratio (coverage or leverage one) the algorithm of valuation of the discount rate is as following:

– determination of the parameter k_0 ;

– knowing k_0, k_d and t, one builds the curve of dependence WACC(i) or WACC(l);

– then, using the known value of coverage ratio (i_0) or leverage ratio (l_0) one finds the value WACC(i_0) or WACC(l_0), which represents the discount rate.

7.2. Using a Few Ratios

If we know say m values of coverage ratios (i_j) and n values of leverage ratios (l_k)

– we find by the above algorithm m values of WACC(i_j) and n values of WACC(l_k) first;

– then we find the average value of WACC by the following formula:

$$WACC_{av} = \frac{1}{m+n}\left[\sum_{j=1}^{m} WACC(i_j) + \sum_{k=1}^{n} WACC(l_k)\right].$$

This found value $WACC_{av}$ should be used when discounting the financial flows in rating.

1) i_1=1

Table 22:

L	WACC(i_1=1)	Kd	t	Ke
0	0,11719	0,06	0,2	0,1172
1	0,11719	0,06	0,2	0,1864
2	0,11719	0,06	0,2	0,2556
3	0,11719	0,06	0,2	0,3248
4	0,11719	0,06	0,2	0,3939
5	0,11719	0,06	0,2	0,4631
6	0,11719	0,06	0,2	0,5323
7	0,11719	0,06	0,2	0,6015
8	0,11719	0,06	0,2	0,6707
9	0,11719	0,06	0,2	0,7399
10	0,11719	0,06	0,2	0,8091

2) i_1=2

Table 23:

L	WACC(i_1=2)	Kd	t	Ke
0	0,11858	0,06	0,2	0,1186
1	0,11858	0,06	0,2	0,1892
2	0,11858	0,06	0,2	0,2597
3	0,11858	0,06	0,2	0,3303
4	0,11858	0,06	0,2	0,4009
5	0,11858	0,06	0,2	0,4715
6	0,11858	0,06	0,2	0,5420
7	0,11858	0,06	0,2	0,6126
8	0,11858	0,06	0,2	0,6832
9	0,11858	0,06	0,2	0,7538
10	0,11858	0,06	0,2	0,8243

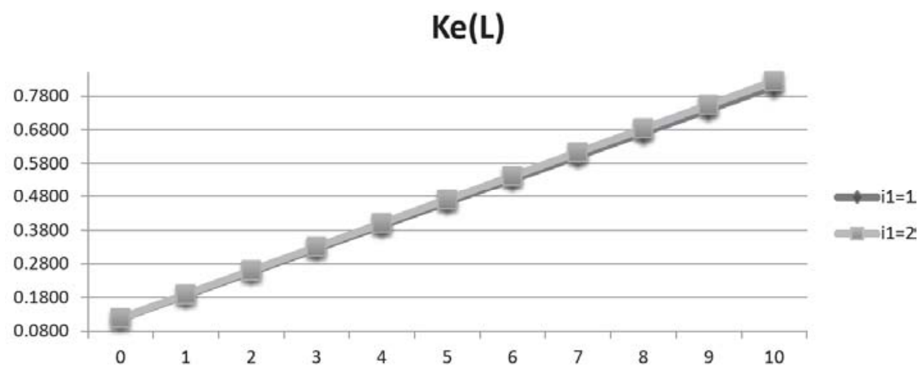

Figure 20: The dependence of equity cost k_e on leverage level at two coverage ratio values i_1 =1 and i_1=2.

8. INFLUENCE OF LEVERAGE LEVEL

We discuss also the interplay between rating ratios and leverage level which can be quite important in rating.

8.1. The Dependence of Equity Cost K_E on Leverage Level at Two Coverage Ratio Values i_j =1 and i_j=2

It is seen from Tables **22-27** and Figures **20-22** that equity cost k_e increases practically linearly with

1) i_2=1

Table 24:

L	WACC(i_2=1)	Kd	t	Ke
0	0,11734	0,06	0,2	0,1173
1	0,11734	0,06	0,2	0,1867
2	0,11734	0,06	0,2	0,2560
3	0,11734	0,06	0,2	0,3254
4	0,11734	0,06	0,2	0,3947
5	0,11734	0,06	0,2	0,4641
6	0,11734	0,06	0,2	0,5334
7	0,11734	0,06	0,2	0,6027
8	0,11734	0,06	0,2	0,6721
9	0,11734	0,06	0,2	0,7414
10	0,11734	0,06	0,2	0,8108

2) i_2=2

Table 25:

L	WACC(i_2=2)	Kd	t	Ke
0	0,11866	0,06	0,2	0,1187
1	0,11866	0,06	0,2	0,1893
2	0,11866	0,06	0,2	0,2600
3	0,11866	0,06	0,2	0,3306
4	0,11866	0,06	0,2	0,4013
5	0,11866	0,06	0,2	0,4719
6	0,11866	0,06	0,2	0,5426
7	0,11866	0,06	0,2	0,6133
8	0,11866	0,06	0,2	0,6839
9	0,11866	0,06	0,2	0,7546
10	0,11866	0,06	0,2	0,8252

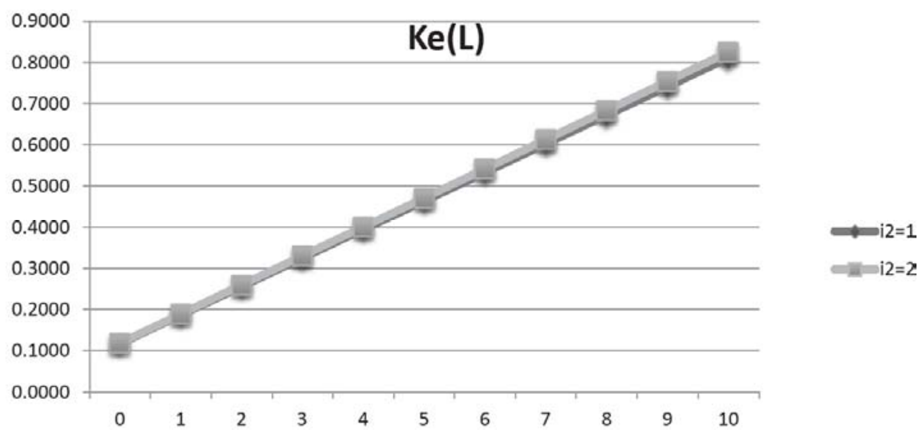

Figure 21: The dependence of equity cost k_e on leverage level at two coverage ratio values i_2 =1 and i_2=2.

1) i_3=1

Table 26:

L	WACC(i_3=1)	Kd	t	Ke
0	0,08571	0,06	0,2	0,0857
1	0,08571	0,06	0,2	0,1234
2	0,08571	0,06	0,2	0,1611
3	0,08571	0,06	0,2	0,1989
4	0,08571	0,06	0,2	0,2366
5	0,08571	0,06	0,2	0,2743
6	0,08571	0,06	0,2	0,3120
7	0,08571	0,06	0,2	0,3497
8	0,08571	0,06	0,2	0,3874
9	0,08571	0,06	0,2	0,4251
10	0,08571	0,06	0,2	0,4629

2) i_3**=2**

Table 27:

L	WACC(i_3=1)	Kd	t	Ke
0	0,10000	0,06	0,2	0,1000
1	0,10000	0,06	0,2	0,1520
2	0,10000	0,06	0,2	0,2040
3	0,10000	0,06	0,2	0,2560
4	0,10000	0,06	0,2	0,3080
5	0,10000	0,06	0,2	0,3600
6	0,10000	0,06	0,2	0,4120
7	0,10000	0,06	0,2	0,4640
8	0,10000	0,06	0,2	0,5160
9	0,10000	0,06	0,2	0,5680
10	0,10000	0,06	0,2	0,6200

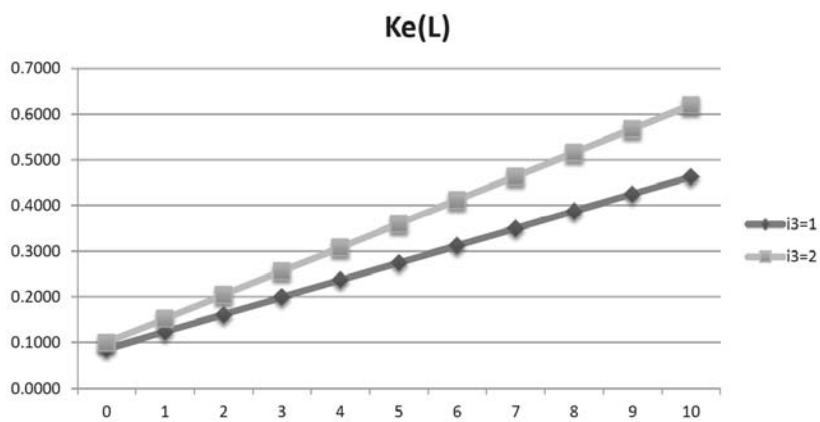

Figure 22: The dependence of equity cost k_e on leverage level at two coverage ratio values i_3 =1 and i_3=2.

leverage level for all coverage ratios i_1, i_2, i_3. For each of two coverage ratios i_1, i_2, curves k_e (L) for two values of i_j (1 and 2) practically coincide. For coverage ratio i_3 curves k_e (L) for value of i_3 =2 lies above one for i_3 =1 and angle of inclination for value of i_3 =2 is bigger.

9. THE DEPENDENCE OF EQUITY COST K_E ON LEVERAGE LEVEL AT TWO LEVERAGE RATIO VALUES L_J =1 AND L_J=2

Let us now study the dependence of equity cost k_e on leverage level at two leverage ratio values l_j =1 and l_j=2 for leverage ratios l_1,l_2, l_3.

It is seen from Tables **28-33** and Figures **23-25** that equity cost k_e increases practically linearly with leverage level for all leverage ratios l_1, l_2, l_3. For each of two leverage ratios l_1, l_3, curves k_e (L) for two values of l_j (1 and 2) practically coincide. For leverage ratio l_2 curves k_e (L) for value of l_3 =1 lies above one for l_3 =2 and angle of inclination for value of l_3 =1 is bigger.

CONCLUSION

A new approach to rating methodology has been developed. It is based on two key factors: 1) The adequate use of discounting of financial flows virtually not used in existing rating methodologies, 2) The incorporation of rating parameters (financial "ratios") into the modern theory of capital structure BFO (and its perpetuity limit). This on the one hand allows use the powerful tool of this theory in the rating, and on the other hand it ensures the correct discount rates when discounting of financial flows. Two models for accounting of discounting of financial flows – one–period and multi–period are discussed. An algorithm of valuation of correct discount rate, accounting rating ratios is suggested. We discuss also the interplay

1) l_1=1

Table 28:

L	WACC(l_1=1)	Kd	t	Ke
0	0,11719	0,06	0,2	0,1172
1	0,11719	0,06	0,2	0,1864
2	0,11719	0,06	0,2	0,2556
3	0,11719	0,06	0,2	0,3248
4	0,11719	0,06	0,2	0,3939
5	0,11719	0,06	0,2	0,4631
6	0,11719	0,06	0,2	0,5323
7	0,11719	0,06	0,2	0,6015
8	0,11719	0,06	0,2	0,6707
9	0,11719	0,06	0,2	0,7399
10	0,11719	0,06	0,2	0,8091

2) l_1=2

Table 29:

L	WACC(l_1=2)	Kd	t	Ke
0	0,11450	0,06	0,2	0,1145
1	0,11450	0,06	0,2	0,1810
2	0,11450	0,06	0,2	0,2475
3	0,11450	0,06	0,2	0,3140
4	0,11450	0,06	0,2	0,3805
5	0,11450	0,06	0,2	0,4470
6	0,11450	0,06	0,2	0,5135
7	0,11450	0,06	0,2	0,5800
8	0,11450	0,06	0,2	0,6465
9	0,11450	0,06	0,2	0,7130
10	0,11450	0,06	0,2	0,7795

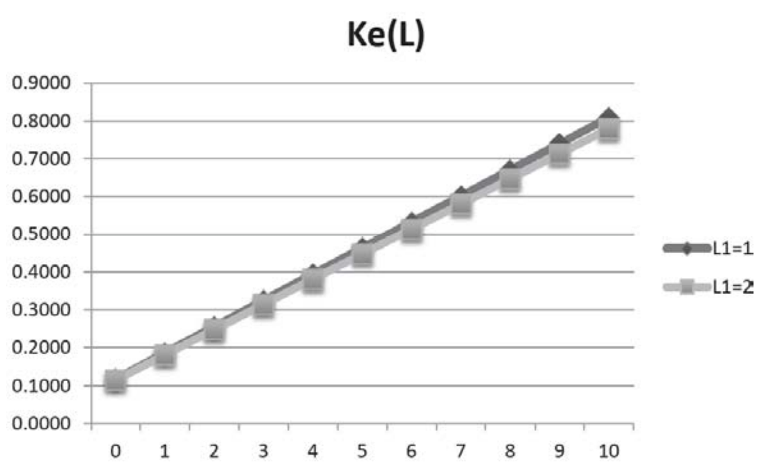

Figure 23: The dependence of equity cost k_e on leverage level at two leverage ratio values l_1 =1 and l_1=2.

1) l_2=1

Table 30:

L	WACC(l_2=1)	Kd	t	Ke
0	0,08571	0,06	0,2	0,0857
1	0,08571	0,06	0,2	0,1234
2	0,08571	0,06	0,2	0,1611
3	0,08571	0,06	0,2	0,1989
4	0,08571	0,06	0,2	0,2366
5	0,08571	0,06	0,2	0,2743
6	0,08571	0,06	0,2	0,3120
7	0,08571	0,06	0,2	0,3497
8	0,08571	0,06	0,2	0,3874
9	0,08571	0,06	0,2	0,4251
10	0,08571	0,06	0,2	0,4629

2) l_2=2

Table 31:

L	WACC(l_2=2)	Kd	t	Ke
0	0,06667	0,06	0,2	0,0667
1	0,06667	0,06	0,2	0,0853
2	0,06667	0,06	0,2	0,1040
3	0,06667	0,06	0,2	0,1227
4	0,06667	0,06	0,2	0,1413
5	0,06667	0,06	0,2	0,1600
6	0,06667	0,06	0,2	0,1787
7	0,06667	0,06	0,2	0,1973
8	0,06667	0,06	0,2	0,2160
9	0,06667	0,06	0,2	0,2347
10	0,06667	0,06	0,2	0,2533

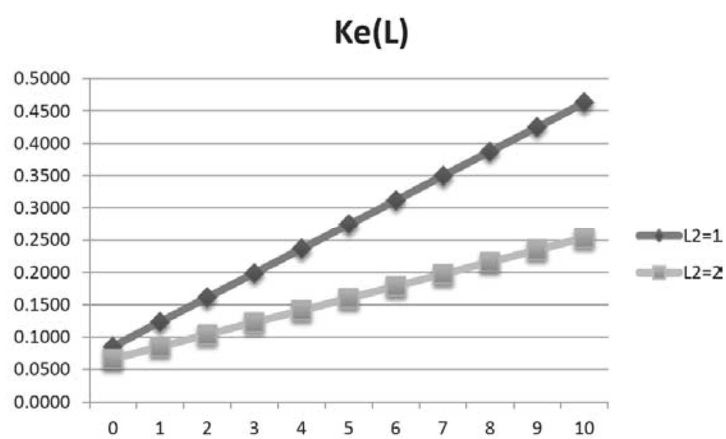

Figure 24: The dependence of equity cost k_e on leverage level at two leverage ratio values l_2 =1 and l_2=2.

1) l_3=1

Table 32:

L	WACC(l_3=1)	Kd	t	Ke
0	0,11735	0,06	0,2	0,1174
1	0,11735	0,06	0,2	0,1867
2	0,11735	0,06	0,2	0,2561
3	0,11735	0,06	0,2	0,3254
4	0,11735	0,06	0,2	0,3948
5	0,11735	0,06	0,2	0,4641
6	0,11735	0,06	0,2	0,5335
7	0,11735	0,06	0,2	0,6028
8	0,11735	0,06	0,2	0,6722
9	0,11735	0,06	0,2	0,7415
10	0,11735	0,06	0,2	0,8109

2) l_3=2

Table 33:

L	WACC(l_3=2)	Kd	t	Ke
0	0,11482	0,06	0,2	0,1148
1	0,11482	0,06	0,2	0,1816
2	0,11482	0,06	0,2	0,2485
3	0,11482	0,06	0,2	0,3153
4	0,11482	0,06	0,2	0,3821
5	0,11482	0,06	0,2	0,4489
6	0,11482	0,06	0,2	0,5157
7	0,11482	0,06	0,2	0,5826
8	0,11482	0,06	0,2	0,6494
9	0,11482	0,06	0,2	0,7162
10	0,11482	0,06	0,2	0,7830

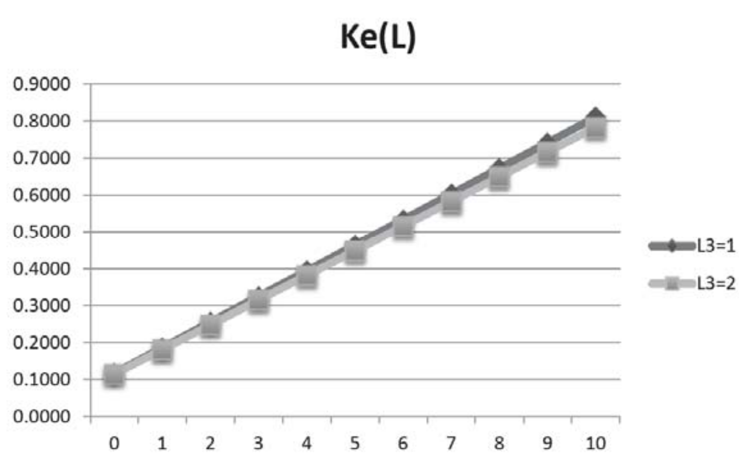

Figure 25: The dependence of equity cost k_e on leverage level at two leverage ratio values l_3 =1 and l_3=2.

between rating ratios and leverage level which can be quite important in rating. All above creates a new base for rating methodologies.

This is the first paper in a series of papers devoted to rating methodology. In next ones we'll consider the application of the modern theory of capital structure BFO (general case of arbitrary age companies) in rating, new approach to project rating etc.

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REFERENCES

Brusov P, Filatova T, Orehova N, Eskindarov M (2015) Modern corporate finance, investment and taxation. Springer International Publishing, pp.1-368. https://doi.org/10.1007/978-3-319-14732-1

Brusov P, Filatova T, Orehova N, Brusova A (2011a) Weighted average cost of capital in the theory of Modigliani–Miller, modified for a finite life–time company. Applied Financial Economics 21(11): 815-824

Brusov P, Filatova P, Orekhova N (2013a) Absence of an Optimal Capital Structure in the Famous Tradeoff Theory! Journal of Reviews on Global Economics 2: 94-116

Brusov P, Filatova P, Orekhova N (2014a) Mechanism of formation of the company optimal capital structure, different from suggested by trade off theory. Cogent Economics & Finance 2: 1-13. https://doi.org/10.1080/23322039.2014.946150

Brusov P, Filatova T, Orehova N *et al*. (2011b) From Modigliani–Miller to general theory of capital cost and capital structure of the company. Research Journal of Economics, Business and ICT 2: 16-21

Brusov P, Filatova T, Eskindarov M, Orehova N (2012a) Influence of debt financing on the effectiveness of the finite duration investment project. Applied Financial Economics 22 (13): 1043-1052

Brusov P, Filatova T, Orehova N *et al.* (2011c) Influence of debt financing on the effectiveness of the investment project within the Modigliani–Miller theory. Research Journal of Economics, Business and ICT (UK) 2: 11-15

Brusov P, Filatova T, Eskindarov M, Orehova N (2012b) Hidden global causes of the global financial crisis. Journal of Reviews on Global Economics 1: 106-111

Brusov P, Filatova T, Orekhova N (2013b) Absence of an Optimal Capital Structure in the Famous Tradeoff Theory! Journal of Reviews on Global Economics 2: 94-116

Brusov P.N., Filatova T. V. (2011d) From Modigliani–Miller to general theory of capital cost and capital structure of the company. Finance and credit 435: 2-8.

Brusov P, Filatova T, Orekhova N, Brusov P. Brusova A. (2012). Modern approach to dividend policy of company. Finance and credit, v.18, issue 37, 2012.

Brusov P Filatova T Orehova N Brusov P.P Brusova N. (2011e) From Modigliani–Miller to general theory of capital cost and capital structure of the company. Research Journal of Economics, Business and ICT 2: 16-21

Brusov P Filatova T Orehova N (2014b) Inflation in Brusov–Filatova–Orekhova Theory and in its Perpetuity Limit – Modigliani – Miller Theory. Journal of Reviews on Global Economics 3: 175-185

Brusov P Filatova T Orehova N (2013c) A Qualitatively New Effect in Corporative Finance: Abnormal Dependence of Cost of Equity of Company on Leverage. Journal of Reviews on Global Economics 2: 183-193

Brusova A (2011) A Comparison of the three methods of estimation of weighted average cost of capital and equity cost of company. Financial analysis: problems and solutions 34 (76): 36-42

Filatova T Orehova N Brusova A (2008) Weighted average cost of capital in the theory of Modigliani–Miller, modified for a finite life–time company. Bulletin of the FU 48: 68-77

Modigliani F, Miller M (1958) The Cost of Capital, Corporate Finance, and the Theory of Investment. American Economic Review 48: 261-297

Modigliani F, Miller M (1963) Corporate Income Taxes and the Cost of Capital: A Correction. American Economic Review 53: 147-175

Modigliani F, Miller M (1966) Some estimates of the Cost of Capital to the Electric Utility Industry 1954–1957. American Economic Review 56: 333-391

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