The Impact of Financial Risk and Volatility to the Cost of Debt, and the Average Cost of Capital

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Abstract: The research is devoted to a question – are the price volatility and financial risks the main factors influencing required return on capital. The answer is negative and the outcome is - traditional WACC, based on volatility and capital structure badly describes required return on capital. Then it is poor approximation for discount rate applicable for company cash flows. So, preferable way for practical assessment may be to use projected cash flows and implied stochastic discount rate, calculated by empirical data.

Keywords: Price volatility, financial risk, financial leverage, MM theory, WACC, stochastic discount rates.

I. INTRODUCTION

The main impetus for this research are the following questions:

1. Can financial risk of the company be appreciated through volatility of its market price?

2. Which way financial risk of the company may affect the value of bonds and the required yield on cash flows?

The first question is probably the most fundamental, as relates to the applicability of "mean - variance framework" to assess risk and return on assets. The second concerns the practical assessment of required yield used to evaluate the value of assets.

Each of the two questions have answers in financial theory, including traditional CAPM and MM but these answers badly correspond to practice and empirical evidences. Therefore, all these questions are in the core of researches and have stimulated the emergence of I-CAPM (R. Merton (1973), R. Merton models for cost of debt (R. Merton (1974)), APT, C-CAPM, numerous factor model (e.g. Fama, French (2006)), and etc. But no model still gives practically acceptable answer to the questions pointed above.

For example, considering the second question, it may be noted that WACC is widely used as discount rate for cash flows of investment projects and free cash flow to a firm. WACC calculations use different methods of evaluation and refinement for beta, as measure of systematic risk (e.g. uprising beta by A. Damodoran) and empirical adjustments for individual risk. The latter adjustment contradicts classical CAPM and C-CAPM (see Chabi-Yo F. (2011)) but may be accounted for in I-CAPM (see Cochrane J. (2008)).

II. LITERATURE REVIEW

MM theory (Miller M. (1988)) and CAPM both are based on the hypothesis of going concern and ignore the risk of bankruptcy or financial instability. CAPM theory employs stationarity as main hypothesis, and neglect transaction costs and market imperfections which lead to numerous discrepancies with practical experience and empirical data (e.g. see J. Stiglitz (1969).

The most widely applied theory in recent years probably is C-CAPM, thanks to its theoretical appeal. Essentially, this theory (as well as the MM theory) can be deduced from the general theory of macroeconomic equilibrium: Arrow-Debreu model (see J.Tyrol (2008)). And this theory commonly is employed as theoretical base for the idea of stochastic discount rates, which was first proposed by H. Biihlmann (1992). Then, in financial theory (e.g. in corporate finance) there is emerged way to build all of it as a part of general economic theory, based on projected future consumption.

The problem is that this brilliant theory instead of describing the real world offers its ideal model, where all the basic assumptions of economic theories are true, where there is no arbitration (including risk-arbitrage) and where all asset prices ideally coincide with the present value of cash flows (e.g. see Garleanu N., Pedersen L. (2011)). This contradiction with reality

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have been repeatedly criticized by R. Thailer (2015) who considered these discrepancies as the result of "irrationality" of consumer choice, which economic theory attributes the rational choice. But the problem, apparently, is not the only (or even not so much) in the irrationality of investors (which certainly true) but also investor's inability to assess the financial risks reliably and objectively (see Froot K., O'Connell P. (2008)). Both lead to the same - an inability reliably determine future discount rate.

Hence follows the application of stochastic discount rates, which is in the focus for some researchers (e.g. see Bakshia G., Carr P., Wu L. (2008), and the latest - Piccotti L. (2017)). However, the typical approach of stochastic rates discounting still comes from C-CAPM and forecast of future consumption (e.g. Bakshia G., Carr P., Wu L. (2008)).

Seventeen years ago, S. Myers (2001) noted that even 40 years after Modigliani and Miller research, our understanding of firms financing choices are limited and that was described by him as "the mystery of capital structure". Probably that is true for today.

For an optimal structure of capital there are two conflicting theories – "trade off" and "pecking order". And empirical verification of those theories (see. E. Fama and k. French (2001)) has shown that none of these theories can be considered as satisfactory. In three major tests of predictions that differs for both theories in one case "trade off" theory is closer to the truth, another one confirms "pecking order" the third one give controversial results. So, E. Fama and K. French (2002) give no certain conclusions. However, Strebulaev I. (2007) stated that both theories may come true and then many researches use modelling approach to explain it (see Bhamra H., Lars-Alexander K., Strebulaev I. (2010).

There are many researchers who seek to build capital structure theory on a more realistic basis than MM did. E.g. see Brusov P., Filatova T., Orehova N., Brusova N. (2011)), Graham J., Leary M. (2011), and etc. In the latest work by Martellinia L., Milhaua V., Tarellib A. (2018), capital structure decisions are inked with corporate market debt programs. But still there is no model which complies both with theory and practice.

Common belief (or a common mistake) is that risks may be assessed through the volatility of the market prices of shares and bonds, the cost of bankruptcy or financial distress is linked to those risks, and it results in a loss of company value.

R. Merton (1974) proposed the model for the cost of bankruptcy, based on the assumption that enterprise value commits a Brownian movement. If the value of the company becomes less the nominal value of debt, the firm goes bankrupt. This assumption provides an opportunity to consider the cost of debt, as the price of the option for all assets of the company with a strike price equal to the nominal value of debt. That model is substantially based on the theory for options by Black-Scholes. S. Myers (2001), defines this approach as "bankruptcy" option, which is always in the pocket of the owner. Though R. Merton model is considered a classic, it has some flaws and provokes obvious questions.

At the first, if that model was reliable, the related option would exist in the market for every asset. There are similar options, known as CDS (cross-default swap). But they are available only for selected bonds (mainly sovereign) and their prices are often considered as a puzzle (for example, see D.Darrell (1988)). The simple fact that these options are not available for most of bonds means that related risks are impossible to evaluate with the R. Merton model.

At the second, R. Merton made some flawed (controversial) assumptions. In particular, the theory of Black-Scholes is applicable only if the price of an asset commits Brownian motion with constant variance. Waiver this assumption (for example, using stochastic volatility) makes use of the Black-Scholes theory impossible. Using waved assumptions, R. Merton (1974) does explicitly the wrong conclusion that the classical theory of MM stands true even under the risk of bankruptcy. That obviously contradicts reality – if a firm goes bankrupt its shares normally have zero value and debt is valued with considerable discount. Despite the above, "structural model" based on Black-Scholes theory, continue to play a prominent role in research on the modelling of default.

Modelling branch of capital structure researches started with the work by Strebulaev (2007) and flourishing by now. E.g. in the work of A. Davydenko, A. Strebulaev, X. Zhao (2012) the result obtained that the average cost of default for the firms that expected bankruptcy, can be estimated at 21.7 per cent of the market value of the assets. Costs are higher for investment grade (28.8%) than for all issuers of bonds (20.2%) which seem as a puzzle. For other modeling results see, e.g. J. Chen, R. Hill (2013), and the latest work by L. Martellinia, V. Milhaua, A. Tarellib (2018).

What increment to financial risk is caused by structure of capital? It is well known that sometimes a firm goes bankrupt taking too much of financial risks (e.g. Enron, Lehman Brothers, etc.) and that may be probably related to the structure of capital. Obviously, over-indebtedness always increases financial risk, but is the only increment? When taking account of the costs of financial risks (including bankruptcy) in the theory of MM it is necessary to mind that a considerable part of financial risk comes from external factors not included in MM theory. These external factors can sometimes be interpreted as individual risk, but sometimes they arise from macroeconomic or sectoral risks (e.g. see Maio P. (2012)).

Going back to the first question posed in the preamble (the extent to which financial risks can be assessed through volatility or "mean - variance framework") - if that principle really worked, then required yield of the asset would have been reliably linked with price volatility. The answer to this question for bonds was obtained in the work by Zhukov (2014), where it has been shown that this is not the case for the majority of bonds with a very high probability (over 70%). So, there is no connection of bond yield with real volatility (would it be calculated for 30, 60 or 90 days). Reliable dependence was found only with so-called "implied volatility", derived as the countdown from Black-Scholes model. However, such a relationship should have correlation coefficients of the order 1. In reality it has correlation of the order of 0.1. It means the significant influence of external factors that principally may not accounted for in Black -Scholes model.

Also, E. Fama, K. French (2006) showed that, on the contrary to CAPM, systematic risk poorly predicts return on assets. Despite those factor models have no theoretical base, they do significantly better as the base for required yield.

Coming to value assessment, where should be counted financial risk – in a cash flow or in a discount rate? It is fairly clear (from elementary financial mathematics) that any risk can be reflected either in the cash flows or in the discount rate. Both ways are mathematically equivalent, but one should choose only one way for every risk, to avoid double counting.

But J. Cochrane (2011) proved that the volatility of discount rates probably is the major source of volatility in market prices. Earlier J. Cochrane (2005) also stated an original approach to the stochastic discount rates (special case of GMM – generalized method of moments) that can be held independently from unrealistic assumptions of C-CAPM. Ultimately, that approach relies essentially on the only one assumption - the value of the asset is equal to the discounted value of money income (1).

$$p = E\,(m\,s) \tag{1}$$

Here (m) -vector stochastic discount factor and s - vector cash flows (for example, free cash flow to the firm).

This assumption implies some rationality of investors, which probably would have recognized too strong by R. Tyler (2015). However, this identity applied to empirical data leads to the new method of pricing - using implied (empirical) stochastic discount rates, proposed by the Zhukov (2018), which are not related to C-CAPM or future consumption rate.

III. MODEL - MODIFICATION OF THE MM THEORY

There are some risks external to MM theory, caused by imperfections of stock market, such as bankruptcy (financial distress) risks, transaction costs, etc. To introduce concept of risks into MM theory, it is necessary to change the basic assumptions of this theory.

Assumption 1

If bankruptcy (financial distress) risks, transaction costs, and other financial risks caused by imperfections of stock market ignored, the expected cash flow to the firm before tax shields on interest E(FCF) does not depend on capital structure or dividend policy.

Assumption 2

The enterprise value is equal to the present value of the expected free cash flow to firm, discounted by rate r(t), corresponded with the required return on total capital employed by the enterprise.

Assumption 3

The required return on total capital employed by the enterprise is equal to the average income required by lenders and shareholders during the period t (opportunity costs), weighted by their share in the total capital employed by the enterprise.

It is easy to see that 1-3 assumptions underlie the MM-theory. However, MM theory requires (at least) two more – on going concern (no risk of default) and balance of financial markets (the absence of arbitrage). Both are unrealistic.

But anyway, in addition to the assumptions 1-3, there is necessary to assume something about the opportunity costs of equity.

Assumption 4 (Generalized Expression for the Cost of Equity)

The opportunity cost of equity (r_E) for the firm is considered by investor as alternative investment in diversified portfolio, which expected income may be described by production of **β**(t) - vector of systematic risk factors of the firm and vector of factor premiums **MRP**(t), where vector **β**(t) describes the sensitivity of yield to equity for the firm F to the yield of the portfolio:

$$\boldsymbol{\beta}(t) = \mathrm{cov}(ROE(F), \mathbf{MRP}(t))/\mathrm{var}(\mathbf{MRP}(t)) \quad (2)$$

The required return on equity exceeds the risk-free rate by the premium for systematic risks, plus an additional premium for the idiosyncratic risk (particularly, default risk), which may differ for the owner and lender.

$$r_E = r_d + \boldsymbol{\beta}(t)\,\mathbf{MRP} + cds_E(D, t) \quad (3)$$

$$r_d - r_f = cds_r(D, t)$$

Here $cds_E(D,t)$ - additional premium for the idiosyncratic risk (e.g., default risk), and transaction costs, while premium for the cost off debt over riskless rate described by $cds_r(D,t)$ - the sum of default costs and transaction costs.

Assumption 4 provides the way to get Hamada's identity (in a modified form). Originally it is derived from the combination of MM and CAPM theories.

Lemma 1 (Modification of Hamada's Identity)

Systematic risk **β** (t) depends linearly on the debt leverage:

$$\boldsymbol{\beta}(t)_E = \boldsymbol{\beta}(t)_U(1 + D/Eq) \quad (4)$$

Here D/ Eq – debt leverage (debt to equity as market values) $\boldsymbol{\beta}(t)_L$ -vector of systematic risk of the firm F with debt (D), $\boldsymbol{\beta}(t)_U$ -vector of systematic risk for similar firms with no leverage (unlevered Beta).

Proof. From the effect of financial leverage:

$$NI = NI_u + (ROIC - r_d)\,D + r_d\,DT$$

$$ROE = ROA_u(1 + D/Eq) + r_dT\,(D/Eq)$$

Using the expression (2) and simple conversion:

$$\boldsymbol{\beta}_E(t) = \mathrm{cov}(ROE(F), \mathbf{MRP}(t)) = \boldsymbol{\beta}_U(1 + D(1-T)/Eq)$$

Lemma 1 (4) and assumption (3) provides with the key identity to build theory like MM - linear dependence of the cost of equity (r_E) from the debt leverage (D/Eq) if additional premium for the idiosyncratic risk ($cds_E(D,t)$ stay constant while debt increases. To define the necessary and sufficient conditions for the basic statements MM of theory there is need in one more assumption:

Assumption 5 (Necessary and Sufficient Condition for the MM Theory)

If the share of debt (D) and interest payments stay within safe limits, financial risk for debt (cds_r (D, t)) stay constant, and the extra financial risk for owner ($cds_E(D, t)$)**,** caused by the increase in debt is equal to zero:

$$cds_r(D, t) = \mathrm{const},\ D \le D1$$

$$cds_E(D, t) = 0 \quad (5)$$

With the assumptions 1-5 and Lemma 1 (modified equality by R. Hamada), one can prove Theorem 1 with the corollaries 1 and 2, which are analogical to MM theory. However, Theorem 2 provides with condition for impact of increased risk of default and transaction costs in excess of duty to secure borders (proof of drop).

Theorem 1 (Necessary and Sufficient Condition for the Capital Structure Irrelevance without Taxes)

Given assumptions 1-4, and if tax shields on interest are zero, then assumption 5 provides the necessary and sufficient condition, when enterprise value does not depend on leverage (irrelevance of enterprise value from capital structure). The proof is omitted as it is similar to MM theorem.

Corollary 1

Given assumptions 1-5, the effect of tax shields on the interest is increase of enterprise value by the debt, multiplied by the marginal tax rate.

Corollary 2

Given assumptions 1-5, if debt level exceeds the safe level D_1 and reaches D_2 while yield of bonds increases from r_1 to r_2, and if extra risk for equity holder is not changed (($cds_E(D_2, t)=0$), the WACC is increased at:

$\Delta WACC = r_2 - r_1$ (6)

However, if both required rate – for equity holder and debt holder changes with the increase of debt, then theorem 2 may be applied.

Denotations (here and onwards) are:

g -average growth of the company's (firm F) cash flows,

EV_1 – enterprise value of F with the safe debt D1

r_2 , r_1 required yield for bonds of the firm F with debt D_1 and D_2 (like in (6))

$\Delta r = (r_2 - r_1)/(r_2 - g)$

$\Delta L = (D_2 - D_1)/EV_1$

Theorem 2 (Impact of Debt Leverage)

Given assumptions 1-5, enterprise value of F will decline with increase of debt over safe limit (denoted D_1) to the new value (D_2) if and only if the interest rate sensitivity to the change of leverage ($\Delta r/\Delta L$) is greater than marginal tax rate applicable to tax shields on interest:

$\Delta r/\Delta L > T$ (7)

For the proof see Zhukov (2015).

IV EMPIRICAL RESULTS - ASSESSMENT OF THE INTEREST RATE SENSITIVITY TO THE CHANGE OF LEVERAGE

The risk of financial distress (e.g. default, or bankruptcy risks) may depend on many factors. And debt leverage is not the only factor influencing required yield for debt (YTM). So, significant role is playing by some external factors (unexplained externalities) which may be difficult to specify but needs to be defined.

Definition (of Externalities)

External factors (financial risk) is hereafter referred to as the unspecified set of factors influencing required yield for debt, while not directly related to the debt leverage of the company.

It is further assumed that for each specified industry and rating the influence of debt leverage to YTM may be assessed by averaging. However, variation of YTM for every class (group) will show the influence of externalities.

The empirical data (see Table **1**) shows that there is a marked dependence of YTM on leverage and ranking.

The estimated level of sensitivity are always exceeds 1, and so any tax rate. Therefore, as a rule of thumb, tax shields must be mostly irrelevant to the structure of capital, because an increase in the debt

Table 1: The Estimation for Sensitivity (7) of YTM to Debt Leverage on the Data for Three Industries (Data from Bloomberg)

Industry	Rating S & P	Number of bonds in Bloomberg	YTM (in % av.)	MV(D)/MV(Eq) (in % av.)	D/EV (in % av.)	Sensitivity (Δr/r)/ΔL
Energy	AAA	24	1.75	20	0.17	-
Financial	AAA	2605	2.6	65	0.39	-
Industry	AAA	16	2	20	0.17	-
Energy	AA	260	2.3	30	0.23	4
Financial	AA	2983	2.8	70	0.41	3.6
Industry	AA	77	2.3	30	0.23	2.17
Energy	(A)	229	3.7	40	0.29	6.3
Financial	(A)	2884	3.6	75	0.43	11
Industry	(A)	308	3.4	40	0.29	5.4
Energy	BBB	3 93	4.2	50	0.33	3
Financial	BBB	2441	4.2	80	0.44	14
Industry	BBB	293	4.1	50	0.33	4.3
Energy	BB	494	5.6	60	0.38	5
Financial	BB	2042	5	85	0.46	14
Industry	BB	224	5.6	60	0.38	5.3

Table 2: WACC and Stochastic Discount Rates for BP Since 2000 by 2016 (Data Obtained from Bloomberg)

	WACC	CFOmln.$	FCF mln.$	Rcfo	Rfcf	EV mln.$	Mcap mln.$
Median	0088	539	135	0.012	0.003	144000	111000
St. Dev.	0.19	1.84	0.46	0.21	0.21	0, 27	0,38

burden leading to an increase in financial risks (e.g. estimated probability of default), should always lead to a decrease in the enterprise value.

But standard deviation of YTM is also growing with decrease of rating. That may be explained by disparity in the quality of assets, debt covenants and collaterals. Low rated companies may issue collateralized bond for lower interest rate. Based on the data (see Table **1**), it can be assumed that for bonds rated below than A or BBB the role of external factors is increasing, causes growth in variations of results. In research by P. Zhukov (2018) has been shown that changes in enterprise value are unrelated to changes either of WACC or cash flows (in a medium term from a quarter to a year). Then implied stochastic discount rates were assessed directly from equation (1) and those rate were substantially lower than WACC.

E.g. average WACC for the company BP from 2000 by 2016 years was 8.8%, while related stochastic discount factor for operating cash flow was only 1.2%, which is close to the cost of debt, and for the free cash flow it was 0.3%, which is closer to riskless rate (see Table **2**).

V. CONCLUSION

1. The theory of MM may be valid only if the firm's debt remains within safe limits, and additional financial risk for owners is not material compared to systematic risk (see Theorem 1, 2).
2. Tax shields are less critical for the choice of capital structure than external factors which are not included to MM and CAPM.
3. The volatility of bond price is unrelated to required yield (YTM).
4. YTM depends on debt leverage in average for big groups (see Table **1**).
5. Traditional WACC poorly describes discount rates for cash flows, and usually substantially overstates the implied stochastic discount rates (see Table **2**).
6. The implied stochastic discount rates derived from the underlying model (1) by J. Cochrane (2005) may be preferable to use as discount rate by the way described in P. Zhukov (2018).

REFERENCES

Bakshia G., Carr P., Wu L. "Stochastic risk premiums, stochastic skewness in currency options, and stochastic discount factors in international economies", *Journal of Financial Economics,* 2008, 87, pp. 132–156. https://doi.org/10.1016/j.jfineco.2006.12.001

Bhamra H., Lars-Alexander K., Strebulaev I. "The aggregate dynamics of capital structure and macroeconomic risk", *Review of Financial Studies* 2010, 23 (12), pp. 4187-4241. https://doi.org/10.1093/rfs/hhq075

Biihlmann H. "Stochastic discounting" , *Insurance: Mathematics and Economics*, 1992,11, pp.113-127. https://doi.org/10.1016/0167-6687(92)90048-G

Brusov P., Filatova T., Orehova N., Brusova N. "Weighted average cost of capital in the theory of the Modigliani-Miller, modified for a finite lifetime company", *Applied Financial Economics,* 2011, 21 (11), pp. 815-824. https://doi.org/10.1080/09603107.2010.537635

Chen J., Hill P. "The impact of diverse measures of default risk on UK stock returns", *Journal of Banking & Finance*, 2013, 7, pp. 5118–5131. https://doi.org/10.1016/j.jbankfin.2013.06.013

Chabi-Yo F. "Explaining the idiosyncratic volatility puzzle using Stochastic Discount Factors", *Journal of Banking & Finance* ,2011,35 1971–1983. https://doi.org/10.1016/j.jbankfin.2011.01.002

Cochrane J. "Presidential Address: Discount Rates", *The Journal of Finance*, 2011, 4, 1047-1108. https://doi.org/10.1111/j.1540-6261.2011.01671.x

Cochrane J. "Asset pricing", Princeton University Press. 2005.

Cochrane J. "A mean-variance benchmark for intertemporal portfolio theory", Working paper, 2008, University of Chicago.

Davydenko S., Strebulaev I., Zhao X. "A market-based study of the cost of default", *The Review of Financial Studies*, 2012, 25 (10), pp. 1024-1033. https://doi.org/10.1093/rfs/hhs091

Denzler S., Dacorogna M., Müller U., McNeil A. "From default probabilities to credit spreads: Credit risk models do explain market price", *Finance Research Letters,* 2006, 3, pp. 79-85. https://doi.org/10.1016/j.frl.2006.01.004

Fama E., French K. "Testing tradeoff and pecking order predictions about dividends and debt", *Review of Financial Studies*, 2002, 15, 1-33. https://doi.org/10.1093/rfs/15.1.1

Fama E, French K. "The Value Premium and the CAPM", *The Journal of Finance* , 2006, 5, 2163-2185. https://doi.org/10.1111/j.1540-6261.2006.01054.x

Frank M., Goyal V. "Trade-off and pecking order theories of debt", Handbook of empirical corporate finance, Amsterdam, the Netherlands: Elsevier, 2008, pp. 135-202. https://doi.org/10.1016/B978-0-444-53265-7.50004-4

Froot K., O'Connell P. "On the pricing of intermediated risks: Theory and application to catastrophe reinsurance", *Journal of Banking and Finance,* 2008, 32, pp. 69–85. https://doi.org/10.1016/j.jbankfin.2007.09.008

Garleanu N., Pedersen L. "Margin-based asset pricing and deviations from the law of one price", *Review of Financial Studies,* 2011, 24, pp. 1980–2022. https://doi.org/10.1093/rfs/hhr027

Graham J., Leary M. "A review of empirical capital structure research and directions for the future", *Annual Review of Financial Economics*, 2011, 3, pp. 309-314. https://doi.org/10.1146/annurev-financial-102710-144821

Maio P. "Multifactor models and their consistency with the ICAPM", *Journal of Financial Economics,*2012, 106, pp. 586–613. https://doi.org/10.1016/j.jfineco.2012.07.001

Martellinia L., Milhaua V. , Tarellib A. "Capital structure decisions and the optimal design of corporate market debt programs", *Journal of Corporate Finance*, 2018,167, pp. 141–167. https://doi.org/10.1016/j.jcorpfin.2017.11.011

Merton R. "An intertemporal Capital Asset Pricing Model", *Econometrica,* 1973,5, pp. 867-887. https://doi.org/10.2307/1913811

Merton, R. "On the pricing of corporate debt: The risk structure of interest rates." *Journal of Finance,*1974, 29 (2), pp. 449-470.

Miller M. "The Modigliani-Miller Proposition after Thirty Years of Economic Perspectives", *Journal of Economic Perspectives*, 1988, 2, pp. 99-120. https://doi.org/10.1257/jep.2.4.99

Myers S. "Capital Structure", *Journal of Economic Perspectives*, 2001,15, pp.81- 102. https://doi.org/10.1257/jep.15.2.81

Piccotti L. Financial contagion risk and the stochastic discount factor, *Journal of Banking and Finance,* 2017, 77, pp. 230–248. https://doi.org/10.1016/j.jbankfin.2017.01.012

Strebulaev I. "Do tests of capital structure theory mean what they say?" *The Journal of Finance*, 2007, 62, pp. 1747-1787. https://doi.org/10.1111/j.1540-6261.2007.01256.x

Stieglitz J. "A Re-Examination of the Modigliani-Miller Theorem", *American Economic Review*, 1969, 59, pp. 784-793.

Sharpe W., Alexander G., Bailey J., "Investments", New York: Prentice Hall. 1999.

Thaler R. "Misbehaving: The Making of Behavioral Economics", W.W. Norton, 2015, 415 p.

Tirole J. The theory of corporate finance, Princeton University Press, 2006.

Zhukov P. Default risk and its effect for a bond required yield and volatility, *Review of Business and Economics Studies,* 2014, 4, pp. 87-98.

Zhukov P. "Modification of the theory of capital structure, taking into account the probability of bankruptcy", *Financial Analytics: Problems and Solutions*, 2015, 269 (35), pp.50-60.

Zhukov P. "The Impact of Cash Flows and Weighted Average Cost of Capital to Enterprise Value in the Oil and Gas Sector" , *Journal of Reviews on Global Economics*, 2018, 7, pp. 138-145. https://doi.org/10.6000/1929-7092.2018.07.11

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