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The Brusov–Filatova–Orekhova Theory of Capital Structure

Applications in Corporate Finance, Investments, Taxation and Ratings

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Dedicated to eternal love,
which touched us with its wing
and gave us happiness,
without which life is meaningless

Preface

The monograph is devoted to a comprehensive and detailed description of the modern theory of capital cost and capital structure—Brusov–Filatova–Orekhova (BFO) theory—and its application to the real economy: corporate finance, investments, taxation, business valuation, and rating. The BFO theory has replaced the world-famous theory of capital cost and capital structure by Nobel laureates Modigliani and Miller (MM theory), which turns out to be outdated, eliminating the main drawback of the MM theory—the eternity of companies and cash flows. The BFO theory is valid for arbitrary age (and to arbitrary lifetime) companies and investment projects of arbitrary duration. Results of the modern BFO theory turn out to be quite different from those of the Modigliani–Miller theory. They show that the latter, via its perpetuity, underestimates the assessment of the weighted average cost of capital and the equity cost of the company and substantially overestimates the assessment of the capitalization of the company.

Such an incorrect assessment of key performance indicators of financial activities of companies has led to an underestimation of risks involved, and impossibility, or serious difficulties in adequate managerial decision-making, which was one of the implicit reasons of the global financial crisis of the year 2008.

Within the BFO theory a lot of qualitatively new results have been obtained, among them:

- Qualitatively new effect in corporate finance, discovered by authors: abnormal dependence of equity cost on leverage, which significantly alters the principles of the company's dividend policy.
- Bankruptcy of the world-famous trade-off theory has been proven.
- Mechanism of the formation of the company optimal capital structure has been suggested, which is different from the trade-off theory.
- Inflation in both Modigliani–Miller as well as in Brusov–Filatova–Orekhova theories has been taken into account in explicit form; its nontrivial impact on the dependence of equity cost on leverage has been detected.

- Study of the role of taxes and leverage has been done, which allows the regulator to set the tax on profits rate, and businesses to choose the optimal level of debt financing.
- Investigation of the influence of tax on profit rate on the effectiveness of investment projects at different debt levels showed that an increase in tax on profit rate on one side leads to a decrease in the project NPV, but on the other side, it leads to a decrease in the sensitivity of the NPV with respect to leverage level. At high leverage level L, the influence of tax on profit rate change on the effectiveness of investment projects becomes significantly less.
- Study of the influence of growth of tax on profit rate on the efficiency of the investment as well has led to two qualitatively new effects in investments:

  1. The growth of tax on profit rate changes the nature of the NPV dependence on leverage L at some value t^*: there is a transition from diminishing function NPV(L) at $t < t^*$ to growing function NPV(L) at $t > t^*$.
  2. At high leverage levels, the growth of tax on profit rate leads to the growth of the efficiency of the investments.

Discovered effects in investments can be applied in a real economic practice for optimizing the management of investments.

The well-established BFO theory allows us to conduct a valid assessment of the core parameters of financial activities of companies, such as weighted average cost of capital and equity capital cost of the company, its capitalization. It allows the management of a company to make adequate decisions, which improves the effectiveness of the company management. More generally, the introduction of the new system of evaluation of the parameters of financial activities of companies into the systems of financial reporting (IFRS, GAAP, etc.) would lead to a lower risk of global financial crisis.

A few types of BFO theory are described in the monograph:

BFO-1 theory (for arbitrary age companies) is applicable for the most interesting case of companies that reached the age of n-years and continue to exist on the market.

BFO-2 theory is related to companies with arbitrary lifetime companies. BFO-2 theory allows us to examine the financial status of the companies which ceased to exist, i.e., of those for which n means not age but a lifetime, i.e., the time of existence.

BFO-3 theory is the BFO theory used in rating methodology: rating ratios are incorporated into the BFO theory.

Over the past couple of years, the BFO authors have obtained very important results related to the generalization of the two main theories of the capital structure (Brusov–Filatova–Orekhova and Modigliani–Miller) to take into account the current financial practice of the company's functioning and taking into account the real conditions of their work.

The BFO and MM theories have been generalized to the case of variable income, arbitrary frequency of income tax payments, advance payments of income tax, etc.,

as well as to their combinations. These generalizations significantly expand the applicability of both theories in practice, in particular, in corporate finance, taxation, business valuation, investments, ratings, etc.

The second part of the monograph is devoted to assessing the effectiveness of investment projects within the modern investment models. The determination of the optimal leverage level for investments is studied in the monograph from two points of view: owners of equity capital and owners of both equity and debt capital.

Corporate management in the modern world is the management of financial flows. The proposed Brusov–Filatova–Orekhova theory allows us to correctly identify a discount rate—basic parameters for discounting of financial flows to arbitrary time moment—and compare financial flows with a view to making literate managerial decisions. The discount rate is a key link to the existing financial system, on which modern finance can be adequately built and the proposed monograph can be of assistance.

The third part of the monograph suggests a new approach to the rating methodology: rating of non-financial issuers, as well as project rating (for arbitrary duration investment projects). The key factors of a new approach are (1) the adequate use of discounting of financial flows virtually not used in existing rating methodologies and (2) the incorporation of rating parameters (financial "ratios") into the modern theory of capital structure (Brusov–Filatova–Orekhova (BFO) theory). This makes it possible to use the powerful tool of this theory, which provides the correct discount rate when discounting financial flows. The interplay between rating ratios and leverage level which can be quite important in rating is discussed. All these create a new base for rating methodologies. A new approach to ratings and rating methodologies allows us to issue more correct ratings of issuers, making the rating methodologies more understandable and transparent.

This book changes our understanding of corporate finance, investments, taxation, business valuation, and rating procedures. It shows that the most used principles of financial management should be changed in accordance with BFO theory. Many of discoveries made within this theory still require interpretations and understanding as well as incorporation into real finance and economy. But it is clear now that without a very serious modification of the conceptions of financial management, it is impossible to adequately manage manufacture, company finance state, investments, taxation, business valuation, and rating procedures, as well as finance in general.

The monograph is intended for graduate students, postgraduate students, teachers of economic and financial institutions, students of MBA program, scientists, financial analysts, financial directors of companies, managers of insurance companies and rating agencies, officials of regional and federal ministries and departments, and ministers responsible for economic and financial management.

Kronburg, Moscow, Russia Peter Brusov
25 January 2023

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Peter Brusov Peter Nickitovich Brusov is Doctor of Physical and Mathematical Science and Professor of the Financial University under the Government of the Russian Federation. He was born September 23, 1949.

Education Peter Brusov graduated from two faculties of Rostov-on-Don State University, Physical and Mathematical, and got PhD degree in Leningrad Mathematical Institute named by V.A. Steklov in 1980 and Doctor of Physical and Mathematical Science degree in Dubna (JINR) in 1993.

In the area of physics, he has created (together with Victor Popov) the theory of collective properties of superfluids and superconductors and has calculated the whole spectrum of collective excitations in bulk and films of superfluid He^3. Peter Brusov has predicted superfluid phases in He^3 films, the nontrivial pairing in high temperature superconductors.

In the area of finance and economy, Peter Brusov has created (together with Tatiana Filatova and Natali Orekhova) the modern theory of capital cost and capital structure—**Brusov–Filatova–Orekhova theory (BFO theory)**.

Employment experience Peter Brusov has been the Head of the Laboratory of high temperature superconductors in Rostov-on-Don State University up to 2004 and is now Professor of the Financial University under the Government of the Russian. Peter Brusov has been Visiting Professor of Northwestern University (USA), Cornell University (USA), Osaka City University (Japan), Chung-Cheng University (Taiwan), and some others.

Peter Brusov is the author of over 500 research publications, including six monographs and numerous textbooks and papers. His main interest is in the area of finance and economy related to corporate finance, investments, taxation, and rating.

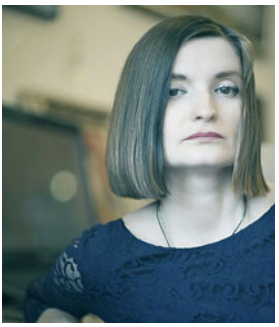
Tatiana Filatova is PhD in Finance and Professor of the Financial University under the Government of the Russian Federation. She was born 23 November 1948.

Education Tatiana Filatova graduated from Moscow Financial Institute in 1973 and got her PhD degree in Finance from Moscow Financial Institute in 1978.

In the area of finance and economy, Tatiana Filatova has created (together with Peter Brusov and Natali Orekhova) the modern theory of capital cost and capital structure—**Brusov–Filatova–Orekhova theory (BFO theory)**.

Employment experience For the past 20 years (from 1998) Tatiana Filatova has been Dean of a few faculties of the Financial University under the Government of the Russian Federation: Financial Management, Management, State and Municipal Government, and some others. Now Tatiana Filatova is Professor of the Financial University under the Government of the Russian Federation.

Tatiana Filatova is the author of over 250 research publications, including five monographs and numerous textbooks and papers. Her main interest is in the area of finance and economy related to financial management, corporate finance, investments, taxation, and rating.



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capital cost and capital structure—**Brusov–Filatova–Orekhova theory (BFO theory)**.

Employment experience Natali Orekhova has been the leading scientist of the Financial University under the Government of the Russian Federation. She was Professor of the Center of Corporate Finance, Investment, Taxation and Rating at the Research Consortium of Universities of the South of Russia. Now she is Professor of the Financial University under the Government of the Russian Federation.

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Chapter 1
Introduction

Keywords Capital structure · Modigliani–Miller (MM) theory · Brusov–Filatova–Orekhova (BFO) theory · Trade-off theory · Generalized BFO theory

1.1 Introduction

One of the main problems in corporate finance is the problem of cost of capital and the impact of capital structure on its cost and capitalization of the companies. To date, even the question of the existence of an optimal capital structure of the companies (at which the company capitalization is maximal, and weighted average cost of capital is minimal) is open. Numerous theories and models, including the first and the only one until 2008 quantitative theory by Nobel laureates Modigliani and Miller (MM) (Modigliani and Miller 1958, 1963, 1966), not only do not solve the problem but also because of the large number of restrictions (for example, theory of MM) have a weak relationship to the real economy. Herewith the qualitative theories and models, based on the empirical approach, do not allow to carry out the necessary assessment.

In the monograph, the foundation of modern corporate finance and investment is laid. It is based on the authors's works on modifying the theory of capital cost and capital structure by Nobel Prize winners Modigliani and Miller, which led to the actual replacement of this theory by the modern theory by Brusov–Filatova–Orekhova (BFO theory) (Brusov & Filatova 2011; Brusov et al. 2014b; Brusova 2011; Brusov et al. 2020a, b; Brusov et al. 2021a, b; Brusov & Filatova 2021; Brusov & Filatova 2022a, b; Brusov et al. 2012c; Brusov et al. 2013c, d; Brusov et al. 2014c; Brusov et al. 2011a–d, 2012a, b, 2013a, b, 2014a; Filatova et al. 2008). The authors have moved from the assumption of Modigliani–Miller concerning the perpetuity (infinite time of life) of companies and further elaborated the quantitative theory of valuation of core parameters of financial activities of companies with arbitrary time of life.

Results of modern BFO theory (Brusov et al. 2011a–d, 2012a, b, 2013a, b, 2014a; Filatova et al. 2008) turn out to be quite different from ones of Modigliani–Miller theory (Modigliani and Miller 1958, 1963, 1966). They show that later, via its perpetuity, underestimates (often significantly) the assessment of weighted average

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