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Lublin, August 25, 2023

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R E V I E W

of the Doctoral Dissertation of MSc **Milada Zargartalebiego** titled:
**The Interdependence of Capital Structure and Business Performance
- Financing Decisions among German Listed Companies**
that was elaborated under the Supervision of
Dr. hab. Ewelina Sokolowska Ph.D. Sc.D., Associate Professor

I. Preliminary remarks

The doctoral dissertation that MSc. **Milad Zargartalebi** prepared consists of an Introduction, three Chapters, a Conclusion, a list of 293 references (26 pages), a list of 37 Tables, and a list of 10 Figures and abbreviations. With an Abstract (in English and Polish) and other information, the dissertation totalled 173 pages. The dissertation is written in English.

During the preparation of this dissertation review, the following assessment criteria were taken into account:
- the relevance of the research scope choice, the subject of the research, and the title of the dissertation,
- the novelty of the scientific points, the formulated research goals, and the hypotheses,
- the methods,
- the structure of the doctoral dissertation,
- the degree of achievement of the assumed research goal,
- formal and other remarks,
- conclusion.

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II. Relevance of research scope choice, research subject and dissertation title

For decades, optimisation of capital structure that could lead to performance maximisation has been a subject of an animated academic debate and practical seeking. I agree with the Author that the studies' results present somewhat controversial findings than clear clues on tackling this problem. If a fundamental approach is taken, that appropriate capital structure is composed when the cost of capital is minimised, and the value of a firm is at its peak.[1] On the face of it, the solution seems to be easy. It is enough to optimise equations systems with structure and performance functions. However, in dynamic, changing and evolving circumstances and taking a variety of expectations of business entities, the problem accrues to be multidimensional and, to some extent, unsolvable. Obviously, theoretics tried to generalise their findings that led to developing a set of excellent capital structure theories, e.g. Modigliani-Miller Capital Structure, Irrelevance Theory, Trade-Off Theory, Pecking Order Theory, Market Timing Theory or Agency Cost Theory.[2] All are applicable in a given situation, but neither can utterly describe how to mould the most efficient capital structure that would be transferred into performance maximisation.

Considering the relationship between capital structure and firms' performance, a subsequent question arises: what is cause and effect, i.e., whether performance moderates capital structure or inversely?

Considering the arguments presented above, the doctoral dissertation of MSc Milad Zargartalebi: *The Interdependence of Capital Structure and Business Performance – Financing Decisions among German Listed Companies* refers to these academic and practical needs. As the Author stated (Introduction, p. 2), *'…there is still a lack of assured knowledge on the effect of the main capital structure determinants…'* and further *'…The optimisation of a firm's capital structure is, therefore, still relevant in academic research. Hence, especially when considering unique conditions, questions on what determines the capital structure do still remain…'* and I share the Author's opinion that general knowledge of this area is rather vast, yet it seems somewhat fragmented and dispersed. Hence, I assess that the choice of this dissertation's research scope and research subject not only raises no objections but also, as a relevant elaboration in this field, may be perceived as a precious source of condensed knowledge for the theory and praxis. Moreover, the title of the dissertation goes in line with its content, and in this context, it was formulated adequately.

III. The novelty of scientific points, formulated research goals, questions and hypotheses

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[1] Demirgüneş, K. (2017). Capital Structure Choice and Firm Value: New Empirical Evidence from Asymmetric Causality Test. *International Journal of Financial Research*, *8*(2), 75–91.

[2] Khan, M. A., Rehan, R., Chhapra, I. U., & Sohail, A. B. (2021). Capital structure theories: A comprehensive review. *Revista Geintec-Gestao Inovacao E Tecnologias*, *11*(3), 1562-1574.

The Author of the dissertation presented his conceptual approach to the scientific issue, i.e. capital structure vs firm's performance (pp. 3-5). The aim of the dissertation was presented in a veiled way (p. 5) and is directed to use financial analysis research to explore secondary data to examine the relationship between management activities (operations activities and investment activities), management efficiency and business performance in terms of firm growth and profitability concerning the capital structure.

Taking previous findings, the Author proposed two research questions: 1) Can business performance differences explain the capital structure choice of firms? 2) Can capital structure explain differences in business performance? Research questions were appropriately worded and seemed to clarify the work's scientific intention. In fact, these questions mean that the 'causality' will be tested in two directions to undertake the challenge to get answers to the question 'what came first, the chicken or the egg'. More profoundly, the Author decided to isolate these relationships among various groups of businesses considering the growth rate of revenues and profitability, firm size, and industry or sector distinctions. Considering this, to my point, it would have been better to formulate more questions corresponding with detailed analysis proposals. This way, it would have been possible to get some positive answers in the empirical part of the thesis.

The Author decided consciously not to formulate a general research model and hypotheses (p. 64), explaining that both factor dimensions are examined in different steps of the research procedure (in Polish Abstract, there is a sentence that hypotheses are falsified — I assume that it is a small slip of the tongue). I do not share this point. Using relatively numerous samples and statistical modelling should lead to hypotheses verification. Nevertheless, the whole way the Author would like to follow is interesting, and I allow myself to analyse critically point by point, both scientific assumptions and their results.

Recapitulation: generally, despite the remarks related to the hypotheses formulation, the dissertation represents an original character, and the methodological assumptions are adequate to achieve scientific purposes.

IV. Methods

In the research processes, various methods were implemented. Apart from the literature review and desk research survey, the following statistical methods and techniques were applied: descriptive statistics, bivariate analysis, regression analysis, group comparison analysis and artificial network analysis. In Chapter 3, the Author presented and justified an adequate set of quantitative methods. They are promising as a set of analytical tools for achieving interesting results and helping answer research questions.

The sampling approach is clearly described, and limitations related to the sample size, sample collection and data were presented. Data used in analyses gathered from GuruFocus dataset and encompasses items from 362 business entities from 2008 to 2019. The Author also presented consciously the way of tackling the data, the exclusion of some types of businesses and the method adopted to exclude outliers. To me, the methodological section's introductory part seems too long and contains partly unnecessary information. It refers, e.g. to a detailed description of financial statements and an academic description of research philosophy.

Recapitulation: To me, the empirical part of the dissertation demonstrates a satisfactory level for a doctoral thesis.

V. Structure of the doctoral dissertation

To achieve the objective of the dissertation, the Author adopted the appropriate structure of the work that consists of an introduction, three chapters, a conclusion, a list of references, a list of tables, and a list of figures and abbreviations. The content of the chapters goes in line with the title of the dissertation and can be perceived as a consequent explication of assumed research challenges. The subjective framework of the work is a consistent and logical sequence of particular parts.

The Introduction (marked as 1) is devoted to a general outline of the research problem and the isolation of research gaps. This part presents the general aims of the dissertation and research questions. Also, the Introduction mentions the research design and presents short descriptions of particular parts of the dissertation. In the end, the theoretical and practical contribution of the work was placed.

Remarks:
1) Presenting theoretical and practical contributions to science is typical of scientific papers. In the doctoral dissertation, these aspects should be part of the conclusions. The Author should avoid this kind of content in the initial part of the dissertation, especially since he presented his 'expected contribution', theoretically not yet knowing where the research will lead Him.
2) In the Introduction (p. 3), the Author stated that business performance can be assessed qualitatively and quantitatively. Subsequently, the Author signalled the issue of the quantitative approach, but the qualitative was left untouched.
3) The overall structure of the Introduction should emphasise the research gap (based on the subject literature), the aim(s) of the research, the research questions, and the description of the thesis structure. In this case, theoretical considerations are somewhat limited.

Despite remarks, the Introduction contains all the required elements and therefore meets the requirements for this part of the dissertation at an acceptable level.

Chapter two, literature review and research framework are devoted to the main theoretical areas that build a base for further considerations. Firstly, the Author described various theoretical approaches that explain how business entities are mould proportion between different types of capital. Traditional and modern approaches that represent a set of neoclassical and neo-institutional capital structure theories were presented. The behavioural approach was also mentioned as isolated and nested in the principal-agent relationship. Regarding the behavioural approach, the dissertation does not justify its distinguishing clearly. Subsequently, an overview of significant capital structure theories was placed. The Author presented shortly: irrelevance theorem of Modigliani and Miller, trade-off theory, neo-institutional theories related to asymmetric information and agency problems, signalling theory, pecking order theory, market timing theory and other approaches like behavioural approaches for explaining the capital structure, existence of market restrictions on the supply of capital, implications from the characteristics of the financing instruments that determine the capital structure. Theories were summarised (Table 1). In the end, the Author has included selected examples of capital structure determinants in the context of company performance, referring directly to the main research thread of the dissertation.

The second part of the chapter is devoted to the fundamental issues relating to the efficiency and growth of enterprises. After the introduction to the issue of business performance and firm growth subject, the Author presented the classifications of business growth definitions/concepts. Following the microeconomic approach of firm growth was marked. Subsequently, a set of chosen growth models was presented encompassing stochastic models, market-based view, resource-based growth and other growth models. These considerations were summarised (Table 3) and discussed. Factors and business growth predictors were subject to a further part of the chapter. The last part presents metrics of performance used in literature to describe or explain a firm's growth.

Remarks:

1) The Author stated that the cost of equity exceeds the cost of debt due to bankruptcy processes management (p. 14). It also should be mentioned about opportunity costs and tax shields as the reasons for these differences (they are touched on further).

2) The theoretical background presented in this chapter is adequate, but in some parts, the Author's discussion, assessment or conclusions could level up the quality of the work. However, this part could be assessed as well prepared piece of knowledge.

3) Table 1 (pp. 26-28), Table 5 (pp. 47-48), and Table 6 (p. 54) were unfortunately left without any comments.

4) The Author and Ph.D candidate should provide arguments on which theories of capital structure and which approach to business performance measurement will be taken and employed in further (empirical) part of the work. Obviously, the Author's decision in this area must be supported by rational arguments based on theory and previous findings.

5) As a summary of the chapter, I expected that the Author would have presented a conceptual model or outline that would present interrelations among theories of capital structure,

performance measures (indicators) and aspects of business growth. It would have illustrated better the current state of the art in this field and made it easier to extract the 'brick' that the Author would have added to current knowledge.

6) Due to the empirical analyses being based on a sample of German businesses, there is a visible lack of discussion related to German context, German literature and German specificity of connection among performance measures and growth (separate subchapter). It would have been interesting to know whether findings in Germany are similar or differ from other countries or regions. This part would have supported analyses of results obtained in Chapter 4.

Despite these partly critical points, the overall evaluation of the chapter is positive and represents an acceptable level for doctoral dissertations.

Chapter three, research design is composed of a few parts. Firstly the Author presented overall descriptions related to research philosophy and the specificity of the modelling in social science. Most are devoted to descriptions of the company's financial statements, their construction, capacity and significance in business performance analyses. It leads to extracting managerial and business performance indicators and models of management objectives, activities and outcomes. Next, the aim of the dissertation and research questions were placed again, and the Author provided arguments for the omission of hypotheses development. Subsequently, the sampling procedure and data collection processes were described. The Author also argued the choice of German companies as survey objects. Sampling let to isolate data from 361 business entities. The time range of the analysis covers the period from 2008 to 2019. The final sample contains 4,229 items (panel data). The Author presented the procedure dealing with outliers. Next, the set of variables employed was depicted. The last part of the chapter was devoted to methods and data analysis procedures. In particular, the Author justified implementing bivariate analysis, regression analysis, group comparison analysis and artificial network analysis. An evaluation of the methods was presented above.

Remarks:

1) 3.2. is titled 'Research questions and hypotheses' while the Author resigned intentionally to propose hypotheses. Therefore the title seems to be inadequate.

2) P. 63, Figure 3 was left without any comments; we do not know whether the Author agreed with this proposal or not.

3) P. 56, there is a division of models (heuristic and formal) without adequate reference.

4) As mentioned previously, in a doctoral dissertation, it is unnecessary to present the content of the financial statement (pp. 58-60). Such basic information is adequate for academic books.

5) P. 66, the Author assumed that companies in the sample 'do share at least higher similarity regarding to issues like tax treatment, insolvency proceedings, financial market conditions …' etc. Could the Author explain the source of such beliefs?

6) Employment of winsorisation as a method of outliers management – good choice. It is an accurate and effective approach that keeps the amount of data included in the analyses.

7) P. 68, could the Author explain why these 13 variables were chosen for analyses. Some justification is needed. A similar question refers to categories of subsets isolation (p. 69).

8) Please explain what 'ownership characteristic' were marked (p. 78) while this criterion was not used in analyses.

Despite the remarks, the overall evaluation of the chapter is positive, and it represents an acceptable level for doctoral dissertations.

Chapter four, empirical analysis contains results of the Author's calculations conducted in line with the taken methodology. Firstly descriptive statistics of variables were presented, encompassing the sector/industry structure of the sample and the main statistical characteristics of variables. Next, bivariate analysis results were placed and regression modelling results, groups comparisons and effects of artificial neural network employment. Calculations and analyses reflect the empirical assumptions presented in the previous chapter. However, I touch on a few aspects:

1) In Table 11, the sectors/industries structure of the companies were presented. However, the Author did not compare the sample structure with the structure of German business entities in the economy. In fact, the Author mentioned that '…Table 11 provides a mirror on the structure of the German economy…' (p. 83), but we do not know whether it reflects it well. Chi-square tests are welcomed.

2) Table 12, descriptive statistics are left without any Authors' comments – it's a pity.

3) Exclusion of all variables based only on correlation's level is to higher simplification. It leads to the situation that some explanatory power is limited. In statistics, there are better methods of variable choice for modelling, e.g. Hellwig's method of variables selection.

4) Table 13, correlation matrix – there is a lack of information on which relations are statistically significant. I guess it is probably only presented in the preceding text, but I am not convinced because (p. 86) the Author wrote '…like for example between ROE and ROA …'. It suggests that not all were extracted in the text. Additionally, there is a lack of interpretations of the results. What does a limited number of significant correlations mean? The same remark refers to VIFs.

5) Page 90 and next, AIC (Akaike information criterion) and RMSE (root mean square error) were presented without explanation or interpretation.

6) Table 21, 22, it is unnecessary to present other significance levels (e.g. *p<0.1) in 'Note' than visible in the data above.

7) Pages 95-96 - minor technical slips related to the method of data presentation (e.g. an empty page with the title of table 24, which is presented below).

8) Page 122, Figure 5 – isolating figures on the graph is impossible. All data have to be additionally presented in a table. Additionally, I am not convinced whether artificial network analysis is necessary for this work. Add value of this method seems to be debatable. I hope the Author will clarify this issue during the defence.

In part 4.6. the Author presented an evaluation of results and discussion divided into two areas: the impact of business performance on capital structure choice and the impact of capital structure

on business performance. These aspects correspond with the research questions of the dissertation. I expected that the Author would have answered the questions precisely instead of presenting a rather vague debate. Additionally, there is a visible lack of research results summary to present which variables/relationships/models provide evidence to answer 'yes' and which to answer 'no'. Taking that the doctoral thesis is limited to less than 200 pages, it was enough space to present in-depth analyses, descriptions and conclusions. In this work, these aspects can be assessed as superficial.

The last chapter includes conclusions summarising crucial findings, contributions to the theory and practical insights. In this part, I also could not find a clear answer to research questions while the Author presented a set of arguments that could confirm his impact on the theory of corporate finance and could be advice for practitioners. I do not share Author's points because firstly, it is necessary to summarise own results, then confront them with current knowledge and finally, contributions and recommendations could be formulated. Without that, it is difficult to assess which suggestions are drawn from research and which are just Author's 'wishes'.

VI. Degree of achievement of the assumed research goal

I do think that the doctoral dissertation of MSc Milad Zargartalebi titled: The Interdependence of Capital Structure and Business Performance - Financing Decisions among German Listed Companies has pros and cons as each scientific work.
Strengths:
- Interesting research approach.
- Good theoretical background.
- Well and consciously organised research process.
- Employment of sophisticated methods.
Weaknesses:
- Presentation and summarising of the results.
- Limitation of own comments and conclusions.
However, when evaluating the entire study in terms of literature review, research methodology, presentation and description of results, and partly critical analyses in the field of corporate finance management, it is possible to conclude that the assumed objectives of the work (see point III of this review) have been generally achieved.

The Author, despite some shortcomings, has proven to possess the following:
- Broad and deep knowledge in the field of Finance and Economy.
- Scientific and research skills and abilities to investigate complex, multidimensional and complicated issues.
- Traits and features of a conscientious researcher to conduct independent research processes and scientific work.

All the mentioned aspects, concerning limitations that each researcher, due to different reasons, is burdened with, predestine MSc Milad Zargartalebi to become an independent researcher.

VII. Formal and other remarks

As a rule, the work was prepared per the editorial requirements. My comments on some aspects were included in the earlier parts of the review. Also, as a reviewer, I assess some of its aspects slightly differently than the Author, which does not significantly impact the final assessment of the entire dissertation. At this point, I would like to draw attention to other minor technical and conceptual mistakes and oversights that the Author should avoid in his further scientific and publishing work. Below are some of them:

1) In scientific work, the balance among particular parts should be respected.
2) The quality of the figures in the dissertation should have been improved. I recommend not copying original pictures from other sources, instead drawing them from scratch.
3) There are some technical mistakes, e.g. p. 23 – a reference to 'paragraph 0' that does not exist;
4) Sometimes, there is a lack of critical analysis of previous findings, studies and literature quoted.
5) The text had numerous repetitions of the same knowledge, which I recommend avoiding in any academic work.
6) Keywords under the abstract should better correspond with the content of the work. Including such a statement as an 'artificial neural network' is unnecessary. Instead, terms such as corporate finance management, German-listed companies should be placed.
7) Small formal mistakes in enumerations are isolated, e.g. p. 14-15; p. 41, p. 56, p. 69.

VIII. Conclusion

In my opinion, the doctoral dissertation that was the subject of this review has a visible impact on the knowledge devoted to capital structure vs business performance. All considerations are based on acceptable, well-formulated research objectives and questions (some remarks in this field were marked earlier). In the work, the Author considered the current knowledge in this field based on international literature and scientific findings. The significant additional value is the Authors' empirical studies conducted on a relatively large data set (over 4,000 items - panel data).

Generally, the research process, regardless of some remarks, is organised properly from a methodological point of view, and the results are presented and discussed, filling the existing research gap in the literature, at least to some extent. In my opinion, the doctoral dissertation meets the requirements stipulated by Art. 187, Act on 20 July 2018 Law of Higher Education and Science (187 ustawy z dnia 20 lipca 2018 r. Prawo o Szkolnictwie Wyższym – Dz. U. z 2018 poz. 1668). MSc. Milad Zargartalebi represents adequate theoretical knowledge in economy and finance and relevant skills in conducting his research processes, evaluating their results and

formulating conclusions. **The dissertation can be assessed positively as a work containing an original solution to a scientific problem (Article 187(2) of the Act)**, providing new knowledge on corporate finance management in the field of shaping capital structure. The above comments refer to aspects that, to some extent, might be perceived as debatable but by no means might undermine a generally positive evaluation. Considering this, I recommend that the Scientific Council of the Discipline of Economics and Finance, University of Gdańsk accept this doctoral dissertation in the Field of Economics and Finance, and I authorise it to a public PhD dissertation defence.

Finally, I would like to ask the Author two further questions:
1) Which capital structure theory is to the Author most suitable to describe how business entities decide to mould the relationship between equity and debt and why this theory?
2) The Author wrote (p. 6) that a sample of German-listed companies provides homogeneity, including external factors. I do share this approach. However, the survey was conducted on data covering an extended period. I want to ask the Author how changes in the economic cycle could (if so) affect the results obtained.

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Lublin, August 25, 2023