



Measurement matters—A meta-study of the determinants of corporate capital structure[☆]



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ABSTRACT

This study aggregates the mixed empirical evidence of the seven most commonly investigated determinants of corporate capital structure. We apply meta-regression analysis on a data set of 3,890 reported results, manually collected from 100 primary studies. Our results reveal that – in descending order of importance – tangible assets (positive sign), market-to-book ratio (negative sign), and profitability (negative sign) are significant determinants of corporate debt level. In addition, we find evidence for publication selection bias in academic literature. Accordingly, specific results are systematically over-represented, as authors prefer reporting statistically significant estimates in line with theory or existing empirical results. Significant determinants, as well as publication selection bias, are more pronounced for characteristics like market-based measures of capital structure, total debt measures of capital structure, and for top articles in highly renowned journals, compared to book-based measures of capital structure or long-term debt measures of capital structure or randomly selected articles including more unknown and unpublished studies.

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1. Introduction

Although the past 60 years produced a surge of empirical literature on the determinants of capital structure, various authors in this major discipline of corporate finance conclude that the overall picture is rather inconclusive (An, Li, & Yu, 2016; Bradley, Jarrell, & Kim, 1984; Schmid, 2013; Denis & McKeon, 2012; Hovakimian, 2006; Strebulaev, 2007). Over just the past five years (2012–2016), the number of studies has increased by more than 300 articles, each proposing its own set of core determinants (among others, Anwar & Sun, 2015; Frank & Goyal, 2009; Öztekin, 2015). This vast number of studies amplifies the heterogeneity of empirical findings, rather than revealing unified evidence of the real drivers of corporate capital structure.

In their seminal work, Harris and Raviv (1991) summarize and classify existing empirical evidence on the determinants of capital structure. One of their key findings refers to the large heterogeneity that characterizes previous empirical results:

“Comparisons suffer from the fact that these studies used different measures of the firm characteristics, different time periods, different leverage measures, and different methodologies.”

(Harris & Raviv, 1991, p. 336)

Accordingly, Harris and Raviv (1991) propose that specific study characteristics systematically affect the results presented in existing primary studies. Meta-regression analysis (MRA) is a commonly-used quantitative review technique to explore heterogeneity in research results. It provides a statistical tool that explicitly models the impact of different study characteristics on the final study outcomes. By means of MRA, previous studies successfully reveal important new insights into various fundamental questions in financial economics research (among many others, Aiello & Bonanno, 2016; Arnold, Rathgeber, & Stöckl, 2014; Feld, Heckemeyer, & Overesch, 2013; Hang, Geyer-Klingenberg, Rathgeber, & Stöckl, 2017; Havránek & Irsova, 2011; Kysucky & Norden, 2015).

In this paper, we employ MRA to synthesize empirical studies on the determinants of capital structure. First, we systematically aggregate previous research findings on the seven most commonly investigated determinants of capital structure, namely tangible assets, non-debt tax shields, market-to-book ratio, firm growth, firm size, earnings volatility, and profitability. Therein, we make use of 3,890 reported results collected from 100 representative studies, selected from a total pool of 591 relevant primary studies. Second, MRA allows calculation of the average effect of each of the seven analyzed capital structure determinants across studies. Third, besides the simple aggregation of effects, we aim to explore the reasons why empirical evidence appears to be inordinately different. To study the sources of within-study and between-study heterogeneity, we include 32 different study characteristics that potentially affect the variation in reported results. These factors cover measurement differences, regional differences, data characteristics, publication characteristics, and differences in model specification.

Through the application of meta-analytical techniques, this paper contributes to existing research in several ways. First, we provide a quantitative literature review aggregating various determinants of capital structure. Compared to (traditional) qualitative summaries on the capital structure determinants (among others, Nyamita, Garbharran, & Dorasamy, 2014; Pandey & Singh, 2015), meta-analysis provides statistical tools for a more objective and comprehensive review (Stanley, 2001). The methodological strengths of meta-analysis include the assignment of study weights based on the reliability of reported results, the aggregation of the existing empirical effects within a single statistical measure, and the correction of potential model misspecification and publication selection in primary studies. Second, we examine the impact of 32 study characteristics on the seven analyzed capital structure determinants. By investigating heterogeneity among empirical outcomes, we aim to explore the differences across studies as emphasized by Harris and Raviv (1991). In this way, we extend the existing work by Feld et al. (2013), who present a comprehensive meta-study on the impact of taxes on corporate debt financing. Finally, we analyze the existence of publication selection bias in this field of research. This allows inferences on the impact of existing theories and influential studies (among others, Harris & Raviv, 1991; Rajan & Zingales, 1995; Titman & Wessels, 1988) on the probability that authors select certain results for publication. Consequently, the analysis provides important indications of the reliability of certain groups of study results.

The remainder of this article is structured as follows. Section 2 describes the theoretical foundation. Section 3 presents the literature search process, the preparation of the data, and the descriptive statistics. The MRA methodology is outlined in Section 4. The subsequent Section 5 reports the empirical findings. Lastly, Section 6 concludes. The appendices discussed in the paper are available in an Online Supplement.

2. Capital structure theory

Assuming a Modigliani-and-Miller world without market imperfections, the choice of capital structure should not affect the cost of capital (Modigliani & Miller, 1958). By introducing market frictions, scholars developed several theories, which provide rational explanations for adjustments of the level of corporate debt. This resulted in three major theories – the trade-off theory, the pecking order theory, and the market timing theory (Cole, 2013). To test the theories empirically, researchers analyze the impact of several firm characteristics (used as proxy variables) on the level of corporate debt. The subsequent sections present a short review of the three major capital structure theories tested in this study, followed by an explanation of the employed firm characteristics.

2.1. Theories

The trade-off theory developed by Kraus and Litzenberger (1973) assumes that firms set their target leverage ratio by balancing costs of bankruptcy and tax benefits. On the one hand, the costs

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