

Optimal Proportions of Capital Structure under Different Influential Factors

Yifei Ren *

University of Toronto, Toronto, M5S 1A1, Canada

* Corresponding Author Email: Yifei.ren@mail.utoronto.ca

Abstract. Noting the absence of articles addressing how each company should choose the optimal proportion of capital structure, this paper explores the best proportion selection of a company's capital structure under the influence of various factors. Firstly, a concise summary of existing theories on capital structure is provided. Subsequently, this paper focuses on two influencing factors: company industry and country of operation. For each factor, further subdivisions are made. Industries are categorized into three types: heavy assets with long cycles, light assets with short cycles, and research and development. Likewise, countries are divided into developed and developing countries. For each scenario, the optimal proportion of debt and equity is explored. The conclusion is that heavy asset with long cycles tends to have a larger proportion of debt, while light asset with short cycles and research and development industries tends to have a higher proportion of equity. Developed countries have substantial proportions of both debt and equity, leaning more towards equity financing. In contrast, developing countries face relatively more challenges in accessing both debt and equity financing and, therefore, rely more on debt financing.

Keywords: Capital Structure, Debt ratio, Equity ratio, Different Industries, Different countries.

1. Introduction

Capital structure refers to the proportion of debt and equity financing used by a company, with the funds obtained through financing typically supporting the company's assets and core operations. Capital structure is crucial for a company as it determines the stability and flexibility of its assets, the ability to invest in future initiatives or business expansions, and the level of trust investors have in the company. Each company has its unique capital structure. For example, Huawei, a Chinese telecommunications technology company, despite being the largest smartphone manufacturer in China, has chosen not to go public and instead maintains control through private ownership. The advantage of this approach is that all equity can be distributed by the company's owners to trusted individuals, giving them greater control over the company. However, the drawback is the inability to raise additional funds through issuing stocks. Consequently, Huawei carries a high level of debt and accounts receivable, increasing its interest rate risk. In the post-epidemic era, under the successive financial waves, deleveraging has become a challenging issue for companies like Huawei [1]. In another instance, some real estate enterprises have adopted a more diverse range of financing methods. Besides the conventional debt and equity financing we are discussing here, many of them maintain good relationships with banks and obtain a substantial portion of their funding through bank loans. Additionally, they also rely on private equity financing. As the name suggests, private equity involves raising funds from private sources for investment purposes. To sum up, the current ways companies obtain funds are varied, and there is no comprehensive system yet to help them establish their capital structure.

This article will explore whether there are ideal capital structure models that can assist companies in better financial planning in different industries and countries with varying levels of development.

2. Literature Review

First of all, this paper will focus on existing comprehensive theories that do not consider the impact of different countries and industries but are theoretically considered as optimal choices for all

companies. The most well-known theory is the M&M theory, proposed by Modigliani and Miller. They believe that the value of a company is independent of its capital structure. Under ideal market conditions, the capital structure of a company does not affect its value. In other words, whether it is debt financing or equity financing, the value of the company remains the same. However, this theory is based on certain assumptions, with the most important being the perfect market assumption, where there are no taxes, no transaction costs, all investors have the same information, and unlimited borrowing is allowed. Obviously, this assumption is too idealized and cannot be achieved in reality.

Based on the Modigliani and Miller theory, many new theories have been proposed, such as the tradeoff theory, the pecking order theory, the free cash flow theory, and the organizational theory of capital structure [2]. However, these four theories mainly explore relatively detailed issues and do not provide a comprehensive answer to how the capital structure should be allocated as a whole. In summary, the most important factor affecting capital structure allocation is its objectives: maximizing company profits, minimizing potential risks, and maintaining future growth trends and sustainable development. To achieve these objectives, there should not be excessive debt or excessive equity financing. Too much debt, like Huawei's case, will lead to interest rate risks and potential bankruptcy if the funding chain encounters problems. Excessive equity financing means that most of the company's profits are distributed to shareholders, which is not conducive to the company's long-term development. Moreover, it may lead to loss of investor trust, resulting in a sharp decline in stock prices and difficulty in raising funds. At the same time, dispersed equity can also lead to implicit competition. Welch named the capital structure a financing pyramid in which most of the funding sits in the most senior claims (at the bottom), and very little funding would be equity (at the top) [2]. In addition to balancing the relationship between equity and debt, companies should also try to reduce their cost inputs. For example, during the initial purchase, using loans or financing methods and repaying in the future utilizing natural inflation can reduce the overall need for capital in the set-up stage.

3. Focus on Different Industries

Next, this paper will first focus on how companies in different industries determine their optimal capital structure. According to Daskalakis's calculation, there are industry specificities that lead to a different capital structure determination process [3]. Different industries have different operating models. For instance, industries with heavy assets, such as factories, require significant investments in machinery procurement. On the other hand, industries like media only need computers for smooth operations. Therefore, it is evident that different industries require different capital structures. As mentioned by Mihaela in his article, there are strong and positive relationships (over 0.5) between Return on Equity (ROE) and debt-to-equity in Technology, Health Care, and Telecommunications sectors. In Energy and Motor Vehicles & Parts sectors, the correlations are positive but not very strong. In this study, all companies will be classified into three categories for exploration: heavy assets with long cycles, light assets with short cycles, and research and development industries.

3.1. Heavy Asset and Long-cycle Industries

Firstly, heavy asset and long-cycle industries refer to those that require substantial investments and have relatively long industrial cycles. These industries often require sustained investments in infrastructure, equipment, and technology, with longer payback periods and relatively fixed assets. Typical examples include manufacturing industries, especially heavy industries such as steel mills. Additionally, energy industries such as oil extraction and power generation, as well as transportation industries like aviation and railway transportation, also fall into the category of heavy asset and long-cycle industries. Companies in these industries typically face higher fixed costs and longer investment payback periods. Due to the significant capital requirements for their facilities, these enterprises require a more robust capital structure.

From the outset, such companies need to consider long-term capital issues, including how to manage working capital when funds are insufficient in the early stages and facility replacements in the later stages. In their capital structure, these companies often rely more on long-term debts to finance initial investments and minimize the dilution effect on shareholders. As mentioned earlier, these enterprises can use loans or financing methods during the initial stage of acquisition, utilizing inflation to repay debts in the future and thereby reducing their funding needs. While equity proportions for this type of industries may be relatively smaller than debt, they are higher compared to the light asset and short-cycle industries. Equity financing serves not only as an auxiliary source of funding but also acts as a buffer to reduce the possibility of bankruptcy. As these companies require long-term asset holdings, debt repayment periods are usually longer. Therefore, companies must ensure their operational conditions and sufficient cash flow to meet debt obligations promptly. Otherwise, long-term debt may increase financial pressure and lead to a breakdown in the funding chain, impacting normal operations. In such situations, equity financing can be appropriately employed for rescue purposes.

One negative example is China's Evergrande Group, which was once the largest real estate company in China. However, due to inadequate financial planning and blind expansion, the management incurred a sharp increase in operating costs. After China imposed restrictions on the real estate industry, Evergrande became unable to repay its debts and is currently facing bankruptcy with liabilities exceeding 300 billion euros [4].

In the context of Muhammad Aqil's research on the Pakistan automotive industry, several factors that could influence ROA were explored. He found that inventory turnover rate and quick ratio have a positive impact on Return on Assets (ROA). In other words, higher inventory turnover and more assets in the quick ratio led to higher ROA for companies. Conversely, factors such as the turnover rate of accounts payable and accounts receivable show negative correlations with ROA [5]. This indirectly supports our argument that leveraging future inflation can help companies better conserve funds.

3.2. Light Asset and Short-cycle Industries

Next, these paragraphs analyze the capital structure of industries with light assets and short cycles. Light assets and short cycles refer to industries that do not require large-scale capital investment in production facilities and have relatively short service cycles. Examples include the consulting industry, service industry, media, and internet industry, among others. These enterprises often do not produce tangible products but focus more on providing services, which require them to closely monitor market changes and offer corresponding services.

Due to their characteristics of low fixed costs and short investment payback periods, companies in this category tend to have lower levels of debt to avoid excessive financial burden. As Gleason mentioned: the results from his research indicates that retailers, in general, use more debt in their capital structure than would be appropriate. Thus, this overleveraging negatively affects firm performance [6]. This demonstrates that companies in the light-asset short-cycle industry should avoid excessive leverage. Even if they use debt financing, they prefer short-term loans, as it allows them to be more flexible and adjust their capital structure as needed. As mentioned by Gill, "For companies in the service industry, we found no significant relationships between the ratio of long-term debt to total assets and profitability" [7]. Furthermore, light asset and short cycle companies do not necessarily rely on inflation to reduce the real value of their repayments. Pursuing flexibility, equity financing is more suitable for these enterprises, providing ample funding sources without adding repayment pressure.

However, even though equity financing may represent a larger proportion compared to debt financing for light asset and short cycle companies, the actual amount raised through equity financing is typically smaller than that of companies in heavy asset and long cycle industries. This difference is due to the varying operational models of the two types of enterprises.

3.3. Research and Development Industries

Apart from the two types of companies mentioned above, there is another special type of company that requires our extra attention, namely, research and development industries. These companies refer to businesses that rely on developing innovative technologies to drive business growth, such as pharmaceutical and technology industries. The challenge faced by these companies is that they need to invest substantial funds during the research phase to drive innovation, and during the innovation process, uncertainties such as unexpected outcomes may arise. Therefore, these companies need a significant reserve of funds to ensure the smooth development and completion of projects.

Due to the often-lengthy R&D cycles and the unpredictability of market sales, debt financing is not recommended for these companies to avoid the risk of being unable to repay debts. Equity financing is more suitable for these companies, enabling them to raise a large amount of funds that can be flexibly used without worrying about repayment. Another important source of funding for these companies is government grants. For instance, during the COVID-19 pandemic, the development of COVID-19 vaccines heavily relied on government funding. Richard G. Frank mentioned in his article that the Biomedical Research and Development Authority (BARDA) alone has spent \$19.3 billion on COVID-19 vaccine development, and an estimated \$39.5 billion was projected in US spending [8]. Such substantial financial investment can only be accomplished with the help of the government. Another example is that John C. Gardner's analysis of Microsoft's optimal capital structure indicates that the optimal debt ratio for the company is approximately 37.5 percent debt. Once this proportion is exceeded, the company's value begins to decline [9]. Therefore, it proves that for such companies, the debt ratio should constitute only a small portion of their capital structure. According to the data from Microtrends, it can be observed that over the past few years, Microsoft has been consistently reducing its debt/equity ratio and recently lowered it to 0.2.

As these companies mature and establish their presence, they can consider gradually increasing the proportion of debt financing. Once these companies have stable operating models and cash flows, such capital structure can help them save on capital costs effectively.

3.4. Big Companies VS Small Companies

Finally, apart from specific industries, this paper will also conduct an additional analysis on the allocation of capital structure proportions between large and small companies. Barclay and Smith Jr argue that the size of a firm will affect the capital structure for two reasons: first, the fixed issuance costs for public issues are large, resulting in a significant scale economy effect in favour of large firms. Second, large firms are more likely to have foreign operations, and to manage their currency exposure, they want to use foreign debt [10]. Given the varying scale of companies, even within the same industry, their capital structures should be differentiated. Generally, larger companies operate more steadily, and possess stable financial reserves and cash flows, thus they can consider utilizing more debt financing. On one hand, larger companies are less concerned about default risks, and on the other hand, they can effectively save on funding costs through debt financing due to their higher scale. Moreover, being perceived as more secure by investors, larger companies find it easier to obtain debt financing.

Conversely, small companies often find themselves in the initial stages with relatively unstable operating models and funding. For such companies, equity financing is a more suitable choice. Firstly, they need not worry about default risks. Secondly, start-up companies tend to be more innovative and are more likely to attract investors with positive long-term outlooks for the company.

To sum up, larger enterprises are more suitable for debt financing to utilize their stable assets and cash flows, maximizing benefits while maintaining equity stability. Smaller enterprises, on the other hand, are better suited for equity financing to acquire flexible funding and reduce financial risks during their initial stages.

4. Focus on Countries with Varying Levels of Development

4.1. Comparison between Developed Countries and Developing Countries

The following paragraphs will analyze the impact of different levels of development in countries on the proportion of capital structure used by businesses. All countries will be categorized into two groups: developing and developed. Due to the more mature and robust capital markets, stable economic environments, and well-established credit systems in developed countries, companies in these countries tend to rely more on equity financing than companies in developing countries. The presence of a larger number of investors in developed countries' capital markets allows businesses to access more financing relatively easily. Consequently, the ownership of shares in these companies is often more dispersed. In contrast, in developing countries, many businesses are family-owned or government-controlled, resulting in more concentrated and monotonous sources of funding, which increases the risk of potential funding gaps.

Nevertheless, even though equity financing is relatively more prevalent in developed countries, debt financing still constitutes a significant portion of their capital structure. Joseph P. H. Fan mentioned that leverage ratios are positively correlated with economic development [11]. This is because the more developed markets in these countries generally offer lower investment risks compared to developing countries, leading to a more diversified financing landscape. Moreover, the robust due diligence and credit systems support companies in obtaining loans at lower costs. Additionally, the existence of corresponding laws and regulations in these countries helps reduce investment risks for investors, attracting more participation in bond financing. On the other hand, in developing countries, investment channels are more limited, and many companies must rely on bank loans for financing.

Furthermore, businesses in developed countries often possess more stable reserves and cash flows, making it easier for them to bear higher debt levels. Large enterprises in developed countries typically have longer histories and larger market shares, providing more stable sources of income and, consequently, gaining more trust from creditors. This enables them to opt for higher levels of debt financing to pursue larger-scale investments and expansions. Conversely, in developing countries, the relatively smaller scale of businesses, coupled with less stable business models and cash flows, makes creditors more cautious and risk-averse. As a result, businesses in developing countries tend to opt for lower levels of debt financing to mitigate financial risks.

Ideally, businesses in developed countries tend to prioritize long-term steady development and thus can rely more on debt financing for long-term investments and asset allocation. On the other hand, businesses in developing countries may prioritize short-term gains and rapid expansion, making equity financing more suitable for obtaining flexible financial support.

4.2. Focus on Developing Countries

The markets of developed countries are relatively similar, but for each different developing country, we can further refine the factors that influence capital structure. For instance, different economic systems, cultural backgrounds, and levels of economic development will all have an impact on capital structure. Taking Asia and Africa as examples, many developing countries in Asia, such as China, India, and Malaysia, have already achieved relatively high economic levels, and their financial markets are more mature. These Asian markets are more attractive to investors and therefore have easier access to financing. As for economic systems, countries like China and Vietnam, which follow an open socialist model, may have reduced appeal to foreign investors to some extent. However, the most crucial aspect is the company's capability. If a company has a long-term advantage and promising returns, investors will still choose to invest in countries like China and Vietnam. Factors such as culture and history can restrict a company's development. For instance, Africa, being a region with a long history of colonization, has missed out on development opportunities and fallen far behind developed countries in terms of economic advancement. Consequently, it becomes challenging for

Africa to produce companies with promising prospects, as other countries already meet the supply demands, and the cost of simple manufacturing has been significantly reduced.

In conclusion, it is essential to tailor the appropriate capital structure for each country based on its unique characteristics. Economic system, cultural background, economic development level, and historical factors all play significant roles in determining the most suitable proportion of capital structure for businesses in each country.

5. Conclusion

In summary, this paper explores the optimal capital structure proportions for companies in different industries and different countries with varying levels of development. We have categorized different companies into three types: heavy asset with long cycles, light asset with short cycles, and research and development-oriented companies. Among these, heavy asset with long cycles tends to have a higher proportion of debt, while light asset with short cycles and research and development companies has a higher proportion of equity. As for countries, we have divided them into developed and developing countries for discussion. Developed countries tend to have a larger proportion of equity and debt financing, leaning towards equity financing. On the other hand, developing countries face relatively more challenges in both debt and equity financing, relying more on debt financing.

All the theories discussed in this paper are based on general scenarios and have not undergone detailed analysis for each specific company. In reality, it is not feasible to generalize all companies based on broad categorizations. To further refine the analysis, future research can continue to break down industries and countries into smaller segments. For example, industries can be subdivided into various sectors, and each sector can be analyzed based on its specific market conditions, potentially yielding more precise and realistic data. However, the conclusions drawn in this paper can serve as a reference to provide a general understanding of capital structure proportions.

References

- [1] Wang J. Development of the Investment Strategy of Huawei Company[J]. 2022.
- [2] Herciu M, Ogrea C. Does capital structure influence company profitability? [J]. Studies in Business & Economics, 2017, 12(3).
- [3] Daskalakis N, Kakavas A, Missiakoulis S. Do industry differences affect firm-specific capital structure determinants? [J]. The European Journal of Finance, 2022: 1-11.
- [4] An D. China Evergrande, which is super indebted, has a net loss of 100 billion euros in two years. [EB/OL] (2023-07-18) [2023-08-10] RFI. <https://www.rfi.fr/cn/%E4%B8%AD%E5%9B%BD/20230717-%E8%B6%85%E7%BA%A7%E8%B4%9F%E5%80%BA%E7%9A%84%E4%B8%AD%E5%9B%BD%E6%81%92%E5%A4%A7%E4%B8%A4%E5%B9%B4%E5%87%80%E4%BA%8F%E6%8D%9F1000%E4%BA%BF%E6%AC%A7%E5%85%83>
- [5] Aqil M, Ahmed R R, Vveinhardt J, et al. Factors influencing the profitability of heavy vehicle industry: a case of Pakistan[J]. Montenegrin Journal of Economics, 2019, 15(1): 61-72.
- [6] Gleason K C, Mathur L K, Mathur I. The interrelationship between culture, capital structure, and performance: evidence from European retailers[J]. Journal of business research, 2000, 50(2): 185-191.
- [7] Gill A, Biger N, Mathur N. The effect of capital structure on profitability: Evidence from the United States[J]. International journal of management, 2011, 28(4): 3.
- [8] Frank R G, Dach L, Lurie N. It was the government that produced COVID-19 vaccine success[J]. Health Affairs Forefront, 2021.
- [9] Gardner J C, McGowan Jr C B, Moeller S E. Using Microsoft corporation to demonstrate the optimal capital structure trade-off theory[J]. Journal of Economic and Financial Education, 2010, 9(2): 29-3
- [10] Talberg M, Winge C, Frydenberg S, et al. Capital structure across industries[J]. International Journal of the Economics of Business, 2008, 15(2): 181-200.

- [11] Fan J P H, Titman S, Twite G. An international comparison of capital structure and debt maturity choices[J]. Journal of Financial and quantitative Analysis, 2012, 47(1): 23-56.