

FINANCIAL SUSTAINABILITY OF A FIRM: DEBT-BASED OR EQUITY-BASED FINANCING TO PURSUE?

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ABSTRACT

This study examines the potential of utilizing equity-based financing by companies in achieving financial sustainability as compared to debt-based financing. To this end, a conceptual framework of equity-based financing over debt-based financing is developed to provide an understanding of the concept of equity-based financing. Subsequently, this study analyses the credit risk exposure between equity and debt for selected sectors in Malaysia. More specifically, a Monte Carlo method is employed to examine the feasibility of the equity-based financing model in fostering the financial sustainability of companies through simulation of equity-based and debt-based financing models from the global financial crisis (GFC) period to the Covid-19 phase. This study finds that equity-based financing can reduce credit risk exposure when returns are tied to the company's performance. The findings also show that equity-based financing can achieve financial sustainability regardless of any economic events. To conclude, equity-based financing can thus be a viable capital financing option for companies because it can contribute to long-term financial sustainability.

Keywords: Equity-based financing, Financial sustainability, Monte carlo simulation, Economic crisis.

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I. INTRODUCTION

Generally, a company can be financed either by debt and equity or 100% equity for its operations (Damodaran, 2014). The decision by the management on the choices of financing will finally make up the capital structure of the company. The debt-based financing is considered the most preferred capital financing among well-established companies, mostly due to the benefits of interest tax savings, seniority claims, and lower cost as compared to equity-based financing. However, the increased issuance of debt-based financing can potentially harm the soundness of the companies and consequently the entire financial system. This condition is evidenced by the credit crisis occurrence in 2007/2008.

The credit crisis originated from the collapse of the United States housing market, also known as the subprime mortgage crisis, in 2006 spread to the entire world in 2007 and 2008 (Hanim Kamil, Abdullah, Shahimi, & Ismail, 2010). This credit crisis has had substantial impact on companies with high debt due to the dwindling availability of credit and greater difficulties in acquiring external funds (Adjei, 2012). The effect of this credit crunch has hindered credit access to businesses and households. According to Kashyap and Stein (1994), financial shocks like the subprime mortgage crisis have an impact on companies by limiting credit to companies that offer profitable trading and investment opportunities. It can be seen when companies generally have limited internal funds during recessionary times and hence are in increasing need for external funds (Braun and Larrain, 2005). Highly indebted companies should find it more expensive to seek external funding due to the restricted availability of credit during the subprime mortgage crisis. However, companies that typically use less external funds should have reduced borrowing costs or be able to obtain funds quickly to lessen the impact of the crisis. Therefore, companies with higher levels of debt-based financing might experience a greater degree of hardship during the crisis since they may not be able to gain external funds to settle their debt obligations (Hamzah et al., 2018). This situation will then be affecting their ability to sustain in the long run, leading them to the edge of bankruptcy (Hanim Kamil et al., 2010). Thus, the companies would be unable to achieve financial sustainability to continue their operations in the future.

With the failure of Lehman Brothers in September 2008, the credit crisis reached its height (Peels et al., 2009). In the context of the major financial crisis, the collapse of Lehman Brothers is the result of a very aggressive leverage policy by the company. Due to the crisis, all companies were forced to focus more attentively on their cash flow. This led to significant decreases in investments and capital spending, while cost savings were encouraged by lowering the company's operating working capital, which was primarily accomplished by cutting back on inventories. In the wake of the 2007/2008 crisis, the majority of economic scholars deliberated that the risk-shifting feature of debt financing and excessive leveraging as the main causes of global financial failure. The risk-shifting problem arises when companies take more risk at the expense of their investors. The company seemed to be reducing the risk of default by shifting risk to the investors, where in fact, they are distributing those risks throughout the entire global financial system by compounding them.

Building on lessons from this crisis, regulatory reforms need to be in place for the financial system so that it will be in a position of strength as a shock absorber during any economic downturns and an enabler for economic recovery (Bank Negara Malaysia, 2022). Among the key initiatives for the reform is the need for the financial system to rebound with risk-sharing features in place of the risk-shifting features of debt-based financing. Economic scholars agree that equity-based financing of the Islamic financial system is the closest instrument to represent risk-sharing behavior (Brunnermeier & Oehmke, 2012; Kuala Lumpur Declaration, 2012; Effendi, Syifa, Sabiti, & Nursyamsiah, 2018). Researchers also acknowledged that the attempt of issuing equity-based financing to raise funds in avoiding debt-based financing is consistent with the practice of Islamic finance that promotes profit and loss sharing, interest-free and no risk-free assets (Mirakhor, 2010; Iqbal and Mirakhor, 2011; Chowdhury et al., 2016). In addition, the existence of the risk-sharing features of equity-based financing is expected to fulfill the principles and objectives of Shariah.

The risk-sharing instrument seems convincing as an alternative to debt in corporate financing due to its outstanding features that can serve as a remedy to debt defaults in the financial system. According to Stiglitz (1989), since risks are shared between a company and investors through equity-based financing, the company will not have to scale down its production as much as it would with debt-based financing when there is economic turbulence. This is because sharing allows risk to be spread among the contracting parties, mitigating uncertainty, and thus lowering the risk for individual participants.

Besides, Iqbal and Mirakhor (2011) argue that this risk-sharing instrument will ensure that the financial resources become readily available to innovators, entrepreneurs, and small and medium (SME) enterprises by not having to take all risks on themselves, if not, giving up profitable projects altogether. They further state that this instrument would also mitigate the asymmetric information problem which arises when the company's manager has more information regarding the company's overall performance as compared to the investors, whereby there is a transaction cost along with the cost of monitoring the manager's activities and decision on the project to be undertaken. They agree that the risk-sharing contract is well structured than the debt-based contract as it has the incentive to maximize both parties' interests. In this sense, this instrument would be strengthening society by enhancing cooperation between contracting parties and bringing the company's manager and investors closer together. Through this effort of alternative financing, the companies that fund their projects with more equity-based financing rather than debt-based financing will find it more bearable for them to sustain in the long run while maximizing investors' wealth.

Based on the above remarks, this study highlights the potential of equity-based financing to support companies for long-term financial sustainability. From the conceptual framework of equity-based over debt-based financing, this study presents a comprehensive simulation that compares the credit risk exposure of both types of financing toward the financial sustainability of a company. It can be seen when a company finance its project with equity-based financing; it was expected that the equity-based financing can provide minimal credit risk exposure to the company since the return to investors fluctuates based on the performance

of the company. Therefore, the company can use the remaining funds of the project to proceed with its future operation and sustain itself in the long run while generating more returns for its investors. The feasibility of the equity-based financing model to promote financial sustainability during the economic crisis is also examined through the simulation of equity-based and debt-based financing models across the global financial crisis (GFC) until the Covid-19 phase.

To the best of our knowledge, none have analyzed the potential of equity-based financing to achieve financial sustainability in the context of credit risk exposure through the Monte Carlo Simulation method. Hence, this study fills the gap in the existing literature on corporate finance by showing that equity-based financing is a viable financing alternative for a company to raise capital rather than solely relying on debt-based financing. This could contribute to the realization the Islamic finance's objectives in promoting financial sustainability while stabilizing the entire economy. Comprehending the ability of equity-based financing in achieving financial sustainability among market players and the financial market as a whole could help the management of companies to make a wise decision on capital financing and also could help investors to assess companies to be invested.

The paper is organized as follows: Section 2 reviews relevant literature, while Section 3 offers a theoretical discussion of the conceptual framework. Section 4 describes and explains the data and methodology. Section 5 discusses the simulation results, and Section 6 concludes the paper.

II. LITERATURE REVIEW

Debt-based financing is recognized as the prominent financial instrument in the global financial system. Even though debt-based financing is said to bring about a higher probability of default, debt levels are high in the current financial system. This is due to the tax savings of debt-based financing which make it a promising financial instrument. According to the trade-off theory, a company would trade-off between the tax benefits of debt and its bankruptcy costs thus resulting in the low cost of debt compared to equity (Modigliani & Miller, 1963). Nevertheless, the GFC in 2007/2008 and the subprime mortgage crisis have been noted to be due to the risk-shifting behavior of debt-based financing and excessive leveraging. The risk-shifting problem contributes to the high tendency of bankruptcy among issuing companies. Due to that, the companies may be unable to achieve financial sustainability to fund their upcoming projects. Many empirical studies have discussed the comparison between debt-based financing and equity-based financing in achieving the ultimate objective of a company in fostering financial sustainability. This goal is significant in determining the continuation of a company's operation. Therefore, the literature includes several studies that compare the ability of debt-based and equity-based financing to maintain the sustainability of a company during an economic downturn and shed light on the potential of equity-based financing as an alternative to debt in the financial system.

Many relevant studies have made a comparison between debt-based and equity-based financing and their roles in financial sustainability. Some studies have found that increased reliance on debt-based financing might threaten the sustainability of a company thus affecting the global financial system. To encounter

this issue, this study highlights prior research that enlightens the benefits of the risk-sharing feature of equity-based financing for long-term sustainability.

In the current financial system, debt-based financing is still actively used by market players. However, extensive reliance on debt has negative consequences on financial health and also economic and societal well-being through occurrences financial crises such as the 2007/2008 global financial crisis (Chapra, 2008). The detrimental impact of debt-based financing on the financial system has raised concern and prompted economic scholars to investigate the most preferred financing instrument that can contribute to social and economic welfare. A study by Fianto, Gan, Hu, & Roudaki (2018), which evaluates the impact of debt-based and equity-based financing by Islamic microfinance in Indonesia on rural households' welfare, indicates that equity-based financing possesses a more positive impact on rural household welfare, especially in terms of income changes as compared to debt-based financing. Employing the double difference-in-difference method, it supports the idea that equity-based financing with a profit and loss sharing (PLS) mechanism is the best financing option for customers of Islamic microfinance. This can be seen when the annual income of customers with equity-based financing contracts increases higher than that of customers with debt-based financing contracts. This result is consistent with Dusuki and Abdullah (2006), whereby they argue that equity-based financing is the ideal financial instrument for Islamic microfinance since it contrasts sharply with conventional debt-based financing by embedding the genuine spirit of Islamic finance and religious concepts. Hence, due to the unique feature of equity-based financing, this current study argues that the adoption of equity-based financing with the PLS mechanism can promote the sustainability and effectiveness of Islamic microfinance.

As mentioned previously, the danger of debt-based financing is well manifested by the global financial crisis (GFC) of 2007/2008 (Meng, Siriwardana, & McNeill, 2015). Ali (2013), in his study, signifies that the GFC and subsequent economic collapse in 2008 exacerbated uncertainty and was detrimental to the global economy. He notes that credit risk has been the biggest threat to financial institutions following the GFC. Some studies analyze the ability of debt and equity-based financing in reducing credit risk and identifying which financing mode fosters financial sustainability. Farihana and Rahman (2021) employ a two-step system generalized method of moments (GMM) technique to investigate whether the PLS financing mechanism lowers the credit risk of Islamic banks in 16 different countries. By using Value at risk (VaR) as a measure of credit risk, the finding from this study indicates that the PLS financing instrument reduces the credit risk of an Islamic bank. This is because the PLS financing brings banks and customers together without the involvement of interest-based financing. Therefore, this strategy allows the banks to improve business performance while lowering credit risk by addressing moral hazards and asymmetric information. Alandejani and Asutay (2017) agree that banks are exposed to higher credit risk when they are offering debt-based financing rather than equity-based financing. This problem arises when banks rely more on debt-based financing or provide unbalance ratio between debt-based and equity-based financing. In contrast, Misman, Ahmad, Khairani, & Amran (2020) in their study contend that equity-based financing carries higher credit risk in 15 full-fledged Islamic banks in Malaysia compared to

debt-based financing. Banks with higher equity-based financing tend to engage in risky projects as they consider that they have enough capital to mitigate any losses that the banks may incur. This condition will then cause the banks to be prone to financial instability and bankruptcy.

The arguments above demonstrate that the GFC of 2007/2008 had a significant economic impact, and its consequences are still rumbling globally (Askari & Mirakhor, 2014). The GFC has prompted regulators to restructure the financial system to reduce its vulnerability. Some of these attempts aim at preventing or limiting debt-based activity while urging that transactions be based on the risk-sharing system of equity-based financing (Hamzah et al., 2018b). The economists in the Kuala Lumpur Declaration (2012) argue that the risk-sharing system is the best instrument to address financial vulnerability, as in the GFC of 2007/2008. They emphasize the danger of the risk-shifting feature of debt-based financing and the risk-sharing system's significance in preventing risk-shifting behavior. Bacha, Mirakhor & Askari (2015) agree that the risk-sharing system of equity-based financing might be the best instrument for addressing the recurring problem of modern economies and the increasingly detrimental consequences of the financial crisis. Concerning that, Hanim Kamil et al. (2010) discuss in their study the ability of conventional and Islamic financial principles to uphold effective capital allocation and financial stability in light of Islamic securitization through Sukuk. From this study, they argue that Sukuk with a risk-sharing behavior is a potential source of financing that could assist in the stabilization of the securities market and provide a remedy for the subprime mortgage crisis.

Besides acknowledging the risk-sharing benefit of equity-based financing, the current financial system also upholds concern about its sustainability during any economic event. The financial system is said to be in a stable condition when there is no excessive volatility, pressure, or crisis that can hamper economic activity and lower economic welfare (Gadanecz and Jayaram, 2009). In the current environment, managers and investors realize that financial sustainability is needed by a company to be able to sustain itself in the long run. From this perspective, financial sustainability can be achieved when the company is resilient and able to absorb shocks and the unwinding of financial imbalances. To achieve financial sustainability, a company must broaden its attention beyond maximizing investors' short-term return by taking into account how its operations will affect the interests of all stakeholders, including the community, environment, and society (Freeman, 1984). As stated by Toronto Stock Exchange (2014), there are several benefits that a company can enjoy through financial sustainability, which are the production of sustainable profits, improved reputation and regulatory approvals, and increased employee loyalty and productivity. Other than that, Cheng, Ioannou, & Serafeim (2014) show that employing sustainable business strategies raises a company's value and lowers the cost of equity financing.

Most of researchers argue that equity-based financing with a risk-sharing feature is the most suitable financial instrument that can contribute to the realization of the long-term sustainability of a company. For example, Scarlata and Alemany (2010) examine a new funding model known as philanthropic venture capital (PhVC) for social enterprises, whereby this financing option uses equity-based financing as their financial instrument in the deal structuring phase. This PhVC

financing model provides capital and value-added services to social enterprises and it focuses on the maximization of social return on the investment. Through the generation and maximization of social return from the investment, the social enterprises will be able to grow, become self-sustaining, and hence survive over the long run. This will then contribute to the achievement of growth and financial sustainability of the social enterprises through the allocation of capital as well as value-added activities that support the businesses on a strategic and managerial level. John (2007) further notes that PhVCs are increasingly using equity as their financing tool for their primary purpose to develop long-term social value, and increased mission impact, and sustainability in Europe's financial services industry. On the other hand, a study by Al Amosh, Khatib, Alkurdi, & Bazhair (2022) that explores the impact of capital financing on sustainability performance in terms of environmental, social, and governance (ESG) among Jordanian companies, reveals that debt-based financing is the most preferred financial instrument that improves ESG performance in all aspects of the companies as compared to equity-based financing. In this respect, the companies' managers are attempting to minimize agency costs by engaging in ESG activities. The authors further mention that the companies are putting more emphasis on debt-based financing rather than equity to achieve their financial and non-financial objectives. This is because new shareholders' opportunism will probably force them to prioritize increasing their wealth at the expense of other stakeholders, which will negatively impact the ESG performance of the companies. As a result, shareholder control is restricted by debt-based financing.

From the survey of relevant literature, it is evident that many studies have been carried out regarding the debt-based and equity-based financing ability to contribute to the sustainability of a company and the economy as a whole. Having said that, the reviewed studies provide mixed results. This study, however, focuses on the potential of equity-based financing in the financial system despite financial shocks, which has led to the achievement of the financial sustainability of a company. Financial sustainability can be achieved when a company can survive in the long run with fewer or no financial obligations through the issuance of equity-based financing. Therefore, this long-term financial sustainability enables a company to generate more profits in the future and thus increase shareholders' wealth.

Despite the significant importance of this area, documented studies that explore the financial sustainability of a company in utilizing equity-based financing are still limited, except for the recent study done by Maikabara, Maulida, & Aderemi (2021). This particular study explores the best financing modes between debt-based and equity-based financing that can contribute to the efficiency of the Islamic financial system to achieve socio-economic development. Nevertheless, their study is a theoretical exploration based on a literature to compare the nature of equity-based and debt-based financing models that can contribute better to the effectiveness of the Islamic financial system. Findings from this particular study explain the need to deviate from debt-based financing due to its possibility of increasing credit risk and thus contributing to financial collapse. Through awareness, economists and market regulators have agreed that the financial system needs equity-based instruments to remain stable. Hence, this study comes out with a conceptual

framework of equity-based over debt-based financing to demonstrate the ability of equity-based financing in achieving financial sustainability and further examines the feasibility of equity-based financing through the empirical simulation that compares credit risk exposure between debt-based and equity-based financing.

III. CONCEPTUAL FRAMEWORK

To enhance the understanding of the concept of equity-based financing, this part develops a conceptual framework of equity-based financing over debt-based financing. The framework is useful in guiding future research on capital financing decisions from the perspective of the financing sources. In specific, the conceptual framework in Figure 1 demonstrates the potential of equity-based financing to achieve financial sustainability among companies and investors.

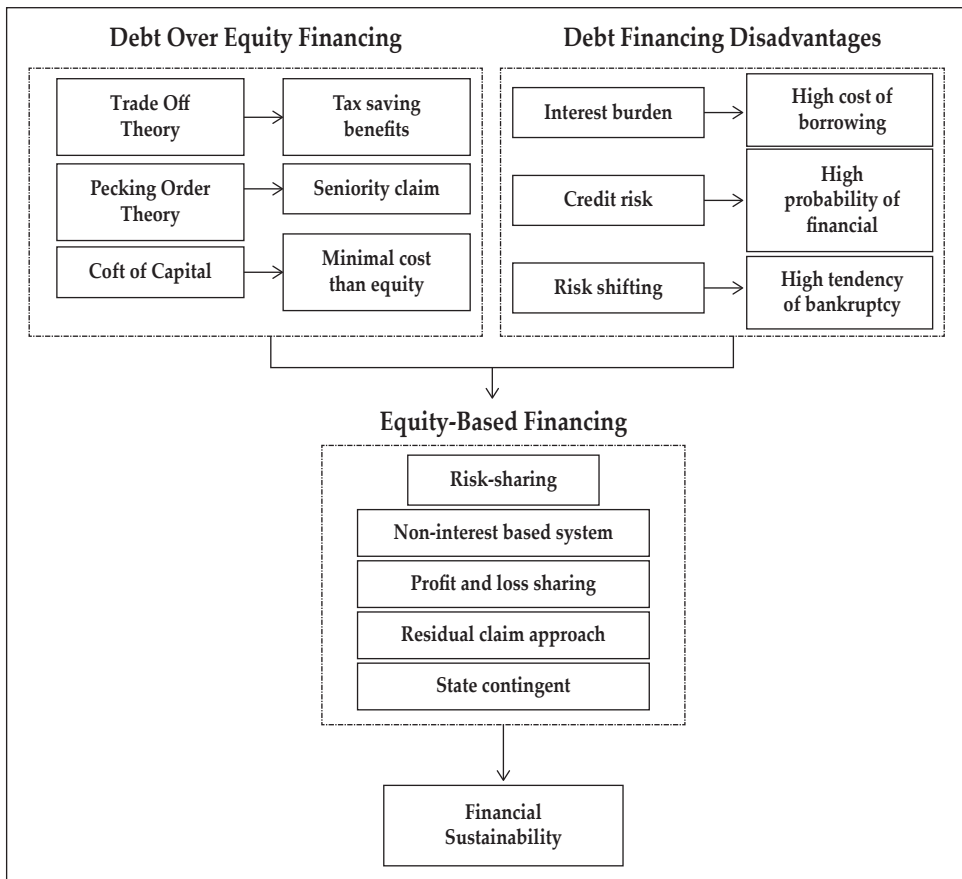


Figure 1.
Conceptual Framework of Equity-based Financing over Debt-based Financing

The debt over equity-based financing is based on various factors. The first factor is the tax savings benefits of debt-based financing, whereby interest payment on a debt is deductible as a tax expense (Iqbal, Llewellyn, & Wilson, 2013). When issuing debt-based financing, it could lower the corporate tax of a company since tax helps reduce interest accruable (Langedijk et al., 2014). Berk, DeMarzo, & Harford (2018) further explain that by using debt, a company may be able to reduce its taxable income and therefore decrease its total tax payments. Thus, this situation could increase the total cash flow available to all investors, increasing the company's value. However, if the company cannot be certain that it will benefit from the interest tax shield, the tax savings benefit of additional debt will shrink and eventually disappear. When the present value of tax savings from additional borrowing is just compensated by increasing the present value of distress costs, the theoretical optimum is obtained. This is referred as the capital structure trade-off theory (Brealey, Myers, & Allen, 2013).

The second factor that causes many to choose debt over equity-based financing is the seniority claim of debt through the pecking order theory (Corporate Finance Institute, 2015). Based on the pecking order theory, managers prefer to fund investments via retained earnings, followed by debt, with equity only used as the last option (Agliardi, Agliardi, & Spanjers, 2016). A company tends to follow this hierarchy of financing options usually due to the problems of information asymmetries and transaction costs (Myers & Majluf, 1984). According to asymmetric information theory, a company's manager possesses more information regarding the company's performance, risk, and future outlook than the outsiders like debtholders and equity holders (Corporate Finance Institute, 2015). Since debtholders and equity holders have less information about a company than managers, a bigger return is demanded when a company finances an investment opportunity with external financing to compensate for higher risk due to information asymmetry. Managers favor debt over equity in external financing because debt has a lower cost of capital than equity.

From the investors' perspectives, investors opt for debt-based financing due to the reason that debts are loans taken from the investors. Hence, the company needs to repay the debts in priority before making any payments to its equity holders (Anjali, 2020). This is because, through the issuance of debt-based financing, the company is liable to pay a fixed payment of interest and principal amount to the investors at the end of the loan tenure regardless of the return of the company's project (Siddiqui, 2008). On the other hand, equity holders are the last to receive any residuals at the time of liquidation because they are the company's owners (Anjali, 2020). Thus, this theory shows that debt has a higher level of seniority claim than equity in corporate financing.

The last factor of debt preference is that cost of debt is lower than the cost of equity. Companies consider the cost of capital between debt and equity-based financing since it could influence their profitability. Several prior studies argue that the cost of debt is lower than the cost of equity (Brealey et al., 2013; Smythe, 2015). Smythe (2015) explains the reason behind this is that the cost of debt is finite. Once the loan is fully repaid, the company is free from its obligations. Therefore, debt is usually less expensive than equity for profitable companies. The more prosperous a company will be, the more expensive it is to give up the equity because it is better for the company to keep the profits and pay interest.

While debt-based financing has these advantages, it also has many disadvantages, as presented in Figure 1. Higher issuance of debt-based financing tends to increase the interest burden for a borrower, resulting higher cost of debt as more debt equates to higher interest payments (Corporate Finance Institute, 2015). The borrower will need to pay a higher payment of interest with the additional borrowing regardless of the outcome of the project (Kayed, 2012). Chatterjee and Eyigungor (2015) mention that when debt is in the long-term, a borrower acting at their discretion will opt to overlook the negative impact of additional borrowing on the value of outstanding debt. Consequently, the borrower will borrow excessively and default frequently. In turn, long-term debt becomes expensive, and the borrower suffers welfare losses as a result of this so-called debt dilution problem. This shows that the cost of debt will exceed the cost of equity (Corporate Finance Institute, 2015).

As mentioned previously, higher issuance of debt leads to higher payment of interest. In other words, higher interest payments may burden the company to repay its debt. This situation leads to higher credit risk exposure for the company since it may be unable to settle its financial obligations to the investors. This problem might have threatened the overall soundness of the financial system and led to a financial crisis (Hamzah et al., 2018a). The failure of one company can have a powerful contagious effect on others even if the companies are in good condition (Ali, 2013). Hence, the accumulation of companies' failures tends to increase the probability of a financial crisis (Gulati, Goswami, & Kumar, 2019).

Other than the above-mentioned debt financing disadvantages, debt-based financing also incorporates risk-shifting problems among the market players. This risk-shifting problem becomes even worse during the company's financial distress. Due to this agency problem, the company has a high probability of bankruptcy. Hence, a company should take into consideration all these three mentioned debt-based financing disadvantages when deciding on issuing financing. Overall, debt is typically less expensive than equity, but this is not always the case and financing choices will also be determined by the company's financial soundness and conditions.

The framework in Figure 1 also highlights the outstanding features of equity-based financing to achieve financial sustainability. This study argues that financing a company's project with equity-based financing seems convincing by combining the justifications for the preference of debt over equity and the debt-based financing disadvantages with the salient features of equity-based financing itself. Equity-based financing is a non-interest-based system incorporating risk-sharing, profit and loss sharing, residual claim approach, and state-contingent properties. According to the economists in Kuala Lumpur Declaration (2012), risk-sharing is the best alternative to the current interest-based debt financing regime that pushed the entire globe to the brink of financial collapse. This argument arises after the economists acknowledge that the financial crisis of 2008 underlined the fact that the most prominent aspect of the prevailing conventional financial system is the risk-shifting from financial institutions to customers, governments, and the public.

In addition, Shari'ah members emphasize risk-sharing as a distinguishing feature of Islamic financial transactions. As stated by Bacha et al. (2015), using

a risk-sharing instrument, the financier must share the underlying business risk. As a result, while an expected return can be calculated, a risk-sharing instrument cannot provide fixed or guaranteed returns. The returns would differ depending on the outcome of the business. Since the returns are conditional on the success of an investment project, they are referred to as 'state-contingent.' Risk-sharing finance has various advantages, including the ability to reduce, if not eliminate, the world's debt-induced financial crisis (Bacha et al., 2015).

Furthermore, the profit and loss sharing concept in equity-based financing is based on an idea of partnership, with banks and customers working together as business partners (Farihana and Rahman, 2021). Warde (2000) indicates in his study that profit and loss sharing, in theory, lowers credit risk. However, it necessitates the bank's direct participation in investment projects with partners (customers). Because the return on investment is uncertain, the Islamic bank puts extra effort as a partner to ensure that a project succeeds. Besides, Li and Lin (2020) mention that all equity holders have residual claims on the assets of a company after completing all other commitments. Since equity holders are residual claimants and have direct control of the business, companies that use equity finance can improve their performance (Caroline & Willy, 2015).

Based on all of the above-mentioned features of equity-based financing, this study argues that the issuance of equity may lead to the achievement of financial sustainability among market players and the financial system. The ability of equity-based financing in fostering financial sustainability can be seen clearly through the concepts of risk-sharing and profit and loss sharing among the contracting parties. The returns to investors through the issuance of equity are based on the performance of the project. If the project is successful, then the investors and the company will receive the pre-agreed profit-sharing ratio. However, if the project is unsuccessful and the company has a negative return, the company is not obliged to pay the returns to the investors since they are sharing the losses of the project. Hence, this situation leads to lower credit risk exposure for the company and enables it to use the remaining funds for its future operations. When the company can sustain itself in the long run, it becomes an incentive for the company to continue generating more profits for the investors. Through this, the company was said to achieve financial sustainability. The sustainability of individuals and the economy can also be seen when the company can pay salaries continuously to its employees.

To sum up, the discussion based on the conceptual framework has argued that equity-based financing is the better alternative as it could promote long-term sustainability for the market players and the economy as a whole. Hence, this might be useful to convince market players to finance more with equity rather than just focusing on debt-based financing.

IV. METHODOLOGY

4.1. Data

Based on the conceptual framework in the preceding section, this study runs the risk and return analysis by simulating capital financing via equity-based and debt-based models and comparing their credit risk exposure. The Monte

Carlo Simulation method is employed to examine the feasibility of equity-based financing to achieve financial sustainability. For illustrative purposes, this study simulates equity-based and debt-based financing models with credit risk exposure using the market price indices from 4 sectors: construction, consumer product, finance, and industrial product. The data are from Thomson Reuters and cover the period from 2007 to 2021, or from the GFC period to the Covid-19 period.

This study uses the price index of each sector as a benchmark against which to simulate credit risk exposure of debt or equity-based financing. The 4 sectors selected for the analysis are those highly impacted during the GFC and Covid-19 crisis. From the data collected, we compute the mean returns and their standard deviations as a basis for the analysis.

4.2. Model Development

After computing the mean returns and standard deviations, this study continues by identifying the risk and return of both debt-based and equity-based financing models. It is done by simulating credit risk exposure between both financing models. This simulation follows the assumptions on the identification of risk and return for debt-based and equity-based financing models, which have been summarized as follows:

Table 1.
Summary of Risk and Return Identification of Financing Models

Model	Return to Investor	Return to Company	Risks
Model 1 (debt-based financing)	Fixed Return	Residual of the profit	The company is not able to meet the fixed payment to the investor.
Model 2 (equity-based financing)	Profit sharing ratio	Profit sharing ratio	The company is not able to gain confidence from the investor to invest in the project.

Source: Author's assumptions

Table 1 identifies the possible risk and return of the financing models. In Model 1, there is a possibility that the company cannot meet the fixed obligation to the investor. Model 2 faces the risk of not getting investors who are willing to give up their fixed return and secured capital. Based on the risks identified above, this study reviews that Model 1 may heighten the company's credit risk exposure. However, this is not the case with Model 2. Even though the trade-off theory may favor debt-based financing in many cases, the long-term excessive credit risk exposure may cause the company to experience financial distress and bankruptcy. Besides, high credit risk may cause a company to be unable to sustain itself during a financial crisis. With this view, this study does a simulation to explain the credit risk exposure between debt-based and equity-based financing models.

For robustness check, this study conducts several additional tests using different sample data of the 4 sectors through the simulation of credit risk exposure of debt-based and equity-based financing models to check whether the different sectors are properly identified and fit intuition with the observation period. Particularly, this simulation aims at examining the feasibility of an equity-based financing model to achieve financial sustainability during the GFC until the Covid-19 phase.

To set up the simulation, this study considers companies in each of the 4 sectors that wish to raise capital via debt (bonds) or equity to finance a project that costs RM1,000,000. To differentiate between equity-based financing and debt-based financing for each sector, this study uses the following data:

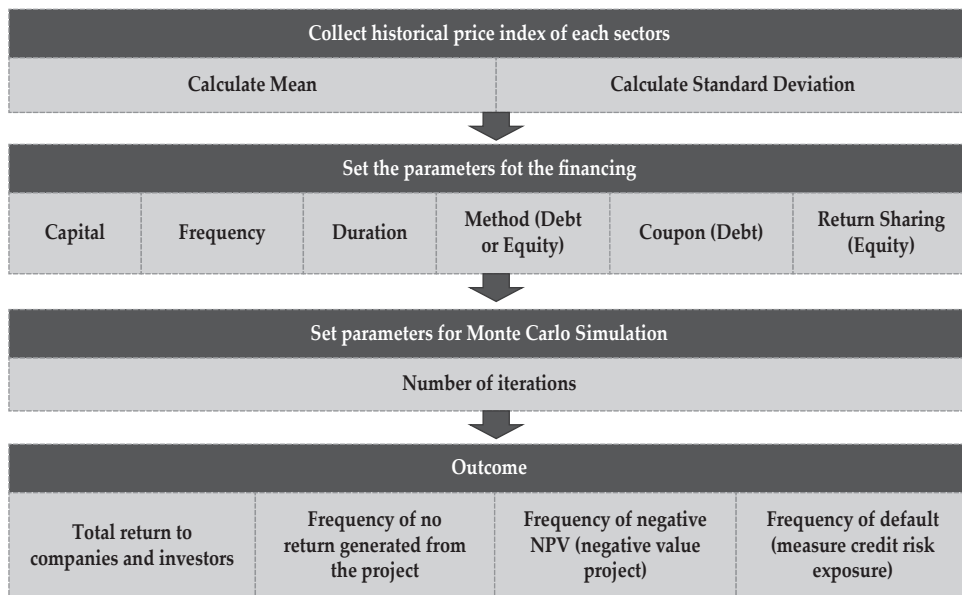
Table 2.
Financing Details for 4 Selected Sectors

Debt-Based Financing	Equity-Based Financing
Capital required = RM1,000,000	Capital required = RM1,000,000
Coupon payment = 5% = RM50,000	Coupon payment = flexible (no return if no profit is generated)
Duration: 15 years (2007-2021, GFC until Covid-19)	Sharing ratio = 70% investors, 30% company Duration: 15 years (2007-2021, GFC until Covid-19)
Payment frequency = Annually	Payment frequency = Annually

Source: Author's assumptions

Table 2 uses a few parameters to simulate the capital financing of a company in each sector. For the simulation, this study assumes that the company would like to raise RM1,000,000 to finance its project. The company has two options, either to raise the capital via debt-based financing (such as bonds) or equity-based financing (return based on the company's performance). As for debt-based financing, i.e. the first option, the company guarantees that the investors will receive an annual 5% coupon payment. In this case, the investors will get a fixed payment of RM50,000 annually. The debt also will mature in 15 years, coinciding the duration from the GFC to the Covid-19 period. Then, the investors will receive the invested amount (guaranteed capital) of RM1,000,000 at the end of the debt tenure.

As for the second option, the company can raise capital via equity-based financing. This type of financing is similar to venture capital, in which the return is based on the performance of the project. The return also will be shared between the company and the investors based on the pre-agreed ratio. In this simulation, the ratio is 70% for the investors and 30% for the companies. In case the project cannot generate any profit, the investors will not receive any return. Hence, in this sense, the investors are sharing the risk of the project with the company. Using all the parameters, this study compares the return and risk of the two financing options. Through the objective, this study uses mean (return) and standard deviation (risk) data from the 4 sectors to generate annual returns of 15 years from the GFC to Covid-19 via 5000 iterations of Monte Carlo Simulation. The order of the procedures that the equity-based and debt-based financing models follow during the simulation is shown in Figure 2:



Source: Author's illustrations

Figure 2.
Monte Carlo Simulation Process for 4 Selected Sectors

Based on Figure 2, this study is expected to provide the outcome on the possible returns to companies in each sector and the investors. The outcome also includes the frequency of producing a negative net present value (NPV) of the project and the possibility of default occurrence. Based on the default frequency, this study elaborates on the credit risk exposure of the companies. The outcome has been produced for each method of financing, which is debt-based and equity-based financing. This study expects that the equity-based model would be able to promote financial sustainability in the long run.

4.3. Model Assumptions

Both debt-based and equity-based financing are used to conduct the Monte Carlo simulation. All parameters for these models are set fixed. In addition, there is no intervention by the government and monetary authorities. Hence, it is assumed that there is no monetary policy that can affect the internal operation of the project.

Payment frequency for both debt-based and equity-based financing models is similar in the sense that the company pays an annual return to the investors. The annual return is continuously paid to the investors through debt-based financing, regardless of any economic condition during the observation period. However, the annual return pays to the investors through equity-based financing is based on the company's performance.

The company in each of the 4 selected sectors - construction, finance, consumer product, and industrial product - have fixed and different percentage of means

and standard deviations which represents their return and risk. These 4 sectors are grouped into low and high project performance based on their return levels.

Negative return frequency as one of the parameters analyzed in this simulation measures the possibility of no return generated from the project. Meanwhile, negative net present value (NPV) frequency measures the profitability of a project and represents the possibility of paying a negative return to investors.

Credit risk exposure is measured by the percentage of default exposure of each financing model. If the company in each sector recorded a higher level of default exposure frequency, the company is most likely exposed to high credit risk. The company may default if it fails to achieve the sustainability condition set by the model.

V. RESULTS AND ANALYSIS

5.1. Simulation of Equity-based and Debt-based Financing Models

This part discusses the findings from the simulation of credit risk exposure of debt-based and equity-based financing models for the companies from 4 sectors. By using the financial data of the 4 selected sectors over 15 years from 2007 to 2021, the simulation runs through the GFC crisis and COVID-19 and enable investigating the ability of the equity-based financing model to maintain the financial sustainability of the companies during the economic downturn. The analysis is separated into two groups, which are sectors with low project performance (return of below 1%) and sectors with high project performance (return of 1% and above). The return act as a profitability benchmark for each sector.

Tables 3 and 4 offer the risk and return analysis of debt-based and equity-based financing for low project performance with the following mean returns and risks (standard deviation):

- a return of 0.16% and a risk of 7% for the construction sector
- a return of 0.43% and a risk of 5% for the finance sector

In debt-based financing, regardless of return, the companies in each sector need to pay a fixed return of RM50,000 annually to the investors. In other words, even though the companies are facing low project performance, they still need to pay a fixed pre-determined return to the investors since the issuance of debt-based financing incurs regular payment of interest. If there are any remaining profits from the project, the companies will get their share eventually. It means that the companies are obliged to settle their obligations before they can get benefits from the project. In other words, the management of the companies is entitled to the residual cash flows in the form of dividends or retained earnings after all obligations have been met (Cai, Yang & Zhao, 2017; Li & Lin, 2020). This situation contributes to a negative return of 100% to the companies as denoted in both Tables 3 and 4. Since these two sectors have low performance, i.e. their returns do not exceed 1%.

On another note, the companies have a high possibility of negative returns because they still need to pay a fixed return to the investors even with low project performance. Thus, low performance and fixed pre-determined return payments to investors in debt-based financing contribute to a high default exposure of 100% within 15 years. In other words, companies with low profitability and obligated to

pay a fixed return to investors through debt issuance would expose the companies to high credit risk. As mentioned by Hackbarth, Miao, & Morellec (2006), companies tend to default on their debt obligations, thus giving rise to companies' credit risk. When the companies default, they may not be able to sustain themselves in the long run, or even worse, they may face bankruptcy. This result is consistent with the findings of Alandejani and Asutay (2017), whereby banks that offer debt-based financing are exposed to high credit risk as those relying on equity-based financing.

Nevertheless, if the companies survive the 15 years, the investors may reap profits as a result of the project's positive NPV (negative NPV frequency of 0%) since the return to investors is guaranteed. These guaranteed returns have made debt-based financing more favorable as compared to equity-based financing since it can minimize the risk profile of the investors (Mohd Jaffar, 2010). In addition, by issuing debt-based financing, investors will have the priority claim if the companies go bankrupt. This is explained in the pecking order theory, whereby investors will have a seniority claim to assets when issuing debt-based financing, thus making equity-based financing to be more expensive (U.S Securities and Exchange Commission, 2009). Seniority takes the form of the order of repayment in the event of companies' default in which investors are entitled to full repayment before equity holders can be paid anything, considering the absolute priority rule (Schlegl, Trebesch, & Wright, 2019).

Table 3.
Risk and Return Analysis for the Construction Sector

Year	Debt-based financing			Equity-based financing		
	Annual Return	Return to Investors	Return to Company	Annual Return	Return to Investors	Return to Company
	Return = 0.16%, Risk = 7%			Return = 0.16%, Risk = 7%		
1	18800	50000	-31204	3100	2147	920
2	17400	50000	-32623	25600	17948	7692
3	28100	50000	-21921	14600	10236	4387
4	23800	50000	-26187	13700	9596	4113
5	19600	50000	-30408	25300	17741	7603
6	33000	50000	-16964	34600	24187	10366
7	17400	50000	-32578	31600	22126	9483
8	34300	50000	-15684	13800	9676	4147
9	26500	50000	-23509	30000	20972	8988
10	30000	50000	-20031	22700	15877	6804
11	22900	50000	-27144	25700	17969	7701
12	21000	50000	-29036	34300	24006	10288
13	18900	50000	-31104	20400	14300	6128
14	33500	50000	-16527	24500	17145	7348
15	18800	50000	-39222	19400	13549	5807
Frequency of negative return			100%	Frequency of negative return		100%
Frequency of negative NPV			0%	Frequency of negative NPV		88%
Frequency of default exposure			100%	Frequency of default exposure		0%

Table 4.
Risk and Return Analysis for the Finance Sector

Year	Debt-based financing			Equity-based financing		
	Return = 0.43%, Risk = 5%			Return = 0.43%, Risk = 5%		
	Annual Return	Return to Investors	Return to Company	Annual Return	Return to Investors	Return to Company
1	25600	50000	-24416	10800	7572	3245
2	18100	50000	-31912	25300	17679	7577
3	13200	50000	-36795	15300	10710	4590
4	26300	50000	-23670	20400	14282	6121
5	23400	50000	-26623	25800	18045	7734
6	9600	50000	-40352	12000	8428	3612
7	24200	50000	-25815	12900	8999	3857
8	14100	50000	-35915	7800	5450	2336
9	26800	50000	-23218	13900	9723	4167
10	16700	50000	-33263	15200	10612	4548
11	32900	50000	-17147	8800	6128	2626
12	20100	50000	-29875	9600	6709	2875
13	8000	50000	-41996	17800	12464	5342
14	17100	50000	-32908	10200	7142	3061
15	9400	50000	-40581	16600	11635	4987
Frequency of negative return			100%	Frequency of negative return		100%
Frequency of Negative NPV			0%	Frequency of negative NPV		100%
Frequency of default exposure			100%	Frequency of default exposure		0%

Tables 5 and 6 offer the risk and return analysis of debt-based and equity-based financing for high project performance with the following mean returns and risks (standard deviation) respectively for:

- a return of 1% and a risk of 4% for the consumer product sector
- a return of 1% and a risk of 5% for industrial product

As in debt-based financing, the companies in this group sector also need to pay a fixed return of RM50,000 to the investors. Even though the companies are performing better than the previous group sectors, they still need to pay that fixed pre-determined return to the investors since the issuance of debt-based financing incurs the regular interest payment regardless of the company's performance. These interest payments would become a burden for the companies to repay the investors as it was set fixed at the beginning of the project. The higher the interest payment, the higher the borrowing costs of the companies and hence the more reluctant the companies to pay back their loan obligations (Anwar, Mansor, Shamsudin, & Mohd Fatzel, 2020). If there are any remaining profits from the project, the companies will also get their share eventually. It means that the companies are obliged to settle their obligations before getting any project benefits. The cost of debt is finite. Once the loan is fully repaid, the companies are free from any obligations. This is a reason why good-performing companies would choose to issue debt rather than equity since debt is usually less expensive than equity for profitable companies.

Regardless of good performance, the companies in this group sector are still exposed to bad economic conditions during the observation period. For example, the GFC and Covid-19 have adversely affected the financial system and brought the economy to the edge of collapse. To support this view, Botta (2020) demonstrates in his study that the capital structure of their sample companies has a major real-world impact during the GFC. The companies with higher leverage report lower capital expense and lower returns which thus cause them to spend less and reduce investment, resulting in lower future earnings. This shows that excessive debt issues severely impact corporate investments, and the impact is worse during the crisis period.

The intensification of the GFC has resulted in great economic and financial difficulties. As for this study, the greater exposure to downturns during the financial crisis contributes to a negative return of 100% to the companies in both the consumer product and industrial product sectors as denoted in Tables 5 and 6. The companies have a high possibility of negative returns because they still need to pay a fixed return to investors even during financial distress. Thus, operating in a bad economy and paying fixed pre-determined returns through debt-based financing contribute to a high default exposure of 100% within 15 years of both sectors' operations. This shows that the companies in both sectors are exposed to high credit risk during the crisis phase. This result is similar to what has been found by Ali (2013) whereby he argues that credit risk is the main threat to financial institutions during the global financial crisis. The high default exposure will eventually reduce the companies' value and result in poor performance (Ali, 2013). If the companies default, they may not be able to sustain themselves in the long run to continue their future operations, or even worse, they may face bankruptcy. This condition can also lead to financial distress of other contracting parties like investors and equity holders. Hence, this cascading effect can cause clustering of defaults among these market players, thus inducing economic collapse (Li & Lin, 2020).

However, if the companies survive the 15 years, the investors may reap profits as a result of the project's positive NPV since the return is guaranteed through debt issuance. Additionally, investors will have the priority claim if the companies in each sector go bankrupt during the observation period. The guaranteed return and priority claim are among the reason why debt-based financing is preferable as a financing instrument among market players and the increase in the preference for debt-based financing has dampened the effort of introducing the risk-sharing feature of equity-based financing into the financial system.

Table 5.
Risk and Return Analysis for the Consumer Product Sector

Year	Debt-based financing			Equity-based financing		
	Return = 1%, Risk = 4%			Return = 1%, Risk = 4%		
	Annual Return	Return to Investors	Return to Company	Annual Return	Return to Investors	Return to Company
1	17300	50000	-32661	8400	2508	5682
2	16600	50000	-33425	12600	3778	8310
3	13400	50000	-36555	29900	8981	19177
4	12700	50000	-37311	12700	3802	7881
5	19200	50000	-30837	26700	7998	16098
6	17400	50000	-32610	16100	4840	9458
7	21000	50000	-28973	7700	2322	4405
8	17300	50000	-32678	7100	2127	3918
9	15000	50000	-34997	19700	5908	10565
10	15200	50000	-34760	11600	3471	750120
11	14500	50000	-35500	22500	6736	13167
12	14000	50000	-36001	9000	2693	7057
13	6700	50000	-43298	28000	8414	19484
14	25400	50000	-24585	24300	7288	13756
15	15400	50000	-34563	12200	3661	10617
Frequency of negative return			100%	Frequency of negative return		100%
Frequency of negative NPV			0%	Frequency of negative NPV		100%
Frequency of default exposure			100%	Frequency of default exposure		0%

Table 6.
Risk and Return Analysis for the Industrial Product Sector

Year	Debt-based financing			Equity-based financing		
	Return = 1%, Risk = 5%			Return = 1%, Risk = 5%		
	Annual Return	Return to Investors	Return to Company	Annual Return	Return to Investors	Return to Company
1	11000	50000	-39012	20300	14182	6078
2	31100	50000	-18854	20000	13970	5987
3	8500	50000	-41530	20500	14336	6144
4	18400	50000	-31554	25700	18007	7717
5	31800	50000	-18186	17000	11899	5099
6	26900	50000	-23083	26000	18175	7789
7	5000	50000	-45038	21900	15318	6565
8	13100	50000	-36920	19800	13842	5932
9	21600	50000	-28374	18800	13130	5627
10	24400	50000	-25577	17600	12329	5284
11	23200	50000	-26771	18400	12861	5512
12	23200	50000	-26817	15400	10776	4618
13	21700	50000	-28277	18300	12815	5492
14	7000	50000	-43048	20300	14217	6093
15	24100	50000	-25944	1600	1095	469
Frequency of negative return			100%	Frequency of negative return		100%
Frequency of negative NPV			0%	Frequency of negative NPV		99%
Frequency of default exposure			100%	Frequency of default exposure		0%

For equity-based financing, the return to the investors varies based on the performance of the companies in each sector. If the companies are performing well, investors will get higher returns from the project. However, if the project is unsuccessful, the companies are not required to pay a fixed return to the investors. Since the returns are conditional on the project's performance, the returns are referred to as state-contingent (Bacha et al., 2015).

As shown in Tables 3 and 4, the lower return from the analysis shown by each sector indicates that the companies have a high possibility of getting negative returns. However, the investors will not receive a return since the companies have negative returns and the companies are not obliged to repay the investors. This is because the investors and the companies are practicing profit and loss sharing of the projects. This situation results in 0% default exposure regardless of the returns and risks to the companies because the returns are adjusted to match the company's performance. It clearly shows that the profit and loss sharing concept of equity is useful in minimizing companies' credit risk. With no financial costs or obligations from the equity issuance, the companies can retain control of their business and thus induce them to use the remaining funds to finance more projects in the future whilst maximizing investors' wealth. Therefore, the companies will be able to sustain themselves in the future thus achieving financial sustainability. Farihana & Rahman (2021) support this finding whereby they find that the Profit and Loss Sharing (PLS) instrument of equity-based financing reduces the credit risk of banks in 16 different countries which thus allows the banks to improve their business performance.

On the other hand, equity-based financing could also contribute to the project's negative NPV of almost 100%, as seen in Tables 3 and 4 since the companies in these sectors possess low project performance. Similar to those in Tables 5 and 6, the possible negative project NPV within the 15-year trajectory is reaching 100%. These situations make sense since the flexibility of return from equity-based financing might lead to negative returns for investors, especially for companies with low project performance. When there is no profit generated from the project, there will be no return paid to the investors, indicating the flexible return practice of equity-based financing.

Yet, through the issuance of equity-based financing, this analysis demonstrates that the companies in each sector can achieve financial sustainability. This is due to zero default exposure recorded by the companies in each sector during the observation period of this study as compared to the debt-based financing which recorded 100% default exposure by all sample sectors. Hence, this condition shows that the companies remain stable when issuing equity-based financing regardless of financial shocks hitting them. This finding is consistent with the study by Maikabara et al. (2021). They find that equity-based financing can contribute to the Islamic financial system's efficiency and sustainability in ensuring socioeconomic development. They also argue that equity-based financing demonstrates the effectiveness of the Islamic financial system in achieving Shariah's objectives. Therefore, the finding of this study seems significant in demonstrating the ability of equity-based financing to achieve long-term sustainability as an alternative to debt.

VI. CONCLUSION

This study has evaluated the best possible alternative financial instrument that can replace debt as a mode of financing. To this end, this study conducts an empirical simulation of debt-based and equity-based financing models with credit risk exposure across the GFC until the Covid-19 phase based on the developed conceptual framework of equity-based financing over debt-based financing. Accordingly, this study employs the Monte Carlo Simulation method to analyze the feasibility of the equity-based financing model in achieving financial sustainability during the observation period.

From the conceptual framework, we highlight the ability of the risk-sharing feature of equity-based financing to offer long-term sustainability among the market players and economy. Subsequently, through the empirical simulation of credit risk exposure between debt-based and equity-based financing models, this study finds that equity-based financing is the most reliable and robust financing instrument since it possesses zero default exposure for all sectors examined and during financial and health shocks. This can be seen when the company can sustain itself in the long run without financial hiccups to its operations. This situation is due to the flexible return practice in equity-based financing where the company needs not to pay any return or provides a minimal return to investors when the company is in financial distress. Therefore, this flexibility contributes to minimal credit risk exposure to the company and enables the company to achieve financial sustainability through its continuation of operation using the remaining funds from its project. When the company can sustain itself in the long run, the company can therefore continuously pay salaries to its employees, increase productivity in the financial market and hence increase money circulation in the economy through financial transactions. This shows that equity-based issuance with a risk-sharing component would be the best alternative to promote social return on top of financial returns that may become an avenue to differentiate Islamic finance from conventional finance.

This study deems that more empirical treatments of a risk-sharing feature of equity-based financing may lead to a greater appreciation of this alternative financing. Through this effort, the outcome of this study may provide greater insights to the companies and the investors in deciding the best alternative financing that can promote long-term sustainability and secure their long-run risk-return profile. This study also notes the danger of excessive debt issuance to the financial market and the economy as a whole. Therefore, the findings of this study can enhance the effort of persuading market players to issue more equity-based financing instead of only focusing on debt-based financing.

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