

## The Nonlinear Effect of Debt on Firm Performance

*(Kesan Tidak Linear Hutang terhadap Prestasi Firma)*

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### ABSTRACT

*This research posits the nonlinearity model of capital structure in Indonesia by examining the rate of debt acquisition and its effect on firms' performance. It uses the total debt and earnings after tax (EAT) as proxies of firms' performance from a sample of 2,064 as listed on the Indonesian Stock Exchange (IDX) from 1999 to 2018. To analyse the nonlinear effect, it uses the polynomial regression analysis. The results established the positive quadratic impact of debt on firms' performance which predicts that increasing debt will trigger such high performance. It is conceived that increasing debt use in financing decisions will cause the company performance to go down in the future. This research provides a new perspective to the field of capital structure theory, especially to the classical trade-off theory. For future research, introducing other proxies in gauging firms' performance may strengthen the validity of this study. It should also explain and elaborate on the nexus between debt increment and positive quadratic effect on firms' performance, and also provide solutions to practical issues in the economy.*

*Keywords: Liability; Earning After Tax (EAT); financing decisions; financing model; capital structure*

### ABSTRAK

*Kajian ini menonjolkan model tidak linear struktur modal di Indonesia dengan mengkaji kadar pengambilalihan hutang dan kesannya terhadap prestasi firma. Ia menggunakan jumlah hutang dan pendapatan selepas cukai (EAT) sebagai proksi prestasi firma dari 2,064 sampel seperti yang disenaraikan di Bursa Saham Indonesia (IDX) dari tahun 1999 hingga 2018. Untuk menganalisis kesan tak linear, ia menggunakan analisis regresi polinomial. Hasilnya menunjukkan kesan positif kuadratik terhadap prestasi firma yang meramalkan bahawa hutang yang semakin meningkat akan mencetuskan prestasi tinggi seperti itu. Ia menunjukkan bahawa peningkatan penggunaan hutang dalam keputusan pembiayaan akan menyebabkan prestasi syarikat turun pada masa akan datang. Kajian ini memberikan perspektif baharu kepada bidang teori struktur modal, terutama kepada teori perdagangan klasik. Untuk kajian pada masa hadapan, disarankan memperkenalkan proksi lain dalam mengukur prestasi firma agar dapat menguatkan kesahihan kajian ini. Ia juga harus menjelaskan dan menghuraikan perhubungan antara kenaikan hutang dan kesan kuadratik yang positif terhadap prestasi firma, dan juga memberikan penyelesaian kepada isu-isu praktikal dalam ekonomi.*

*Kata kunci: Liabiliti; Pendapatan Selepas Cukai (EAT); keputusan pembiayaan; model pembiayaan; struktur modal*

### INTRODUCTION

Data from the Bank of Indonesia (2011-2015) showed an increase of debt for financing decisions in Indonesia. The rising rate of debt use in the country approximates 15% annually. Data from the Financial Services Authority, for the third quarter of 2018, similarly showed continuous increase in debt for financing decisions. The trends appear anomalous and contradict the trade-off theory of capital structure which posits that firms would restrict their debt due to higher financial risk (Allayannis et al. 2003). It is therefore interesting to elucidate into this apparent paradox in the use of debt for financing decision and its possible effect on firms' performance. Figure. 1 shows the trend of debt

financing and firms' earning after tax in 1999 to 2016 where the year-long trend of debt usage and financial performance is illustrated. It is clear that the pattern of debt use in Indonesia is on the rise. Interestingly, the growth trend in company's financial performance in the year tended to be nonlinear. Whether the quadratic trend in the firms' financial performance is due to increasing debt as a source of funding for most firms in Indonesia need further enquiry.

Although many scholars have focused on how to optimise the capital structure, there are many issues which remain unresolved. It is regarding of how the proportion and impact of debt on firms' performance (Adachi-Stoto & Vithessonthi 2019; Fan 2019; Giannetti 2019; Jiang et al. 2019). For example, Scott (1977)



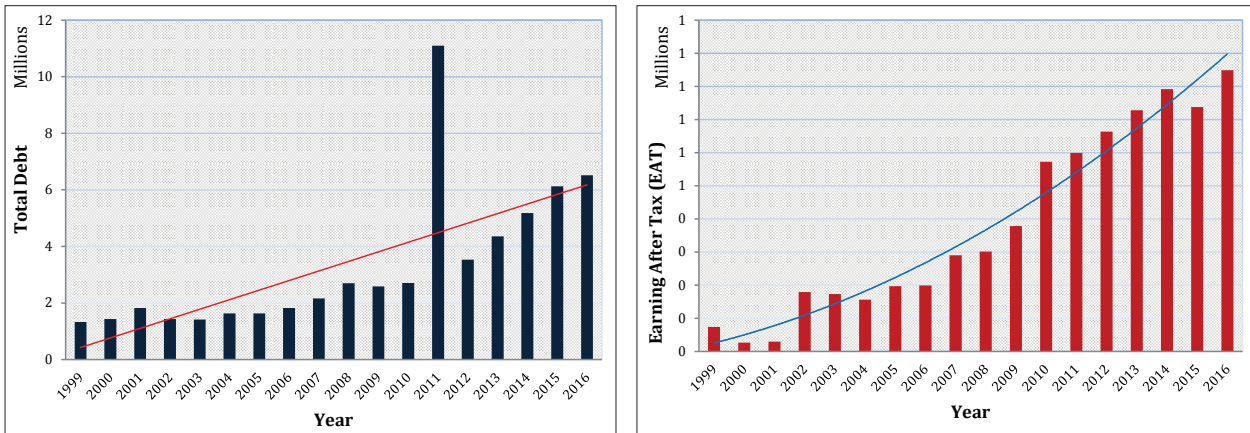


FIGURE 1. Total Debt and Earning After Tax in Indonesia at 1999 - 2016

and Shyam-sunder & Myers (1999) supported the hypothesis within the trade-off theory which posits that increasing debt to finance decisions would increase financial and bankruptcy risk to the firm. Barry et.al (2015) discovered that firms which have higher debt tend to underperform in the future. They are supported by some past findings (Ju, Parrino, Poteshman, & Weisbach 2005; Hackbarth et.al 2007; Adesola 2009; Cotei et.al 2011; Zeitun & Saleh 2015; Loi et.at 2015; Marshall et.al, 2018) although some workers provided alternative arguments. For example, Raharja and Mranani (2016) and Raharja et.al (2017) suggested the positive effect of debt on the value of the firm. Anderson et.al (2003) earlier reported on the positive role of debt through impact on minimizing cost of capital. This positive effect of debt can be explained with the theory of Modigliani-Miller (MM Theory) relating to the advantage of tax benefits (Modigliani & Miller 1958) and with the agency theory relating to strengthening of control mechanism in the firms (Jensen & Meckling 1976).

A mix of opinions exist from past research. The trade-off theory mentioned earlier stated the negative impact of debt in financing decisions. This argument can be clarified through the financial constraint hypothesis framework and the free cash flow hypothesis. Both hypotheses suggest that companies tend to limit the use of debt when they don't have the capacity for large cash flows (Ismail & Yunus 2015). When such company insists on acquiring large debts, the potential risk of bankruptcy must be faced. It can be justified by the classical financial theory, in the theory argued that using debt too much for financing decisions would increase the fixed expenses of the the firm. If the fixed cost of the firm had been increasing, the break-even point of the firm become longer. It condition is extremely detrimental to the company, because it makes the company longer to gain a profit. Finally, it push the company to go to the bankruptcy. Conversely, agency theory and MM theory argued differently claiming that

the firm's performance is positively influenced through having higher debt. Despite the contradicting theories on capital structure, researchers generally agreed that debt policy has an important role in the firm's value. This consideration justifies the elucidation for a new model on capital structure in the present study, especially one pertaining to the effect of debt for financing decisions in Indonesia. With sampling of 2,064 firms, between 1999 and 2016, the results present a non-linear model of capital structure. The polynomial regression was employed to analyze the non-linearity relation between debt and firm performance.

The study is divided into 5 (five) parts. Part 1, introduces the urgency of the research. Part 2, explains and develops the theoretical foundation accruing from the literature review and the underlying hypothesis of the research. Part 3 dwells with research method and analysis of the hypothesis. Finally, Part 4 and Part 5 detail out the results, discuss the findings and suggest future line of enquiry.

## LITERATURE REVIEW

### MM THEORY

Modigliani and Miller in 1958 pioneered the issues regarding effect of debt on tax payment. It argued that debt used for financing decisions exert a positive impact on the value of the firm through interest deduction usually labelled as tax benefits. It should be noted that existing interest payment is related to payment of taxes which can be alleviated through increasing use of debt in financing policy (Clemente-Almendros & Sogorb-Mira 2018).

Many earlier scholars found that the rate of taxes is one of the main factors which moved debt policy in the firm (Mackie-Mason 1990; Givoly et.al 1992; Graham 1996). Heider and Ljungqvist (2015) showed that firms tend to change the level of their leverage following

variation in taxes rate since its declining value would effect the marginal cost of bankruptcy exceeds the marginal benefit of taxes. Implicitly, their research argued that using debt for financing policy would elevate the value of the firm.

Graham (2000) confirmed that tax deduction exists and showed that 44% of the firms sampled in his study could double their debt and still receive tax benefits. According to the theory by Modigliani and Miller (MM) the optimal capital structure is attained when firms increasingly use more debt for financing decisions. The optimal marginal taxes advantage generated will subsequently effect increment in the value of the firm. This premise was however challenged by the classical and static trade-off theory of capital structure which conversely suggest that using more debt for financing policy will place the firm under elevated risk of bankruptcy.

#### TRADE-OFF THEORY

The basic tenets of the classical trade-off theory suggest that firms ought to consider the level of debt and its effect on bankruptcy risk of the firms. It further argues that using more debt for financing decisions will degrade the value of the firms. This negative relation between debt and firm values was supported by some recent studies (Su 2004; Cogliati & Paleari 2011; Raharja 2014). They perceived that the increasing use of debt is basically an anomaly.

The classical trade-off theory was developed recently in consonant with the static trade-off theory but both tenets however conflicted with the dynamic trade-off theory. Their basic disagreement is in the level of debt adjustment in relation to consideration on marginal tax advantages and the marginal cost of bankruptcy. The dynamics trade-off theory argued that there is no debt adjustment in the future (Hennessy & Whited 2005). Heider and Ljungqvist (2015) contended that this theory has for the first time considered trading-off between marginal tax advantages and marginal cost of bankruptcy. However, in the long-term, the level of debt is beyond adjustment, even if the level of tax rate is shrinking. The shareholder is generally reluctant to reduce the level of debt, despite marginal cost of bankruptcy exceeding the advantage of marginal taxes. This is due to the fact that the shareholder could still maximize their value by exercising put option. The dynamic trade-off theory posits that taxes are not the main factors which determines the use of debt for financing decisions. It also involved the complexities of corporate governance such as shareholders interest and behavior in managing the firm's values.

As mentioned above, the classical, static, and dynamic trade-off theory differed on the level of debt adjustment in the future, but concurred on the negative effect of debt on the firm's performance. They mutually

agree that when marginal cost of bankruptcy exceeds marginal tax advantages, it would lead to the decline in the firm's values as a whole. There are however several opposing theories as stated earlier. The phenomena that occur in Indonesia for example implicitly assert the evidence contrary to the argument of the trade-off theory. Therefore, it needs a new approach on the modelling of debt as capital structure.

## METHODOLOGY

### DATA ANALYSIS

As stated earlier, there are several inconsistencies in research findings regarding the relationship of debt use with company performance. Some studies posit that the use of debt has a positive effect on company's performance, while several other studies contradict this. In addition, an interesting phenomenon developing in Indonesia revealed that the trend of debt use in recent years was on the increase. The company's performance trends at the same time showed a nonlinear increase. In cognition, this research has adopted the quadratic approach of polynomial regression analysis to test the nonlinear relation between the firm's performance and debt financing. This can be justified through using the framework of the cash flow hypothesis. In theory, it is explained that companies that have relatively large cash flows will not limit the use of external funding sources (debt). The effect of massive debt on financing decisions will increase the company's leverage and the company's fixed cost. As a result, according to the trade-off theory of capital structure, the company's performance will decline in the future. The equation bellow shows the research model for this research.

$$EAT_i = \alpha_i + \beta_1.TD_i - \beta_2.TD_i^2 + \beta_3.SIZE_i + \beta_4.EAT_{-1,i} + \varepsilon_i$$

Where,

$EAT_i$  = earning after tax of firms  $i$

$TD_i$  = total debt of firms  $i$

$TD_i^2$  = the quadrate of total debt of firms  $i$

$SIZE_i$  = market capitalization of firms  $i$

$EAT_{-1,i}$  = earning after tax at  $t - 1$  of firms  $i$

EAT (earnings after tax) in research is used as a proxy for company performance. While the proxy of debt use is measured using the total debt (short and long-term) owned by the company, and is symbolised in this study by TD. In elucidating the nonlinearity effect of using debt, this study introduces  $TD^2$  variables to examine the nonlinear impact of debt used for the firm's performance. Other variables, such as SIZE and  $EAT_{-1}$ , are used as control variables in the model. SIZE is measured using the market capitalisation of the company, whereas  $EAT_{-1}$  is the earning after tax in the previous 1 (one) year.

## HYPOTHESIS DEVELOPMENT

As mentioned above there were varying opinions between predecessor theories on capital structure. For example, opinions differ in determining factors of using debt for financing decisions and ultimately in the effect of debt on the firm's values. In this research, we do not focus on the debate relating to these factors on debt use but rather on the effect of using debt for financing decisions. As Fama said, the focus of optimal capital structure is on how the decisions can create firm's values. Considering the pieces of evidence of development in using debt for financing decisions in Indonesia and the MM theory of capital structure, this research advances positive relation between debt and firm's values. In addition, the alternative premise which supported our hypothesis in this study is the agency theory proposed by Jensen and Meckling (1976).

In the perspective of agency theory, firms have separated ownership from the governance of their business activities. The shareholder who owns the firm does not operationalize their firm directly. They are assisted by their manager to manage their goals. In such arrangement, problems may arise due to conflicting interests between the shareholder and the firm manager, often called agency conflict. A mechanism is thus necessary to regulate the behavior of the manager. Agrawal & Knoeber (1996) discovered that agency conflict can be minimized through the debt policy of the firm. They also found that using debt for financing decisions could increase the firms' value. Ebaid (2009) and (Raharja et al. 2017) revealed the positive relation between debt and the firm's performance whereas Anderson et al. (2003) explicitly provided evidence on how the mechanism of control could be adopted in the debt policy of the firm. However, consider to the other theory and previous many previous research which argued that using debt too much in capital structure would cause the company performance to go down in the future. Therefore, in this study therefore the following hypothesis is proposed:

*H<sub>1</sub>: Debt has a significant positive relationship to the company performance, but too much debt usage will cause the company performance to go down in the future*

## DATA AND SAMPLE

The study utilized secondary data from financial statements of all manufacturing firms (2,064 firms in all) as listed in the Indonesian Stock Exchange (IDX), from 1999 to 2016. If a company becomes delisted during the study period, it will be eliminated from the research sample. Table.1 shows a summary of EAT distribution and total debt in each year.

The table displays the average of both earning after tax and total debt of the manufacturing firms in Indonesia between 1999 and 2016. Of interest here, the performance of the company from 1999 to 2001 was relatively

TABLE 1. Earning after tax and total debt

Year	Earning After Tax (EAT)	Total Debt
	(In million Rupiah)	
1999	73,827	1,325,548
2000	26,487	1,436,646
2001	29,270	1,819,879
2002	179,421	1,431,615
2003	172,973	1,417,933
2004	156,299	1,632,579
2005	196,925	1,634,380
2006	198,935	1,823,332
2007	289,878	2,162,635
2008	301,611	2,695,109
2009	378,117	2,585,862
2010	572,172	2,710,735
2011	599,366	11,094,295
2012	663,503	3,533,765
2013	727,639	4,356,794
2014	791,776	5,179,824
2015	737,312	6,121,760
2016	848,561	6,517,667

Source: Indonesian Stock Exchange (IDX)

weak compared to the rest of the studied period, being especially poor in 2001. This can be explained, since the country was still undergoing the transition of government then, wherein the early stages the political conditions were relatively unstable. The instability bred uncertainty in the economy, with the company's performance widely suboptimal for that particular year. The performance however improved with time. Conversely though, the data revealed that the improving democratic governance greatly boosted up the economy as evidenced in the continuous improvement in company's performance.

As mentioned previously, earnings after tax (EAT) was used as a proxy of firms' performance, whereas total debt used as a proxy of debt financing of the firms. Table. 1 shows firms' performance and the annual increase in their debt financing. The approximate rate of debt increase for financing and firms' performance for 1999-2016 were respectively 23% and 38%. The simultaneous increase in debt financing and firms' performance implicitly explain the positive relation between them. Furthermore, from the perspective of classical and modern trade-off theory, the evidence of debt financing behaviour in Indonesia seems like an anomaly, which thus serves the justification for undertaking this research. Figure.1 details out the growth trend of the two variables. The increasing debt use for financing decisions in Indonesia is correspondingly followed by growth earnings after tax. As shown in Figure.1, the trend of increase occurs every year, which lends to the belief that debt is still the main alternative

source of financing decisions. Myers & Majluf (1984) also affirmed the positive role of debt financing. For many firms it is the preferred means of sourcing funds to finance business. Figure.1 displays the polynomial pattern of total debt and earnings after tax. Despite the lack of statistical verification, it does implicitly support our hypothesis that a nonlinear pattern exists in the relationship between debt use for financing decisions and the firm’s performance.

EMPIRICAL RESULT

As mentioned earlier (Table.1 and Figure.1) the increasing trend in firms’ performance and debt financing behavior in Indonesia follows the polynomial pattern. Accordingly, the empirical testing conducted in this study is confined to quadratic equations in its line of enquire; namely, whether the use of debt in Indonesia has a nonlinear effect in improving company performance. Table 2 below provides statistical proof of this nonlinear influence of debt financing.

TABLE 2. The Relation of Debt Financing (Debt) and Firms Performance (EAT)

	Earning After Tax (EAT)
Constant	0.41
Debt	2.25 (5.40***)
Debt <sup>2</sup>	-0.05 (-3.11***)
Size	-0.78 (-13.35***)
EAT <sub>-1</sub>	-0.0078 (25.01***)
F statistic	71.18***
Adj R <sup>2</sup>	0.39

\*\*\*significant at < 5%

Source: Analyzed

Table 2 shows the linear positive effect of debt on firms’ performance with a coefficient parameter value is 2.25, which means that the use of debt for financing decisions will increase the firms’ performance by 2.25 Rupiah. The second variable of quadratic debt has negative significant effect on firms’ performance. This is proof that the research results verified the nonlinear relationship between debt financing and the firms’ performance. The coefficient parameter of quadratic debt is -0.05, as such increasing debt for financing decisions will cause the firms’ performance to go down quadratically by as much as -0.05 Rupiah. The analytical model formulated is extremely robust, with F value at 5% significance (Table 2). And according to the R-square value, the independent variable in the model could

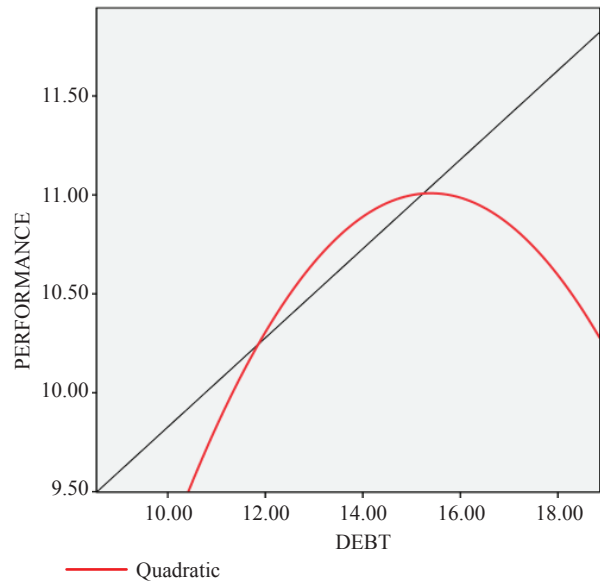


FIGURE 2. Relation between debt financing decisions and firms performance

explain the variation of the dependent variable by as much as 39%. Overall, the results supported the hypothesis on non-linear relationship between debt financing and firms’ performance (Figure 2). The scatter plot shows a linear relationship, and a nonlinear quadratic relationship (red line) between the two variables.

CONCLUSION

The study empirically confirmed that the use of debt for financing decisions exerts a positive linear and nonlinear negative quadratic effect on firms’ performance. Unlike past findings, this non-linear relationship is not supported by any previous theories and may signify a novel outcome of this study. The negative quadratic effect suggests that debt financing has a negative influence on firms’ performance in the future. Thus clearly supporting the hypothesis of the classical trade-off theory which posits that increasing debt for financing decisions would increase the bankruptcy risk and thus reduce firm’s performance. The study however concurs with the agent theory and MM theory on capital structure. The finding of this study can be justified through using the framework of the cash flow hypothesis and financing constraint hypothesis (Liu, Xia, & Yang 2017; Phan 2018). Theoretically, companies that have relatively large cash flows will not limit the use of external funding sources (debt). The purpose of acquiring such massive debt is to increase the company’s leverage and company performance in the future. However, in the other side, the consequences of the increasing of debt usage will cause the fixed cost of the firm improving. The increasing of fixed cost of the firm makes the break-even point of the firm become longer. And it causes the

company become longer to make profit. Finally, it's quadratically will cause the company's performance to go down in the future. The results of this study justify some of the previous theories, both of which say that debt has a positive effect on company performance. And other theories that state that debt has a negative impact on company performance. This study found in a single model that debt has both effects, both negative and positive. In the early stages of using debt, the decision will have a positive impact on the company's performance. However, if the use of debt is increasingly enlarged or increased, then the use of debt has a negative effect on the performance of the company.

The novelty in the findings is the quadratic negative effect or nonlinear relationship in the debt usage on the firm's performance. It is interesting to speculate in future studies on which variables are most influential in bestowing the quadratic effects. The MM theory posits that tax advantage is one factor which triggers the positive effect on firms' performance. Alternatively, the agency theory postulates that the positive effect of debt was generated through existing tight control mechanism which minimized agency conflict between firms. It should be noted however that these theories postulate on the assumption of a linear relationship between debt and firms' performance, and not on a nonlinear one.

The study clearly shows that debt has a positive effect on company's performance. Given this potential, policymakers should focus in facilitating firms to access debt sources, particularly for companies in the small to micro scale categories. Collectively, their contribution may accelerate the growth of the economy. However, this study also proves that higher debt usage will reduce the company's performance in the future. Therefore, in addition to focusing on the ease of accessibility of debt, this study also proposes that policymakers be able to identify at what point the use of debt needs to be tightened and controlled. On this potential, subsequent research should urgently identify the trigger variables that generate quadratic effect on debt influence over firms' performance. For example, in corporate sector growth an enlarging firm is in dire need of large funding to accelerate its business and this appears doable through the quadratic effect as proven in the study. It is envisioned that future research may also require a more complex analysis tool in order to facilitate complex interactions between variables.

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