



Sensitivity of Size-measure in Firm-life Cycle Theory: Total Asset vs Total Sales

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Abstract

Using different firm size proxies in financial research produces varying empirical results. The purpose of the paper is to find out the most appropriate firm size proxy between total sales and total assets in explaining asymmetric information at each stage of the firm life cycle. Pooled data were obtained as many as 3467 observation units from the annual reports of companies listed on the Indonesia Stock Exchange (IDX) for the 2008-2019 period. In-line functional regression analysis based on dummy percentiles was used to answer research questions. Empirical results have explained that total sales have greater goodness of fit as a proxy for firm size than total assets. The presence of asymmetric information produces debt issues as a signal of poor quality firms. Thus, many previous studies may not be robust and biased.

Sensitivitas Ukuran-ukuran dalam Teori Siklus Hidup Perusahaan: Total Aset vs Total Penjualan

Abstrak

Menggunakan proxy ukuran perusahaan yang berbeda dalam penelitian keuangan menghasilkan hasil empiris yang bervariasi. Tujuan dari makalah ini adalah untuk mengetahui proksi ukuran perusahaan yang paling tepat antara total penjualan dan total aset dalam menjelaskan informasi asimetris pada setiap tahap siklus hidup perusahaan. Pooled data diperoleh sebanyak 3.467 unit pengamatan dari laporan tahunan perusahaan yang terdaftar di Bursa Efek Indonesia (BEI) periode 2008-2019. Analisis regresi fungsional in-line berdasarkan persentil dummy digunakan untuk menjawab pertanyaan penelitian. Hasil empiris menjelaskan bahwa total penjualan memiliki goodness of fit yang lebih besar sebagai proksi ukuran perusahaan daripada total aset. Kehadiran informasi asimetris menghasilkan masalah utang sebagai sinyal kualitas perusahaan yang buruk. Dengan demikian, banyak penelitian sebelumnya mungkin tidak kuat dan bias.

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INTRODUCTION

Firm size is usually used as a variable firm characteristic in financial research, especially financing policies. Dang et al., (2018) documenting, firstly, the firm size coefficient is substantial and statistically significant. Still, when studying firm performance with capital structure, firm size is mechanically correlated. Second, firm size often changes signs and significance in regression tests when using different measures (total assets, total sales). Third, the goodness of fit as measured by R-square varies with different sizes. Robustness checks are needed when using different company sizes

Pecking order theory is often tested on the assumption of a perfect capital market in Indonesia, compared to other capital structure theories (Monica & Pramesti, 2017). Based on the assumption of asymmetric information in the used-car market (Akerlof, 1970), the capital structure decision follows a hierarchy, starting with the priority of internal sources of funds, external from debt, and finally through the issuance equity in financing new investments (Myers, 1984a; Myers & Majluf, 1984). The investment perspective that has been made by Ross (1977) illustrates that when managers have superior information, they have an incentive to send private information signals through the choice of debt level. Companies with lower cashflow expectations find it more expensive to issue a higher level of debt (bankruptcy risk) than companies with higher cashflow expectations. Like a lemon seller who found it more expensive when providing a warranty. Thus, high-valued firms can send higher debt information signals (Harris & Raviv, 1991; Klein et al., 2002).

The use of company size proxies in capital structure research is a current asset. If they contain asymmetric information will result in new investors having a higher premium payoff incentive when issuing equity for further investment. As a result, companies prefer to issue debt rather than equity in the funding hierarchy for new investments (Harris & Raviv, 1991; Klein et al., 2002). Second, when growth opportunities inc-

rease, managers with superior information over others have more control over the company's assets, namely sales growth that results in excess cash flow from the project's NPV (Dalbor et al., 2004; Jensen, 1986; La Rocca et al., 2007). As a result, managers prefer debt over equity because of lower market sensitivity. Total sales measure growth opportunities in this research (Cempakasari et al., 2019).

The two proxies of firm size (total assets and total sales) are firm-characteristics variables that are important in the firm life-cycle, which is related to asymmetric information. When the company's age moves from introduction to growth and maturity, it changes company size and reduces asymmetric information. In the early stages of the life-cycle, the financing option (capital structure) proves more dependent on internal funding. Sequential disagreement was found when the company size variables, namely large and small, were included in the life cycle. According to pecking order theory, large companies tend to have higher debt ratios, and smaller companies with high growth do not follow the funding hierarchy (Frank & Goyal, 2003b). Differences in firm-size proxy measurements provide gaps in our paper, such as total sales and total assets (Dalbor et al., 2004), the number of employees (Dalbor et al., 2004; Law No. 20, 2008), only total assets (Martono et al., 2021; Paula et al., 2016) in their empirical research.

It is widely accepted that investors' expectations about generating future cash flows and the average cost of capital drive the company's market value in propositions I and II between tax and without tax. (Modigliani & Miller, 1958). Both impact at the beginning of the life cycle when they tend to show a greater level of information asymmetry, more growth opportunities, and are still small. The life cycle is suspected that they may prefer different financing strategies when there is an increase in the stage in the life cycle (Teixeira & Coutinho dos Santos, 2011).

It was found that there are still differences in the use of company size proxies, such as total sales (Cempakasari et al., 2019; Dalbor et al., 2004), and total assets (Dang et al., 2018; Yulian-

to et al., 2021). Larger firms than small firms have less severe asymmetric information problems and consequently, choose to issue equity when the market is better informed about their true quality. Thus, smaller firms may owe more because the relative cost of issuing equity is higher for them (Parsons & Titman, 2009). We use the firm life-cycle in three stages, which may differ, in two stages (Moon & Yan, 2012), four stages (Teixeira & Coutinho dos Santos, 2011), five stages (Dickinson, 2011). The stages are introduction, growth, and maturity. Our reason is asymmetric information research in Indonesia is also found in the introduction stage (Yulianto et al., 2021) However, differences in asymmetric information were found at the introduction stage for large and small companies in samples other than Indonesia (Frank & Goyal, 2003a ; Month & Yan, 2012). Because of these differences, we use the model (Anthony & Ramesh, 1992; Cempakasari et al., 2019) with three stages of life-cycle with the assumption of firm size homogeneity in the introduction phase, as our hypothetical model as follows:

Table 1. Firm Life Cycle

Life cycle stage	Firm Size	Firm Age
Growth	High	Young
Mature	Medium	Mature
Decline	Low	Old

Ahmed et al., (2021) provide conclusions from previous research, in the early stages of the life-cycle (introduction), the company faces resource and financial scarcity. This situation is exacerbated by the asymmetric information of new companies and the uncertainty of future cash flows. As a result, they generally borrow external financing at higher interest rates. Myers & Majluf (1984) confirm when the company's size as a company resource contains asymmetric information; then all investors will demand a higher premium payoff. The second stage of the firm life-cycle is known as the growth stage. During this phase, companies expand their production and sales, increasing cash inflow. During this

phase, firms enjoy higher profitability and reduced uncertainty about cash flow due to reduced asymmetric information (Ahmed et al., 2021). At this stage, the company's size, as measured by total sales, has increased (Drobotz et al., 2006).

The third stage of the firm-life cycle is known as the mature phase, where the company is larger and faces lower cash flow risk due to its ability to use resources based on market needs (Ahmed et al., 2021). Although asymmetric information is reduced, they require more assets and investments to create profits and cash flow stability. Finally, the decline phase is marked by falling revenues and profit margins. This phenomenon is associated with increasing the number of units whose production is working below capacity. This situation forced the company to sell assets and close the strategic business unit as a corrective action. Managers have incentives to overinvest in projects with negative NPVs through issuing external funds (Jensen & Meckling, 1976). The manager will enjoy the payoff from the investment if it is successful; otherwise, the project's failure becomes a risk for debtholders because of the limited liability of managers and shareholders.

Since the growth phase has increased to mature, there has been an increase in cash inflow and an increase in investment financing. With asymmetric information, companies avoid issuing debt issues as a negative signal. As a result, they miss investment opportunities, and companies in the mature phase are smaller than the growth phase. When entering the decline phase, its cash inflow decreased and still maintained its reputation by selling assets as a survival strategy. As a result, the company's size becomes smaller than the previous two stages. Therefore, this paper hypothesizes that the older the age in the life-cycle stage, the smaller the company's size.

METHOD

Total sales variables and total assets are used as measured by \ln total sales (Cempakasari et al., 2019) and \ln total assets (Yulianto et al.,

2021). Data were analyzed using functional regression based on percentile in the firm life cycle as a dummy to measure company age.

ny & Ramesh, 1992; Cempakasari et al., 2019), obtained as many as 1459 observation units in the category of young age (40.01%), 772 obser-

Table 2. Firm Life Cycle Categorization

Quantile	Total assets/total sales	Life-cycle Charateristics	Life cycle stage
80.01- 100%	5	High	Growth
60.01% - 80%	4	High	Growth
40.01% - 60%	3	Medium	Mature
20.01 – 40%	2	Low	Decline
0 -20%	1	Low	Decline

In-lin Model model, $\ln Y_i = a + b_1 D_2 + b_2 D_3 + \text{eused}$ to analyze (Gujarati & Porter, 2014), with variable Y is ln total assets and total sales expressed in interval scale. The dummy variable based on age is $D_2=1$, then the company is mature, $D_3=1$, the company is old, $D_2=0$ and $D_3=0$, the company is growing.

RESULTS AND DISCUSSION

Pooled data were obtained as many as 3467 observation units from the annual reports of companies listed on the Indonesia Stock Exchange (IDX) for the 2008-2019 period. After categorization based on a percentile (Antho-

vation units of mature age (21.17%), and 1416 old age (3882%). Differences in the policies of the financial and banking sectors are excluded from the data (Martono et al., 2020); hence, the non-financial and banking sectors are obtained.

Table 3, Panel A describes the difference in data distribution between total assets and total sales. The company's total assets when young, mature, and old are more homogeneous than total sales, and between the mean total assets and total assets are relatively the same, U-shaped curve. Thus, the addition of age in the life-cycle of young, mature, and old results in no difference in the mean, but the utilization of investment opportunities produces a greater

Table 3. Descriptive Statistics

	Obs	Q1	median	Q3	mean	Std. Dev	Kurtosis	Skewness
Panel A								
Total Asset	3647							
Young	1459	27,461	28,439	29,484	28,474	1,541	.141	.064
Mature	772	26,614	27,910	29,290	27,862	1,860	-.022	-.203
Old	1416	27,319	28,524	29,849	28,548	1,885	.254	-.034
Total Sales	3647							
Young	1459	26,465	27.806	28,892	27,628	1,835	.385	-.395
Mature	772	25.569	27,200	28,673	26,921	2,319	1,760	-.835
Old	1416	26,888	28,264	29,579	28.147	2.104	.647	-.350
Table B								
All Firm	3647							
Total Asset	3647	27,206	28.393	29,561	28.373	1,770	.316	-.073
Total Sales	3647	26,399	27,878	29,080	27,680	2,100	1,260	-.527

variation in total sales than total assets. Panel B explains that total sales are more varied due to differences in industry sectors, compared to total assets (Das & Roy, 2007). Furthermore, a lin-log functional regression test based on dummy variables from the firm life-cycle was carried out, the following results were obtained

Table 4. Analysis of Functional Regression

	Dependent Variables	
	Total Asset	Total Sales
Intercept	28,474*	27,628*
D2	-.611*	-.708*
D3	.075	.519*
F-Value	42,403	90.168
Sig	.000	.000
R-Square	.023	.047

* = sig 5%. Total assets = ln total assets;

Total sales = ln total sales

When the company was young in life-cycle, total assets were $\exp(28,474) = 2,322.16$ billion rupiah and decreased by $\exp(-0.611) = 0.543$ billion. It is found that there is a difference in total assets between young-firm and mature-firm, but there is no difference in total assets between young-firm and old-firm. The total sales proxy explains that mature firms have less total sales than newborn firms, and old firms have more total sales than newborn firms. This result does not match the prediction when both proxies are used to measure the size based on the firm-life cycle, which depends on the company's age. The total sales proxy can explain that firm size goodness is greater than total assets. There has been much literature discussing firm characteristics as a determinant of capital structure (Month & Yan, 2012; Paula et al., 2016) or dividends (DeAngelo et al., 2006). Companies have varying leverage or dividend patterns at different stages of their life-cycle. Thus the age of the company determines the category in the firm life-cycle and then determines the firm characteristics.

In Ross (1977), we see intuition Akerlof (1970), with the analogy of plums and lemons in the used-car market. The presence of asymmetric information (unobservable quality), resulted in the cars being sold were lemons (bad quality cars), not plums (good quality cars) due to equilibrium pooling. Prices in the market are more expensive than lemons and cheaper than plums are offered. The lemon seller cannot imitate the signal from the plum seller because it is too costly for them.

One major difference between the models Ross (1977) with Akerlof (1970) is the objective function (Klein et al., 2002). The analogy of the used-car model is profit maximization, and the signal incentive model of debt is the manager's salary. Salary is a trade-off between the firm's value function and the bankruptcy penalty, so managers choose the optimal level of corporate debt to maximize their salary. Managers with superior information have incentives to signal their personal information through the choice of debt levels. Firms with lower expected cash flows feel more costly when issuing higher debt (because the probability of bankruptcy increases), than firms with higher expected cash flows. Good quality companies will issue higher debt.

Next, we discuss the total sales proxy because it has a goodness of fit greater than total assets. Unlike previous research, it is documented that the company's size will decrease when the company's age is older (Anthony & Ramesh, 1992). With five categories in firm life-cycle (Dickinson, 2011), it explains that cash flow from operations increases until it reaches the mature stage and decreases until it reaches the decline stage. The presence of funding in taking advantage of investment opportunities increases total sales. It is explained that investment opportunities are determined by the use of fixed assets funded by a mix of debt and equity (La Rocca et al., 2007; Myers, 1984b), so the company experiences sales growth while capturing growth opportunities. Thus, total sales depend on the financing policy produced by asymmetric information.

When the firm value is determined generating expected cash flow (Modigliani & Miller, 1958), the implication is how the expected generating cash flow is determined by the firm life-cycle (DeAngelo et al., 2006; La-Rocca et al., 2011; Month & Yan, 2012). The main difference with documentation Anthony & Ramesh (1992) is increased company size in the decline phase. The high level of asymmetric information and limited internal financing resulted in the company losing growth opportunities, resulting in a decrease in total sales. In contrast, when asymmetric information is low and internal financing is limited, it can be substituted with securities issued. The stages of each firm's life-cycle based on age determine the difference in total sales, newborn companies that are in the growth stage can capture investment opportunities better, and have lower asymmetric information, than the previous stage, which is called introduction (Dickinson, 2011; Paula et al., 2016). Because growth is relatively low, it is financed by internal financing, increasing sales.

There was a decrease in total sales at the mature stage. The company could not take advantage of investment opportunities due to limited internal financing and the undervalued value of securities issued due to asymmetric information. The increase in cash flow tends to be used for innovation and maintains the market that is not proportional to the expected cash flow. As a result, when securities debt is undervalued, it is better to miss growth opportunities to decline total sales. In the final stage, the old phase, the manager succeeds in the positive NPV project because of the overinvestment behavior in the risky project to increase total sales (Cariola et al., 2011)

Thus, this study confirms the "measurement size" in the "size effect". Unfortunately, this means that much of the previous research relating to firm life-cycles and firm size may be underpowered and biased. Thus, researchers need to be careful when selecting firm size proxies for their research, keeping in mind the scope and context of their work.

CONCLUSION AND RECOMMENDATION

The presence of financial decisions determined by the age in the life-cycle produces total sales more precisely than total assets as a proxy for firm size. As they get older, companies face less asymmetric information, so they can issue external financing when internal financing limitations are found, increasing total sales produced by exploiting growth opportunities through financing. When mature, the company has limited internal financing and uses external funding to capture growth opportunities sales. However, when the company's quality is assessed from the debt signal (Harris & Raviv, 1990; Ross, 1973), they avoid external financing, resulting in a decrease in total sales. When they are old, with a lower asymmetric level, they are forced to use external financing to remain sustainable. They are faced between the choice of innovation and maintaining the market with internal or external financing. When using external financing for sustainable orientation, sales increase.

Some of the research limitations are: (1) the availability of data is the main limitation of this study. The time-series data is only for 2008 – 2019, and the error probability is relatively high. (2) this study only uses 1 country, even when only 5 countries still need further research. Therefore it is possible to add data from many countries (Hashmi et al., 2020). The study only uses the accuracy of firm size proxies only on financial policy, which is mostly done on seven corporate financial practices.

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