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Leverage, Profitability, Firm Size, Exchange Rate, and Systematic Risk: Evidence from the Manufacturing Industry in Indonesia

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Abstract: Systematic risk, a type of manageable risk for firms, enables business management to perceive and take necessary actions to counter market risks. This study looked into leverage, profitability, firm size, exchange rate, and systematic risk. This study analysed secondary data retrieved from 369 manufacturing companies listed on the Indonesia Stock Exchange (IDX) from 2016 to 2018. The multiple linear regression analysis was adopted to test the hypotheses, while SPSS was applied to perform data analysis. The study outcomes revealed that leverage had a significantly negative relationship with systematic risk, while profitability and firm size displayed a significantly positive relationship with systematic risk, and exchange rate did not exhibit any significant relationship with systematic risk. The study offers managerial implications that leverage should be managed well to understand systematic risk, mainly because high leverage generates more risk for a firm. Firm profitability and firm size offer good understanding about firm-level systematic risk. Study limitations and future research endeavours end this paper.

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1. Introduction

Corporations are under stress to perform as stakeholders seek different parameters to achieve economic success. A firm's efficient operation demands capital to perform and flourish (Arifuddun, Hanafi, & Usman, 2017). Most corporations acquire capital funding from the capital market and loans from institutions (Dang, LI, & Yang, 2018). Although debt financing promotes business resources, it leads to risk-taking (Dzikrullah, Harymawan, & Ratri, 2020). Despite the increased business profitability and firm size with well-managed debt financing, one cannot deny the lurking business risk (Gebauer, Setzer & Westphel, 2018; Seyran & Craig, 2018; Lovrinic, 2018; Firmenich, 2019; Kim et al., 2019; Celik, 2019; Mugwenhi et al., 2019; Merye, 2019).

The Indonesian manufacturing sector has been flourishing in recent times. The Ministry of Industry for the Republic of Indonesia (2019) website announced that the contribution of its manufacturing sector to the Indonesian economy had hit 21.30% in the last four years. This portrayed positive economic growth in Indonesia. Support from government had substantially advanced the domestic economic activities, while simultaneously exerting positive impact on firm performance in the manufacturing segment (Ghozali, Handriani, & Hersunggodo, 2020). Domestic manufacturing firms, particularly those listed on the Indonesian capital market, have vast opportunities to attain optimal firm performance in line with company performance goals.

Decisions on corporate financial funding are heavily determined by the ability of the firms in carrying out their operating activities and impact on firm risk (Haykal, Erlina, Maksum & Muda, 2020). Leverage condition facilitates the operations of large manufacturing firms, primarily because huge capital is required to perform manufacturing activities (Ghozali et al., 2020; Meyer & Keyser, 2019; Nel, 2019; Garcia-Rubio et al., 2019; Number, 2019). To successfully run business activities, funding decisions are integral in a company (Ibrahim & Lau, 2019), both from internal and external sources (Nanda & Panda, 2018; Nel, 2019; Chenrai & Jitmahantakul, 2019; Garcia et al., 2019; Lovrinic, 2018).

Leverage has been widely used to measure the extent to which the firm's assets finance through debt (Horne, James, & Wachwicz, 2005). Leverage reflects companies' borrowing capacities and effective use of investment (Ibrahim & Lau, 2019). Typically, companies with high leverage are increasingly risky (Stephan & Alexander, 2015). Every investment necessarily contains uncertainty and risk elements (Horne et al., 2005). Investors face different risks related to expected return (Gitman, Lawrence, & Chad, 2012). Essentially, investors face two possibilities; (1) gain massive expected return with higher level risk or (2) gain some return with the lowest level risk (Nanda & Panda, 2018). A rational investor certainly weighs in risk and return. The behaviour displayed by investors is closely related to the outcomes of investment analysis in light of risk (Horne et al., 2005). The two types of risks are systematic and unsystematic risks (Stephan & Alexander, 2015). Systematic risk is related to changes in the market, while unsystematic risk is related to the internal factors of a firm (Khasawneh & Dasouqi, 2017).

Leverage is correlated with profitability and risk (Laham, Anas, & Mahmoud, 2013). Profitability is a vital indicator assessed by corporate investors while examining a firm's performance, primarily because it portrays the ability of the firm to earn profits and the rate of return that investors probably receive (Gitman et al., 2012). Profitability describes if a business entity has good opportunities or prospects in the future. Higher business profitability signifies better survivability for a firm (Ibrahim & Lau, 2019).

Apart from leverage and profitability, firm size also significantly influences the systematic risks of a firm (Gitman et al., 2012). Firm size reflects the business size of a firm in terms of the size of the firm assets (Horne et al., 2005). Larger firm size denotes greater opportunity for a firm to obtain external funding (Nanda & Panda, 2018). Another aspect that investors need to seek in the overall macroeconomic conditions that may affect the systematic risk of a firm is the exchange rate, mainly because currency exchange rates always change over time (Laham et al., 2013). This change in value occurs due to changes in the supply and demand for a foreign currency exchange rate on each exchange market from time to time (Horne et al., 2005; Firmenich, 2019; Kim et al., 2019; Celik, 2019; Mugwenhi et al., 2019; Merve, 2019; Meyer & Keyser, 2019).

To successfully run a firm, managers (agents) and shareholders (principals) should focus on information about financial and external variables (Nanda & Panda, 2018). It is also necessary to pay attention to other factors that influence systematic risk, including macroeconomic factors (Nasih, Fadhihah & Harymawan, 2020). Such factors are external factors that can affect share prices and cannot be controlled by the firm. One example is the exchange rate. If the exchange rate moves sharply, it means that the exchange rate frequently fluctuates at an unstable change rate (Horne et al., 2005). Exchange rate fluctuations can adversely affect the level of confidence among foreign investor towards the capital market of Indonesia Stock Exchange (IDX) (Zaini, Sadalia & Fachrudin, 2018).

As such, this study explored the effects of leverage, profitability, firm size, and exchange rates on systematic risk in manufacturing companies listed on the IDX from 2016 to 2018. The study outcomes indicated that leverage was negatively related to systematic risk. Meanwhile, profitability and firm size exhibited significantly positive relationship with systematic risk. Finally, no relationship was established between exchange rates and systematic risk.

The remainder of this paper is structured as follows. Section 2 presents the literature review and the research hypotheses. Section 3 describes the sample, the variables, and the research design. Section 4 specifies the empirical findings. Lastly, Section 5 summarises the paper and concludes the study.

2. Literature Review

2.1. Leverage and Systematic Risk

Leverage depicts how much of a firm's operations are financed with debt. Van Horne (2005) asserted that the higher the ratio of debt to total assets, the greater the firm's financial risk; and the lower the risk of debt to total assets, the lower the risk. Leverage describes the amount of money borrowed for investment, wherein companies with high leverage are riskier (Stephan & Alexander, 2015). As debt financing brings more financial risk, borrowing firms with default on debt can result in confiscation of assets or even bankruptcy for the business. Zaini et al., (2018) postulated that leverage had a significantly positive effect on systematic risk.

Beltrame, Previtali, and Sclip (2018) consider the panel for the 97 commercial banks which were listed in 11 European Union countries during the time span of 2005 to 2016 through annual observations. It is believed that the standard version of bank's leverage ration is limited for the investors in the similar marketplace. However, three step bank leverage adjustment is proposed in order to analyse the impact of credit risk on the beta coefficient of equity of the banks. The study findings believe quality of bank assets affects the association between the leverage and value of systematic risk in the targeted economies. In addition, authors like (Rehman, Khurshid, Iltaf, Hafeez, & Kashif, 2019) have tested the impact of leverage on

the systematic risk capital asset pricing model for the low capital-intensive firms. For addressing the study objectives, data was collected from 94 non-financial firms during the time of 2010 to 2015 while observing the degree of operating leverage, degree of financial leverage to review the trends in systematic risk of banks. Furthermore, they also have analzyed the trend for the low- and high-income firms. the study findings believe that there is a significant and positive influence of both operating and financial leverage on the systematic risk/beta. However, these findings are found to be insignificant for the low capital-intensive firms. Besides, their findings conclude that capital intensity does influence the leverage due to which leverage has its consistent impact on the value of systematic risk.

Pringgabayu and Rizal (2018) tries to examine the influence of financial leverage as measured through debt ratio in terms of degree o f financial leverage, debt to equity ratio, debt to total asset ratio, debt to equity ratio, and systematic risk/beta. The time duration of their study consists of 2006 to 2009 which also comprises of financial crisis in the world economy. For the analysis purpose, data was collected from manufacturing firms of Indonesia which are listed in Indonesian Stock Exchange. with the help of generalized lease square or GLS approach, positive impact of degree of financial leverage, debt to total asset ratio, degree of financial leverage on the systematic risk of selected firms.

In addition, Khasawneh and Dasouqi (2017) reported that debt financing displayed a significantly positive correlation with systematic risk among Jordanian companies on debt financing and risk research outcomes. Stephen and Alexander (2015) postulated that leverage was positively correlated with systematic risk. Based on the above discussion, the following hypothesis is proposed:

Hypothesis (H1): *Financial leverage has a positive effect on systematic risk among manufacturing companies listed on the IDX.*

2.2. Profitability and Systematic Risk

Profitability measures the ability of a firm to generate profits. Profitability is conceptualised as return on assets (ROA) that narrates invested capital productivity (Khasawneh & Dasouqi, 2017). The level of profitability reflects the efficacy of firm operations in generating profits (Horne et al., 2005). With higher profitability level, a firm is willing to accept higher risk (Laham et al., 2013). The greater the profit earned by firm owner, the greater the risk-taking attitude among the firm management. The ROA exerted a significantly positive effect on systematic risk (Khasawneh & Dasouqi, 2017). Jeon, Kim, and Lee(2006) specifies the fact that since the time of recent crisis in the economy of Korea along with the starting of merger and acquisition, the accounting information as shared by the hotel industry has got much significance. furthermore, the capital cost of such firms is higher comparatively to other firms as listed in the securities as well. For better understanding, their study has developed a model to predict the systematic risk. They believe that the persistence of abnormal return/earnings has its systematic link with the book value of equity and earnings as well. The findings of their study can be utilized for the measurement of persistence growth of the selected firms along with the soundness of the management. Savor and Wilson (2016) believe that firms schedule to report their earning while taking the title of annualized return. Their study has suggested a model of risk-based explanation for the annualized return. Ball, Sadka, and Tseng (2020) considers the accounting data to estimate the firm's systematic risk through earnings along with some macroeconomic indicators. They have found that that firms' earnings-based sensitivities/ betas to aggregate supply and demand shocks are negatively correlated to each other. Furthermore, they also explain the cross-section of returns better than conventional "index" betas. This is since they are correlated with firm qualities employed in asset pricing model. Hence it is observed that both factors of systematic risk and firm earnings are reasonably associated to each other. As such, the following is hypothesised:

Hypothesis (H2): Profitability has a positive effect on systematic risk among manufacturing companies listed on the IDX.

2.3. The Effect of Firm Size on Systematic Risk

Firm size denotes the total value of all assets owned by the business. Firm size represents the firm financial strength and health (Lie, Ikhsan, Jubi, Harmain, & Nasution, 2020). Realisation of risk for a large business differs from a small-sized firm. Small companies are more interested in sourcing funds in debt and become riskier for investors (Stephan & Alexander, 2015). Large-sized firms have many internal funds available to deal with for daily business commitments (Lie et al., 2020). Dang et al., (2018) reported that firm size had a significantly positive effect on systematic risk. Arifuddin et al., (2017) revealed that firm size displayed a positive effect on systematic risk.

In addition, existing literature has also explored the indirect relationship between the firm size and systematic risk. For instance, Rossoni and Mendes-Da-Silva (2019) have developed a theoretical and empirical analysis for examining the association between the firm size and risk factors. For this purpose, a sample from 358 companies have been collected during the time period of 2002 to 2007. It is observed that the effect of reputation on the risk factor is positively moderated by the size of the firm. Sensoy (2017) claims that earlier studies have supported the hypothesis for the systematic risk institutional ownership. However, the role of firm size for the systematic risk is yet to explore. Besides, his study findings reveals that systematic risk in the form of liquidity may be higher for the mid to large capital firms. However, systematic liquidity risk decreases with the increasing number of investors at any firm size level too.

Hence, the following is proposed:

Hypothesis (H3): Firm size has a positive effect on systematic risk among manufacturing companies listed on the IDX.

2.4. Exchange Rate and Systematic Risk

Exchange rate refers to the price or value of a country's currency expressed in another country's currency, or the amount of domestic currency required to obtain one unit of foreign currency (Setyani & Gunarsih, 2018). A stable exchange rate facilitates businesses to perform international trade activities. For manufacturing firms, the import of raw material is easier when the exchange rate is stable; indicating lower risk (Laham et al., 2013). A stable exchange rate offers a good price structure and stable price for consumers. Stephan and Alexander (2015) asserted that exchange rate had a significantly positive effect on systematic risk. Some other authors have also explored the linkage between the systematic risk, exchange rate sensitivities and oil prices. For instance, Nandha and Hammoudeh (2007) have tested the association between the beta risk and stork return along with the exchange rates of 15 countries in Asia-Paceific region while applying international factor model. It is observed out of fifteen, thirteen countries have their expected beta signs which is reasonably linked with the domestic risk. However, out of fifteen, nine countries are affected by the level of exchange rate in terms of relative factors distribution.

Thus, the hypothesis below is proposed:

Hypothesis (H4): Exchange rate has a positive effect on systematic risk among manufacturing companies listed on the IDX.

3. Research Design

3.1. Research Sample and Data Source

This study utilised a sample of all manufacturing companies listed on the IDX from 2016 to 2018. Additionally, annual reports published by corporations were exploited as sources of data for this study. Purposive sampling technique was employed and all data were sourced from the IDX website.

3.2. Data Definition and Variable Measurement

The dependent variable used in this study is systematic risk. According to Horne et al., (2005), beta (ß) is a measuring tool used to examine systematic risk. Stock returns are correlated with changes in market returns, wherein this correlation is enabled by connecting firm stock returns (Rit) with market return index or composite stock price index (Rmt). Systematic risk can be estimated with the regression equation given in Eq. 1.

Rit = (Pt-(Pt-1))/(Pt-1)

Rmt = (IHSGt-(IHSGt-1))/(IHSGt-1)

Rit = α i + ß iRm+ e

Systematic risk = ß0 + ß1 leverage+ ß2 profitability + ß3firm size + ß4 excnage rate + εit Eq. 1.

The independent variables employed in this study are leverage, profitability, firm size, and exchange rate. Leverage obtained from the total debt ratio divided by total assets (Harymawan et al., 2020). Profitability is measured using ROA, which denotes the ratio of earnings after tax divided by total assets (Haykal et al., 2020; Nasih et al., 2020). Firm size is measured using the natural logarithm of total assets (Dzikrullah et al., 2020). The exchange rate measurement adhered to that prescribed by Ekananda (2014).

3.3. Research Methods

As per the nature of the study variables, present study is quantitative in nature where all the variables are measured through some numerical values. To data analysis, this study has applied the multiple regression technique to analzyed the relationship between the study variables. The technique of multiple regression is widely used in the field of management and social sciences which primarily uses several explanatory variables to predict the outcomes of a response variable. Through multiple regression analysis, researcher can determine the linear relationship between the study variables, and it is also known as an extension to ordinary least square methods which involves more than one independent variables in any research. To present the equation of multiple regression technique, Equation 1 below provides a general understanding.

yi =ß0+ß1xi1+ß2xi2+...+ßpxip+ϵ……Equation 1

where in the above equation 1, the title of i=n indicates the total number of observations in a given data set. The main dependent variable of the study is represented through y for a given sampled firms i. Additionally, ß0 shows the constant value of main dependent variable which indicates fixed amount of outcome variable when the effect from all the explanatory variables will have their zero effect. Furthermore, the regression betas like ß1,ß2…., ßp are showing the change in main dependent variable due to selected independent variables of the study. Lastly, ϵ= the model's error term (also known as the residuals). Now converting the above Equation 1 into more relative form, we have achieved the following Equation 2, showing the relationship between selected explanatory and outcome variables of the study.

Yi. RISK =ß0+ß1LEV+ß2ROA + ß3SIZE+ ß4KURS +ϵ……Equation 2

where the title of RISK represents the main dependent variable of the study as explained by all the four independent variables like LEV, ROA, SIZE, and KURS, respectively. The findings for the second equation are provided under analysis portion of the study.

4. Result and Discussion

4.1. Descriptive Statistics

Table 1 tabulates the descriptive statistics of this study. The results showed that the systematic risk of 369 listed manufacturing companies scored a mean value of 0.2445 (Std. Deviation = 1.401). Most of the listed companies had leverage with a mean score of 0.451 (Std. Deviation = 0.201). The ROA for the sample companies had a mean score of 0.0485 (Std. Deviation = 0.092). Next, firm size revealed a mean score of 28.565 (Std. Deviation = 1.605). Lastly, the exchange rate risk for the sample companies was 13853.28 for mean score (Std. Deviation = 476.673).

Table 1. Descriptive Statistics

Variables	Minimum	Maximum	Mean	Std. Deviation
RISK	-4.3175	4.5020	0.244508	1.4011498
LEV	0.0769	0.9939	0.451731	0.2016777
ROA	-0.3918	0.7160	0.048579	0.0927163
SIZE	21.0339	33.4737	28.565283	1.6053840
KURS	13436	14471	13853.28	474.673

Note: LEV: Leverage, ROA: Return on Asset (Profitability), SIZE: Firm Size, KRUS: Exchange Rate, RISK: Systematic Risk

4.2. Results of Multiple Linear Regression Analysis

Referring to the outcomes derived from the multiple regression analysis (see Table 2), the r2 values that signified change in systematic risk had been significantly predicted by the factors of LEV, ROA, SIZE, and KURS. These factors explained 8.6% of the change in systematic risk for the sample companies. The coefficient for leverage displayed a significantly negative relationship with systematic risk. Systematic risk appeared to increase with the leverage ratio, which indicated the amount of debt the firm had used to run its operations (Gebauer et al., 2018).

Manufacturing companies tend to be conservative on debt. Companies use debt when business prospects enhance. Hence, companies use debt as business investment, such as purchasing production machines or vehicles to support production. Such business investment may expand the business and improve its productivity performance to reap lucrative profits. The study results are in line with Laham et al. (2013), who reported that leverage had a significantly negative effect on systematic risk.

Table 2. Results of Multiple Linear Regression Analysis

	Coefficient	t-value	Sig.
(constant)	-7.680	-3.198	0.002
LEV	-0.861	-2.339	0.020
ROA	1.922	2.387	0.017
SIZE	0.194	4.338	0.000
KURS	0.0002	1.318	0.188
Adjusted r^2	0.086		
F Statistic	9.708		
F Sig	0.000		

Note: LEV: Leverage, ROA: Return on Asset (Profitability), SIZE: Firm Size, KRUS: Exchange Rate, RISK: Systematic Risk

The study outcomes revealed that the ROA had a significantly positive relationship with systematic risk. Increasing

profitability recorded by manufacturing companies escalates systematic risk, primarily because higher firm performance reflects high ROA as profitability. In a similar vein, Ghozali et al. (2018) reported that high profitability increased the good reputation of a firm. Companies, particularly those in the manufacturing sector with high profitability, are more attractive to capital market investors. Nonetheless, firm demand is not necessarily proportional to the high demand in the capital market (Gitman et al., 2012). This increases the fluctuation or instability of stock prices in the capital market, apart from affecting the market share price index (IHSG) in the capital market. In precise, instable stock exchange affects systematic risk (Gitman et al., 2012). The study results are in line with Haykal et al. (2020), who stated that profitability displayed a significantly positive effect on systematic risk.

Firm size exemplified a significantly positive link with systematic risk. The result denotes that a larger firm size can acquire a larger business scale, better operations, and more total assets. An indicator for investors to assess firm performance is the firm size (Horne et al., 2005). When there is a shock in the regional and global economic system for companies, the impact of systematic risk is heavier on large-scale manufacturing companies than those small-scale, mainly because the former is more sensitive to global market conditions and involves many stakeholders (Dang et al., 2018). Firm size is determined from the total assets. The result is in line with Arifuddin et al., (2017), who claimed that firm size had a significantly positive effect on systematic risk.

Finally, no relationship was recorded between exchange rates and systematic risk. Similarly, Setyani et al., (2018) depicted that exchange rates did not significantly affect systematic risk. The exchange rate of rupiah against the dollar was controlled and did not experience any drastic change. The exchange rate did not affect systematic risk, hence the absence of any significant effect on systematic risk.

5. Conclusion

Risk is emergent of uncertain conditions and has an adverse effect on investing activities. High-risk investment leads to higher returns. Investors are very attentive towards market risk conditions. Information about systematic risk enables business managers to devise effective strategies in order to manage the risk well. This study assessed the relationships of leverage, profitability, firm size, and exchange rates with systematic risk. The study outcomes signified that leverage was negatively related to systematic risk. Both profitability and firm size displayed a significantly positive relationship with systematic risk. Finally, no correlation was established between exchange rates and systematic risk.

Leverage appeared to negatively influence systematic risk. Business managers need to understand the right size of funds required to expand their business and face manageable risk. Excessive debt is not good for business, especially when it becomes unmanageable and induces more business risk. Firm profitability and firm size exemplified a positive impact on firm systematic risk. Systematic risk aids in managing firm profitability in accordance to firm size. As most Indonesian manufacturing companies were unrelated to export business, the fluctuation of the exchange rate did not affect systematic risk.

Several limitations were noted in this study. First, the Adjusted R2 was merely 0.086% or 8.6%; indicating 0.914 or 91.4% of other variables that can affect systematic risk and external factors that demand further exploration. Second, since this study only used systematic risk, future research work may assess both risk types; systematic and unsystematic risks. As such, further researchers may further investigate risks that occur within the firm.

Future studies may employ a larger sample size and incorporate other sub-sectors, such as mining, financial, and manufacturing segments. Additionally, future research may include other macroeconomic variables, such as inflation and interest rates. Sample data extraction period of beyond three years may better describe the existing conditions. Essentially, this study serves as a reference pertaining to the overview of financial ratios for Indonesian manufacturing companies from 2016 to 2018 to anticipate undesired systematic risks.

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