

The Role of Supply Chain Management in the Relationship between Earnings Management and Idiosyncratic Volatility

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Abstract. This study aims to investigate the association between earnings management and idiosyncratic volatility, as well as the role of supply chain management in moderating the relationship between the two using a quantitative approach. Two kinds of earnings management, real and accrual, are investigated towards idiosyncratic volatility. In measuring supply chain management and real earnings management, this study employs Kothari model and Cohen model, respectively. As for idiosyncratic volatility, it is measured by using the three-factor model by Fama and French. Samples used in this study are Indonesian manufacturing companies listed in the IDX from 2014 to 2017. This study suggests that real and accrual earnings management are positively associated with idiosyncratic volatility. Also, it finds that supply chain improve the relationship between earnings management and idiosyncratic volatility.

Keywords— *Idiosyncratic risk, Earnings Management, Supply Chain Management*

1. Introduction

In investment, investors face a risk-return paradox, which is the relationship between risk and return [1]. Given that, other than return, the risk becomes one of the main concepts in investment. In the stock market, investors are faced with various types of risks. In general, risks can conveniently be categorized into two groups, systematic and unsystematic risk [2]. Titman defined that systematic risk or non-diversifiable risk component measures the contribution of the investment to the risk of the market portfolio.

In contrast, the unsystematic risk or diversifiable risk is the component that does not contribute to the risk of the market portfolio. In other words, unsystematic risk is a unique or specific risk embodied in a company. Unsystematic risk is also known as idiosyncratic risk.

Numerous studies were conducted focusing more on the systematic risk rather than unsystematic risk. This is because investors and researchers have put

more attention to the risk which cannot be mitigated through diversification. However, the study on idiosyncratic risk is as essential as systemic risk since it is influenced by the preferences and policies made by the managers. Managers respond to events and phenomena from the internal and external companies through policies. In [3] stated that the risk preferences of the inventory manager could be expressed as a function of the profit value of the product concerning the level of product availability and the probability of loss, respectively. Thus, the managers' intervention affects the risk coming from the internal company. Moreover, [4] documented that from 2007 to 2010 in the developing market, idiosyncratic volatility was the most significant component of total volatility and showed no trend in this period. This finding emphasizes the importance for the researchers to conduct further study on idiosyncratic volatility in Indonesia.

Although several studies on idiosyncratic volatility have been conducted in other countries, there have not been many studies on this particular area in Indonesia. In [5] was the first to analyze the relationship between idiosyncratic risk and return. Naomi found that idiosyncratic volatility had a positive correlation with the return, supporting the concept of high-risk, resulting in high return. That being said, this study is also categorized as capital market research. Although, in general, capital market research is associated with the relationship between financial information and the stock price, this study is associated with financial information with idiosyncratic risk.

In [6] exhibited that there were some reasons why exploring idiosyncratic volatility would be valuable. Firstly, investors might want to diversify their portfolio to mitigate the risk. However, they might not be able to create well-diversified portfolios due to transaction costs and incomplete information in which idiosyncratic could not be

eliminated. Secondly, speculators and investment managers focus more on idiosyncratic volatility than total aggregate volatility as they aim extraordinary returns. Thirdly, institutional investors are more careful to manage their fund from the trustees, which result in sensitivity towards idiosyncratic volatility. Lastly, idiosyncratic volatility determines abnormal event-related returns, as firm-specific events affect individual stock prices.

In 2012, Indonesian companies started to implement International Financial Reporting Standards (IFRS) to their financial reports, according to [7]. According to [8] the implementation of unified standards would increase financial report comparability and attract more investors across the border. In other words, implementing IFRS would internationalize the Indonesian market to foreign investors. Besides, [9] showcased that the goal of IFRS convergence was to allow the financial report to provide more valid information about assets, liabilities, equity, revenues, and expenses of the company. They added that by implementing IFRS, the company was expected to increase its financial report comparability and to provide more credible, relevant, and reliable information. Therefore, investors need comprehensive information on companies so that investors can make investment decisions as desired. However, a study conducted by [10] found that Indonesian investors did not employ the information in the financial report in the decision-making process. It can be inferred that the usefulness of financial statements in Indonesia has not reached its optimum level. Indonesian investors, according to [11], make decisions based on their hunch, other people's perspectives, self-stances, and other considerations. In other words, they do not use fundamental analysis in decision making.

Moreover, another problem arising from the presented financial information is the longstanding question of whether the users can use the information provided in the financial reports. Financial information should be able to assist investors in the decision-making process [12]. As the financial statements is a tool of communication between managers and shareholders, the financial information should also be able to depict the risk arising internally from the firm.

Based on several studies, financial information in the financial reports has not yet wholly provided

the information used by the users, especially when it comes to firm risk. In [13] stated that one of the main weaknesses in accounting information issued by the firms was the lack of information on risks faced by the companies. In [14] recommended that the company should have identified, managed, and evaluated the main risks that the company was facing. Cadbury added that companies should publish the company risks as one of the items on the list for the reform of the adequate supervision and control process in UK companies. However, risks are hard to measure. In [15] mentioned that operational risks were the risk of direct or indirect losses resulting from internal process errors, personnel or systems errors, or external factors. One of the examples of operating risk, according to the study, is the risk deriving from errors or failings in established procedures, which are challenging to be untied from the so-called legal risks since it frequently has legal consequences.

The quality of earnings can be identified through the earnings management undertaken by the managers. In [16] agreed that poor earnings quality or poor financial reporting quality is consistent with unintelligible financial statements. Thus, if the quality of earnings is respectable, the indication of earnings management practice will be less provided. A higher magnitude of earnings management will consequently result in low earnings quality. Therefore, it is possibly predicted that higher earnings management could increase internal risks.

Earnings management can be understood as the act of accounting technique used to present a piece of overly positive information on a company's business performance in its financial reports. In [17] contended that earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial statements to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers.

In [18] stated that firms could use multiple earnings management strategies to manage their earnings, which are accrual-based and real earnings management. Accrual-based earnings management aims to obscure actual economic performance by changing accounting methods or estimates within the generally accepted accounting principles [19]. In contrast, real earnings management alters the execution of real business transactions [20]. In [21]

documented that accrual-based earnings management increased steadily from 1987 until the passage of the Sarbanes-Oxley Act (SOX) in 2002. However, the trend showed a significant decline after the passage of SOX. The accrual-based earnings management was then switched into real earnings management activities after SOX. In [22] also found that the companies in the US undertook the switching in earnings management from accrual-based earnings management in a global financial crisis or before SOX into real-based earnings management after SOX. The managers were prohibited from manipulating accrual-based earnings management, and investors had to pay more attention to the firms with a higher magnitude of earnings management. In conclusion, based on the previous findings on this matter, companies tend to perform different types of earnings management due to the betterment of the business and accounting environment.

Regarding the association between the quality of earnings and idiosyncratic volatility, [23] documented that worsening earnings quality has a positive association with rising return volatility over the 40-year for the period of 1962 to 2001 in the US. Supporting the finding by [24] also documented that there was a negative relationship between financial reporting quality with idiosyncratic volatility, meaning that firms with better financial reporting quality experienced lower idiosyncratic volatility.

The existence of supply chain management could reduce the level of earnings management. This statement is according to the study of [25], mentioning that there was a negative relationship between earnings management and supply chain management. Supply chain management is all the influences affecting the institutional processes, including to stipulate the controllers and regulators involved in organizing the production and sales of goods and services [26]. This study thus believes that good governance can reduce the relationship between earnings management and idiosyncratic volatility.

In this research, supply chain management is measured by using the index by the Organization for Economic Cooperation and Development (OECD). The index by the OECD was used in the study conducted by [27] in Hongkong Stock Exchange. Several studies conducted on supply chain management in Indonesia have employed several proxies to represent supply chain

management. In [28] used some measures as proxies of supply chain management, namely auditor quality, audit committee, management ownership, independent commissioner. In [29] used ownership structure and governance mechanisms to represent supply chain management. The usage of the OECD index in this study aims to provide a more comprehensive and descriptive practice of supply chain management in Indonesian companies.

This research is distinctive with previous studies in some circumstances. This study is the first to examine the association between earnings management and idiosyncratic volatility in Indonesia. Not only accrual earnings management, but this study also tests the influence of real earnings management on the idiosyncratic volatility. Furthermore, this research tries to examine the role of supply chain management in the relationship between accrual as well as real earnings management and idiosyncratic volatility. Studies that relate to this topic are still limited in Indonesia. The study done by [30] is believed to be the first research put on the table regarding this topic.

Control variables used in this study function to keep the relationship between independent and dependent variables away from external factors. Control variables in this study are firm size, operating cash flow, the sum of earnings before extraordinary items and depreciation to market capitalization, and leverage, which are based on previous studies proven to explain the influences on the idiosyncratic volatility. In [31] found that several determinants significantly associated with idiosyncratic risk, which are firm size, the book to market ratio, and cash flow to price ratio. In [32] in their study employed some control variables, which are significant to idiosyncratic volatility such as firm size, the book to market ratio, ratio, stock return, and leverage. In [5] also employed some control variables in the model, which were cash flow of operation (OCF), firm size, financial leverage, and operation cycle. In [9] documented that factors significant to idiosyncratic volatility are book to market ratio, firm size, leverage, stock return, and operating performance.

According to previous studies' findings and phenomena, this study tries to examine whether the accrual-based and real-based earnings management undertaken by a company is positively associated with idiosyncratic risk of the company. This study

also measures the role of supply chain management, whether it weakens the association between earnings management and idiosyncratic risk.

2. Literature Review And Hypothesis Development

Agency theory is described by [5] as a relationship that arises where the contract is present under which one party (the principal) engages another party (the agent) to undertake some actions on behalf of the principal. They also describe agency theory as a nexus of contract where the principal as the resource owners and the agents as those who operate, utilize and control the resources. Principals consist of stakeholders providing support to the company, including shareholders, creditors, and government. Whereas agents are the managers of a company whose authority is to govern and to run the business. The distinct functions between principals and agents create agency problems. This circumstance allows the managers to have better information on the firm than that of the principals. In [6] stated that agency theory implicitly contained information asymmetry. In [12] denoted the appeal of agency theory lies in the fact that it attributes the role of accounting as the bonding and monitoring mechanisms. That way, principals and agents are then acting cohesively as utility maximizers. However, there is no guarantee the managers will always act in line with the principals' interests.

In [15] stated that firms could use multiple earnings management strategies to manage their earnings, which are accrual-based and real earnings management. Accrual-based earnings management aims to obscure actual economic performance by changing accounting methods or estimates within the generally accepted accounting principles. In contrast, real earnings management alters the execution of real business transactions. In [18] documented that accrual-based earnings management increased steadily from 1987 until the passage of the Sarbanes-Oxley Act (SOX) in 2002. However, the trend showed a significant decline after the passage of SOX. The accrual-based earnings management was then switched into real earnings management activities after SOX. In [12] also found that the companies in the US undertook the switching in earnings management from accrual-based earnings management in a global financial crisis or before SOX into real-based earnings management after SOX. The managers were prohibited from manipulating accrual-based

earnings management, and investors had to pay more attention to the firms with a higher magnitude of earnings management. In conclusion, based on the previous findings on this matter, companies tend to perform different types of earnings management due to the betterment of the business and accounting environment.

In [16] exhibited that earnings management can be performed to achieve two different goals; opportunistic feast or efficiency activity. Thus, earnings management does not necessarily refer to a bad image, even though such activities tend to refer to adverse events. Scott added that there are several patterns of earnings management, namely taking a bath, income minimization, income maximization, and income smoothing. The first method is taking a bath, which can take place during periods of organizational stressor restructuring. The managers think that during such periods, reporting a large amount of loss has little to lose.

In consequence, it will take a "big bath" by writing off assets, providing for expected future costs, and generally "clearing the decks." Due to the iron law of accrual reversal, this enhances the probability of future reported profits. In effect, the recording of massive write-offs saves future earnings.

Regarding the association between the quality of earnings and idiosyncratic volatility, [5] documented that worsening earnings quality has a positive association with rising return volatility over the 40-year for the period of 1962 to 2001 in the US. Supporting the finding by [16] also documented that there was a negative relationship between financial reporting quality with idiosyncratic volatility, meaning that firms with better financial reporting quality experienced lower idiosyncratic volatility.

The concept and models of supply chain management have evolved from time to time. The challenges from both internal and external companies require the company to update its supply chain management continuously. In [18] stated that supply chain management portrayed all the influences affecting the institutional processes, including to stipulate the controllers and regulators involved in organizing the production and sales of goods and services.

Based on the agency theory, which allows managers to act on behalf of the principals, the asymmetry information between managers and principals might arise. It creates a space for the

managers to manipulate financial information. The activities of earnings management could finally increase the idiosyncratic volatility according to the studies of [9]. Previously, the study of [17] found that there was a significant negative relationship between earnings quality and idiosyncratic risk.

The high magnitude of earnings management can result in the low quality of earnings, and therefore, the activities, in the end, can increase the firm risk. Managers have the authority to choose accounting policy in reporting financial information. Whatever accounting policies the managers choose, will affect the quality of earnings. The accounting standards allow the managers to opt for accounting policies and preferences on their own, which consequently creates potentials for managers to conduct opportunistic earnings manipulation.

This study, therefore, predicts that the accrual earnings management undertaken by the managers increases the risk coming from the internal company. The first hypothesis inclines that the higher the magnitude of the accrual earnings management reflects, the higher the risk faced by the company is.

H1 Accrual earnings management has a positive association with idiosyncratic risk.

Different from accrual earnings management, real earnings management is an activity performed by the managers to manipulate earnings through the regular operation. Real earnings management can be conducted through three different operations; operating cash flows, production costs, and discretionary expenses. Each activity can potentially contribute to the company's specific risk, both partially and simultaneously.

According to several previous studies, these activities are significant to idiosyncratic risk in different patterns. Besides, according to the studies by [8], there was a shifting trend to switch the use of accrual earnings management before the SOX to the use of real earnings management after the enactment of SOX. Moreover, [5] found that real earnings management was positively correlated with idiosyncratic volatility. This study thus inclines that high real earnings management explains high risk faced by the company.

H2 Real earnings management has a positive relationship with idiosyncratic risk.

Supply chain management is initially designed to create a better business environment. It aims to reduce asymmetric information between managers and investors and to keep the company's going

concerned. Consequently, it reduces space for managers to manipulate earnings as managers need to report and disclose policies made to investors. This study, therefore, attempts to find out the effectiveness of supply chain management implementation in Indonesia whether supply chain management has substantially and significantly implemented, or it is just cosmetic.

Based on the negative effect of supply chain management on earnings management and idiosyncratic volatility, this study predicts that supply chain management can reduce the positive effect between accrual earnings management and idiosyncratic risk. Thus, this study believes that the adoption of supply chain management will push down the magnitude of the association between earnings management and the inherent risk.

H3 Supply chain management weakens the relationship between accrual earnings management and idiosyncratic risk.

An effective supply chain management practice is aimed to reduce asymmetric information. Regarding real earnings management, supply chain management affects decisions made by managers daily in normal operations. The essence of supply chain management should be portrayed and carried on in real activities, and in the end, will affect the quality of earnings. As it is previously stated, the quality of supply chain management is tested if it can reduce the association between earnings management and idiosyncratic risk. Due to the difficulty in identifying and detecting real earnings management practices, good supply chain management is indicated to be able to reduce the association between real earnings management and idiosyncratic risk.

Of its negative correlation with real accrual management and idiosyncratic volatility, this study predicts that supply chain management negatively affects the association between real earnings management and idiosyncratic risk. The existence of supply chain management would reduce the positive relationship between dependent and independent variables.

H4 Supply chain management weakens the relationship between real earnings management and idiosyncratic risk.

3. Research Method

This study employs a quantitative approach using multiple regression analysis. This research uses secondary data from the stock market and financial

reports of manufacturing companies. To obtain the results of this research, a set of panel data from 2012 to 2017 is used. The year 2012 is chosen as the beginning of the observation period as at that time, companies in Indonesia started to implement International Financial Reporting Standards (IFRS). Moreover, the year 2017 is chosen as it is the latest accounting period that has wholly ended and on which most of the companies have provided their financial reports. However, The period used in determining the samples is four years, starting from 2014 to 2017 due to the calculation of real earnings management which needs the t-2 data. Thus, the population consists of 136 manufacturing companies listed in the IDX at the beginning of 2012.

Samples in this research are finalized by eliminating several companies using some criteria. First, delisted companies during research observation. Delisting companies are excluded as

they will not be able to provide data the investors needed, and the stock price history is not available. Second, companies with non-English annual reports and unstructured annual reports. As a proxy for supply chain management, this paper uses the supply chain management index by the OECD. The keywords used to formulate the index are all in English subject to the guidance by the OECD. Third, companies of which annual report is unavailable and unstructured. The process of indexing cannot be completed if the annual report does not provide clear information and format of the reports. Lastly, the companies performing stock or reverse stock split in the period from 2012 to 2017 are excluded. Eliminating such companies is to keep consistency in calculating the returns from the companies in measuring idiosyncratic volatility. The final number of samples used for this study is 61 companies. The following are all the criteria in formulating the samples used in this research.

Table 1 Purposive Sampling Method

Criteria	Number	Measurement
Manufacturing Companies listed in 2011	136	Companies
Reduced by: Delisted companies in the period of 2012 to 2017	-8	Companies
Reduced by: Non-English annual reports	-9	Companies
Reduced by: Unstructured annual/financial report information	-31	Companies
Reduced by: Companies performing a stock split and reverse stock split	-27	Companies
Sample used	61	Companies
Year	4	Years
Sample in 4 years	244	Firm-Year

Source: Processed from www.idx.go.id

In measuring idiosyncratic risk, this study employs a five-factor model by Fama and French. Fama & French (1993) documented a three-factor model that could measure risk.

$$R_{it} - R_{ft} = a_i + b_i (R_{Mt} - R_{Ft}) + S_iSMB_t + h_iHML_t + e_{it} \dots \dots \dots (1)$$

Remarks:

- R_{Mt} = market risk period t
- R_{Ft} = risk-free period t
- S_iSMB_t = the difference between the returns on portfolio (small minus big) period t
- h_iHML_t = the difference between the returns on the portfolio with BTM (high minus low) period t

According to Fama and French model, to create a metrics, value-weighted portfolios need to be constructed – S/L (small-low), S/M (small-medium), S/H (small-high), B/L (big-low), B/M (big-medium), and B/H (big-high) as the intersection of the two sizes and three BM groups.

The SMB factor is calculated every day as the simple value of the weighted average of the returns on the three small stock portfolios minus the returns on the three significant stock portfolios. Likewise, HML is a hedge portfolio that is constructed as the gap in returns of the two large BM portfolios and the returns of the two low BM portfolios. In the end, according to Fu (2009), Idiosyncratic volatility is calculated using standard deviation from the residual of the model above. Independent variables tested in this research are accrual earnings management and real earnings management. Consistent with [11], a proxy used for accrual earnings management in this research is a model developed by [5], which calculates discretionary accruals and then gets them squared. According to [19], to measure earnings management, in their study, they augmented the modified Jones model with return on assets as a variable to control performance to compare the

effectiveness of performance matching, versus a regression-based approach. According to [17], as a proxy for accrual earnings management, the residual values of equation 2 are squared (ABSDA). Thus, the following is the method to measure earnings management, according to Kothari et al. (2005).

$$TA_{it} = \beta_0 + \beta_1 \Delta ASSETS_{it-1} + \beta_2 \Delta Sales_{it} + \beta_3 \Delta PPE_{it} + \beta_4 ROA_{it} + e \dots \dots \dots (2)$$

Remarks:

TA_{it} = the change in non-cash current assets minus the change in current liabilities excluding the current portion of long-term debt, minus depreciation and amortization, scaled by lagged total assets.

$ASSETS_{it-1}$ = lagged total assets

$\Delta Sales_{it}$ = change in sales scaled by lagged total assets

PPE_{it} = net property, plant, and equipment scaled by lagged total assets

ROA_{it} = return on assets

As for the measure of real earnings management, this study uses a model developed by Roychowdhury who divides real earnings management activities into three categories, including sales manipulation, overproduction, and decrease of discretionary expenditures.

Abnormal CFO

$$CFO_{it} / A_{it-1} = \beta_0 + \beta_1 \Delta CFO_{it-1} + \beta_2 St / A_{it-1} + \beta_3 \Delta St / A_{it-1} + e \dots \dots \dots (3)$$

Abnormal Discretionary Expenses

$$DISEX_{it} / A_{it-1} = \beta_0 + \beta_1 \Delta DISEX_{it-1} + \beta_2 St / A_{it-1} + e \dots \dots \dots (4)$$

Abnormal Production Cost

$$PROD_{it} / A_{it-1} = \beta_0 + \beta_1 \Delta PROD_{it-1} + \beta_2 St / A_{it-1} + \beta_3 \Delta St / A_{it-1} + \beta_4 \Delta St-1 / A_{it-1} \dots \dots \dots (5)$$

Remarks:

CFO_{it} = cash flow from operating activities company i period t

A_{it-1} = total Asset company i period t

St = sales company i period t

$PROD_{it}$ = production cost company i period t

$DISEX_{it}$ = discretionary Expenses company i period t

In [19] combined three individual variables into two comprehensive metrics of real earnings management to reflect the total effect of real earnings management. The first tool is RM1, which reflects the net expenses saving effect and is calculated by multiplying abnormal discretionary

expenses by the negative value and then adding them to the abnormal production costs. The second one is RM2, which explains the net operating cash flow effect and is calculated by multiplying the abnormal cash flow from operations by the abnormal discretionary expenses with the negative value and then aggregating them into one variable. Finally, the absolute values of RM1 and RM2 are utilized as proxies for the reporting quality based on real earnings management. According to [22], abnormal cash flow from operation impacts in different directions, and the net effect is ambiguous. Thus, this study uses the absolute value of RM1 as a proxy for real earnings management and only chooses manufacturing companies as samples.

The moderating variable used to test the relationship between dependent and independent variables is supply chain management. As a proxy for supply chain management, this research is following index calculation by the OECD. The index encompasses some components such as the rights of shareholders, the equitable treatment of shareholders, the role of stakeholders, disclosure, and transparency, and the role of the board of directors. The comprehensive calculation index is expected to explain the role of supply chain management in the relationship between earnings management with idiosyncratic volatility. This proxy was used by [4] in their cross-country research in five countries, which are China, Hongkong, Indonesia, Philippines, and Thailand.

Control variables used in this study function to keep the relationship between independent and dependent variables away from external factors. Control variables in this study are the firm size (SIZE), operating cash flow deflated by average assets (OCF), the sum of earnings before extraordinary items and depreciation to market capitalization (CFP) and leverage (LEV) which are based on previous studies proven to explain the influences on the idiosyncratic volatility. In [31] found that several determinants significantly associated with idiosyncratic risk, which were firm size, the book to market ratio, and cash flow to price ratio. In [32] in their study employed some control variables, which are significant to idiosyncratic volatility such as firm size, the book to market ratio, ratio, stock return, and leverage. In [17] also employed some control variables in the model, which were cash flow of operation (OCF), firm size, financial leverage, and operation cycle.

In [8] documented that factors significant to idiosyncratic volatility are book to market ratio, firm size, leverage, stock return, and operating performance.

Therefore, this study formulates two equations in examining the relationships. The first equation examines the association between both accrual and real earnings management and idiosyncratic risk.

$$IVOL = \beta + \beta_1 ABSDA + \beta_2 RM1 + \beta_3 SIZE + \beta_4 OCF + \beta_5 LEV + \beta_6 CFP + e \dots \dots \dots (6)$$

The second equation tests the role of supply chain management in the relationship between the independent variable, which is accrual earnings management and idiosyncratic risk.

$$IVOL = \beta + \beta_1 ABSDA + \beta_2 CG + \beta_3 DA*CG + \beta_4 RM1*CG + \beta_5 SIZE + \beta_6 OCF + \beta_7 LEV + \beta_8 CFP + e \quad (7)$$

Remarks:

- IVOL = idiosyncratic volatility
- ABSDA = absolute value of discretionary accruals company i period t representing earnings management
- RM1 = absolute real earnings management
- SIZE = firm size calculated by the natural logarithm of the total assets

- OCF = operating cash flow
- LEV = total debt to total assets
- CFP = the sum of earnings before extraordinary items and depreciation to the market capitalization
- CG = supply chain management index

4. Results And Discussions

Descriptive Statistics

One of the most important functions that manufacturing companies deal with in the field of supply chain management, and the decisions related to it, have a significant impact on their competitiveness, is "supply chain supply management". But in this direction, there are issues facing managers, including a) choosing the best combination from the orders received to the supply chain and b) determining the exact cost of carrying out an order. The descriptive statistical analysis in this study is described by using the mean, maximum, minimum, standard deviation, and median. The summary of the results of descriptive statistics on the variables data in this study presented in Table 2.

Table 2: results of variables

Variable	N	Mean	Max.	Min.	Std. Dev.	Med
IVOL	244	0.097	0.901	0.002	0.090	0.073
ABSDA	244	0.006	0.308	4.74E-10	0.022	0.001
RM 1	244	-1.5E-15	1.550	-2.985	0.386	0.067
SIZE	244	28.919	33.320	24.076	1.629	28.769
OCF	244	0.069	0.467	-0.218	0.084	0.057
LEV	244	0.579	5.073	0.073	0.634	0.490
ROA	244	0.032	0.479	-1.279	0.117	0.023
CFP	244	0.750	131.039	-7.318	8.408	0.104
CG	244	0.570	0.805	0.220	0.0973	0.582

Furthermore, the results of regression model selection tests (chow test, Lagrange multiplier test, Hausman test) suggest that the most appropriate

regression model 1 and model 2 in this research is a random-effect model (REM). The result of equation model regression model 1 is as follows:

Table 3: Equation Model Regression Test Results

	Coeff	t-Stat	Prob	
ABSDA	0.430	1.75	0.040	**
RM1	0.073	3.73	0.000	***
SIZE	-0.005	-1.30	0.096	*
OCF	-0.023	-0.31	0.376	
LEV	0.006	0.51	0.305	
CFP	0.001	1.93	0.026	**
Adj R2	0.110			
F-Stat	23.190			
Prob (F-Stat)	0.000			

Furthermore, the result of equation model regression model 2 is as follows:

Table 4: Equation Model Regression Test Results

	Coeff	t-Stat	Prob	
ABSDA	-0.795	-0.34	0.368	
RM1	-0.040	-0.35	0.363	
CG	0.159	2.10	0.018	**
RM1*CG	0.191	0.97	0.166	
ABSDA*CG	2.505	0.53	0.298	
SIZE	-0.007	-1.69	0.045	**
OCF	-0.036	-0.48	0.317	
LEV	0.0156	1.28	0.099	*
CFP	0.001	1.11	0.134	
Adj R2	0.128			
F-Stat	28.5			
Prob (F-Stat)	0.000			

5. Discussions

Accrual Earnings Management and Idiosyncratic Volatility

Accrual earnings management has a positive association with idiosyncratic volatility. This finding supports previous studies by [11], which posit a positive relationship between accrual earnings management and idiosyncratic volatility. This finding also supports [16], suggesting a negative association between reporting quality and idiosyncratic volatility. Therefore, it is concluded that earnings management can negatively affect or endanger the sustainability and going concerned about the company. The quality of earnings becomes one crucial factor for investors to make a decision. The quality of earnings can be seen in the quality of accrual. Accrual is the difference between net income and cash flow from operating activities caused by management policies such as depreciation, revenue recognition, inadequate debt allowance, etc. Accrual earnings management in this research is proxied by discretionary accrual that is squared.

According to the analysis results, it can be inferred that accrual earnings management is highly associated with idiosyncratic volatility. This high magnitude of earnings management leads to high idiosyncratic volatility. Significant earnings management association with idiosyncratic volatility using two proxies concludes that earnings management activities, whether current or non-current performed by managers, are risky and able to endanger the company's going concerned. Current discretionary accrual, shown by earnings management measure by [9], shows that management has the most discretion over current

accruals such as early revenue recognition and account payable decrease. It is reaffirmed by the main measure results showing all factors, current and non-current accruals, significant to idiosyncratic risk.

The significant association between earnings management and idiosyncratic volatility using the Kothari model shows that not only do the managers focus on current discretionary accruals, but they also employ non-current discretionary accruals which are depreciation and amortization in manipulating earnings. In conclusion, the managers use both current and non-current discretionary accruals to manage earnings. These activities can potentially lead the company to higher idiosyncratic volatility. That being said, the managers conduct earnings management as a manifestation of opportunistic feat.

In [26] suggested that earnings management could be considered as an opportunistic activity or bad earnings management. There are several ways to perform accrual-based earnings management through accounting method preference. Some of the methods to manipulate discretionary accrual are to increase or to reduce amortization expense, to recognize revenue early, to decrease account payable, and to increase inventory. An aggressive practice of earnings management can lead to inaccurate decision making as the quality of earnings presented in the financial report is terrible. These opportunistic earnings management activities can potentially decrease investors' trust in the financial information provided by the company, which leads to ignoring financial information. The implementation of IFRS in 2012 should be able to create a better business environment and lead to

better decision making by the managers. However, if the managers are tendentious to manipulate earnings as opportunistic activities through real and accrual earnings management, it will, in the end, increase idiosyncratic risk. Increasing the idiosyncratic risk of the company means putting the company in a dangerous state. Thus, if the managers can repress or avoid opportunistic activities through earnings management, the idiosyncratic risk of the company can be minimized.

Of earnings management practice in Indonesia, according to [17], the magnitude of earnings management activities in Indonesia is relatively high and above the average. This condition is caused by some factors, namely the weak law enforcement, lack of investor protection, and high concentration of company ownership. The study added that compared to earnings management in Malaysia, Indonesian companies perform a higher magnitude of earnings management that is undertaken in conventional and sharia companies. With the taxation, [11] exhibited that earnings management is being conducted by the managers to avoid tax in response to tariff reductions in Indonesia. Not conducive business environment and other motives for conducting earnings management are the main factors of high concentration of earnings management in Indonesia. This condition leads to the higher idiosyncratic risk portion of the company's total risk in the market.

In [17] argued that there are some motivations for the managers to manage their earnings, such as bonuses, debt covenant purposes, to meet investors' earnings expectations, and stock offerings. These motivations will lead to vague disclosure of earnings. There is thus asymmetric information between the managers and the investors. The investors in making an investment decision are using inaccurate data reported in the financial reports. Therefore, the prices in the market are falsely judged. The prices in the market carry false judgment by the investors, causing overpriced.

Real Earnings Management and Idiosyncratic Volatility

Real earnings management has a positive relationship with idiosyncratic volatility. This finding is in line with previous studies by [8], arguing that real earnings management has a positive relationship with idiosyncratic risk. RM1 is the sum amount of abnormal discretionary

expenses multiplied by negative one and abnormal production. In [9] stated that there are three manipulation methods and the impact of real earnings management. By the descriptive statistics, it can be inferred that real earnings management practice has started to be used as the mean fluctuates over the years, not to mention the increasing maximum value and standard deviation. This result, coupled with the fact that real earnings management is significant to idiosyncratic volatility, indicates that the shifting trend from accrual earnings management to real earnings management is present, though the magnitude is still low.

The significant association between earnings management, both real and accrual, and idiosyncratic volatility shows that the implementation of IFRS has reached its main objective, which is to create a better business environment, as well as to reduce asymmetric information between investors and managers. This can be seen through the values of earnings management, both accrual and real, which are relatively low and get better from time to time. To put it more precisely, if the managers do not manipulate the company's earnings, the idiosyncratic risk is low. On the contrary, if the managers decide to manage earnings, the idiosyncratic risk will get bigger.

The first way of manipulating earnings through real activities is an acceleration of the timing of sales through discounts or more lenient credit terms. With the combination of those two, sales volume will be boosted temporarily, but once the firm readjusts to the old price, the volume will be back to normal. The additional sales will promote earnings in the current period, assuming the margins are positive. However, the combination of giving out sales and more favorable credit terms will result in cash flow shortfall in a short period.

The second method of real earnings management is reporting the lower cost of goods sold through increased production. Overproduction can hide and disguise the fixed overhead costs over a large number of units, which consequently causes lower fixed costs per unit. As the reduction in fixed costs is not offset by an increase in the marginal cost per unit, the total cost per unit declines. The decrease in the reported cost of goods sold will lead to higher operating margins. However, the firm still has to allocate more expenses, such as holding costs that result in higher annual production costs

relative to sales. It will also lead to a shortage of cash flows from operating activities.

The last method is by decreasing discretionary expenses, including advertising, research and development, and SG and administration expenses. Reducing those items will promote earnings in the current period. It can also cause higher current period cash flows if the firm generally pays for such expenses in cash.

In this study, RM1 is divided and broken down into two elements, abnormal discretionary expenses multiplied by negative one and abnormal production. The RM1 then is replaced by those two variables to check the methods of conducting real earnings management by the managers, if it's through production, discretionary expenses, or the combination of both. The first method is not employed in this research as its consistent with [6] that the use of abnormal cash flows and abnormal production all together will lead to ambiguity.

According to [13], real earnings management and accrual earnings management can either substitute or complement each other. It can be indicated by the coefficient of real earnings management and accrual earnings management. If the two proxies are significant and have the same direction to idiosyncratic volatility, they complement each other. On the other hand, if the regression results show that real earnings management and accrual earnings management have a different direction, and they are significant while partially tested, real earnings management and accrual earnings management substitute each other. Based on the results, it can be concluded that in the association with idiosyncratic volatility, the managers perform both real and accrual earnings management concurrently to manipulate earnings. The combination of the two earnings management activities increases idiosyncratic risk and, in the end, endangers the company's going concerned. In conclusion, manufacturing companies in Indonesia from 2014 to 2017 chose to perform real earnings management via abnormal production costs to reduce the cost of goods sold and increase operating margin rather than cut the discretionary expense items.

Supply chain management in Moderating Relationship between Accrual Earnings Management and Idiosyncratic Volatility

Supply chain management has failed to weaken the association between accrual earnings management

and idiosyncratic volatility. This finding supports the finding of [15], who reported that supply chain management has no relationship with earnings quality. Thus, it can be concluded that supply chain management has failed to weaken the significant relationship between earnings management and idiosyncratic volatility. It indicates the ineffective practice of supply chain management. Furthermore, it indicates the supply chain management practices in Indonesia only focus on fulfilling administrative requirements, and it is still unable to investigate earnings management practice.

In [17] stated that in accrual-based earnings management, there is one law known as an iron law. Iron law explains accruals reverse, which means if the managers manage earnings upward to an amount higher than it should be in a period, the subsequent period will force the future earnings to be down just as current earnings were raised. Then, the greater magnitude of more earnings management is needed if the reporting of losses is to be further postponed. In effect, if a firm is performing poorly, earnings management cannot indefinitely postpone the day of reckoning. The possibility that earnings management can be excellent should not be used to rationalize misleading or fraudulent reporting. It is the role of the accountant and auditor to find a fine line between earnings management and earnings mismanagement. [17] added that this line must be determined by effective supply chain management, reinforced by securities and managerial labor markets, standard setters, securities commissions, and the courts. Thus, supply chain management should act as a damper for earnings management. However, this research finds that supply chain management does not moderate the relationship between accrual earnings management with idiosyncratic volatility.

Regarding supply chain management implementation in Indonesia, the study of [12] expressed that the implementation of supply chain management in Indonesia is just cosmetic and aimed to create a better image in public. Wibowo also exhibited the results of the international survey assessing supply chain management implementation in Indonesia. According to [12], the CLSA conducted other assessments in 2003, 2004, 2005, and 2007. Of all the surveys taken place, Indonesia was always at the bottom of all selected countries. These bad results, coupled with the most recent survey done

by the Asian Supply chain management Association (ACGA), indicated that supply chain management implementation had not gotten any better significantly from time to time. They added some factors were causing ineffective supply chain management implementation in Indonesia. These drivers can be classified into three groups, namely internal drivers, external drivers, and the structure of ownership drivers.

Firstly, internal drivers include the lack of commitment by the officials and employees, poor understanding of supply chain management principals, absence of a good role model, incompatibility of a firm's culture supporting good supply chain management, and ineffective internal control. Secondly, external drivers involve regulations, law enforcement, and the role of related institutions such as Central Bank, Ministry of Finance, Financial Services Authority, National Committee on Supply chain management Policy, etc. All the institutions must align their roles and authorities with regulating and supervising the implementation of supply chain management in Indonesian companies. Lastly, the structure of ownership is affecting the implementation of supply chain management if the ownership is concentrated in some parties. Concentrated ownership occurs if an individual or a party owns 40 percent of company shares. Concentrated ownership can bring a negative impact on the company due to the authority and power attached to them, which causes injustice among shareholders.

Several studies have been undertaken in testing the relationship between supply chain management and idiosyncratic volatility. For instance, [26] denoted that supply chain management, proxied by ownership structure, board structure, managerial incentives, and information transparency, have negative effects on idiosyncratic risk. From all the previous studies above, it is concluded that supply chain management was tested partially, or in other words, the previous studies only use some factors to represent supply chain management.

This finding does not align with the results of previous studies. In [26] reported that firms with better supply chain management mechanisms tend to have lower idiosyncratic risk using data of Taiwanese financial institutions from 2006 to 2014. The different results with the study by them are caused by the different proxies of supply chain management and capital market characteristics as well as the business environment. They used

ownership structure, board structure, managerial incentive, and information transparency as proxies for idiosyncratic risk. However, the finding of this research supports the conclusion [14], which denoted the low supply chain management indicates low idiosyncratic risk.

With higher supply chain management, the agency problem occurring between managers and investors becomes lower in [26]. Thus, in the market, risk should be reduced. However, the finding of this research offers the opposite direction. With higher supply chain management, the idiosyncratic risk is found to increase. It means the practice and implementation of good supply chain management in Indonesia give room to increase the risk. This condition can indicate several things, such as the poor implementation of supply chain management in Indonesia and the implementation of supply chain management, which only focuses on complying with the regulations and administrative requirements. In other words, having good supply chain management implemented does not guarantee the firm has low idiosyncratic risk; instead, the finding in this research suggests that it indicates high idiosyncratic risk.

Supply chain management in Moderating Relationship between Real Earnings Management and Idiosyncratic Volatility

This study finds that supply chain management fails to weaken the relationship between real earnings management and idiosyncratic volatility using. It concludes that supply chain management practice and implementation in Indonesia are not able to reduce the association between real earnings management and idiosyncratic risk. This condition is understandable as the practice of real earnings management is harder to identify and more subtle.

Real activities are performed daily. Many factors are considered in real activities such as business environment, business process, stakeholders, company liquidity, production capacity, etc. That being said, it is homework for all parties to implement good supply chain management in real activities. Supply chain management must be taken seriously, and all the parties must show a strong commitment to the implementation. By doing so, the primary goal of supply chain management can hopefully be achieved on any level. However, noting the poor implementation of supply chain management in Indonesia, shown by the results from several surveys, the role of supply chain management in moderating the association between

real earnings management and idiosyncratic volatility has not reached its optimal goal, which is to reduce the relationship between them. It becomes an essential homework for many related parties to push up the quality of supply chain management in Indonesia.

The report issued by the Asian Supply chain management Association (ACGA) placed Indonesia as the worst rank in supply chain management implementation among the surveyed countries in Indonesia. The report also argues that supply chain management reform in Indonesia is low on the government's priorities, and the direction is unclear. Thus, Indonesia was placed at the last in some categories. There are seven categories in the assessment which are, government and public governance, regulators, CG rules, listed companies, investors, auditors, and audit regulators, as well as civil society and media. It confirms that supply chain management implementation in Indonesia is still ineffective and inefficient. However, it is hard to identify which factor has contributed the most in this moderation relationship as this study employs a comprehensive supply chain management index by the OECD.

Furthermore, the report also notes that Indonesia has made little progress in CG reform over the past two years, with low priorities on the government's agenda. The securities regulator is segregated, and the stock exchange puts little attention to supply chain management. The report also reveals that company disclosure is showing some indications of improvement, and accounting/financial reporting standards are generally reasonable. Nevertheless, insider trading and other market misconduct remain occurred.

The survey results from time to time have exhibited poor implementation of supply chain management in Indonesia. In [12] stated that supply chain management in Indonesia mostly aimed to create an excellent image for the public, and its implementation had been inconsistent. A more firm commitment by some parties from the internal and external company is needed to create more impactful and beneficial supply chain management.

6. Conclusions

Executorial cost management employs measurement and analysis tools (e.g., cost driver analysis, supplier scorecards) to evaluate supply chain performance and sustainability. Using selected studies in accounting, operations

management and business strategy, we provide an overview of strategic cost management in supply chains, highlight contemporary developments, and suggest directions for future research. Accrual earnings management has a strong positive relationship with idiosyncratic volatility. It concludes that the more serious the magnitude of earnings management performed by the managers, the higher the idiosyncratic risk in the market is. The substantial magnitude of earnings management is identified by the high discretionary accrual calculated by the Kothari model. This too implies that a good earnings quality reduces the idiosyncratic volatility. Accrual earnings management is one of the ways the managers respond to various conditions through accounting policies. The following question is whether this action increases the idiosyncratic risk in the market. The results show that accrual earnings management positively affects idiosyncratic risk in the market. Earnings quality can be identified through the quality of the accrual. Thus, the lousy quality of accrual results in high idiosyncratic volatility.

Based on the results, real earnings management has a positive association with idiosyncratic volatility. This implies the managers who manage earnings upwards will result in high idiosyncratic risk in the market. On the other spectrum, idiosyncratic risk in the market is unable to capture the downwards earnings management performed by the managers. This study also finds that real earnings management, which endangers companies is undertaken through production cost manipulation. The managers tend to reduce the cost of goods sold through an increase in production cost. It will eventually lead to a higher reported income. This action has a strong positive relationship with idiosyncratic volatility. Meanwhile, earnings management through discretionary expense is not proven to have a positive relationship with idiosyncratic risk.

Supply chain management fails to weaken the association between accrual earnings management and idiosyncratic risk. It indicates the ineffective implementation of supply chain management in Indonesian manufacturing companies. Supply chain management practice in Indonesia is indicated only to fulfill the administrative requirements and regulations.

Supply chain management fails to moderate the relationship between real earnings management and idiosyncratic risk. The results which were shown

using the regression model 2 imply that supply chain management does not weaken nor strengthen the strong relationship between both real and accrual earnings management and idiosyncratic volatility. This moderating relationship can be caused by the ineffective implementation of supply chain management in Indonesia.

This research is expected to provide evidence in formulating policies to stakeholders, namely government, investors, financial service authority, and accounting standard board. Future research may investigate the relationship between idiosyncratic volatility and accrual earnings management as well as real earnings management using samples from sectors other than manufacture to result in a more comprehensive conceptual relationship between earnings management and idiosyncratic volatility. Future research can also test with a longer period of observation using different proxies for CG and earnings management.

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