

Board of Commissioner Characteristics and Stock Price Synchronicity: Testing the Role of Industrial Complexity as a Moderating Variable

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Abstract— This study examines the relationship between characteristics of the Board of Commissioner and stock price synchronicity, the moderating effect of industrial complexity on the relationship between the characteristics of the Board of Commissioner and stock price synchronicity. Samples were taken from companies listed on the Indonesia Stock Exchange for the period 2014-2018. The results show that the size of the Board of Commissioner is associated with stock price synchronicity. In contrast, gender diversity and the independence of the Board of Commissioner were not significantly related to stock price synchronicity. However, the interaction between industry complexity and the independence of the Board of Commissioner has a significant negative relationship with stock price synchronicity. These findings indicate that the independent Board of Commissioner functions effectively in monitoring the company's financial reporting policies in complex industries. The interaction between gender and industry complexity is also not significantly related to stock price synchronicity. Surprisingly, the interaction between the size of the Board of Commissioner and industry complexity is not significant even though the size of the Board of Commissioner as the main variable has a positive effect on stock prices, synchronicity. Overall, it can be concluded that industry complexity plays an important role in influencing the relationship between the independence and size of the Board of Commissioner with stock price synchronicity but not for the gender diversity of the Board of Commissioner.

Keywords— Stock price synchronicity, Firm-specific information, market-wide information, industry complexity, Board of Commissioner.

I. INTRODUCTION.

Information circulating in the market can be divided into two types of information, namely information that is directly related to the company or firm-specific information and market-wide information (Roll, 1988). Financial reports are example of information that is directly related to the company which is often used in assessing the fundamentals and prospects of the company in the future. Meanwhile, macroeconomic, socio-political conditions or the competitive landscape of the industry are some examples of broad market information. Industry information includes the level of demand for motor vehicles, commodity prices, and policies issued by the government related to certain industries (Roll, 1988).

Stock price synchronicity describes the extent to which company-specific information is used in stock transactions. If the variation of stock returns is not in line with broad market information, then stock price synchronicity is lower. On the other hand, if stock return variations are more in line with broad market information, stock price synchronicity will be higher (Chan and Hameed, 2006). Thus, stock price synchronicity reflects how much market-wide information is absorbed by stock prices relative to company-wide information.

Morck et al. (2000) analyzed and concluded that idiosyncratic risk is higher in an efficient capital market. Daouk et al. (2006) explained that if the company's information environment allows market players to get information quickly, cheaply and reliably, firm-specific information will be absorbed more into stock prices than market-wide information. The better the company's information environment, the more firm-specific information is absorbed into the stock price and the lower the price synchronicity. An important issue related to stock price synchronicity is whether stock price variations caused by firm-specific information contain noise causing the stock prices deviate from fundamental values (Chan and Hameed, 2006).

Prior studies have shown that good corporate governance improves the quality of financial reports (Xie, et al., 2003; Gul et al., 2011; Budsaratragoon et al., 2013). One of the components of good corporate governance is the existence of the Board of Directors. Note that the term Board of Commissioner has a parallel function to the US Board of Directors. But the term Board of Directors has a different meaning for Indonesian public companies which reflects the members of top management. The purpose of this study is to provide evidence of a relationship between the characteristics of the Board of Commissioner on stock price synchronicity using a sample of Indonesian public companies. The characteristics of the Board of Commissioner that are of concern are the independence, size and gender of the Board of Commissioner. However, the focus is also on the moderating effect of industry complexity on the relationship.

II. LITERATURE REVIEW

A. Stock Price Synchronicity

Afficient market theory suggests that stock prices absorb market-wide information and firm-specific information quickly because market participants can digest any type of information. But Roll (1988) found that existing asset pricing models produce a low R² indicating a lower ability of market returns to explain individual variations in returns. Roll separates stock return variations into components caused by company-specific information and market-wide information. When investors rely on firm-specific information in stock trading rather than market-wide information, changes in stock prices will be strongly influenced by firm-specific information. On the other hand, if firm-specific information are not reliable, investors will turn to market-wide information. Therefore, Roll argues that the low R² linking firm stock return and market return in the United States is the result of market participants relying more on firm-specific information than on broad market information. Subsequent studies that try to identify the factors that cause the extent to which individual stock prices move to follow the market price index are often referred to as stock price synchronicity studies.

Various studies have attempted to identify the determinants of stock price synchronicity. Morck et al. (2000) found that capital market governance affects stock price synchronicity. Piotroski and Roulstone (2004) show that stock price synchronicity is positively related to analyst forecasting activity. Chan and Hameed (2006) provide evidence of a positive relationship between analyst coverage and stock price synchronicity. Meanwhile, Gul et al. (2010) found that foreign ownership and auditor quality are positively related to stock price synchronicity.

B. Complex Business Environment

Business diversification brings major changes to operational and control activities. Busman et.al (2004) argues that multi-industry and multinational companies face a complex managerial environment that leads to complex supervisory problems. Multinational companies with cross-border subsidiaries experience problems related to cultural differences and legal systems. In addition, geographical differences, currencies, high audit fees, legal systems, languages and cultures give rise to information complexity (Duru and Reeb, 2002; Denis et.al., 2002). Operational complexity also arises due to differences in tax systems and financial restrictions (Bodnar et.al. (1998).

The economic impact of diversification and the reasons behind it have been the subject of serious discussion and have filled the academic literature. Dennis et.al (2002) concluded that the costs that must be borne by the company due to industry diversification are greater than the benefits obtained. They argue that an increase in agency costs between managers and shareholders affects the capital allocation and focus of managers. In addition, the company's diverse activities and unrelated company segments create conflicts in corporate culture and operating style that can distract

managers from more strategic tasks. Owen and Polk (2000) find that diversification is negatively related to firm value, suggesting that diversification destroys firm value.

In addition to having a negative impact on firm value, diversification also creates a serious information asymmetry between parties within the firm, and between the firm and outside investors (Gilson et.al 2001). Diversification causes business activities and company information systems to become increasingly complex (Bushman et.al 2004). Diversification also causes segment reporting to be less informative (Givoly et.al., 1999). Peterson (2012) examines the effect of accounting complexity on the likelihood of revenue restatements. The results show that the accounting complexity associated with income measurement increases the probability of income restatement. In addition, revenue restatements occurred due to intentional and unintentional reporting errors.

Accounting complexity arises because of the difficulty in applying accounting standards when mapping a company's economic activities into accounting rules as a basis for recognizing and measuring accounting elements such as assets, liabilities, income, costs, and owner's equity (Francis and Gunn, 2015). The complexity of accounting in an industry requires specialized accounting knowledge to identify potential problems in a client's financial statements (Danos, 1989). The business trends and jargon used in an industry are often unique and specific to that industry.

C. Characteristics of the Board of Commissioner

Note that the Board of Commissioner is a unique term for an Indonesian company that refers to a group of people who are responsible for overseeing the board of directors. This term parallels the Board of Directors for American companies. But for Indonesian firms, Board of Directors refer to those who are responsible in managing firms. An effective Board of Commissioner prevents the company from abuse of authority by managers. Managers may feel compelled to exploit company resources in the absence of effective controls. Board of Commissioner must have more freedom to voice criticism openly to the Board of Directors. It is difficult to expect the Board of Commissioner to function effectively when all the commissioners are from within the company. They may feel reluctant to remind managers that the financial reporting practices adopted by the company have the potential to mislead users of financial statements. Klein (2002) provides evidence that the independence of the Board of Commissioner is negatively related to earnings management. Therefore, it is very important to include people outside the company who have no ties or interests with the company to sit on the Board of Commissioner. Independent board members are expected to be more courageous in expressing opinions openly in meetings held with the company's directors compared to non-independent

members, especially those related to the financial reporting process.

Several other studies have also found a relationship between Board independence and the supervisory performance, including Byrd and Hickman (1992), Beasley (1996), Dechow, et al. (1996), and Xie et al. (2003). The results of this previous study indicate that external commissioners improve the supervisory function of the Board in terms of disciplining managers. Lack of control motivates managers to act opportunistically and try to cover up adverse performance by choosing accounting and accrual policies. As a result, financial statements no longer present the actual condition of the company and have the potential to mislead users of financial statements. On the other hand, rational investors who doubt the accounting numbers may choose to ignore the financial information and turn to other sources of information. As a result, less company-specific information has been absorbed in stock prices, leading to increased price synchronicity. Based on these arguments, the relationship between Board independence and price synchronicity is stated in the following hypothesis:

H_{1a}: The independence of the Board of Commissioner is negatively related to the stock price synchronicity.

In some industries such as the service sector, the business model is not so complex that applying GAAP does not pose a problem. On the other hand, industries such as software development and industries with long life cycles such as construction have more complex business models and involve huge cash transactions, making GAAP implementation a bit more difficult. Therefore, differences in the inherent complexity between one industry and another are expected to affect the earnings quality of companies operating in different industries. Revenue recognition of firms in complex industries is expected to contain higher measurement error than firms in less complex industries. Because the financial statements of companies in complex industries contain more noise, they become less reliable and difficult to understand.

The moderating effect of industrial complexity is stated in the following hypothesis.

H_{1b}: Industry complexity affect the association between Independence of the Board of Commissioner and stock price synchronicity.

The supervisory function of the Board of Commissioner can also be influenced by the size of the Board of Commissioner. The accumulated skills, knowledge and experience of members of the Board of Commissioner are very useful in assisting them in carrying out their supervisory functions. As the number of members of the Board of Commissioner increases, the supervisory function is also expected to increase and the potential for abuse of authority to decrease. The skills and knowledge of members with different backgrounds increase the opportunity to find financial reporting practices that are not in accordance with acceptable

practices and thus, the quality of financial reports will also improve.

In addition to having diverse expertise and skills, the domination and pressure of managers against the Board of Commissioner becomes difficult. Therefore, the large size of the Board of Commissioner can increase investor confidence in the company's financial statements and thus, more financial information is absorbed by stock prices causing lower stock price synchronicity.

However, the results of previous studies showed inconsistent results. Dimitropoulos and Asteriou (2010) using data from the Greek capital market failed to find a significant relationship between the size of the Board of Commissioner and the quality of information. Meanwhile, Vafeas (2000) found that the higher the number of the Board of Commissioner, the lower the quality of reported earnings. The findings indicate that the size of the Board of Commissioner is positively related to stock price synchronicity. On the other hand, Budsaratragoon et al. (2013) found a positive relationship between the size of the Board of Commissioner and the quality of financial reports. The results indicate that the size of the Board of Commissioner and price synchronicity are negatively correlated.

Based on the inconsistent results, the relationship between the size of the Board of Commissioner and stock price synchronicity is not stated in a certain direction.

H_{2a}: The size of the Board of Commissioner is related to stock price synchronicity.

As previously explained, companies in complex industries will have difficulty reporting financial performance so that it will affect stock price synchronization. In carrying out its supervisory function, the Board of Commissioner will also experience difficulties in assessing the business practices of companies in complex industries and this will affect the quality of financial reporting. The effect of industry complexity is formulated in the following hypothesis:

H_{2a}: Industry complexity affect the association between the size of the Board of Commissioner and stock price synchronicity.

Gender diversity is expected to affect the implementation of corporate governance and the quality of information released by companies. Research conducted by Adams and Ferreira (2004) shows that companies that have a high variance of stock returns also have fewer female members of the Board of Commissioner. Similarly, Gul et al. (2011) argued that gender diversity affects the quality of information because female commissioners are more thorough and focused in carrying out the supervisory function of the Board of Commissioner. As female commissioners encourage more transparent financial reporting, more financial information will be absorbed in stock prices and in turn reduce price synchronicity. The relationship between gender diversity and stock price synchronicity

and the moderating effect of industry complexity is stated as follows:

H3a: Gender diversity of the Board of Commissioner is negatively related to stock price synchronicity.

H3b: Industry complexity affects the relationship between gender and stock price synchronicity.

III. METHODS

The sample was selected from public companies listed on the Indonesia Stock Exchange for the period 2014-2018. The company's financial data is obtained from the annual report which can be downloaded from www.idx.co.id and stock price data obtained from <https://finance.yahoo.com>. A total of 1350 observations that meet the sample criteria during the study period.

The following model is estimated for the test of hypothesis.

$$\text{Synch}_{it} = \beta_0 + \beta_1 \text{Bd_Indp}_{it} + \beta_2 \text{Bd_Size}_{it} + \beta_3 \text{Bd_Gen}_{it} + \beta_4 \text{Complex}_{it} + \beta_5 \text{Complex} * \text{Bd_Indp}_{it} + \beta_6 \text{Complex} * \text{Bd_Size}_{it} + \beta_7 \text{Complex} * \text{Gen}_{it} + \beta_8 \text{Lev}_{it} + \beta_9 \text{Std_ROA}_{it} + \beta_{10} \text{Growth}_{it} + \varepsilon_{it} \quad (1)$$

Where: Synch= Stok Price Synchronicity. Complex= Industrial complexity. Bd_Indp = Independence of the Board of Commissioner. Bd_Size= Board of Commissioner Size. Bd_Gen = Gender Diversity. Complex*Bd_Indp = Interaction Variable. Lev= Leverage. Fsize= Firm Size. Std_ROA = Earnings volatility (standard deviation of ROA). Growth= Company Growth.

Stock price synchronicity reflects the extent to which market participants rely on information originating from the company (firm specific information) rather than information outside the company (market-wide information). Higher stock price synchronicity indicates that the market relies on market-wide information rather than firm-wide information. Measuring stock price synchronicity involve two steps. The first step is to get adjusted R² from a market model that links individual returns to market returns. This study uses an extended market model as used in Gul et al. (2011).

$$\text{Ret}_{it} = \beta_0 + \beta_1 \text{Mret}_t + \beta_2 \text{Mret}_{t-1} + \beta_3 \text{Mret}_{t-2} + \beta_4 \text{Mret}_{t+1} + \beta_5 \text{Mret}_{t+1} + \varepsilon_t \quad (2)$$

Where: Ret_{it} = stock return of company i at time t (weekly); Mret_t = market return at time t (weekly).

The second step is to transform the adjusted R² from estimation of the market model as described below.

$$\text{SYNCH} = \log(\text{adj } R^2 / (1 - \text{adj } R^2)) \quad (3)$$

The process for determining industrial complexity involves two steps. The first step is to group companies into nine sectors based on the Jakarta Stock Exchange Industry Classification (JASICA). These sectors are (1), Mining (2), Basic and Chemical Industry (3),

Miscellaneous Industries (4), Consumer Goods Industry (5), Property, Real Estate and Building Construction (6), Infrastructure, Utilities & Transportation (7), Finance (8) and Trade, Services & Investment (9). The next step is to apply the criteria of Francis et.al (2015) to determine whether a company belongs to a complex or non-complex industry. Note that Francis et.al (2015) rely on two sources to measure industry complexity: FASB's Topic 900 and AICPA's Audit and Accounting Practice Guides. From these two sources, they looked for guidance on the application of certain accounting standards involving complex issues and guidelines for conducting audits. As a result, 18 industries are in the complex category and the remaining 28 industries are in the non-complex category. The industrial classification under JASICA was then mapped into complex and non-complex classifications of Francis et.al (2015).

Commissioners from outside the company are expected to improve the supervisory function of the Board of Commissioner. The reason is that independent commissioners have more freedom in expressing criticism compared to commissioners from within the company. Thus, the more commissioners who come from outside the company, the more independent the Board of Commissioner. In particular, the independence of the Board of Commissioner is measured by comparing the number of commissioners from outside the company with the number of commissioners on the Board of Commissioner. The size of the Board of Commissioner is measured by the number of Commissioners on the Board of Commissioner. And gender diversity is a dummy variable that takes 1 if a company has female commissioners and 0 otherwise.

Four control variables were included in the model to control for differences in firm characteristics. These variables are company size, company growth, Earnings volatility, and leverage. Previous studies have shown that these four variables were associated with stock price synchronicity (Piotroski and Roulstone, 2004; Chan and Hameed, 2006). Specifically, firm size is measured by the natural logarithm of total assets. Leverage is the ratio of total debt to total assets. Profit volatility is proxied by the standard deviation of profitability (ROA) for five years including the current year. The company's growth is the ratio of this year's total sales to the previous year's total sales.

IV. RESULTS AND DISCUSSION

The number of observations that meet the sample criteria and can be used for hypothesis testing is 1350 firm-years. However, 298 observations with extreme values were excluded from the sample, resulting in a final sample of 1052 observations. This is due to the adverse effect of extreme values on the regression results. The descriptive statistics are presented in Table 1.

Table 1. Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Standar Dev.
Synch	1052	-3	0.910	-1.511	0.718
Complex	1052	0	1	0.66	0.474
Bd_Indp	1052	0.25	1	0.409	0.104
Bd_Size	1052	2	11	4.250	1.764
Bd-Gen	1052	0	1	0.116	0.174
Lev	1052	0.0002	1.960	0.473	0.235
Fsize	1052	3.430	12.750	7.899	1.707
Std-ROA	1052	0.004	1.050	0,047	0.089
Growth	1052	-4.460	4.430	0.097	0.471

Table 1 shows the mean for stock price synchronicity (Synch) is -1.511 with a minimum and maximum value of -3 and 0.910, respectively. Note that the variable is the logarithm of the market model's coefficient of determination. Thus, no insightful interpretation can be deduced from the mean value. The mean for complexity (Complex) is 0.66 with a minimum value of 0 and a maximum of 1. The mean suggests that 66% of the sample companies operate in a complex business environment. Turning to the characteristics of the Board of Commissioner, the mean of 0.409 for Bd_Indp indicates that the percentage of independent commissioners has met the minimum requirement of 30% from the Indonesian Financial Services Authority. The mean for Bd_Size is 4,250, indicating that the minimum requirements of three commissioners set by the Financial Services Authority have also been met. The gender diversity (Bd_Gen) has a mean of 0.116, indicating that only 11.6% of women sit on the Board of Commissioner. This figure is very small to expect women commissioners to have a significant impact on the supervisory function of the Board of Commissioner. With regard to firm characteristics, descriptive statistics show that the sample is medium-sized firms with low debt ratios, moderate growth rates, and relatively low earnings volatility.

The regression estimates are reported in Table 2. The Bd_Indp coefficient of 0.036 (Sig.=0.274) indicates that the Independent Board of Commissioners is not significantly related to stock price synchronicity. Thus, H1a is rejected. Industrial complexity (Complex) is also insignificantly related to stock price synchronicity (Sig.=0.535). However, the interaction between industry complexity and the independence of the Board of Commissioners (COM*Bd_Indp) is negatively related to stock price synchronicity (Sig.=0.047) which leads to the acceptance of H1b. The results show that independent commissioners who work in complex industries are able to increase the credibility of financial reports. Higher financial report quality increases investor confidence in

financial statements, thereby reducing stock price synchronicity.

H2a predicts that Board of Commissioner Size is related to stock price synchronicity. Note that no specific direction is stated on the hypothesis due to mixed results found in previous studies. The results are consistent with the prediction. However, a positive regression coefficient indicates that a larger Board of Commissioner fails to perform its monitoring function effectively, leading to lower quality of financial reports. Lower quality financial reports erode investors' confidence, forcing them to turn to other sources of information and ultimately leading to high stock price synchronicity. The finding is not consistent with Vafeas (2000) who found that the size of the Board of Commissioner is negatively related to earnings quality. In contrast, the interaction variable (COM*Bd_Size) is not significantly related to stock price synchronicity, leading to the rejection of H2b. Note that the interaction effect of industry complexity changes the relationship between Board Size and stock price synchronicity. This is reflected in negative coefficient of COM*Bd_Size.

Female commissioners are expected to improve monitoring function of Board of Commissioner. The results contradict with the hypothesis. The quality of the financial statements of companies that have female members on the Board of Commissioner is no different from that of companies with only male members. This finding is inconsistent with the results of previous studies. Gul et al. (2011) reported that companies with different gender diversity in the Board of Commissioner have high information quality. As for interaction variable (COM*Gen), the results suggest that industry complexity does not affect the relationship between gender diversity and stock price synchronicity. Thus, H3a and H3b are not statistically supported.

Table 3. Board of Commissioner Characteristics and *Price Synchronicity*

Model	Unstandardized Coefficients		T	Sig.	Collinearity Statistics	
	B	Std. Error			Tolerance	VIF

(Constant)	-1.470	.061	-24.200	.000		
Bd_Indp	.036	.033	1.095	.274	.419	2.387
Bd_Size	.215	.037	5.821	.000	.335	2.985
Bd_Gen	.061	.233	.262	.794	.279	3.590
Complex	-.033	.054	-.621	.535	.707	1.414
COMxBd_Indp	-.086	.044	-1.984	.047	.426	2.347
COMxBd_Size	-.066	.046	-1.451	.147	.334	2.991
COMxGen	-.297	.275	-1.078	.281	.243	4.111
Std_ROA	-.356	.247	-1.442	.150	.960	1.042
Growth	.037	.046	.805	.421	.991	1.009
Lev	.029	.093	.317	.751	.968	1.033

***Significant at the 0.01 level (2-tailed); **Significant at the 0.05 level (2-tailed); * Significant at the 0.10 level (2-tailed)

V. CONCLUSIONS

Investors' beliefs about the quality and reliability of firm-specific and market-wide information determine the amount of information absorbed in stock prices. Stock prices absorb both types of information at different rates. If firm-specific information is less reliable, then market participants prefer broad market information in making investment decisions. Different market responses to the two groups of information cause variations in individual stock returns and market returns. The movement of individual stock returns following the change in market returns is called stock price synchronicity. Furthermore, stock price synchronicity reflects how much stock prices absorb firm-specific information and market-wide information. As before, this depends on the market's perception of the reliability of the information. One example of firm-specific information is financial statements. If the market believes in the reliability of financial statements, firm-specific information is absorbed more in stock prices than market-wide information. In such circumstances, stock price synchronicity decreases because individual stock returns do not change in proportion to changes in market returns. On the other hand, if the market does not believe in the reliability of financial statements and chooses to use other information in the market to trade stocks, then the synchronicity of stock prices will be high.

This study examines the effect of the characteristics of the Board of Commissioner represented by the independence of the Board of Commissioner, the size of the Board of Commissioner, and the gender diversity of the Board of Commissioner on stock price synchronicity. In addition, this study also examines the effect of industry complexity on the relationship between the characteristics of the Board of Commissioner and stock price synchronicity. Regression analysis shows that the size of the Board of Commissioner is related to stock price synchronicity. Different results were found for gender diversity and the independence of the Board of Commissioner where the two variables were not significantly related to stock price synchronicity. However, the interaction between industry complexity

and the independence of the Board of Commissioner is significantly negatively related to stock price synchronicity. Meanwhile, industry complexity as the main variable is not significantly related to stock price synchronicity. These findings indicate that the independent Board of Commissioner functions effectively in monitoring the company's financial reporting policies in complex industries. The interaction between gender and industry complexity is also not significantly related to stock price synchronicity. Surprising results were found for the interaction variable between the size of the Board of Commissioner and industry complexity which also showed an insignificant relationship with stock price synchronicity, although the size of the Board of Commissioner itself had a positive effect on stock price synchronicity. Overall, it can be concluded that industry complexity plays an important role in influencing the relationship between the independence and size of the Board of Commissioner with stock price synchronicity but not for the gender diversity of the Board of Commissioner.

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