

# Board Size and Performance of Manufacturing Companies in Emerging Country

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*Abstract:* - The purpose of this study is to determine the effect of board size on the performance of manufacturing firms in Indonesia. This study also evaluates the relationship of these aspects in large and small companies and separates subsamples of firms with and without dual CEOs. Meanwhile, the data were evaluated using a static estimator panel on a sample of 208 public trading industrial businesses from 2008 to 2017. The findings of this study indicated that, first, increasing the board size tends to boost manufacturing companies' performance. This is particularly prominent in large firms and those without dual CEOs. Therefore, the findings confirmed the agency theory, which holds that a larger board of directors improves firm performance through increased oversight by a wider group of people. Also, it explained the efforts to increase the number of directors that can advise CEOs, particularly in large firms and those without CEO duality.

*Key-Words:* - Board Size, Firm Performance, Manufacture

## 1 Introduction

Corporations in most countries have boards of directors explicitly charged with defending shareholders' interests. These boards have traditionally been legally obligated to advise and supervise the management and govern firms on behalf of shareholders. Generally, formulating business rules, establishing strategic goals, allowing significant transactions and new stock sales, declaring dividends, etc., are examples of fiduciary obligations. As the supervisory body that provides strategic direction, the board of directors is important to the internal processes of corporate governance procedures [1]. Therefore, it may be significant in regulating agency concerns that are important to corporate governance, particularly in monitoring executives [2]. A board may more carefully monitor its business and take appropriate governance action, providing the number of independent directors is sufficient to guarantee effectiveness [3].

Consequently, this study investigated the impact of board size on the performance of manufacturing companies in Indonesia. It also examined the relationship between these two aspects based on the categories of large and small companies and separated subsamples of companies with and without CEO duality. The study used a sample of 208 listed manufacturing companies from 2008 to 2017, and the data were analyzed via a static estimator panel. Subsequently, the study found that, first, board size tends to encourage an increase in the performance of

manufacturing companies. This finding was discovered to be more pronounced for large companies and those without CEO duality.

Meanwhile, this study was conducted in Indonesia, a developing country with an intriguing setting. Previously, numerous studies on ICD focused only on developed countries [4] – [14]. However, the capital markets in emerging countries differ significantly from those in developed nations. [15] demonstrated that developed countries had well-established stock capital markets, which majorly arose due to globalization and financial deregulation. As a result, examining the country's peculiarities is important to provide a more accurate description of its financial system [16].

Hence, this article significantly contributes to existing literature. Although numerous prior research studied the factors affecting company success, few have examined the effect of board size on business performance in emerging countries. Since the findings of prior research are inconsistent [4] – [14], this study aims to close this gap by determining the specific conditions where board size may affect firm performance. This may be critical for capital market authorities and businesses in regulating performance.

## 2 Literature Review

Generally, corporate governance is understood through the agency theory of business, which is a contract between the board of directors or the agent and the owner [17]. However, complications arise in

the event that an agent fails to perform the tasks agreed upon in the employment contract. Consequently, the board of directors is tasked with monitoring the performance and activities of human management to ensure the decisions made are in the owners' best interests. Previous studies by [17], [18], and [19] argue that large boards can be fewer effective monitors than smaller ones, based on the agency theory.

Although numerous studies have examined the possible effect of board size in predicting business performance, the evidence of this role is inconsistent.

Several found that board size tends to positively impact company performance. [4] conducted an empirical examination of this concept and discovered a negative correlation between company performance and board size for a sample of major US companies. After adjusting for firm size, [5] found that a positive association existed between the number of board directors and the value of the studied companies, which comprised 348 of Australia's biggest publicly listed firms. A favorable connection between the percentage of inside directors and a market-based measure of company success was also discovered. Likewise, [6] demonstrated that the positive connection between board size and company performance in Australia is driven by firm size, as such relationships exist exclusively in larger firm samples but not smaller ones.

Then, [20] used 174 banks between 1995 and 2002 to show that contrary to theories suggesting that smaller boards are more successful, increasing the number of directors has no negative impact on performance. This points to a favorable connection between board size and performance. [21] examined a sample of smaller companies with a history of poor operational performance and discovered that increasing the board size is linked with an improved share price. Also, [22] showed that board size favorably affects performance in Egyptian companies with CEO non-duality. Furthermore, [7] used a sample comprising FTSE100 components between 2010 and 2011 to demonstrate that the total number of directors, as a feature of the corporate board's composition, has a statistically significant and strongly beneficial influence on company performance.

Meanwhile, [23] showed that the board size of Indian companies tends to positively influence performance. [24] discovered that increasing the number of directors is related to improved firm performance in low and high board size categories. Also, [8] demonstrated that large boards decrease agency costs and increase firm value in UK firms. [25] emphasized the relevance of a modest board in

boosting an Islamic bank's performance compared to a larger one. The findings showed that an Islamic bank's board of directors should not be less than three members nor larger than six.

Conversely, according to many studies, board size has a detrimental influence on firm success. [9] investigated its impact on the performance of a sample of companies from the Netherlands, the United Kingdom, Denmark, France, and Italy. Subsequently, the findings revealed a negative association between the size of the board of directors and the company performance. Also, [26] concluded that larger boards had a dampening effect on bank performance from 1999 until 2003 in Thailand.

In addition, [10] used data from 1252 companies to show that larger boards are related to lower corporate performance or are negatively associated with return on assets. [11] also studied a sample of 500 firms from 1984 to 1992 and found a strong correlation between smaller boards and better business performance before the antitakeover legislation was passed. However, a much weaker relationship was observed after the takeover limits were enacted. According to [12], the detrimental effect of board size on business performance is most prevalent among large enterprises in Denmark. Conversely, the influence on small and medium-sized businesses with fewer boards is less clear.

By focusing on UK-based companies, [13] discovered that boards of directors have weak monitoring roles. However, the study found that detrimental effects of the board size are more likely to reflect the failure of the advisory role rather than its monitoring duty. They also discovered that bigger board sizes tend to negatively impact the performance of large corporations. Meanwhile, special emphasis was placed on family-owned small businesses in Finland. [14] showed that size influenced these small family boards with a maximum of six members. They discovered board size had a substantial negative correlation with company performance, even in this case. Finally, the findings of [27] on the performance of Indian manufacturing companies between 2011 and 2015 revealed that larger boards dampened company performance.

### 3 Methodology

The purposive sampling technique was used in this study to produce a representative sample based on preset criteria. Subsequently, the population comprised manufacturing enterprises listed on the Indonesian Stock Exchange (IDX) between 2008 and 2017. The criteria used to select the manufacturing enterprises sampled were (1) those listed on the

Indonesian Stock Exchange (IDX) between 2008 and 2017 and (2) those that provided complete data between 2008 and 2017. Manufacturing enterprises were solely sampled to avoid difficulties concerning differences in characteristics with nonmanufacturing firms. Following this screening process, a final sample of 208 firms was obtained.

Meanwhile, the key dependent variable was firm performance, which was measured using return on assets (ROA), as in [4], [8], [10], [13], [20], [23], [24], [25], and [28]. ROA is defined as the ratio of net profit to total assets, and a higher percentage equates to better company performance. Conversely, the primary explanatory variable was board size, defined as the logarithm of the total number of directors (BSIZE).

Subsequently, additional control variables were incorporated into the empirical model to eliminate the bias associated with omitted variables. The first was the Size of the Firm (SIZE). A bigger firm implies market strength, and a larger total asset base suggests a strong corporation, which can result in future profit growth. This implies that a company becomes more profitable with an increase in size

[26], [13]. Second, Liquidity (LIQ), measured as cash and its equivalents to total assets [29], [30]. Better liquidity conditions will support a company's operations and improve performance. Third, Leverage (LEV). The effect of an increase in a company's capital structure on performance is ambiguous. Although it positively impacts company financing, this increase may have a negative effect, particularly with improper management [8], [10], [13], [23], [25]. The fourth control variable was Dividend Policy (DIV). Changes in dividends are positively associated with future variations in profits and profitability, according to a prediction of the dividend signaling theory [31], [32]. The fifth was Inflation (INF), which causes a decrease in people's purchasing power, thereby reducing company sales and profitability [33], [34], [35]. Sixth, Gross Domestic Product (GDP). A rise in GDP will boost people's income and raise demand for products, thereby enhancing business performance [34], [36]. Table 1 summarizes the definition and measure variables.

Table 1. Definition and Measure Variables

Variables	Symbol	Definition and measure	Expected Sign
Performance	ROA	The ratio of net profit to total assets (%)	
Board Size	BSIZE	The overall number of the board members	+/-
Size of Firm	SIZE	Ln total assets	+
Liquidity	LIQ	Cash and its total asset equivalents (%)	+
Leverage	LEV	The ratio of total debt to total equity (%)	+/-
Dividend	DIV	Dummy variable, where the value 1 is given to companies that have paid dividends and 0 to those that have not.	+
Inflation	INF	Annual inflation rate (%)	-
Gross Domestic Product	GDP	Growth of GDP (%)	+

This study used the following regressions as the baseline model to examine the effect of board size on manufacturing firm performance:

$$ROA_{i,t} = \alpha_{i,t} + \beta_1 BSIZE_{i,t} + \sum_{k=1}^7 \delta_k CV_{i,t} + \varepsilon_{i,t} \quad (1),$$

where ROA signifies the firm performance as the dependent variable (in percentage) for firm *i* at time *t*, while BSIZE means board size and is the independent variable. CV represents the control variables *k* of firm *i* at time *t*, namely SIZE, LIQ, LEV, DIV, INF, and GDP. In addition, dummies were used to control for year effects.

Equation (1) was estimated using the panel statis estimator, comprising the ordinary least square/OLS, the fixed-effects/FE, and random-effect/RE estimator. The Breusch-Pagan Lagrangian multiplier

test can be employed for random effects, while the Hausman test can be used to choose between the three methods [37]. Subsequently, the Breusch-Pagan Lagrangian multiplier test was used to compare the PLS and FEM models. Then, the Hausman test compared the FEM and REM models. Generally, FEM is the best model for both tests, providing the *p*-value is significant [38].

## 4 Result and Discussion

Table 2 summarizes the descriptive statistics for all variables used in this study after extreme values of 1% and 95% were achieved. The return on assets' score demonstrated that the manufacturing companies in Indonesia performed satisfactorily between 2008 and 2017, as demonstrated by the

6.24% average. Meanwhile, the average board size was 4.01 members, with a minimum and maximum of two and eight members, respectively. Table 3 displays the correlation matrix for each independent variable. In this study, there was no evidence of

multicollinearity on the independent variable, as shown by the correlation coefficient value below 0.80. Hence, the model used in this study did not exhibit multicollinearity.

Table 2. Descriptive statistics for all variables (N = 955)

Variables	Mean	Std. Dev	Min	Max
ROA	6.2595	8.1217	-10.104	26.189
BSIZE	4.1026	1.5479	2	8
SIZE	23.575	4.8092	14.125	30.004
CASH	9.1093	8.4435	0.3743	37.132
LEV	49.820	20.274	11.399	85.280
DIV	0.3748	0.4843	0	1
INF	5.5601	2.7058	2.8	11.1
GDP	12.688	5.3434	7.5038	25.255

Table 3. Correlation Matrix

	BSIZE	SIZE	CASH	LEV	DIV	INF	GDP
BSIZE	1.0000						
SIZE	-0.1734	1.0000					
CASH	0.1944	0.0230	1.0000				
LEV	0.0174	0.0482	0.2548	1.0000			
DIV	0.0227	-0.0520	-0.0297	0.0492	1.0000		
INF	0.0543	-0.0089	0.0048	-0.0937	0.0064	1.0000	
GDP	0.0676	-0.0315	0.0198	-0.1656	0.0423	0.6050	1.0000

Table 4 contains a summary of the baseline results. In columns 1, 2, and 3, the effect of board size on firm performance was examined using several estimators. The study results consistently indicated that the respective coefficients were 0.3829 ( $p = 0.018$ ), 0.819 ( $p = 0.010$ ), and 0.515 ( $p = 0.018$ ), where OLS, FE, and RE are used. Hence, the primary finding is that board size positively affects the performance of manufacturing firms. The positive impact means that more board members in a

company signifies a higher likelihood of improved performance, as stated by previous research [4], [5], [6], [7], [8], [20], [21], [22], [23], [24], [25]. These findings indicate that the board of directors is critical in resolving agency conflicts at the core of corporate governance, particularly concerning executive oversight. The board closely monitors and takes appropriate governance actions to ensure the company's operations significantly benefit the stakeholders, thereby improving performance.

Table 4. Board Size and Firm Performance; Baseline

Explanatory Variable	Dependent Variable: ROA		
	OLS	FE	RE
	(1)	(2)	(3)
BSIZE	0.3829** (2.37)	0.819* (2.60)	0.515* (2.19)
SIZE	0.0072 (0.14)	0.116 (1.15)	0.0543 (0.73)
CASH	-0.0391 (-1.33)	-0.03 (-0.82)	-0.0405 (-1.23)
LEV	-0.0094 (-0.80)	-0.0388* (-2.07)	-0.0245 (-1.54)
DIV	7.8962*** (16.35)	4.663*** (6.34)	5.469*** (8.30)
INF	-0.0402	-0.297*	4.062

	(-0.26)	(-2.22)	-0.73
GDP	0.0060	0.129	-1.439
	(0.07)	(1.45)	(-0.99)
Constant	2.6344	1.202	1.123
	(1.25)	(0.43)	(0.16)
Year Dummy	Yes	Yes	Yes
R Squared	0.2321	0.1585	0.1531
F Test	21.80	4.20	
Prob > F	0.0000	0.0000	
Wald chi2			90.92
Prob > chi2			0.0000
Observation	955	955	955

Note: t statistics in parentheses; \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

Table 5 presents the empirical results regarding the effect of board size and firm performance in large and small firms. The results show that the relationship between board size and firm performance is positive and significant for all models. However, this finding was more pronounced in large firms, corresponding with the notion that bigger companies require improved monitoring. Therefore, greater board size

is necessary to ensure the effectiveness runs according to the stakeholder goals. These results indicate that the corporate governance mechanism in large companies corresponds with management objectives, as shown in previous studies by [4], [6], [7], [22], [23], [24].

Table 5. Board Size and Firm Performance; Large vs. Small Firms

Explanatory Variable	Dependent Variable: ROA						
	Large Firms				Small Firms		
	OLS	FE	RE		OLS	FE	RE
	(1)	(2)	(3)		(4)	(5)	(6)
BFSIZE	0.6850***	0.9756***	0.8495***		0.1024	0.3865	0.0986
	(2.83)	(2.64)	(2.92)		(0.45)	(0.68)	(0.26)
SIZE	-0.0332	0.0817	0.0643		-0.2639***	0.1748	-0.0168
	(-0.22)	(0.77)	(0.67)		(-2.78)	(1.04)	(-0.12)
CASH	-0.0143	0.0219	0.0021		-0.0739	-0.0800	-0.0893
	(-0.36)	(0.51)	(0.05)		(-1.65)	(-1.63)	(-1.88)
LEV	-0.0191	-0.0503**	-0.0345		0.0069	-0.0257	-0.0109
	(-1.09)	(-2.17)	(-1.65)		(0.41)	(-0.73)	(-0.40)
DIV	7.991***	3.253***	4.548***		7.843***	5.695***	6.148***
	(11.38)	(3.42)	(5.31)		(11.54)	(5.95)	(6.92)
INF	-0.1722	-0.2024	9.6724		0.0218	-0.3363	-3.923
	(-0.73)	(-1.03)	(1.37)		(0.10)	(-1.66)	(-0.44)
GDP	-0.0356	-0.0300	-2.7169		0.0632	0.2297	0.4021
	(-0.30)	(-0.27)	(-1.42)		(0.53)	(1.73)	(0.18)
Constant	4.4752	3.3380	-6.8175		7.4380**	0.5084	13.717
	(0.93)	(1.11)	(-0.83)		(2.38)	(0.11)	(1.35)
Year Dummy	Yes	Yes	Yes		Yes	Yes	Yes
R Squared	0.2329	0.1069	0.1005		0.2611	0.2474	0.2392
F Test	10.71	3.10			14.22	3.51	
Prob > F	0.0000	0.0000			0.0000	0.0001	
Wald chi2			69.74				73.27
Prob > chi2			0.0000				0.0000
Observation	490	490	490		465	465	465

Note: t statistics in parentheses; \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

Table 6 shows the effect of board size on firm performance. Here, the subsample was divided into two groups comprising companies with and without dual CEOs. Subsequently, the study's findings indicated that board size had no effect on companies with dual CEOs but positively affected those without this structure. These findings corroborate [22], which indicated that the CEO dual leadership structure may obstruct external directors from exercising their

authority in overseeing management. Therefore, adopting CEO duality in a firm with a sizable board of directors is more likely to negatively impact financial performance. This is because the structure may impair the directors' performance by reflecting the CEO's relative authority in establishing the board's agenda, regulating information flow, and undermining the independence of external members.

Table 6. Board Size and Firm Performance; CEO Duality vs. No CEO Duality

Explanatory Variable	Dependent Variable: ROA						
	CEO Duality			No CEO Duality			
	OLS	FE	RE	OLS	FE	RE	
BSIZE	0.1864 (0.53)	1.1828 (1.53)	0.6478 (1.28)	0.4216** (2.29)	0.6766* (1.73)	0.4968* (1.77)	
SIZE	0.1286 (1.34)	0.2347 (0.54)	0.1137 (0.79)	-0.0752 (-1.18)	0.1278 (0.99)	0.0368 (0.38)	
CASH	-0.0596 (-1.16)	0.0179 (-0.28)	-0.0433 (-0.77)	-0.0353 (-0.97)	-0.0269 (-0.69)	-0.0263 (-0.71)	
LEV	-0.105*** (-4.95)	-0.191*** (-3.41)	-0.116*** (-3.27)	0.0274** (1.99)	-0.0067 (-0.35)	0.0034 (0.21)	
DIV	7.082*** (7.81)	5.108*** (3.10)	5.946*** (4.53)	8.037*** (13.92)	4.398*** (5.50)	5.168*** (7.07)	
INF	-0.2814 (-0.90)	-0.5034 (-1.77)	11.731 (-1.34)	-0.0036 (-0.02)	-0.2048 (-1.37)	-0.7451 (-0.11)	
GDP	-0.0733 (-0.41)	0.0529 (0.27)	-2.916 (-1.24)	0.0533 (0.56)	0.1781* (1.71)	-0.4811 (-0.28)	
Constant	8.0018 (1.86)	5.0147 (0.43)	-8.8394 (-0.92)	1.8347 (0.74)	-0.9702 (-0.25)	7.9487 (0.93)	
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	
R Squared	0.2551	0.2775	0.2539	0.2625	0.1622	0.1569	
F Test	7.19	2.56		18.21	3.76		
Prob > F	0.0000	0.0043		0.0000	0.0000		
Wald chi2			44.74			78.39	
Prob > chi2			0.0000			0.0000	
Observation	283	283	283	658	658	658	

Note: t statistics in parentheses; \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## 5 Conclusion

The purpose of this study was to determine the effect of board size on the performance of Indonesian manufacturing enterprises. Also, the relationship between these aspects was investigated in large and small company categories, and the sub-samples of organizations with and without CEO duality structures were separated. A static estimator panel was used to assess data from 208 public trading and manufacturing businesses from 2008 to 2017. The study revealed that, first, increasing the size of a company's board of directors tends to boost its performance. This finding is more prominent in large organizations and companies without CEO duality. Importantly, the data confirm the agency theory,

which holds that a bigger board size improves business performance due to monitoring from a larger group of individuals. Therefore, these findings support measures to increase the number of board directors that can advise CEOs, particularly in large enterprises and organizations without CEO duality.

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## Authors' Contribution

Michael Hadjaat is tasked with oversight.

Anisa Kusumawardani conceptualized the work.

Musviyanti is in charge of data curation.

Yana Ulfah is responsible for methodology.

Rizky Yudaruddin is in charge of editing and proofreading tasks.

Yanzil Azizil Yudaruddin is in charge of writing the initial draft.