



The Effect of Capital Structure, Family Ownership and Board of Commissioners and Audit Committee Effectiveness on the Efficiency of Manufacturing Companies

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ABSTRACT

This research aims to provide empirical evidence regarding the effect of capital structure, family ownership and effectiveness of the board of commissioners and the audit committee on the level of efficiency in manufacturing companies. Efficiency is measured using Data Envelopment Analysis (DEA) scores, while board of commissioners and audit committee effectiveness is measured using a method developed by Hermawan (2011). The hypotheses are examined using panel data regression with the fixed effects method for a sample of 100 manufacturing companies listed on the Indonesia Stock Exchange for the period 2008–2012. The results of this research conclude that companies with higher leverage are able to attain higher efficiency in their operations. Companies with greater board of commissioners effectiveness can also attain higher efficiency in their operations. Meanwhile, family ownership and audit committee effectiveness have no significant impact on efficiency in the companies studied.

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INTRODUCTION

The presence of external financing within the capital structure of public companies, i.e. debt and stock, can inherently lead to agency problems between management (as the agent) and stockholders (as the principal). Agency problems can trigger agency costs, which become additional costs for companies in operating their businesses. Hence, the occurrence of agency costs may also affect companies' efficiency (Jensen and Meckling, 1976).

Family-owned companies tend to experience less in the way of agency problems than public companies. The owner-managers of family companies tend to have less incentive to utilise the company's resources for their own personal interest (i.e. perquisite consumption), with this incentive also decreasing in line with an increase in family owner-managers' levels of stock ownership (Fama and Jensen, 1983; Ang et al., 2000). Ang et al. (2000) and Anderson et al. (2003) found that agency costs tend to be lower in companies that are family owned and controlled. In addition, Margaritis and Psillaki (2010) and Chu (2011) found that family-owned and controlled companies tend to be more efficient and more profitable than non-family-owned companies.

Agency costs are affected by the composition of debt and stock in the firm's capital structure. The existence of debt in the company's capital structure could reduce the agency costs of free cash flow that are caused by agency problems between management and stockholders regarding the firm's dividend payout policy. The existence of debt within the company's capital structure may also have a motivational effect for companies in terms of enhancing their ability to operate in a more effective and efficient manner and ensure that they can deliver the future cash flows promised to creditors (Jensen, 1986). Berger (2002), Ab-Rahim et al. (2012), Margaritis and Psillaki (2007) and Margaritis and Psillaki (2010) all found that companies with higher leverage in their capital structure tend to have a higher level of efficiency than firms with lower leverage.

In response to agency problems and anticipating the emergence of agency costs, companies seek to implement corporate governance practices in their business operations. The Organisation for Economic Co-operation and Development (OECD) (2004) states that the practice of corporate governance is a key element in improving efficiency and growth by improving the quality of the relationships between a company's management, board, shareholders, creditors and other stakeholders. Gul et al. (2012) found that good corporate governance (GCG) practices have the potential to reduce a company's agency costs. Furthermore, Zelenyuk and Zheka (2006), Li and Duncan (2009) and Hsu and Pongpich (2010) found that companies with good-quality corporate governance were able to operate more efficiently.

In Indonesia, the practice of corporate governance has come to be seen as an important aspect of a company's operations, as shown by the formation of a national committee on governance called Komite Nasional Kebijakan Governance (KNKG). Furthermore, the government has issued a national law on limited liability companies (i.e. Undang-Undang No. 40 Tahun 2007 Perseroan Terbatas) and Bapepam-LK Regulation No. IX.I.5, in addition to Indonesia Stock Exchange Regulation No. I-A regulating the practice of corporate governance within companies. Based on the Guidelines for Good Corporate Governance established by KNKG (2006) and government regulations regarding corporate governance practices, the Board of Commissioners (BOC) is collectively responsible for supervising the implementation of GCG practices within a company. The BOC should also establish an audit committee to support the implementation of its oversight function. Thus, the effectiveness of the BOC and audit committee plays an important role in determining the quality of corporate governance in the company.

The objective of this research is to provide empirical evidence regarding the effect of capital structure, family ownership and BOC and audit committee effectiveness on a company's efficiency. The study is unique as it incorporates the Data Envelopment Analysis (DEA) method. The DEA method for calculating efficiency is unique to manufacturing industry research as it is mostly used in the banking industry and provides the ability to generate an insightful detailed illustration of whether the targeted efficiency level can be achieved or not.

This research enriches the previous literature by shedding light on the crucial factors affecting manufacturing firm efficiency in Indonesia and also enriches related past research in the context of manufacturing industry in production-intensive countries like China (He et al., 2013; Lin et al., 2009) and Taiwan (Chiang and Lin, 2007). This research emphasises the importance of corporate governance mechanisms by focusing on the impact of BOC and audit committee effectiveness on efficiency that may increase the incentive for GCG implementation. This study will be of specific benefit to Indonesian regulators, the

management of manufacturing firms and investors, for use in assessing the efficiency of manufacturing firms and when seeking to increase a firm's efficiency.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Agency Theory

In a family-owned company, the source of funding is the personal wealth of the company's owners, who also usually act as the company's management and make the decisions regarding the company operations. In a public company that is funded by external financing, i.e. stock and debt, there is an agency relationship between the company's management and shareholders, i.e. a contract between the stockholders (as the principal) and the company's management (as the agent), in which the company's management has the authority to run the operation, including the authority to make decisions on behalf of stockholders (Jensen and Meckling, 1976).

In an agency relationship, the possibility of conflict (agency problems) arises due to the fact that both parties, i.e. agent and principal, may seek to act as utility maximisers based on the motive of maximising their own utility. Agency problems may occur due to a separation of the ownership and control functions, a divergence of the interests of the management and principal, and also the presence of asymmetric information between the management (agent) and stockholders (principal). The existence of agency problems may lead to agency costs in the form of monitoring costs, bonding costs and residual loss. Aside from the existence of stocks (outside equity) in the company's capital structure, agency costs may also arise from the presence of debt in the company's capital structure. This debt may comprise wealth opportunity loss due to debt from corporate investment decisions, monitoring costs and bonding costs by bondholders, and bankruptcy and reorganisation costs (Jensen and Meckling, 1976).

Board of Commissioners and Audit Committee Effectiveness

Corporate governance constitutes a set of rules that define the relationship between shareholders, managers, creditors, government, employees and internal and external stakeholders, related to the rights and responsibilities of each party that aims to create added value for stakeholders (Forum for Corporate Governance in Indonesia, 2011). A company will implement corporate governance practices in its business operations in response to agency problems and if it anticipates the emergence of agency costs. Dey (2008) found that companies with a high level of agency problems tend to have a better quality of corporate governance, as measured by the effectiveness of the BOC, the quality of independent auditors and the effectiveness of the audit committee. Moreover, Gul et al. (2012) found that GCG practices, i.e. board independence and the separation of the CEO and chairperson positions, can reduce agency costs. Zelenyuk and Zheka (2006), Li and Duncan (2009) and Hsu and Pongpich (2010) found that companies with GCG are able to operate more efficiently since they are not likely to experience any serious agency problems that may have an impact on their efficient utilisation of resources, thus leading to a risk of inefficiency.

Based on Indonesian laws and regulations and the corporate governance guidelines issued by the KNKG (2006), the BOC and audit committee have key roles in determining the quality of corporate governance practices through the activities they perform in monitoring company performance. Based on the national law on limited liability companies (i.e. Undang-Undang No. 40 Tahun 2007 Perseroan Terbatas), the BOC supervises the management's policies and activities in running the company's business and advises the board of directors in accordance with the company's objectives. Meanwhile, also based on the KNKG (2006) corporate governance guidelines, the audit committee assists the BOC in ensuring that (1) the financial statements are presented fairly and in accordance with generally accepted accounting principles, (2) the internal control structure is well executed, (3) the processes of internal and external audit are conducted in accordance with the applicable standards, and (4) follow-up actions arising from previous audit findings are well conducted by management. Therefore, the effectiveness of the BOC and audit committee can be a key factor in the quality of corporate governance practices. The effectiveness of the BOC and audit committee can effectively encourage more effective and efficient operations in order to maximise the value of the company.

Hermawan (2011) explains that BOC effectiveness can be assessed using the following four characteristics: independence, activity, size and competence. Meanwhile, audit committee effectiveness can be

assessed by examining the three characteristics of activity, size and competence. A BOC that is more independent is considered to be more objective in the execution of its monitoring activities over the performance of the management in order to encourage companies to operate more efficiently. In addition, through more monitoring activities, both the board and the audit committee have more opportunities to monitor company performance (Hsu and Pongpich, 2010; Huang et al., 2011). A larger audit committee and BOC usually include people from a variety of backgrounds and with a range of knowledge and different levels of experience, thereby enabling the inclusion of various opinions and viewpoints. This condition may improve the quality of the monitoring activities conducted by the BOC and the audit committee over management performance, thus encouraging companies to operate more efficiently. Meanwhile, the competence of the BOC and audit committee may increase the effectiveness of their monitoring in such a way as to encourage the management to be more effective and efficient (Hsu and Pongpich, 2010; Huang et al., 2011).

Effective supervision of both the BOC and audit committee may reduce the agency costs in a company (Gul et al., 2012). Oversight by the BOC and audit committee will create pressure on the agent to effectively allocate factors of production and inputs. It may reduce the potential for input misallocation as well as the agent's inadequate motivation to allocate inputs and other productions problem (Leibenstein, 1966; Kim and Maksimovic, 1990). Such an ability may encourage companies to operate more efficiently. Based on consistent findings that the BOC and audit committee, through their respective characteristics, have the ability to increase firm efficiency, the following hypotheses are developed:

H1a: Board of Commissioners effectiveness is positively associated with firm efficiency level.

H2a: Audit Committee effectiveness is positively associated with firm efficiency level.

Family Ownership

Claessens et al. (2000) determined that more than 60% of the companies listed on the stock exchanges of countries in the East Asia region are controlled by an ultimate owner through a pyramidal ownership structure and cross-shareholdings between companies. Furthermore, 60% of the companies that are controlled by ultimate owners also have members in the company management with a family connection or some other affiliation to the ultimate owner.

The concentration of family ownership in a company can act as a barrier to the establishment of a regulatory framework for corporate governance and economic activity in the future. However, Fama and Jensen (1983) explain that the agency problems in family-owned companies tend to be lower than those in companies with dispersed ownership.

In family-owned companies, the family owner (as the principal) tends to have the ability to influence the agent's decision or even to sit on the company's management board. For family owners, the incentive to use the company's resources to maximise personal benefit (perquisite consumption) tends to be lower and decrease with increased ownership of the company's stock. The benefit gained from a claim on corporate profits and value is considered to be larger and tends to increase in line with increased ownership of company stock compared to the benefits gained from perquisite consumption, which tend to be constant. Decreased levels of agency problems in family-owned companies have been shown to result in lower agency costs due to reduced monitoring and bonding costs and the potential residual loss resulting from perquisite consumption (Jensen and Meckling, 1976; Fama and Jensen, 1983; Ang et al., 2000).

Decreased agency costs can reduce the potential for misallocation of inputs in the production process that may lead to a suboptimal level of output produced from a combination of certain inputs (Kim and Maksimovic, 1990). In addition, the motivational effect of debt may eliminate the problem of inadequate motivation that can lead to the agent performing a suboptimal allocation of the inputs and other factors of production required to produce the output (Leibenstein, 1966). This reduced potential for a misallocation of inputs and inadequate motivation in allocating inputs and other production factors in the production process may encourage companies to operate more efficiently.

Several prior studies have analysed the relationship between company ownership structure and agency costs. Anderson et al. (2003) found that the agency cost of debt tends to be lower in family-owned companies. Margaritis and Psillaki (2010) also found that family-owned companies tend to be more efficient and more profitable. The results found by a number of previous studies are consistent with research by Fama and Jensen (1983), who explained that family ownership of a company negatively affects agency costs so as to increase the

level of company efficiency. Since prior research has largely considered that family ownership has a positive effect on the efficiency level of manufacturing firms, our third hypothesis is as follows:

H3a: Companies with high family ownership have higher efficiency levels than other companies.

Capital Structure

In order to achieve their goal, which is to maximise shareholder wealth through increased corporate value, companies need adequate funding in order to build their business operations or make the investment decisions needed to grow the company. Management may choose alternative sources of funding, which may be in the form of stocks or debt (Ross et al., 2010). However, the existence of external financing (equity and debt) as part of the firm's capital structure would inherently lead to agency cost. An increase in the proportion of debt within a company's capital structure would increase its agency cost of debt and lower the agency cost of stocks, and vice versa. Therefore, management needs to determine the optimum composition of stock and debt within the company's capital structure that minimises total agency cost and maximises the value of the company (Jensen and Meckling, 1976).

The existence of debt within the company's capital structure may reduce the agency costs of free cash flow that are caused by agency problems between management and stockholders regarding dividend payout policy and investment decisions. In addition, the existence of debt in the company's capital structure may also provide a motivational effect for companies to enhance their capabilities to operate in a more effective and efficient manner, so that companies are able to deliver on the future cash flow promises made to creditors. A failure by the company to deliver the future cash flows promised to creditors may result in a lawsuit against the company, which may jeopardise its sustainability (Jensen, 1986).

Decreased agency cost would reduce the potential for a misallocation of inputs in the production process and lead to a suboptimal level of output produced from a given combination of inputs (Kim and Maksimovic, 1990). In addition, the motivational effect of debt may eliminate the problem of inadequate motivation that leads to a suboptimal allocation of the inputs and other factors of production by the agent to the production process (Leibenstein, 1966). This reduced potential for misallocation of inputs and inadequate motivation in allocating inputs and other production factors to the production process may encourage companies to operate more efficiently. This indicates that the level of corporate leverage has a positive effect on the efficiency level of the company.

The relationship between capital structures and corporate efficiency levels has been analysed in several previous studies. Margaritis and Psillaki (2007) and Margaritis and Psillaki (2010) found that companies with higher leverage in their capital structure tend to have a higher level of efficiency than firms with lower leverage. Similarly, Nasr (1996) found that firms with higher leverage in their capital structure tend to have higher technical efficiency. Research by Berger (2002) showed that firms with higher leverage in their capital structure tend to have higher profit efficiency. Ab-Rahim et al. (2012) also found that companies with a higher capital-to-asset ratio tend to have lower levels of efficiency. These findings further indicate that the level of corporate leverage has a positive effect on the efficiency level of the company and leads to our fourth hypothesis as follows:

H4a: Leverage is positively associated with firm efficiency level.

Efficiency

Efficiency can be described as a comparison of the actual quantity of inputs used and outputs produced against the frontier of the optimal quantity of inputs and outputs. There are two types of efficiency: technical efficiency, which is the ability to produce a maximum number of units of output from a given number of units of input, and price efficiency,¹ which is the ability to use units of input to produce units of output in optimal proportions (e.g. between capital and labour) based on the costs incurred in doing so. The combination of technical efficiency and price efficiency will result in economic efficiency (Farrel, 1957; Daraio and Simar, 2007).

¹ Price efficiency in Farrel's research (1957) is defined as allocative efficiency in many other studies (Coelli et al., 2005). Thus, the term 'price efficiency' as seen in Farrel (1957) will be referred to as 'allocative efficiency' in this research.

A company can achieve technical efficiency if it is able to operate at the level of the production frontier, i.e. the maximum number of units of output are produced from each unit of input. The most frequently used model to measure efficiency is a non-parametric deterministic model through the use of DEA (Coelli et al., 2005; Daraio and Simar, 2007). Previous research in China and Taiwan (He et al., 2013; Lin et al., 2009; Chiang and Lin, 2007) regarding the impact of corporate governance on the efficiency of manufacturing firms also used DEA as a proxy for efficiency. Essentially, DEA measures productivity as the ratio of weighted outputs to weighted inputs in each decision making unit (DMU), as described in Equation 2.1.

$$\frac{\text{weighted sum of inputs}}{\text{weighted sum of outputs}} = \frac{\sum_{i=1}^S u_i y_{iq}}{\sum_{j=1}^m v_j x_{jq}} \quad (1)$$

Where:

- y_{iq} = known i^{th} output for DMU q
- x_{jq} = known j^{th} input for DMU q
- u_i = weight of the i^{th} output at DMU q
- v_j = weight of the j^{th} input at DMU q .

DEA estimates the efficiency frontier through linear programming with a non-parametric frontier approach that uses a weighted ratio of outputs to weighted inputs from all of the DMUs of a company and is calculated by Equation 2.1. The DEA efficiency score serves as a comparison between the efficiency of a DMU and the optimum efficiency score on the efficiency frontier (Charnes et al., 1978). Since DEA incorporates linear programming in its method, it enables efficiency to be measured with no requirement for the input and output data to use the same units. However, DEA can only be employed in a homogeneous industry in order to generate a comparable result.

There are two approaches that can be used to measure efficiency when determining the form of the efficiency frontier (Coelli et al., 2005), i.e. the input-oriented approach and the output-oriented approach. The input-oriented approach focuses on the perspective of cost minimisation, i.e. how far the number of input units can be reduced without changing the number of units of output generated. An input-oriented efficiency frontier indicates the minimum combination of inputs that can be used to produce a given level of output. Meanwhile, the output-oriented approach focuses on the revenue-maximising perspective, i.e. the maximum level to which the units of output can be increased without changing the number of units of input used. The output-oriented efficiency frontier demonstrates the maximum output that can be generated from a particular combination of inputs.

Schaar and Sherry (2008) state that there are three models of DEA which can be utilised to estimate the efficiency frontier and measure the efficiency level. These are:

- a. The Charnes–Cooper–Rhodes (CCR) model that uses a constant-returns-to-scale (CRS) assumption, i.e. a constant ratio between output and input;
- b. The Banker–Charnes–Cooper (BCC) model that uses a variable-returns-to-scale (VRS) assumption, i.e. increases in input and output are not of the same proportion, so the efficiency frontier formed will be either convex or concave; and
- c. The Slacks-based measure (SBM) model that calculates the value of the input and output ‘slacks’ on the frontier.

RESEARCH DESIGN

The first model of the research, as described in Equation 3.1, aims to test the research hypotheses; thus, whether the company’s capital structure, company’s family ownership and the effectiveness of the BOC and audit committee have a significant effect on the company’s efficiency level. In addition, this research adds several control variables to the model, i.e. company size, profitability and tangible fixed assets.

$$EFF_{it} = \beta_0 + \beta_1 BOCScore_{it} + \beta_2 AUCScore_{it} + \beta_3 FAMOWN_{it} + \beta_4 LEVERAGE_{it} + \beta_5 SIZE_{it} + \beta_6 PROFIT_{it} + \beta_7 TANGIBLE_{it} + \varepsilon_{it} \quad (2)$$

For additional testing, as described in Equation 3.2, the second model of the research aims to analyse those characteristics of the BOC and audit committee that have a significant effect on the company's efficiency level. Therefore, the scores obtained for the effectiveness of the BOC and audit committee will be split into the scores for each characteristic, with the other variables remaining the same as in the first model.

$$EFF_{it} = \beta_0 + \beta_1 BOCIND_{it} + \beta_2 BOCACT_{it} + \beta_3 BOCSIZE_{it} + \beta_4 BOCCOMP_{it} + \beta_5 AUCACT_{it} + \beta_6 AUFSIZE_{it} + \beta_7 AUCCOMP_{it} + \beta_8 FAMOWN_{it} + \beta_9 LEVERAGE_{it} + \beta_{10} SIZE_{it} + \beta_{11} PROFIT_{it} + \beta_{12} TANGIBLE_{it} + \varepsilon_{it} \quad (3)$$

Where:

- EFF_{it} = Efficiency level measured by DEA with the CCR model, using net sales as output and cost of sales, number of labourers and tangible fixed assets as input.
- $BOCScore_{it}$ = Board of Commissioners effectiveness score as measured using a method developed by Hermawan (2011) through an assessment of the BOC characteristics of independence, activity, size and competence.
- $BOCIND_{it}$ = Board of Commissioners independence score as measured by a method developed by Hermawan (2011).
- $BOCACT_{it}$ = Board of Commissioners activity score as measured by a method developed by Hermawan (2011).
- $BOCSIZE_{it}$ = Board of Commissioners size score as measured by a method developed by Hermawan (2011).
- $BOCCOMP_{it}$ = Board of Commissioners competence score as measured by a method developed by Hermawan (2011).
- $FAMOWN_{it}$ = Dummy variable to describe family ownership in the company, i.e. '1' for a company with more than 50% of the company's total stock in family ownership, and '0' for a company with less than 50% of the company's total stock in family ownership. The definition of 'Family' refers to Arifin (2003), i.e. individuals and companies whose ownerships are mandatory to be disclosed (at a minimum of 5% of total stock ownership), except public companies, state-owned companies, financial institutions or members of the public whose ownerships are not mandatory to be disclosed.
- $LEVERAGE_{it}$ = Company's capital structure as measured by the Debt to Equity ratio.
- $AUCScore_{it}$ = Audit Committee effectiveness score as measured by a method developed by Hermawan (2011) through an assessment of the Audit Committee characteristics of activity, size and competence.
- $AUCACT_{it}$ = Audit Committee activity score as measured by a method developed by Hermawan (2011).
- $AUFSIZE_{it}$ = Audit Committee size score as measured by a method developed by Hermawan (2011).
- $AUCCOMP_{it}$ = Audit Committee competence score as measured by a method developed by Hermawan (2011).
- $SIZE_{it}$ = Company size as measured by the natural logarithm of total assets.
- $PROFIT_{it}$ = Company profitability as measured by return on assets (ROA).
- $TANGIBLE_{it}$ = Company's characteristic of capital/labour intensity as measured by the ratio of net tangible fixed assets to total assets.

Technical efficiency is measured using the CCR method as opposed to either of the other two options for DEA calculation. The reason is that the CCR method uses a CRS assumption that enables a constant comparison between output and input value (Schaar and Shelly, 2008). The CRS method eliminates the difference between the technical efficiency input-oriented and the technical efficiency output-oriented measures.

The method developed by Hermawan (2011) with regard to the variables for BOC and audit committee characteristics is basically a checklist of certain factors for use in assessing the effectiveness of both groups. This checklist is a compilation of the list of questions used by the Indonesian Institute for Corporate Directorship for their 2005 corporate governance index determination, with some modifications supported by the literature pertaining to this study. The checklist is provided in Appendices 1 and 2.

Here, hypothesis testing was carried out using panel data regression analysis, with the panel regression model (pooled least squares, fixed effects or random effects) selected based on the Chow test and Hausman test.

The sample selection was performed using a purposive sampling method, i.e. sample selection based on the predetermined criteria as follows:

1. Companies in the manufacturing industry listed on the stock exchange during the period 2008–2012.
2. The company has a financial period ending 31 December.

3. The company has not been delisted during the period 2008–2012.
4. The company has not faced any corporate action during the period 2008–2012.
5. The company provided annual reports, financial reports and other data relevant to the research, in full, during the period 2008–2012.

DISCUSSION AND ANALYSIS

Descriptive Statistics

For the sample selection for the study population, 100 companies met the purposive sampling criteria for inclusion in the research sample, with a total number of 427 observations. Unbalanced panel data were used.

The descriptive statistics (Table 4.1) show that the average efficiency score (EFF) is 0.618, which indicates that, on average, the sample companies were able to reduce their inputs by as much as 0.382 while still maintaining their output level. Average leverage (LEVERAGE) is 0.602, indicating that the capital structure of the sample firms contains an average proportion of 49.1% of total assets financed by liabilities. Average Family Ownership (FAMOWN) is 0.389, which means that 38.9% of the observations are for companies with a high level of family ownership, while 61.1% of all observations are for companies with a low level of family ownership.

Table 1 Descriptive Statistics of the Research Variables for the Period 2008–2012

	Mean	Median	Max.	Min.	Std. Dev.
EFF	0.618	0.579	1	0.240	0.170
BOCSORE	34.461	34	47	18	4.175
AUCSCORE	23.691	24	32	11	4.487
FAMOWN	0.389	0	1	0	0.488
LEVERAGE	0.602	0.523	2.21	0,04	0.491
SIZE (in USD million)	424,759	107,016	6,647,500	4,843	937,158
PROFIT	0.092	0.065	0.656	-0.62	0.140
TANGIBLE	0.381	0.353	0.984	0.01	0.209

Sample size = 427. EFF = Efficiency level measured by DEA method, BOCSORE = Board of Commissioners Effectiveness score, AUCSCORE = Audit Committee Effectiveness score, FAMOWN = Dummy variable, '1' for a company with a high level of family ownership and '0' for a company with a low level of family ownership, LEVERAGE = Capital Structure measured by the Debt to Equity ratio, SIZE = Company size measured by natural logarithm of total assets, PROFIT = Company's profitability measured by ROA, TANGIBLE = Company's tangible fixed assets measured by the ratio of net tangible fixed assets to total assets.

In this research, the effectiveness of the BOC and audit committee are measured using an assessment method developed by Hermawan (2011) that focuses on the characteristics of the BOC and audit committee. The assessment of BOC effectiveness consists of 17 questions, while the assessment of audit committee effectiveness consists of 11 questions. Each question was assessed against three categories, namely Good, Fair and Poor, with rules that responses in the Good category are scored 3, those in the Fair category have a score of 2, while responses in the Poor category are scored with 1.

The descriptive statistics (Table 4.1) show that the average total score of the effectiveness of the BOC is 34.461; this is classified as Fair, which equals a score of 34 (17 questions multiplied by 2). Thus, it can be concluded that, on average, the BOCs of the sample firms have sufficient effectiveness but still require further improvement. The average total score for audit committee effectiveness is 23; this is also classified as being within the Fair category, which in this case equates to a score of 22 (11 questions multiplied by 2). Thus, it can be concluded that, on average, the audit committees of the sample firms also have sufficient effectiveness but still require further improvement.

Table 2 Descriptive Statistics of Board of Commissioners Characteristics for the Period 2008–2012

	Number of questions	Minimum	Maximum	Mean	Std. Deviation
Independence	6	6	17	9.31	1.915
Activity	6	6	18	13.39	2.407
Size	1	1	3	1.76	.964
Competence	4	4	12	10.00	1.293

The results of the descriptive statistics for the BOC characteristics (Table 4.2) show that the average score for BOC independence is 9.31, which is below the average score for the Fair category (i.e. 12). It can thus be concluded that, on average, the independence of the BOCs of the sample firms is not good. The average score for BOC activity is 13.39, which is classified as within the Fair category (i.e. 12). This condition shows that, on average, the BOCs of the sample companies carried out their monitoring activity to a sufficient degree. The average score for BOC size is 1.76, which is classified below the Fair category value (i.e. 2). This condition shows that, on average, the size of the BOCs in the sample companies has not been good enough. The average score for BOC competence is 10, which is classified above the Fair category value (i.e. 8). This condition shows that, on average, the competence of the BOCs in the sample companies in carrying out their responsibilities has been sufficient.

Table 3 Descriptive Statistics of Audit Committee Characteristics for the Period 2008–2012

	Number of questions	Minimum	Maximum	Mean	Std. Deviation
Activity	8	8	24	16.54	3.704
Size	1	1	3	2.07	.398
Competence	2	2	6	5.07	1.392

The results of the descriptive statistics for audit committee characteristics (Table 4.3) show that the average score for audit committee activity is 16.54, which is classified above the Fair category value (i.e. 16). It can thus be concluded that, on average, the audit committees of the sample companies have carried out their monitoring activities sufficiently. The average score for audit committee size is 2.07, which is still classified as within the Fair category (i.e. 2). This shows that, on average, the size of the audit committees of the sample companies has been good enough for them to perform their tasks and responsibilities. The average score for audit committee competence is 5.07, which is classified above the Fair category value (i.e. 4). This shows that, on average, the competence of the audit committees of the sample companies in carrying out their responsibilities has been very good.

Statistical Testing

Reliability testing for the scoring of Audit Committee Effectiveness (AUSCORE) using Cronbach's alpha indicates a value of 0.739. Meanwhile, Board of Commissioners Effectiveness (BOCSCORE) had a Cronbach's alpha value of 0.560. Thus, the scoring for the research variables of Board of Commissioners Effectiveness and Audit Committee Effectiveness is sufficiently reliable for use in this research.

Testing of the panel data regression models using the Chow test and Hausman test concludes that the best regression model for this research is the fixed effects model. Meanwhile, the results of the classic assumption tests show that the research model is free from normality, multicollinearity and heteroscedasticity. The results of the fixed effects regression testing in this research are given in Table 4.4.

Table 4 Regression Results of the Main Research Model

	Expected Sign	Coefficient	t-Statistic	Prob.
C		0.07707	0.20149	0.3512
BOCSCORE	+	0.00409	0.00185	0.0137**
AUCSCORE	+	0.00057	0.00153	0.3549
FAMOWN	+	0.01250	0.02578	0.3141
LEVERAGE	+	0.06302	0.02240	0.0026***
SIZE	+	0.03098	0.01681	0.0332**
PROFIT	+	0.15818	0.03791	0.0000***
TANGIBLE	+	-0.10516	0.05523	0.0289**
R-squared		0.92460		
Adjusted R-squared		0.89835		
Durbin-Watson stat		1.71128		
F-statistic		35.22547		
Prob(F-statistic)		0.00000		

Note: *** Significant at $\alpha = 1\%$ (one-tailed), ** Significant at $\alpha = 5\%$ (one-tailed).

Sample size = 427, EFF = Efficiency level measured by the DEA method, BOCSCORE = Board of Commissioners Effectiveness score, AUCSCORE = Audit Committee Effectiveness score, FAMOWN = Dummy variable, '1' for a company with a high level of family ownership, and '0' for a company with a low level of family ownership, LEVERAGE = Capital Structure measured by the Debt to Equity ratio, SIZE = Company size

measured by the natural logarithm of total assets, PROFIT = Company's profitability measured by ROA, TANGIBLE = Company's tangible fixed assets measured by the ratio of net tangible fixed assets to total assets.

The results of the fixed effects regression model (as shown in Table 4.4) show that the independent variables simultaneously have a significant effect on the company's efficiency level. In addition, the regression model is able to explain 89.83% of the variation of the dependent variable (efficiency level), with the remaining 10.17% being explained by other factors not included in the regression model.

The results for the fixed effects regression model (as shown in Table 4.4) reveal that Leverage (LEVERAGE) and Board of Commissioners Effectiveness (BOCScore) have a significant positive effect on the company's Efficiency Level (EFF), whereas Family Ownership (FAMOWN) and Audit Committee Effectiveness (AUCScore) do not have a significant effect on the Efficiency Level (EFF).

The results of the additional testing (as shown in Table 4.5) also show that Leverage (LEVERAGE) has a significant positive effect on Efficiency Level (EFF). The BOC characteristic with a significant positive effect on Efficiency Level (EFF) is the Activity of the Board of Commissioners (BOCACT). Meanwhile, other characteristics of the BOC (BOCIND, BOCSIZE and BOCCOMP) have no significant effect on Efficiency Level (EFF). Other independent variables such as Family Ownership (FAMOWN) and all of the Audit Committee characteristics (AUCACT, AUFSIZE and AUCCOMP) also have no significant effect on Efficiency Level (EFF). The correlation table between the additional testing variables, specifically regarding BOC and Audit Committee characteristics, is given in Appendix 3.

Table 5 Regression Results of the Additional Research Model

	Expected Sign	Coefficient	t-Statistic	Prob.
C		0.14175	0.69797	0.24285
BOCIND	+	0.00085	0.21821	0.41370
BOCACT	+	0.00763	3.19573	0.00075***
BOCSIZE	+	0.00711	0.98839	0.16185
BOCCOMP	+	-0.00542	-1.17470	0.12050
AUCACT	+	-0.00019	-0.10658	0.45760
AUFSIZE	+	0.00483	0.40449	0.34305
AUCCOMP	+	0.00272	0.70024	0.24215
FAMOWN	+	0.01837	0.69801	0.24285
LEVERAGE	+	0.05161	2.26559	0.01210**
PROFIT	+	0.16060	4.19955	0.00000***
SIZE	+	0.03155	1.86706	0.03140**
TANGIBLE	+	-0.10970	-1.97299	0.02470**
R-squared	0.92653			
Adjusted R-squared	0.89936			
Durbin-Watson stat	1.75062			
F-statistic	34.10356			
Prob(F-statistic)	0.00000			

Note: *** Significant at $\alpha = 1\%$ (one-tailed), ** Significant at $\alpha = 5\%$ (one-tailed)

Sample size = 427, EFF = Efficiency Level measured by the DEA method, BOCIND = Independence score of Board of Commissioners, BOCACT = Activity score of Board of Commissioners, BOCSIZE = Activity score of Board of Commissioners, BOCCOMP = Competence score of Board of Commissioners, AUCACT = Activity score of Audit Committee, AUFSIZE = Size score of Audit Committee, AUCCOMP = Competence score of Audit Committee, FAMOWN = Dummy variable, '1' for a company with a high level of family ownership, and '0' for a company with a low level of family ownership, LEVERAGE = Capital Structure as measured by the Debt to Equity ratio, SIZE = Company size measured by total assets, PROFIT = Company's profitability measured by ROA, TANGIBLE = Company's tangible fixed assets as measured by the ratio of net tangible fixed assets to total assets.

The Effect of Board of Commissioners Effectiveness on Efficiency

The results of this research indicate that the effectiveness of the BOC has a significant and positive effect on the company's efficiency level, so Hypothesis H1a is accepted. The results of additional testing reveal Activity as the BOC characteristic that has a significant positive effect on efficiency level. The results of this research support those of previous studies by Hsu and Pongpich (2010) and Huang et al. (2011) regarding the effect of BOC effectiveness on the company's efficiency.

Effective monitoring of the BOC may reduce agency costs in a company (Gul et al., 2012). Oversight by the BOC may create pressure for the agent to allocate the factors of production and inputs effectively. Through

more monitoring activities, the BOC also has more opportunities to monitor company performance (Hsu and Pongpich, 2010; Huang et al., 2011). These conditions may reduce the potential for a misallocation of inputs in the production process that lead to a suboptimal level of output being produced from a given level of inputs, at the same time as potentially eliminating the problem of inadequate motivation that leads to an agent not optimally allocating the factors of production and their controlled inputs to produce the required level of output (Leibenstein, 1966; Kim and Maksimovic, 1990). A reduced potential for misallocation of inputs and inadequate agent motivation in allocating inputs and other production factors in the production process may encourage companies to operate more efficiently.

The Effect of Audit Committee Effectiveness on Efficiency

The results of this research indicate that audit committee effectiveness does not have a significant effect on company efficiency, meaning Hypothesis H2a is rejected. In addition, the results of the additional testing reveal that none of the audit committee characteristics have a significant effect on company efficiency. The results of this research have thus not succeeded in proving the results of previous studies by Hsu and Pongpich (2010) and Huang et al. (2011) regarding the effect of audit committee effectiveness on company efficiency.

The monitoring of a company's productivity and efficiency may not be one of the direct major responsibilities of the audit committee within the company. Based on Bapepam-LK Regulation No. IX.I.5 and Indonesia Stock Exchange Regulation No. IA, a company's performance in terms of its efficiency or profitability is not included as the main focus of the monitoring performed by the audit committee. In addition, it is alleged that the audit committees of public companies in Indonesia merely comply with the requirements of Bapepam-LK Regulation No. IX.I.5 in terms of their characteristics. As such, the audit committee is (a) required to hold regular meetings, at least once every three (3) months, which must be attended by more than 50% of the committee members, and (b) it must contain at least three (3) independent commissioners as members, alongside external parties from outside the company. These conditions may lead to the insignificant effect of audit committee effectiveness on the company's efficiency level.

The Effect of Family Ownership on Efficiency

The results of this research indicate that family ownership does not significantly affect the company's efficiency level; Hypothesis H3a is thus rejected. The results of this research have not been able to prove the findings for the effect of family ownership on company efficiency obtained in the previous studies by Margaritis and Psillaki (2010) and Chu (2011).

Most public companies in Indonesia continue to have ownership structures that are concentrated within a family. This family is also usually involved in the corporate managerial policy. Therefore, an increase in stock ownership by the ultimate shareholders or family owner, which also has control over the company's management, may not lead to a reduction in the agency problems within family firms in Indonesia (Arifin, 2003). This condition may lead to the insignificant effect of family ownership of a company on the company's efficiency, especially in public companies in Indonesia.

The Effect of Capital Structure on Efficiency

The results of this research indicate that corporate leverage has a significant positive effect on company efficiency; as such, Hypothesis H4a is accepted. The results of this research support previous studies by Nasr (1996), Berger (2002), Margaritis and Psillaki (2007), Margaritis and Psillaki (2010) and Ab-Rahim et al. (2012) regarding the effect of capital structure on the company's efficiency level.

The presence of debt within the company's capital structure could reduce the agency costs of free cash flow which are caused by agency problems between the company's management and stockholders regarding dividend payout policy and investment decisions. Decreased agency costs would reduce the potential for a misallocation of inputs in the production process which lead to a suboptimal level of output being produced from a certain combination of inputs (Kim and Maksimovic, 1990).

In addition, the existence of debt within the company's capital structure may provide a motivational effect for companies to enhance their capabilities to operate in a more effective and efficient manner, meaning they are able to meet their future cash flows as promised to creditors. The failure by a company to deliver the future cash flows it has promised to creditors may result in a lawsuit being brought against the company that could jeopardise

its sustainability (Jensen, 1986). The motivational effect of debt may eliminate the problem of inadequate motivation that leads to the agent not optimally allocating the inputs and other factors of production to producing output (Leibenstein, 1966). The reduced potential for misallocation of inputs and inadequate motivation of the agent in allocating inputs and other production factors in the production process may encourage companies to operate more efficiently.

CONCLUSIONS

This research has aimed to provide empirical evidence regarding the effect of capital structure, family ownership and the effectiveness of the BOC and audit committee on efficiency in manufacturing companies. Efficiency was measured using DEA scores, while the effectiveness of the BOC and audit committee was measured using an effectiveness measuring method previously developed by Hermawan (2011). The use of the DEA method, which is mostly used in banking research, helped to provide novel insights regarding the relationship between various corporate governance variables and efficiency, as opposed to performance, which is largely explored in various manufacturing industry research. Through this research, the manufacturing industry will obtain a clearer view of how well their governance structure relates to efficiency as well as how to improve it. Moreover, market regulators would find the research useful to strengthen arguments for leverage, mandatory BOC and audit committee regulations, and the enforcement of GCG practices.

The results of this research show that corporate leverage has a significant positive effect on company efficiency. The existence of debt in the capital structure of a company can reduce agency costs between principals and agents, in addition to providing a motivational effect that encourages companies to operate more effectively and efficiently in order to meet their future cash flow obligations. Family ownership does not significantly affect the efficiency level. The insignificant effect of family ownership may be due to differences in the characteristics of the agency problems in Indonesia between family firms and companies with dispersed ownership. Therefore, the mechanism of increasing stock ownership by the ultimate shareholders or family, who also have control over the company's management, may not lead to a reduction in the agency problems within family firms in Indonesia.

BOC effectiveness has a significant positive effect on the company's efficiency level. Effective monitoring of the company's performance by the BOC may encourage companies to operate more efficiently. Furthermore, BOC activity has a significant positive effect on the company's efficiency. Meanwhile, other characteristics of the BOC (i.e. independence, size and competence) have no significant effect on the efficiency level. Through greater monitoring activities, the BOC also has more opportunities to monitor company performance and to encourage companies to operate more efficiently.

Audit committee effectiveness has no significant effect on the company's efficiency level. The insignificant effect of audit committee effectiveness may be caused by the fact that the monitoring of a company's productivity and efficiency are not the direct major responsibilities of a company's audit committee, according to Bapepam-LK Regulation No. IX.I.5 and Indonesia Stock Exchange Regulation No. IA.

This research contains the following limitations which might be considered and improved upon in any future research:

1. The effectiveness of the BOC and audit committee was measured using an assessment method developed by Hermawan (2011) on BOC and audit committee characteristics including independence, activity, size and competence, using information obtained from companies' annual reports. Therefore, there is a possibility that the effectiveness scores obtained for the BOC and audit committee do not reflect the actual effectiveness of the BOC and audit committee.
2. Family ownership is measured using a dummy variable that classifies firms into those with high levels of family ownership (i.e. companies with a proportion of family ownership exceeding 50% of the total share ownership) and those with low levels of family ownership (i.e. companies with a proportion of family ownership lower than 50% of the total share ownership). However, it is possible that the criteria used to assess 50% family ownership are not fully precise. In addition, this research does not take into account the control rights and cash flow rights of a family through a pyramidal ownership structure.

3. The definition of 'Family' in this research refers to Arifin (2003), i.e. individuals and companies whose ownerships are mandatory to be disclosed (at a minimum of 5% of total stock ownership), except public companies, state-owned companies, financial institutions or members of the public, whose ownerships are not mandatory to be disclosed. However, there is a possibility that the underlying assumptions are not appropriate to describe family ownership.
4. The efficiency level in this research is measured only using DEA technical efficiency with the CCR model. There is a possibility that the use of outputs and inputs in this research is not fully precise and does not describe the company's actual efficiency level.
5. This research utilises data from financial statements denominated in USD, which may lead to bias due to the influence of the translational value of IDR to USD.

Based on the limitations of the study, we provide the following suggestions for further research:

1. Future research may seek to use an alternative approach to measure BOC and audit committee effectiveness, such as the survey method or a focus group discussion.
2. Future studies may use allocative efficiency and overall efficiency as measures of DEA efficiency level in the DEA method in order to ensure consistency with the results of this research when using different proxies for DEA efficiency level.
3. Future research may use alternative proxies for inputs and outputs in the measurement of DEA efficiency level in order to ensure consistency with the results of this research when using different proxies for inputs and outputs.
4. Further research may be performed using the object of companies in industries other than the manufacturing industry, such as the mining industry, agricultural industry, financial services industry and other industries, in order to ensure consistency of the results of this research with those for companies in other industries.
5. Future research may deepen the definition of family in terms of 'family ownership' and the proportion of ownership held by a family that can result in them controlling the company. Also, future studies may seek to include variables for the control rights and cash flow rights held by a family through a pyramidal ownership structure.

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APPENDICES

Appendix 1 Board of Commissioners effectiveness checklist, adopted from Hermawan (2011)

No.	Description	Good	Fair	Poor
A. Board Independence				
1	Among the board of commissioners, how many are independent commissioners? If more than 50% of the board is independent, the company will be given a ‘good’ score. Firms with 30% to 50% of the board made up of independent commissioners will earn a ‘fair’ score. If less than 30% of the board is independent, or there is no information, the company will earn a ‘poor’ score.			
2	Is the chairman an independent commissioner? If the chairman is an independent commissioner, the firm will earn a ‘good’ score and a ‘poor’ score otherwise or if no information.			
3	Does the company state the definition of independence in its annual report? Firms with a clear definition of independence in the annual report will earn a ‘good’ score. A ‘poor’ score will be awarded if the company does not define independence or if no information.			
4	Among the board of commissioners, how many are employees of shareholders or affiliated companies owned by shareholders? If there is more than 50% of the board, or no information, the company will be given a ‘poor’ score. If there is 30% to 50% of the board, the firm will earn a ‘fair’ score. If less than 30% of the board, the company will earn a ‘good’ score.			
5	Does the company have a nominating committee and remuneration committee? Firms that have both committees will earn a ‘good’ score. Firms that have at least one of the two committees will earn a ‘fair’ score. A ‘poor’ score will be given to a company that has neither of these committees or if no information.			
6	What is the average length (in years) of the Board of Commissioners’ tenure? If the average tenure of the board is less than 5 years, the company will receive a ‘good’ score. If the average tenure of the board is between 5 and 10 years, the score is ‘fair’, and if the average tenure is more than 10 years, the score will be ‘poor’.			
B. Board Activities				
7	Does the company clearly describe the board responsibilities? If board responsibilities are clearly stated and disclosed, the firm will receive a ‘good’ score. A company that has not defined the board responsibilities or has no information will earn a ‘poor’ score.			
8	How many meetings are held during the year? If the board meets more than six times per year, the firm earns a ‘good’ score. If 4–6 meetings, the firm is scored as ‘fair’, while less than four times or no information is scored as ‘poor’.			
9	What is the attendance of the board members during the year? If the overall board attendance for the year is greater than 80%, the firm earns a ‘good’ score. If attendance is 70–80% it receives a ‘fair’ score, and less than 70% or no information receives a ‘poor’ score.			
10	Does the company have a separate board of commissioners’ report describing their responsibilities in reviewing the firm’s financial statements? Firms will receive a ‘good’ score if they produce a board of commissioners’ report as part of the annual report. A score of ‘poor’ will be awarded if there is no report from the board or no information.			
11	Does the BOC conduct an annual performance assessment of the BOD? If the board evaluates the performance of the top executive officer, the company receives a ‘good’ score and a ‘poor’ score otherwise or if no information.			
12	Does the board conduct an assessment of the business prospects prepared by the BOD? If the board assesses the business prospects, the company receives a ‘good’ score and a ‘poor’ score otherwise or if no information.			
C. Board Size				
13	What is the size of the board of commissioners? A ‘good’ score will be given to a firm with 5–10 board members. A firm with a board size of 11–15 members receives a ‘fair’ score. Boards with a size of 16 or more or less than 5 members, or no information will receive a ‘poor’ score.			
D. Board Expertise and Competence				
14	Do the board members have a sophisticated knowledge of accounting and finance? If more than 50% of the board members have such knowledge, the company will be given a ‘good’ score. If it is 30% to 50% of the board, the firm will earn a ‘fair’ score. If less than 30% of the board, or no information, the company will earn a ‘poor’ score.			

Appendix 1 Cont.

15	Do the board members have sufficient experience of business (i.e. do they have experience as a member of the board of commissioners in any company, including this company, or as the CEO of another company)? If more than 50% of the board members have such experience, the company will be given a 'good' score. If there is 30% to 50% of the board, the firm will earn a 'fair' score. If less than 30% of the board, or no information, the company will earn a 'poor' score.			
16	Do the board members have sophisticated knowledge of the company's business? If more than 50% of the board members have such knowledge, the company will be given a 'good' score. If it is 30% to 50% of the independent board members, the firm will earn a 'fair' score. If less than 30% of the independent board members, or no information, the company will earn a 'poor' score.			
17	What is the average age of the board members? If the average age of the board members is more than 40 years old, the company will receive a 'good' score. If the average age of the board members is between 30 and 40 years old, the score is 'fair', and if the average age is below 30 years old, the score will be 'poor'.			
TOTAL SCORE				

Appendix 2 Audit Committee Effectiveness checklist, adopted from Hermawan (2011)

No.	Description	Good	Fair	Poor
A. Audit Committee Activities				
1-5	Assess the responsibilities fulfilled by the audit committee during the year, including the following items: 1. Evaluating internal control 2. Propose auditor 3. Financial report review 4. Evaluating legal compliance 5. Prepare a complete audit committee report for disclosure. In each category, if the responsibility is fulfilled, firms will receive a 'good' score. If the responsibility is not fulfilled, or there is no information, the company will receive a 'poor' score.			
6	How many meetings are held during the year? If the audit committee meets more than six times per year, the firm will earn a 'good' score. If there are 4-6 meetings, the firm will earn a 'fair' score, while less than four meetings or no information will be scored as 'poor'.			
TOTAL SCORE				

Appendix 3 Correlation table for additional test BOC and audit committee characteristics

	BOC IND	BOC ACT	BOC SIZE	BOC COMP	AUC ACT	AUC SIZE	AUC COMP
BOC IND	1.000						
BOC ACT	0.000	1.000					
BOC SIZE	.247**	0.000	1.000				
BOC COMP	.209**	0.056	0.000	1.000			
AUC ACT	0.000	-0.248	0.440	0.000	1.000		
AUC SIZE	-0.038	.194**	0.000	0.000	0.027	1.000	
AUC COMP	.146**	.399**	.134**	0.000	0.000	0.000	1.000
	-0.002	0.000	-0.005	-0.579	0.000	.177**	
	.149**	.163**	.145**	-0.049	0.000	0.000	
	-0.002	0.001	0.003	-0.315	0.000	0.000	
	.132**	.361**	0.079	.258**	.272**	.131**	1.000
	-0.007	0.000	-0.104	0.000	0.000	-0.007	0.000