

The Influence of Board Independence, Board Size and Managerial Ownership on Firm Investment Efficiency

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ABSTRACT

The purpose of this study is to examine the relationship between corporate governance, namely board independence, board size, and managerial ownership, with firm investment efficiency. Top 200 public listed companies in Malaysia according to market capitalisation from 2009 to 2011 were selected as a sample for the study. Level of investment efficiency was determined based on deviation from expected investment using the investment prediction model as a function of revenue growth. Board independence is measured by proportion of independent non-executive director of the board while board size is based on total number of directors of the board. Managerial ownership was calculated based on percentage of share owned by the executive director over the total number of shares issued by the company. Size of firm was computed based on total assets used as a control variable. Binomial logistic regression analysis was employed to test the hypotheses. The study found that only board size influenced the level of investment of the company, while board independence and managerial ownership prevent inefficiency pertaining to investment decision making. The results confirm the role of corporate governance in enhancing the performance of the company, particularly the role of the board size in protecting the interest of the shareholders.

Keywords: Investment, corporate governance, board independence, board size, managerial ownership, Malaysia

ARTICLE INFO

Article history:

Received: 02 July 2015

Accepted: 13 April 2017

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INTRODUCTION

Corporate governance became important after 1997-1998 Asian financial crisis that

had hit several countries in Southeast Asia (Norwani et al., 2011) including Malaysia. The crisis revealed the icebergs, namely poor capital structure, uncontrollable gearing level, lack of accountability, and transparency. Malaysian authorities took proactive action to win back market confidence with the introduction of the Malaysian Code of Corporate Governance in 2000 and major revamp of the stock exchange requirements of Bursa Malaysia in 2001 such as corporate disclosure, directors' accountability and protection of minority shareholders.

Prior study shows that strong and effective corporate governance will give tremendous benefits to stakeholders such as transparent financial statement and superior financial reporting quality (Agrawal & Chadha, 2005; Brown et al., 2010; Karamaou & Vafeas, 2005; Brown & Caylor, 2006; Firth et al., 2007; Klai & Omri, 2011; Hashim et al., 2014; Husnin et al., 2016). This will then influence better and effective investment decisions and indirectly increase firm value (Chen et al., 2011), because good governance is able to reduce information asymmetry and lower the agency cost of monitoring and controlling management.

Corporate governance characteristics include Board of Directors' level of independence, size, and managerial ownership can influence the quality of financial reporting. Previous research shows that companies with a higher number of independent directors have greater tendency to generate quality earning information (Bushman et al., 2004; Vafeas,

2005; Qinghua et al., 2007). Performance also increases with a larger board size (Dalton et al., 1999) and higher equity participation by company executives (Elsila et al., 2013). All of these empirical findings show that quality directors will diligently monitor and supervise all aspects of a company's operation and financial details. Consequently, this will increase financial reporting quality, financial performance, firm value and boost company's investment efficiency, which is the focus of this study.

Investment efficiency is very important because it ensures that every dollar invested by shareholders generates an optimal return. Although very high return is preferable, it is risky because high investment returns are also associated with high risks that may turn into loss investment. Because of this, managers that manage the company investment need to be monitored so that the investment decisions will generate an appropriate return to investors. They also need to work hard to gather more capital at a lower cost to invest when a good opportunity arises. This may be done by attracting genuine investors via practising good governance in the company.

Literature review, however, shows that not many studies have been conducted on corporate governance and investment efficiency. Studies have discussed governance mechanisms and their relationship with financial reporting quality (Agrawal & Chadha, 2005; Brown et al., 2010; Karamaou & Vafeas, 2005; Brown & Caylor, 2006; Firth et al., 2007; Klai & Omri, 2011), as well as the relationship

between financial reporting quality and investment efficiency (Gilaninia et al., 2012; Kangarlouei et al., 2011; Li & Wang, 2010; Bushman & Smith, 2001), indicating that all these factors, governance mechanisms and investment efficiency are related. Effective corporate governance mechanism will lead to increased financial reporting quality which in turn influences firm's investment efficiency. This shows that corporate governance is important in every aspect of company operations, including its investment strategy. This is because effective corporate governance mechanisms will ensure shareholders and stakeholders receive reliable information about the organisation and mitigate agency problem as the manager will not hide the value of their investment (Bushman & Smith, 2003). Based on this argument, the purpose of this study is to investigate whether corporate governance has a direct influence on the investment efficiency of the company. In short, this study intends to answer the following research question, "*Does the corporate governance mechanism influence firm investment efficiency?*"

This study contributes to the body of knowledge in several ways. First, it provides useful information for determining whether there is a relationship between corporate governance mechanisms and company investment efficiency. Second, this study will enhance knowledge of business stakeholders, including shareholders, management, board of directors, creditors, and about the current condition of corporate governance and investment efficiency of

Malaysian companies. Third, the findings would be useful for companies to monitor and control firm performance as well as highlight to them the benefits and roles of corporate governance in company management.

This paper is organised as follows. The next section is a review of relevant literature, followed by research methodology. Section four contains findings and discussions. The last section concludes the paper by summarising main findings and outlining limitations of the study.

LITERATURE REVIEW

Corporate Governance

Series of accounting scandals, corporate collapse, and management fraud showed a failure of a corporate governance practices (Kiel & Nicholson, 2003). The Asian financial crisis of 1997-1998 had exposed weaknesses of corporate governance practices (Norwani et al., 2011; Hamid et al., 2011) which resulted in a call for major reforms in this area.

The government established the High Level Financial Committee on Corporate Governance in 1999 with the objective to review corporate governance framework specific for Malaysian business environment. In 2000, the Malaysian Code on Corporate Governance (MCCG) was introduced as a guideline for organisations and board of directors in carrying out their responsibilities. It highlights the principles and best practices of good governance and describes corporate governance structure and

its internal processes. In 2007, the MCCG was revised with the aim of strengthening the role of board of directors and ensuring that board committees discharge their responsibilities effectively. It was again revised in 2012 to focus on strengthening not only the company but also to regulate the market, so that the internal and external governance mechanisms complement each other.

Efforts to improve good corporate governance practices were taken on the belief that strong corporate governance benefits the company, largely in improving their performance. Corporate governance acts as a monitoring platform ensuring checks and balances and that the interests of all the shareholders and stakeholders are properly served. These monitoring mechanisms, for examples, were implemented through block ownership (Shleifer & Vishny, 1986; Asmuni et al., 2015), board size (Chiang & Chia, 2005; Haniffa & Hudaib, 2006), directors' independence (Abbott et al., 2004; Klein, 2002), CEO-Chairman power separation (Jensen, 1993; Husnin et al., 2013), strong work ethics (Manan et al., 2013; Siti Khadijah et al., 2015), directors' financial literacy (DeZoort & Salterio, 2001; Cohen et al., 2002), board meetings (Yatim et al., 2006), audit committees (Chen and Zhou, 2007; Davidson et al., 2005), remuneration committees and disclosures (Bosch, 1995; Jaafar et al., 2014), nominating committees (Leblanc, 2004) and external audits (Kim et al., 2003; Krishnan, 2003). The list is not exhaustive, as many empirical studies have argued on the inconsistency of the

governance-performance results due to these complex relationships. More specifically, companies should employ several monitoring mechanisms simultaneously, such that ineffective monitoring mechanisms will be substituted or complemented by alternative monitoring mechanisms (Azim, 2012). For example, CEO duality practices can be complemented by increasing the number of independent non-executive directors in the Board so that there is a balance of power in managing and decision making in the company.

Investment Efficiency

Investment efficiency refers to the positive net present value (NPV) of the investment project undertaken by an organisation under a predictive scenario, free from market interferences such as adverse selection or agency cost (Li & Wang, 2010). The decision to invest depends on the expected benefits and interest from investments, such as future growth and product demand (McNichols & Stubben, 2008).

In order to increase investment efficiency, a firm needs to strengthen its capital structure to finance a good investment opportunity when it appears (Verdi, 2006). This also prevents the manager from passing positive NPV investment due to inability to finance those project, which will result in underinvestment (Hubbard, 1998). However, the company can also face underinvestment situations, even though it may have the luxury of capital. The manager of this type of company expropriates

resources by investing inefficiently due to personal interests (Verdi, 2006).

Most scholars measure firm investments by using underinvestment and overinvestment as a proxy (Biddle et al., 2009; Kangarlouei et al., 2011; Li & Wang, 2010; Verdi, 2006). Underinvestment refers to the passing up of investment opportunities that is likely to have positive net present value (Li & Wang, 2010), while overinvestment refers to the choice to invest in a project with negative net present value (Biddle et al., 2009). In such a situation, investment efficiency will be achieved if the company is able to achieve an optimal investment position level.

Information asymmetry is one of the reasons for investment inefficiency in an organisation (Myers & Majluf, 1984; Verdi, 2006). Agency theory predicts that even though a manager is well informed about the existence of a profitable investment opportunity, it might not be pursued due to moral hazard problem. Prior study found that quality financial reporting information will improve investment performance level due to minimum information asymmetry (Verdi, 2006; Biddle et al., 2009). The small gap in the information asymmetry between the firm and its investors will contribute to a lower organisation cost of raising fund and monitoring managers. This indirectly will improve project selection (Verdi, 2006). Empirical evidence also shows that quality financial information provides information related to investment opportunities (Biddle et al., 2009; Verdi, 2006; Bushman & Smith, 2003) and hence, investment efficiency

(Gilaninia et al., 2012; Healy & Palepu, 2001).

This study uses underinvestment and overinvestment as a proxy for investment position level. Both proxies are related to the inefficiency of investment. Based on previous studies, underinvestment is found in an organisation that faces financial constraints, whereas overinvestment is common in an organisation with a large cash balance (Verdi, 2006). Biddle et al. (2009) used deviation from expected investment from investment prediction model as a function of revenue growth i.e. negative investment deficiency from expected investment (so-called lower investment) and positive deviation (so-called excess investment). This study has adopted the same measurement as Biddle's et al. (2009) and Kangarlouei (2011).

Corporate Governance and Investment

Corporate governance structure and firm investment are important indicators to evaluate and monitor an organisation's financial health, strategy, future direction and management. However, there are only a few studies that examined the relationship between corporate governance structure and firm investment. Most previous studies had investigated the relationship between financial reporting quality and investment efficiency with corporate governance as a control variable (Biddle et al., 2009; Kangarlouei et al., 2011; Li & Wang, 2010).

A study by Bushman and Smith (2003), for example, found that the quality of financial accounting information may

affect both investment and organisational productivity. The results show that there is positive association between the quality of financial accounting information and economic performance by disciplining management. El-Gammal and Showeiry (2012) found that the nature of relationship between corporate governance and financial accounting information may influence the effectiveness and efficiency of investment decision and hence, investment efficiency. Niu (2006) found that a strong corporate governance structure may be an effective factor to increase financial reporting quality. Therefore, when the quality of financial information is increased, it can the organisation can channel its resource towards good and efficient investment project.

The present study is intended to fill the gap and investigate the relationship between corporate governance structure and firm investment level. It will examine whether corporate governance structure is able to influence firm investment level by monitoring or controlling both overinvestment and underinvestment. As suggested by Biddle et al. (2009), financial reporting quality is linked with lower overinvestment and underinvestment. According to previous studies, higher financial reporting quality will minimise problems that might arise due to information asymmetry and agency cost (Healy & Palepu, 2001).

Agency Theory

Agency Theory (Jensen & Meckling, 1976) posits that there is problem in terms of the relationship between the owner of a firm, known as the principal, with their manager, called the agent. This calls for a control mechanism, known as an agency costs incurred by principal to monitor the work of their agent. In the context of current research, the shareholders (owner) will forego a certain amount of money (agency cost) in monitoring the work of the management (agent). The money spent is intended, for example, to strengthen the corporate governance system of the company such as hiring more independent non-executive directors and subscribe services from competent external auditors. In the context of this study, the manager may not seek to optimise the investment of the company and fail to generate return as expected by the shareholders due to the moral hazard problem.

Hypotheses Development

Independent Non-Executive Director.

Independent non-executive director is a person who does not hold any executive duties or responsibilities and free from any business and other affiliations with the organisation either directly or indirectly. The number of independent non-executive directors may influence the effectiveness of monitoring management and the integrity of financial accounting (Niu, 2006). According

to Baesley (1996), the role of independent directors in the board is to ensure effective monitoring mechanism. This implies that if the proportion of independent directors is higher, the board may be encouraged to be more effective in monitoring its corporate governance practices (Khanchel, 2007).

Previous studies have suggested that independent directors function as effective monitors of corporate governance practices because they do not have any personal or financial interests in the company. An independent director also does not have familial ties with the organisations' management (Boo & Sharma, 2008) and in a better position to objectively challenge the management (Klein, 2002). Empirical research shows that an organisation that has a large proportion of independent non-executive directors is able to mitigate earnings management (Klein, 2002), minimise accounting fraud cases (Baesley, 1996) and prevent managers from expropriation and misusing organisational resources (Niu, 2006).

The hypothesis is as follows:

H₁: There is a no relationship between the proportion of independent non-executive directors in the board and the firm's overinvestment or underinvestment level.

Board Size. The role of the board of directors is to act and represent the interests of the shareholders as well as to monitor and oversee the management (Phan & Yoshikawa, 2000). Most of the previous studies have found a positive relationship

between board size and company performance (Dalton et al., 1999) because a bigger board translates into diverse skills, knowledge, competency and experiences (Kiel & Nicholson, 2003) for effective monitoring of the management (Abidin et al., 2009) and the workload can also be distributed to many people (Alzoubi, 2012).

Peasnell et al. (2001) show a positive relationship between board size and accounting quality which in turn influences the relationship with investment level. Gois (2009) found the bigger the board the better their capability and ability to monitor the management. This may lower accounting discretion which results in a higher accounting information quality as well as mitigate overinvestment and underinvestment.

Thus, the following second hypothesis:

H₂: There is a significant relationship between board size and the firm's underinvestment and overinvestment level.

Managerial Ownership. Managers who also have investment in the company can control corporate behaviour directly from their position as manager and decision maker. When there is managerial ownership in the organisation, it will minimise agency cost, because it serves as an incentive to align the interest of owner-manager and other shareholders (Lopez-Iturriaga & Rodriguez-Sanz, 2001). The owners and management are the same individuals and are thus less likely to expropriate their own wealth (Wong, 2011). Besides, the owner-

manager also will have greater information related to firm's opportunity. This will lead to reduction of information asymmetry and give incentive to managers to improve performance (Basu, 2014). The share held by the manager is an effective mechanism to mitigate agency problems as well as to align manager interest with shareholders.

You et al. (2003) opined that managers are less motivated to perform their duties on behalf of the shareholders if fewer shares are owned by a manager than the total equity of the organisation. The increase in managerial ownership can limit managerial manipulation, increases quality of financial reporting and leads to better financial performance via superior investment position. According to agency theory, there is a positive relationship between the manager who has interest and share in an organisation's equity with optimal investment decision (Jensen & Meckling, 1976). Managerial ownership structure may minimise conflict of interests between manager and shareholders and indirectly would motivate managers to pursue value-enhancing investment. Cho (1998) found that managerial ownership can positively affect corporate investments and its value, while Ju and Zhao (2014) found that firm in the closed-end industry with director's ownership received less fund discounts.

Loh and Venkatraman (1993) documented that managerial ownership may lead to underinvestment in risky projects and persuade managers to invest in 'safer' ventures (Mustapha & Ahmad, 2011). Himmelberg et al. (1999) found a positive

relationship between firm investment and ownership structure, due to greater opportunities for managerial discretion. The manager has more information about investment opportunities and free cash flow. Thus, due to this valuable information, the manager may reduce their shareholding when the free cash rises and possibly will overinvest it. However, if they are also the owner of the company, they will manage spending while enjoying good investment opportunities. Hence, the following third hypothesis:

H₃: There is a no relationship between the percentage of managerial ownership and the firm's overinvestment or underinvestment level.

RESEARCH METHODOLOGY

Sample Selection and Data Collection

The samples for this study consist of top 200 public listed companies based on their market capitalisation at the end of the 2011. This sample has excluded finance companies due to the differences in regulatory requirements and business nature (Arce & Mora, 2002), as well as companies listed on other than the main market and those with insufficient data. The final sample consists 163 companies. Information for similar companies was also collected for 2010 and 2009 leading to the total observations of 489 firm-years. Main sources of data were the companies' annual reports and Thomson DataStream databases.

Variable Measurements

Table 1 provides a detailed description of the variables used in the study.

As shown in Table 1, the dependent variable (firm investment position level) for the final model used in this study is

Table 1
List of Variables and Its Measurement

Variables	Measurements
Dependent variable Investment position level (overinvestment, underinvestment)	Residual of Y_1 . If ϵ_1 less than zero or negative value, then coded as 0. However, if ϵ_1 is more than zero or positive value, then coded as 1
Independent variables	
Board independence	Proportion of independent non-executive director of the board Total directors of the board
Board Size	
Managerial ownership	Percentage of share owned by the executive director to the total number of share issued by the company
Control Variable	
Firm size	Total assets, expresses as a \log_{10} function

the residual or error term of yet another regression model. In order to get the residual, the preliminary regression model needs to be constructed. As the study examined data from three consecutive years, beginning from 2009 until 2011, there will be three preliminary multiple linear regression models, i.e. the year 2011 (t), year 2010 (t-1), and year 2009 (t-2). The general preliminary regression models are explained below.

$$Y_1 = \alpha_0 + \alpha_1 Z_1 + \alpha_2 Z_2 + \alpha_3 Z_3 + \epsilon_1$$

Where:

Y_1 = Investment, measured by investment in plant, equipment, land building, research and development expenditure less revenue from selling fixed asset *over* Total assets

Z_1 = Growth in revenue in the preceding years. This is coded as 0 or 1. The figure 0 means there was no growth or positive growth in years (t)* Where t is the based year 2011. The figure 1 means there was negative growth in year (t)* [*For 2010 = (t-1), 2009 = (t-2)]

Z_2 = Percentage of firm's revenue growth in year (t)* where t is based on year 2011[*For 2010 = (t-1), 2009 = (t-2)]
= ((Revenue (t)* less revenue (t-1)** over Revenue (t-1)**) x 100 %
[*For 2010 = (t-1), 2009 = (t-2)]
[*For 2010 = (t-2), 2009 = (t-3)]

Z_3 = The product of Z_1 and Z_2 for the year (t)*
= ($Z_1 \times Z_2$)
[*For 2010 = (t-1), 2009 = (t-2)]

ε_1 = Residual or error term for year (t)*
 [*For 2010 = (t-1), 2009 = (t-2)]

Investment level which is measured by the deviation from expected investment using the investment prediction model as a function of revenue growth is consistent with earlier studies (Biddle et al., 2009; Kangarlouei et al., 2011; Li & Wang, 2010). Biddle et al. (2009) proposed that the differences or changes from normal standards of expected investment is considered as inefficient investment. The differences will be seen through their residual error term. If there is negative residual error term, it is considered an underinvestment, whereas positive residual error term is considered overinvestment. For the purpose of running the overall regression model, the error term (residual) found in the preliminary multiple regression models will be used as the new dependent variable.

Statistical Analysis

Three main tests were run to analyse data related to corporate governance and firm's investment level. The first test is descriptive analysis. The second test uses linear multiple regression test to ascertain the residual or error term in order to get the dependent variable (firm's investment level). The final test, binomial logistic regression analysis, has been used to test the research hypothesis. This study uses logistic regressions to develop the model and test whether the independent variables will influence a firm's investment level (overinvestment or underinvestment). In

this study, there are three developed logistic regression equations representing the years 2009, 2010, and 2011. The equation for 2011 is as follows:

$$Y_2 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon_2$$

where Y_2 = Residual of the preliminary model. If ε_1 is less than zero or negative value (indicating underinvestment), then coded as 0, whereas, if ε_1 is more than zero or positive value (indicating overinvestment), then it will be coded as 1 for the year (t), X_1 = Board independence in the year (t), X_2 = Board size in the year (t), X_3 = Managerial ownership in the year (t), X_4 = Firm size in the year (t), ε_2 = Residual or error term for the final model in the year (t). The equation models for 2009 and 2010 are similar except that for 2009 year = t-2 and for 2010 year = t-1.

FINDINGS AND DISCUSSION

Descriptive Statistics

Table 2 shows descriptive statistics of the independent variables (board independence, board size, managerial ownership), control variables (total assets) and dependent variables (overinvestment, underinvestment). The minimum value for board independence is between 0.22 and 0.25, indicating there are companies that do not comply with MCGG requirement to have a minimum of one-third (33%) independent directors in the board. However, many companies on average have approximately half of their board composed of independence director (0.45, 0.45, 0.44)

with the maximum of 0.78, 0.86 and 0.9 in 2009, 2010 and 2011 respectively.

In terms of board size, the minimum number of directors in the board was 3 in

Table 2
Descriptive Statistics of the Variables Used in the Final Model

Variables	Years	Min	Max	Mean	Std. Deviation
Board Independence	2011	0.25	0.90	0.45	0.12487
	2010	0.25	0.86	0.45	0.12399
	2009	0.22	0.78	0.44	0.11646
Board size	2011	3.00	15.00	8.29	2.06700
	2010	5.00	15.00	8.31	2.04400
	2009	5.00	15.00	8.31	2.04400
Managerial ownership	2011	0.00	73.39	6.49	13.01854
	2010	0.00	72.82	6.43	13.09102
	2009	0.00	71.73	6.02	12.31613
Total assets _{log10}	2011	5.08	7.87	6.39	0.52538
	2010	5.29	7.87	6.35	0.52752
	2009	5.20	7.85	6.30	0.53807
				No of Companies	%
Investment	2011	Overinvestment		86	52.8
		Underinvestment		77	47.2
	2010	Overinvestment		86	52.8
		Underinvestment		77	47.2
	2009	Overinvestment		85	52.1
		Underinvestment		78	47.9

2011, decreased from 5 in 2009 and 2010. The maximum number of directors recorded is 15, with an average of 8 directors for all the three years. The minimum, maximum, and mean value of managerial ownership is consistent through the years. There are companies in which executive directors do not have or have very minimal shares. The highest ownership is approximately about 70%, which is common p for family based company. The mean values are roughly 6% for all three years (6.46, 6.43, 6.02).

For the control variables, the minimum number of the log total asset is 5.08, 5.29 and 5.2 in years 2011, 2010 and 2009 respectively while the maximum number of log total asset is 7.87 for 2011 and 2010, and 7.85 for 2009. The value of the asset can be tested to see whether it has affected the firm's investment level alongside independent variables.

The dependent variables were measured as residual function of revenue growth which acted as a proxy to overinvestment

and underinvestment. Overinvestment is a positive residual of investment, whereas underinvestment is represented by negative residual of the investment. Table 3 shows that the value or data for overinvestment in 2011 and 2010 are 86 companies each (52.8%) and 85 companies (52.1%) in 2009. For underinvestment, there are 77 companies (47.2%) in 2011 and 2010 and 78 companies (47.9%) in 2009.

Logistic Regression Model Analysis

There are three types of assumptions that must be considered before using logistic regression analyses: sample size, multicollinearity and outliers (Pallant, 2010).

Sample size. This study examined 163 companies in 2009, 2010 and 2011. This amount is sufficient to run logistic regression, as the minimum sample needed is 50 (Field, 2009).

Multicollinearity. Multicollinearity has been examined with Tolerance and VIF (variance inflation factor) value. None of the variables have Tolerance value less than 0.1, and VIF value of more than 10 indicates no severe multicollinearity problem among the variables (Pallant, 2010; O'Brien, 2007).

Outlier. Close examination of the scatter plot has confirmed that there was no case with standardised residual value higher than 3.3 or less than -3.3 which indicates no outlier problems in the samples (Pallant, 2010; Tabachnick & Fidell, 2013).

Final Logistic Regression Model

Table 3 presents the finding of logistic regression for 2011, 2010 and 2009. In 2011. None of the independent variables has significant relationship with the firm investment and the full model was not statistically significant ($\chi^2(5, N = 163) = 6.926, p > 0.05$). The result explains between 12.4% (Cox and Snell R square) and 16.5% (Nagelkerke R Square) of the variance in firm's investment position level in the companies and correctly classified 65% of cases. All the independent variables show very weak prediction, with an odds ratio of less than 1 (Board independence = 0.922, Board size = 0.905, Managerial ownership = 0.763). This indicates that all the independent variables do not influence level of investment of the company for either overinvestment or underinvestment.

In 2010, only board size has a significant relationship with firm investment at 5%. The full model was not statistically significant, as $\chi^2(5, N = 163) = 8.019, p > 0.05$ indicates that the model is unable to distinguish between companies with overinvestment and underinvestment. The model explains between 9.6% (Cox and Snell R square) and 12.8% (Nagelkerke R Square) of the variance in investment efficiency in the companies and has correctly classified 60.7% of the cases. The odds ratio for all the independent variables is less than 1, indicating very weak prediction. However, board size as represented by the number of directors has a negative significant correlated with the firm's investment level. This means that the larger the board size,

Table 3
Results of Final Logistic Regression Model

	Board Independence	Board size	Managerial ownership	Total assets _{log10}	Constant
2011					
B	-0.081	-0.100	-0.271	1.262	-6.709
SE	1.587	0.093	0.317	0.373	2.422
Wald	0.003	1.138	0.732	11.419	7.676
Sig.	0.959	0.286	0.392	0.001**	0.006
Odd Ratio or Exp(B)	0.922	0.905	0.763	3.532	0.001
Lower	0.041	0.754	0.41	1.699	
Upper	20.679	1.087	1.419	7.342	
2010					
B	-1.649	-0.189	-0.429	1.067	-4.044
SE	1.611	0.094	0.314	0.363	2.285
Wald	1.048	4.061	1.86	8.658	3.132
Sig.	0.306	0.044*	0.173	0.003**	0.077
Odd Ratio or Exp(B)	0.192	0.827	0.651	2.908	0.018
Lower	0.008	0.688	0.352	1.428	
Upper	4.519	0.995	1.206	5.92	
2009					
B	-0.699	-0.016	-0.235	0.879	-3.844
SE	1.649	0.09	0.311	0.342	2.199
Wald	0.180	0.033	0.574	6.600	3.056
Sig.	0.672	0.857	0.449	0.01**	0.080
Odd Ratio or Exp(B)	0.497	0.984	0.79	2.409	0.021
Lower	0.020	0.826	0.43	1.232	
Upper	12.593	1.173	1.453	4.711	

*p < 0.05, **p < 0.01, ***p < 0.1

the larger the tendency for the company to underinvest. This is possibly due to the fact that larger board size will impair a firm's corporate effectiveness, contributing to investment inefficiency.

Result in 2009 was replicated in 2011. None of the independent variables has significant relationship with firm investment. The model was not statistically significant, (χ^2 (5, N = 163) = 0.783, p > 0.05) indicates

the model is unable to differentiate the company with different level of investment (overinvest or underinvest). The result explains only between 5.8% (Cox and Snell R square) and 7.8% (Nagelkerke R Square) of the variance in investment efficiency in the companies, which is the lowest among the three years, and correctly classified 61.3% of cases. No difference in odds ratio of all independent variables is seen with

previous year results for 2011 and 2010 (less than 1).

The control variable, total assets, shows significant results in all years under examination (2011: .001, $p < 0.01$; 2010: .003, $p < 0.01$; 2009: .01, $p < 0.01$) with strong prediction value of 3.532 in 2011, 2.908 in 2010 and 2.409 in 2009. This indicates that the higher the total assets of the company, the higher the tendency towards overinvestment.

The results indicate that there is no statistical significant relationship between board independence and firm's investment for 2011, 2010 and 2009 (p -value = 0.959, 0.306, 0.672) respectively which shows board independence does not have an impact on firm overinvestment or underinvestment level. The independent directors tends to play their role effectively in monitoring the company by ensuring the company does not over or underinvest. Baesley (1996) found that a higher number of independent non-executive directors can reduce and minimise accounting fraud in financial statements. This shows that the board needs to include independent directors who do not have any affiliation with the company to enhance its effectiveness. Therefore, it can be concluded that good board monitoring is an effective mechanism to monitor firm's investment position.

Board size had a negative relationship with investment position at 5% significant level in 2010, indicating that larger boards have a greater tendency to underinvestment. This result is consistent with Rahman and Ali (2006), and Gill and Mathur (2011) that

found that larger board size may impair a firm's performance.

This finding indicates that the bigger the board size, the lower the investment efficiency due to higher underinvested capital. This may signify that to have an effective board, the company should not have too many directors as top decision makers as this will slow down the decision making process, making it difficult to control the company as well as face communication issues. Hence, monitoring quality of the board is weakened. This finding was supported by Yermarck (1996), Eisenberg et al. (1998), and Hermalin and Weisbach (2003), who suggested that smaller board size is better to minimise issues relating to free riders, communication breakdowns, monitoring problem and inefficiency. In a nutshell, quality rather than quantity, is vital to manage a company. This result however needs to be interpreted with caution. First, board size was significance in one year (2010) but not significant in the other two years, 2009 and 2011. Second, its prediction value also very weak (Odd Ratio or Exp(B) = 0.827) at less than 1.

For managerial ownership, it is predicted that higher percentage of shares owned by the management will not influence overinvestment or underinvestment. Based on this, the hypothesis is accepted. This is because there is no significant relationship among all predictors for overinvestment or underinvestment for all three years (p -value for each year 2011, 2010 and 2009 is 0.392, 0.173, 0.449 respectively). Thus, it can be concluded that managerial ownership can

be effective monitoring a firm's investment level. Managers who also own the company will put greater effort to ensure the company achieves optimal investment level and generate appropriate return.

CONCLUSION AND LIMITATIONS

The purpose of this study was to examine whether good corporate governance practices ensure companies achieve optimal investment level. Corporate governance here refers to board independence, board size and managerial ownership, while investment position level was based on whether the company was at an under or overinvestment level.

The study used logistic regression and found that all the independent variables do not have any significant relationship with investment position, except board size, which showed a significant negative relationship with underinvested capital in one of the three years' period of study. In general, this provides evidence that strong corporate governance mechanism positively contributes to the performance of the company via mitigation of potential inefficient investment levels though either overinvestment or underinvestment. Thus, investment efficiency can be attained because optimal investment can be made by having sufficient capability to finance positive NPV investment and at the same time, not giving up good investment opportunity due to limited financing.

There are several limitations of this study. This study used categorical variables for investment inefficiency as represented

by underinvestment and overinvestment. Future research can use econometric approach by using continuous variables as a proxy of investment efficiency. In terms of the sample, this research only chose 200 large companies by market capitalisation for three years. To get more robust results, future research should choose more and bigger samples. The period of study should be extended, and other type of analysis such as longitudinal analysis can be utilised.

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