CHAPTER 5

METHODOLOGY AND RESEARCH DESIGN

5.1. INTRODUCTION

There are principally two objectives in this chapter. The first objective is to explain the research methodology and the theoretical model for the study and develop testable hypotheses in relation to dividend payout, growth and corporate governance based on the discussions in the preceding chapters. The second objective is to explain the sample selection, measurement of the variables in the theoretical model and the data analysis procedures. This theoretical model incorporates variables that are relevant in the Malaysian context in examining the dividend payout, growth and corporate governance (CG) relationships. The CG mechanisms are treated as moderating variables in the model, which include the board size , board composition (number of independent directors representing the board), duality, ownership structures (whether government linked, non-government linked companies and family owned businesses) and interaction with IOS (interactions between IOS and government linked and family controlled firms).

The data collection technique used is mainly to extract published data from annual reports and on-line databases using the Datastream facilities and subsequently, the data is analysed using the SPSS and e-views software.

Based the literature review in the preceding chapters, Section 5.2 summarises the research questions and discusses the theoretical framework (model) of the study and

this is followed by the relevant hypotheses development. Section 5.3 provides the arguments to support the development of each of the hypothesis. Section 5.4 presents a summary of the hypotheses. Section 5.5 explains the sample selection process. Section 5.6 provides an explanation of the measurement use for independent variables, dependent variable, moderating variables and control variables together with an explanation of the statistical techniques used to analyse the data and to test the hypotheses proposed in the study. Section 5.7 discusses on the regression model and lastly Section 5.8 concludes.

5.2. RESEARCH METHODOLOGY

This study is situated in the positivist paradigm i.e by differentiating a subject from an object, the positivist paradigm provides an objective reality against which researchers can compare their claims and ascertain truth. According to Guba and Lincoln (1994), positivist approaches rely heavily on experimental methods, ensures a distance between subjective biases, involves hypothesis generation and testing and typically use quantitative methods. Further, Chua (1986) reiterates that mainstream accounting is grounded in a common set of philosophical assumptions about knowledge, the empirical world and the relationship between theory and practice. By changing the set of assumptions, fundamentally two alternative world views and their underlying assumptions has been elucidated i.e the interpretative and the critical. Hence, the consequence of this is that researches are conducted on the "same" problem but two different approaches.

5.3. RESEARCH QUESTIONS, OBJECTIVES AND THEORETICAL MODEL

5.3.1. Research Questions

The research question serves as a guide to the selection of the methodological approach that best address the research problem and accomplish the research objectives. Answering the research question provides an understanding of the corporate governance variables and their influence on the dividend policy of the companies. The main research question is: Do board size, board composition, ownership structure and the interactions of growth opportunities influence the dividend payout of public listed companies in Malaysia?

More specifically:

i) Does the negative relationship between investment growth opportunities and dividend payout observed in prior studies exist in the Malaysian context?

ii) Does board size and board composition of the company moderate the relationship between investment opportunities and dividend payout?

iii) Is there a positive relationship between investment opportunities and dividend payout for government linked companies?

iv) Is there a negative relationship between investment opportunities and dividend payout for family controlled firms?

5.3.2. Research Objective

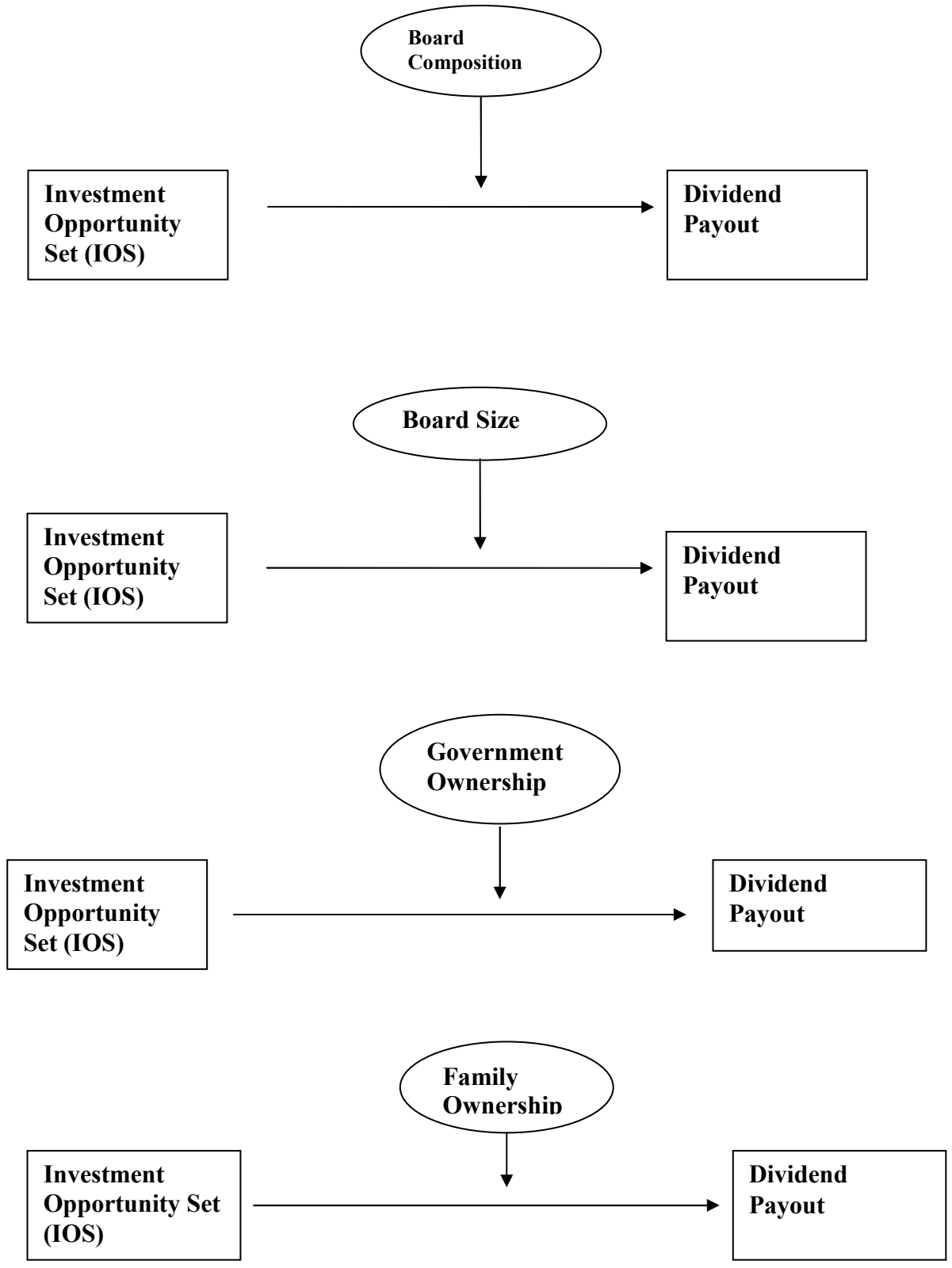
The primary objective of this study is to examine the moderating effect of board size, board composition, government ownership and family ownership on the relationship between growth opportunities (IOS) and dividend payout in the Malaysian context. The other objectives are as stated below:

- To investigate and ascertain whether the negative relationship between investment opportunities and dividend payout of listed companies observed in the western economies with market capitalism exists in the Malaysian corporate context.
- To examine whether board size and board composition have an impact on the relationship between investment opportunities and dividend payout of public- listed companies, in other words, does monitoring reduce the agency cost of FCF.
- To examine whether there is a positive relationship between government linked company and dividend payout.
- To examine whether there is a negative relationship between family controlled firm and dividend payout policy.

5.3.3. Theoretical Model

The theoretical framework provides a rationale to examine the association between the IOS and dividend policy. In this framework, moderating variables and control variables are incorporated to examine influence and establish the relationship between independent and dependent variables. The control variables that have been incorporated are return on assets (ROA), duality (DUAL), industry dummies, year dummies, logarithm of market capitalisation (LOGMKTC) and debt to total assets (DTA) and followed by moderating variables comprising board size (BSIZE), board composition (BCOM), family ownership (FLYC) and government ownership (GLC).

Figure 5.1
Theoretical Representation of Relationship



Further, to add robustness to the existing control variables, additional interactive variables such as IOS and board size and board composition has been incorporated. A summary of the operationalisation of the research variables is shown in Table 5.3.

Figure 5.1 presents the diagrammatic representation of the theoretical framework utilised in this study. In essence, the study examines the relationship between the growth prospects of firms (high and low growth firms measured using proxy variable) which is the independent variable and dividend payout as the dependent variable. Board composition, board size, government ownership and family ownership are the moderating variables respectively. As discussed earlier, the control variables used are return on assets (ROA), duality (DUAL), industry dummies, year dummies, debt to total assets (DTA) and logarithm of market capitalisation (LOGMKTC).

5.4. HYPOTHESES DEVELOPMENT

The theoretical framework in Figure 5.1 is used to develop testable hypotheses in this study and the hypotheses presented are tested in the context of the Malaysian environment. The main theory applied here is the contracting theory based on Jensen's Free Cash Flow Theory which suggests that high growth firms pay lower dividends due to their heavy investments and the expectation of a better return by shareholders in the near future. The different hypotheses derived here are based on the fact that control variables affecting a firm vary across the world and especially between developed markets and developing markets due to the ownership structure of the organisation.

A review of the literature on the relationship between growth opportunities and various corporate governance characteristics, especially board composition, board size, government linked and non-government linked companies, family ownership and other control variable show inconsistent results.

5.4.1. Investment Opportunities Set (IOS)

There have been many studies which have shown a significant negative relationship between investment growth opportunities and dividend payout. Smith & Watts (1992) report a negative relationship between investment growth opportunities and dividend payout using the industry level data. According to Smith & Watts (1992) based on the signalling theory, firms with growth opportunities have higher debt and dividend policies in order to signal to the market that they have better earnings prospects. Further, according to them under the contracting theory, firms with more growth or higher IOS are less likely to issue debt or pay dividends as they prefer to utilise the free cash flow for investment opportunities purposes.

Gaver & Gaver (1993) verify the results of Smith & Watts (1992) using a more rigorous methodology by way of firm level study and found that growth firms have lower debt/equity ratio and significant lower dividend yields than non-growth firms. Further, Gul (1999) based on a study on investment opportunity set and corporate policy choices in China, reemphasised the fact that consistent with prior studies, investment opportunity set (IOS) is found to be negatively associated with debt financing and dividend payouts.

Similar results are also found in the study of Korean Chaebol companies. Gul & Kealey (1999) report using observations from 411 Korean firms that growth options are negatively associated with dividends. Another study by D'Souza & Saxena (1999) & Fama & French (2001) show that newly listed firms, with high growth opportunities refrained from dividend payments. Jensen (1986) also makes a similar point by

suggesting that low growth firms pay out dividends in order to overcome some free cash flow problems (Lang *et al.,* 1991).

Although there have been many studies on the negative relationship between high growth firms and dividend payout, the overall results are mixed and inconclusive mainly due institutional factors. . Evidently, although several theories exist to explain the firms' dividend payout policies, none of these theories fully answer the question why firms pay dividends to their shareholders although it is opined that the agency theory seems to offer the most promising theoretical framework.

H1: There is a significant negative relationship between high growth firms and dividend payout *ceteris paribus.*

In summary, H1 relates to the relationship between growth opportunities and the firm dividend payout. The literature suggest a negative relationship between growth and dividend, where high growth firms declare low dividends and low growth firms declare high dividends which support the contracting theory based on Jensen's Free Cash Flow Theory.

5.4.2. Board Composition

The "Board composition" is ordinarily defined as the proportion of outside directors to total directors (Baysinger & Butler, 1985; Kesner (1987) as per the discussion in chapter 3, the components within the board are very important to judge the effectiveness of a particular board in monitoring. Peasnell *et al.* (2000) report that independent non executive directors have the capability to detect earnings management

as most of them are familiar with financial reporting issues as they hold senior management positions in other firms. Craven & Wallace (2001) reiterate that the appointment of outside directors would lead the board to be more independent in monitoring and thus reduce the agency conflicts and improves performance.

On a more specific note, Anderson *et al.* (1993) define investment opportunities set as firm specific and are relative to such things as managerial skill. Hence, it is difficult to monitor manager's actions as it is difficult to determine if it is manager's actions or external factors that led to successful investment options. Bathala et al. (1994) and Hutchinson (2002) found a negative relationship between the proportion of outside directors and the firm's growth rate. Furthermore, Anderson et al. (1993) report that growth firms incur higher monitoring costs than low growth firms.

Further, on the aspect of corporate governance, Dalton et al. (1999) report on fraudulent reporting. Beasley (1996) and Fama (1980) found that the domination by insiders might lead to transfer of wealth to managers at the expense of the shareholders and these pushes up the agency cost of the company. There have also been a number of studies done mainly in US on the relationship between independent directors and corporate performance. Baysinger & Butler (1985) and Hambrick & Jackson (2000) found evidence that the proportion of independent directors is positively correlated to accounting measures of performance. Similarly, Hermalon & Weisbach (1988) found that firms which are performing poorly tend to increase the number of non executive directors representing the board to have a check on the overall performance of the company. Hence, the overall results have been mixed.

Further, Hermalon & Weisbach (1988) report that outside directors, are more likely to join and inside directors leave the board of poorly performing firms. Jensen (1993) posits that the main concern is on the difficulty of boards to respond to failure at top management if there is a lack of independent leadership. Other studies that support the existence of outside directors on the board of directors as a monitory role are for example (Fama & Jensen, 1983; Shivdasani, 1993; Lehn *et al.,* 2003; Linck *et al.,* 2007, 2008).

There have also been perceptions that those who are better managers tend to become outside directors (Fama, 1980; Fama & Jensen, 1983; Kaplan & Reishus, 1990). Furthermore, Fama & Jensen (1983) and Campbell (1993) report that those directors who hold multiple directorships have greater incentives to monitor corporate decisions and hold the reputation as market experts. However, there are other differing views such as Higgs (2003) who posit a small number of outside independent directors and that they are still weak due to an overly informal appointment process. Further, Davies (2001) also document that the outside directors performances are more on the advising rather than monitoring.

Cotter *et al.* (1997) in examining the role of target firms' independent outside directors during takeover attempts by tender offer found that outside directors enhance target shareholders' gains. Further, boards with a higher majority of independent directors are more likely to use resistance strategies to enhance shareholders wealth. On that note, Ajay (2007) argue that independent directors have added pressure from the stakeholders on the grounds of bringing in expertise, independent judgement and also to provide transparency at the time of poor results.

Coles & Hoe (2003) argue that outsiders' motivation can either be as ownership of firm shares, which entitles them to a share on the final value of the share or as reputational benefits from high firm value such as more future directorship in other firms. Lawler *et al.* (2002) posit that there is a shift from a mere traditional role of the board as a "Pawn" to more than shareholder value, must be considered and assessed.

Similarly, Byrd & Hickman (1992) found that bidding firm's on which the independent directors represent more than 50% of the board members of the company, generally have significantly higher announcement of excessive returns than other bidders. Furthermore, Rosenstein & Wyatt (1990) found a direct evidence of a positive stock price reaction at the announcement of an appointment of an additional independent director.

Klein (1998) confirms the link between board independence and accounting quality by focusing on accrual management permitted within the accounting standards. Beekes *et al*. (2004) found that the proportion of outside directors on the board is associated with the likelihood of timelier recognition of bad news and this evidence supports the contention that board independence is associated with accounting quality. More importantly, Kini *et al.* (1995) demonstrate that the extent of independent directors on the board substitutes for market based corporate controls.

In the Malaysian context, Abdullah (2004) reiterate that the choice of board composition is not random but based on other factors. The other factors that influence the choice of board composition in Malaysia are, for example, size of the board, the extent to which the directors are independent of management, the extent of directors' shareholdings, CEO duality and the presence of large shareholding. Saleh *et al.* (2005)

found that more independent director representation on the board does not limit the action of CEO-Chairman towards earnings management practices. Hutchinson & Gul (2004) posit that the exogenous variable that is selected as an environmental factor is the firm's growth opportunity because there is strong theory to suggest that IOS is negatively associated with firm's performance and on this premise found that the negative association is weaker for firms with a higher proportion of non-executive directors on the board.

Based on the rationalisation of the above results, it can be envisage that the overall results have been mixed and inconclusive. In the Malaysian context, other corporate moderating variables such as to whether the companies are GLCs, non-GLCs or family controlled have a greater influence on the proportion of non-executive directors representing the board. This is because legal, political and institutional environment support different types of corporate governance by favouring a particular level of ownership concentration. For instance in Malaysia, Chinese (typically the family orientated businesses) control more than half of the family owned public listed companies in Malaysia and family members usually control the board and management, hence the accountability aspect of corporate governance may not be important and as such the business prosperity aspect of corporate governance is fulfilled as long as the company thrives.

Further, there are also other factors that need to be considered prior to an increase or decrease on the number of directors required to represent the board. Instances where an increase in the proportion of independent directors are envisage is when firms are found to be performing poorly, presence of shareholding, size of the board, CEO duality and maintaining quality accounting. However, in this study, it is expected that the negative

association between firms' investment opportunities and dividend payout is weaker for firms with more non-executive directors.

$H2_a$: The negative relationship between firms' investment opportunities and dividend payout is weaker for firms with more non-independent directors.

$H2_{b:}$ There is a positive association between dividend payout and the proportion of independent directors.

In summary, H2 relates to the board composition which is measured based on the ratio of total number of independent directors to the total number of board of directors. This hypothesis is based on the rationalisation that a smaller number of independent directors tend to have a more monitoring role and multiple directorships have greater incentives to monitor corporate decisions and hold the reputation as market experts.

5.4.3. Board size

Many studies report the negative association between board size and performance (Yermack, 1986; Eisenberg *et al.,* 1998; Bamhart & Rosenstein, 1998; Ajay, 2007; Cheng, 2008). Further test using numerous models such as fixed effects, random effects and OLS estimates together with regressions substituted with other proxy variables such as return on assets, return on sales and assets, also produce the same results (Yermack, 1986; Eisenberg *et al.,* 1998; Bamhart & Rosenstein, 1998). The negative association still persisted, confirming that firms with smaller boards perform better than firms with larger board size (Ajay, 2007; Cheng, 2008).

On a similar note, Vafeas (2000) document that firms with the smallest board (on average five members) are better informed about earnings and can be regarded as having better monitoring abilities. Mak & Yuanto (2003) found that listed firms valuations of Singaporeans and Malaysian firms are at highest when the board members are limited to five. The studies that support the negative effect of board size on earnings include (Huther, 1997; Conyon & Peck, 1998; Postma *et al.,* 2003; Loderer & Peyer, 2002; Ajay, 2007 and Cheng, 2008).

In fact, Yermack (1986) emphasise the quality of monitoring and decision making and highlight the problems associated with co-ordination, communication and effective decision making for an enlarged board. He evidence that smaller boards are more likely to dismiss CEOs for poor performance. Similarly, Lipton & Lorsch (1992) and Jensen (1993) contend that larger boards may lead to reluctance to hold open and candid discussions over key executive decisions. Furthermore, Steiner (1972), Hackman (1990) and Holthausen & Larcker (1993) are of the view that board size is among other variables that influence executive compensation and company performance. Hermalin & Weisback, (2003) contend that larger boards are only symbolic in nature and are not able to serve the true nature of the board. Further, Cheng (2008) posit that it takes more compromises for a larger board to reach consensus and consequently, decisions of larger boards are less extreme and hence lead to less variable corporate performance.

Magnet (1992), observe that directors from large boards hesitate to criticise the policies of top managers or to candidly discuss on corporate performance. The implication of the board size effect leads to a situation where it is becoming a trend for average board to shrink over time (Bacon, 1990; Huson *et al.,* 2001; Coleman et al., 2007). Large boards may also be prone to increase in board diversity in terms of experience, skills,

gender and nationality. Furthermore, Yermack (1986) note that large boards affect the value of a firm in a negative fashion as there is an agency cost involved when the board size is large. In other words, it may help to alleviate the agency problem by monitoring and controlling the opportunistic behaviour of management. Coleman & Biekpe (2007) also support the view that board size is positively related to Tobin's q.

Similarly, Conyon & Peck (1998) who examined the board size effect for a sample of firms from the United Kingdom, France, the Netherlands, Denmark and Italy found a negative relationship between board size and firm valuation. This is confirmed by subsequent studies in (Ajay, 2007; Cheng *et al.,* 2008).

Although there have been many studies with suggestions and recommendation on the ideal board size that should be maintained by a board, however, it has been inconclusive and the overall results are mixed. In this study, the negative relationship between firms' investment opportunities and dividend payout is weaker for firms with a larger board size as smaller boards tend to be better informed about earnings and regarded as having good monitoring skills. Further, it is also envisage that listed firms with smaller board size have better firm valuations, more likely to remove CEOs who are not performing, more effective to influence executive compensation and company performance, lower agency cost and is also easier to reach consensus.

$H3_a$: There is a negative association between dividend payout and board size.

$H3_b$: The negative relationship between firms' investment opportunities and dividend payout is weaker for firms with a smaller board size.

In summary, H3 relates to board size. Whilst there are conflicting evidence on the relationship between board size and performance, generally, past empirical results confirm that larger boards are generally ineffective. Larger boards have been said to have difficulties in arranging meetings, reach consensus and react rapidly due to communication and coordination problems. Furthermore, they also encourage directors to free rides and the ability and incentive to control management decreases with the increase in board size. Accordingly H3b hypothesises that the negative relationship between firms' investment opportunities and dividend payout is weaker for firms with a larger board size.

5.4.4. Ownership structure

5.4.4.1. Government linked company

Gugler (2003) found that state owned controlled firms have the highest dividends payout and practices dividend smoothing. The reason for the high dividend payout is attributed to the lesser motivations by citizens/individuals to monitor the management. The Government controlled firms are likely to suffer from this agency problem as they are controlled by a large number of citizens. Hence, managers of government controlled firms prefer to have a stable dividend policy with high dividends payout to keep the principles happy.

Gul (1999) reported that firms with a higher level of government ownership in China are associated with higher debt and dividend payments. The findings support as expected that growth firms have significantly lower debt/equity ratios than non-growth firms and this result is in line with the studies pursued by Ferri & Jones (1979), Long &

Malitz (1984) and Titman & Wessels (1988). Further, this finding is also consistent with the contracting costs explanations of a firm's dividend policy (Rozeff, 1982; and Smith & Watt, 1992). Kowalewski *et al.* (2008) used long term debt to assets as a firms leverage and closeness to debt covenant restrictions and argue that high financial risk is associated with lower dividend payout as it discourages both paying out dividends and taking further loan.

Smith & Warner (1979) and Kalay (1982) argued that the contractual arrangement also applies to a firm's dividend policy. Contractual arrangement encourages managers to pay higher dividends rather than under take negative net value projects. On the other hand firms with low growth opportunities are likely to pay higher dividends in order to remove resources from the firm. The study also found that profitable investment options can tolerate more restrictions on dividends before the expected benefits of controlling payout are offset by negative investment projects.

Gul (1999) opined that the government ownership is a form of or at least similar to, institutional ownership, hence, it is likely that the monitoring hypothesis may also apply. Gul (1999) too argued that although the literature on the relation between government ownership and corporate policies is as yet unexplored, there is relatively more evidence on the institutional ownership literature that provides relevant linkages. For example, the pressure institutional investors exert on managers could have an impact on managers' incentives. Other studies which support the above statement are for example (Brickley *et al.,* 1988; Pound, 1988; Bushee, 1988).

Further, Gul (1999) stressed that there is some anecdotal evidence that suggest a positive association between government ownership and dividends since firms with

government ownership have relatively less difficulty raising funds to finance investments and therefore afford to pay dividends. Likewise, firms with low government ownership are more likely to have difficulty raising funds and therefore are likely to rely on retained earnings for investments. Gugler (2003) found that state controlled firms in Austria "smooth" dividends and have large target payout ratios and are most reluctant to cut dividends despite the potential costs incurred by the shareholders. This behaviour is consistent with the agency cost explanation in Goergen *et al.* (2005) who posited that as most citizens are only indirect shareholders of government controlled firms, they have few incentives to monitor the management and hence managers of government controlled firms prefer a stable dividend policy with high dividends.

Amidu & Abor (2006) found no association between institutional shareholding and dividend payout ratio to show that the higher the percentage of institutional holding the lower the dividend payout ratio. In contrast, Guo & Ni (2008) argued that dividend payers are more associated with institutional investors than non payers whereby the firms with higher institutional ownership are more likely to pay and continue to pay dividends.

Based on the discussions above, it is envisaged that there is likely to be a positive relationship between government linked company and dividend payout due to factors such as Malaysia's political economy and social responsibility with regards to the positive affirmative actions taken by the government (discussed in Chapters 2 and 3). A continuous dividend payout is attributed to the lesser motivations by citizens/individuals to monitor the management. The GLCs are likely to suffer from this agency problem as they are controlled by a large number of citizens. Hence,

managers of government controlled firms prefer to have a stable dividend policy with high dividends payout to keep the principles happy. This behaviour is consistent with the agency cost explanation whereby it is posit that as most citizens are only indirect shareholders of government controlled firms, they have few incentives to monitor the management and hence managers of government controlled firms prefer a stable dividend policy with high dividends.

H4: There is a positive relationship between government linked company and dividend payout.

5.4.4.2. Family Ownership

As noted from Chapter 2 and 3, the Malaysian corporate ownership is highly concentrated. Kang (1999) found that firms with early-generation family shareholders have higher levels of dividend payouts and that firm with later-generation family shareholders have lower levels of dividend payouts hence implying that early-generation family owners are effective in corporate governance and later-generation family owners may be particularly ineffective in shaping dividend policy.

Gul & Kealey (1999) found positive and significance association between the existence of family control (Chaebol) and dividend policy. The result obtained is also consistent with prior studies in which a negative association is found between high growth firms and dividend payout. Further, Goergen *et al.* (2005) argue that in firms controlled by families, dividends are less important and more volatile. This is because agency costs are expected to be lower due to close monitoring by the controlling shareholder. Hence, dividends are not expected to play an important role as a monitoring device and are expected to move closely with earnings or cash flows.

Further, Gugler (2003) posited that family controlled firms show no smoothing in dividends, have lower target payout ratios and are least reluctant to cut dividends. These owner-managers are reactive to investment opportunities and financing needs and adjust to dividend policy accordingly. In contrast, Gadhoum *et al.* (2007) argued that the protective power of dividend is less effective in Canadian family firms and the hidden reason is the control that families exert on the dividend payout policy.

Further, Chen *et al.* (2005), found little relationship between family ownership and dividend payout. However, only for small firms there is a significant negative relationship between dividend payouts and family ownership of up to 10% of the company's stock and these findings suggest that dividend payouts are potentially used by controlling shareholders in smaller Hong Kong companies as a way of extracting resources out of the firms they control. However, How *et al.* (2008) argued that small and medium size family controlled firms are significantly more likely to pay dividends than large family controlled firms, however this is moderated by the discrepancy between the controlling shareholder's cash flow rights and voting rights.

In Malaysia, the Chinese (typically the family orientated businesses) control more than half of the family owned public listed companies in Malaysia and as a result of this, the Chinese family owned companies, family members usually control the board and management, hence the accountability aspect of corporate governance may not be important. The corporate governance aspect is considered fulfilled as long as the company performs. Further, as majority of the shareholders are family members, they are unlikely to expect higher dividends and most of the profits would be retained for investment purposes.

$H5_a$: There is a negative relationship between family controlled firm and dividend payout

$H5_b$: The negative relationship between IOS and dividend payout is weaker for family controlled firms

5.5. SAMPLE SELECTION

The sample of this study consists of three hundred of the largest market capitalised companies listed on Bursa Malaysia for the years ended 2004 till 2006. This period is chosen because most reforms came into implementation during this period and the period concerned was expected to show higher level of corporate governance practices. The 300 largest public listed market capitalised companies is selected not only to represent the total sample of the companies but also to include high growth firms in the sample. All the information obtained is from published data as the companies are listed in the Bursa. In situations where the data is not available from particular source other alternative means of sourcing for information is sorted e.g obtaining a hard copy of the annual report.

The analysis involved all the sectors listed on the Bursa (See Table 5.1). The statistical package of E-views and SPSS are used to conduct the data analysis for this study i.e descriptive analysis, correlation and multiple regression and the E-views is used to compute the cross-sectional data using the Ordinary Least-Squares Regression.

Table 5.1
Sector Representation of the Sample Companies

	Number of Companies	%
Consumer product	28	9.33
Trading/Services	108	36.00
Properties/Hotel	50	16.67
Construction	19	6.33
Plantations	32	10.67
Industrial	63	21.00
Total	300	100.00

The data is collected for the three categories: dependent, independent and control variables. The data for this study is collected from the Kuala Lumpur Stock Exchange (KLSE), OSIRIS, DATASTREAM, BANKSCOPE and Malaysian Stock Performance Guide. After eliminating the missing data, the sample size is reduced to 409 (See Table 5.2). The data for the computation of MBE, market capitalisation, logarithm of assets, dividend payout, debt to assets, return of assets and industrial classification is obtained from OSIRIS and DATASTREAM. Board details such as board composition and board size is obtained from the Malaysian stock performance guide by Dynaquest Sdn Bhd and OSIRIS and bank data is obtained from the BANKSCOPE.

Table 5.2
Derivation of Sample, 2004 to 2006

Sample selection	Total
Top 300 of the market capitalisation of the companies for the years (2004 – 2006) as listed on the Main Board of Bursa Malaysia	900
Less:	
Bank, Insurance and unit trusts	24
Companies with incomplete data	467
Final Sample	409

5.6. MEASUREMENT, CONCEPTUALISATION & OPERATIONALISATION OF THE VARIABLES

This section presents the measurement, conceptualisation and operationalisation of the variables used in the IOS model. The independent variable, IOS is measured via a proxy i.e market to book equity (MBE) as discussed in section 5.6.1. The dependent variable is the dividend payout (DPP) and the moderating variables are board size (BSIZE), board composition (BCOM), family ownership (FLYC) and government

linked companies (GLC). The interaction between IOS & BSIZE, IOS & BCOM and IOS & FLYC is also tested. The control variables are return on assets (ROA), log of market capitalisation (LOGMKTC), debt to total assets (DTA) and duality (Dual).

The variables such as market capitalisation and net assets are transformed into logarithmic form by taking natural logarithms. The variables have been adjusted to remove non-linearity in the relationship with IOS. Furthermore, missing data among the individual growth measures precludes some firms from the analysis.

5.6.1. Measurement of the Independent Variable: IOS

The measurement of IOS has been a thorny issue amongst researchers. There have been several proxies used in the accounting and finance literature to measure IOS. Kallapur & Trombley (1999) classified these proxies into price based and investment based proxies and variance measures. Price based proxies are based on the assumption that growth firms will have higher market value relative to assets in place as growth prospects are at least partially absorbed and reflected in the share price (Kallapur & Trombley, 1999). Accordingly, among the many proxies available, the market to book value of assets has been the most commonly used proxy and this is found to be highly correlated with future growth (Adam & Goyal, 2008).

Typically, four proxies have been identified, namely, (i) Earnings Price ratio; (ii) CAPX/PPE Ratio (iii) Market to Book Value of Assets ratio (MBA); and (iv) market to Book Value of Equity ratio (MBE) (Adam & Goyal, 2008). These are discussed briefly next.

(i) *Earnings Price Ratio*

This is a commonly used proxy for IOS which is the Earning Price (EP) ratio or its inverse, the price-earnings ratio. Chung & Charoenwong (1991) argue that a higher EP ratio indicate that a larger proportion of equity value is attributable to assets in place relative to growth opportunities. This inference assumes that current earnings is a proxy for cash flows received from assets in place whereas a firm's market value of equity reflects the present value of all future cash flows, that is, cash flows from assets in place and future investment opportunities. EP ratio has an advantage in the sense that EP does not rely on the market value of debt which is typically unobservable. The disadvantage of EP is that it would not be a meaningful measure of investment opportunities if firms report zero or negative earnings.

Furthermore, EP has other interpretations in the literature. Penman (1996), points out that it has been interpreted as an earnings growth i.e indicator of a risk measure, and also as earnings capitalisation rate. Furthermore, the EP ratio is affected by leverage. Penman (1996) observed that a lower EP ratio does not always mean that a firm has good investment opportunities because current earnings sometimes deviate temporarily from long-run expected values.

Smith & Watts (1992) too found that several of their regression coefficients become insignificant when the earnings to price ratio is used as an IOS proxy. Further, Gaver & Gaver (1993) report on the correlations among their proxies and found several of the MVE/BVE and R&D/A, or variance of returns proxies insignificant. Similarly, in Skinner's (1993) logit regression of goodwill method choice on IOS proxies, the coefficients on R&D/S and Tobin's Q are of opposite signs. Hence, the IOS proxies discussed above are not suitable as a proxy measurement.

(ii) *CAPX/PPE Ratio*

This refers to capital expenditure to property plant equipment ratio CAPX/PPE. A related measure is research intensity defined by R & D expenditures divided by total assets or sales. This variable is highly recommended on the basis that capital expenditures are largely discretionary and lead to the acquisition of new investment opportunities. For instance, a firm that develops a mineral research, requires the option to extract metals and hence firms that invest more, has more investment opportunities compared to firms that do not have research intensive activities. This ratio is not suitable in this study as only firms that are involved in research intensive activities find this proxy more suitable as a proxy measurement.

(iii) MBA ratio

According to Adam & Goyal (2008), the Market to Book Value of Assets ratio or the closely related measure, Tobin Q, is perhaps the most commonly used proxy for investment opportunities. Perfect & Wiles (1994) show that Tobin's Q and the MBA ratio are highly correlated (the correlation coefficient is about 0.96) and therefore they do not distinguish between Tobin's Q and the MBA ratio. The book value of assets is a proxy for assets in place and investment opportunities. Thus, a high MBA ratio indicates that a firm has many investment opportunities relative to its assets in place.

Although MBA has many advantages it too has its shortcomings. Firstly, the market value of asset requires an estimation of the market value of debt and debt is often not publicly traded. Secondly, the book value of assets does not necessarily equal the replacement value of assets and thirdly the MBA ratio (or Tobin's Q) is also used as a proxy for many other variables such as corporate performance, intangibles, quality of

management, agency problems and firm value. And as such the value as a proxy for growth opportunities remains ambiguous.

Lougee & Marquardt (2004) also found that the market to book value of asset (MBA) and market to book value of equity (MBE) growth measures to be most frequently used in prior research. Moreover, since these ratios mirror the definition of growth opportunities provided in (Myers, 1977), and because growth opportunities arising from investments in intangibles are captured by market values (Lev & Zarowin, 1999), it was contended that the use of market to book ratios as proxies for the IOS is unlikely to cause serious problems in the study. In their study of association between goodwill accounting policies and New Zealand (NZ) firms' growth options, Bradbury *et al*. (2003), found that their version of the MBA measure is a good proxy for NZ firms' growth options. This is particularly so relative to US measures, since NZ firms frequently revalue their fixed assets and the book value of assets approximates their market value. A high MBA indicate that the market values the firm well in excess of the market value of its net assets. In an efficient market, this excess reflects the value of unrecorded growth options.

iv) MBE Ratio

Increasingly the MBE ratio is used as a proxy for IOS (Loderer & Martin, 1987; Collins & Kothari, 1989; Chung & Charoenwong, 1991; Gaver & Gaver, 1993; Skinner, 1993; Anderson *et al.,* 1993; Baber *et al.,* 1996; Gul, 1999; Hossain *et al.,* 2000; and Adam & Goyal, 2008). The market value of equity measures the present value of all future cash flows to equity holders from both assets in place and future investment opportunities. The MBE ratio is a combination of cash flow from assets in place and future investment opportunities. The MBE ratio does not require information on the market

value of debt and the estimation of replacement values. However, the MBE ratio is affected by leverage and much of the literature argued that leverage is a function of investment opportunities (Rajan & Zingales, 1995; Frank & Goyal, 2005). Another concern of MBE is that the firms with negative equity must be omitted from the analysis as negative MBE ratios are not meaningful in measuring investment opportunities.

So given the many choices for measuring IOS, in this study the MBE ratio is chosen. The rationale is explained next.

MBE as measure of IOS

The MBE ratio is chosen as the proxy for IOS (growth opportunities) as it allows an assessment on the robustness and sensitivity of the analysis to be made (Adam & Goyal, 2008). MBE measures the present value of all future cash flows to equity holders from both assets in place and future investment opportunities. It is a combination of cash flow from assets in place and future investment opportunities. Further, it does not require information on the market value of debt and the estimation of replacement values. However, one concern of MBE is that the firms with negative equity are omitted from the analysis as negative MBE ratios are not meaningful in measuring investment opportunities. This measure is also used extensively in prior studies (Anderson *et al.,* 1993; Baber *et al.,* 1996; Gaver & Gaver, 1993; Gul, 1999; Hossain *et al.,* 2000; and Skinner, 1993).

MBE is measured using the following formula:

Shares outstanding x shares closing price /total common equity.

5.6.2. Measurement of the Dependent Variable: Dividend Payout

Gaver & Gaver (1992) use the dividend payout ratio and the dividend yield as the two measures for dividend policy. The dividend payout ratio is the dividend per share divided by primary earnings per share before extraordinary items and the dividend yield is the dividend per share divided by the closing price per share. It was noted that the dividend yield is sensitive to share price whereas the dividend payout is not. For this reason, the dividend payout ratio is taken as the primary measure of financing and dividend policy. Similarly other studies (Smith & Watts, 1992; Gaver & Gaver, 1993; Gul, 1999 and Adam & Goyal, 2008) used this measure.

The dividend payout is measured in this study using the following formula:

Cash dividend paid/Net income (Profit after tax).

5.6.3. Measurement of the Moderating variables

There are four moderating variables in this study, namely, (i) board size; (ii) board composition (iii) government linked companies; and (iv) family ownership.

5.6.3.1. Board Size

Board size refers to the number of directors on the board and is an important variable to gauge on quantum of dividend payouts. According to Ajay (2007) this variable is widely use in the literature of corporate governance and its value is found by counting the total number of executive and non-executive directors in a firm. Other studies that uses this measure include Yermack (1986), Huther (1997), Conyon & Peck (1998), Postma *et al.,* (2003), Loderer & Peyer (2002), Nordin *et al.,* (2005) and Guest (2008).

5.6.3.2. Board Composition

Members of the board of directors are commonly regarded as either "insiders' or "outsiders". An insider is usually a full time officer of the corporation and is normally the CEO or president of the company whereas an outsider does not serve in a managerial position. According to Baysinger & Butler (1985) and Kesner *et al.* (1986), "Board composition" is ordinarily defined as the proportion of outside directors to total directors.

The ratio gives an indication on the board's independence and to what extent the board is represented by inside directors or outside directors. Other studies such as Conyon & Peck (1998), Weir (1997), Nordin *et al.,* (2005), Ponnu (2008) and Guest (2008) identify external board members as non-executive directors. Board composition is the proportion of non-executive directors (NEDs) on the board. The higher the ratio, the greater is the proportion of non-executive directors on the board.

5.6.3.3. Government linked companies

GLCs are defined as companies whose major ownership and control is held by a main shareholder who is either a government agency such as Khazanah, Ministry of Finance (MoF) Inc, Bank Negara Malaysia or Kumpulan Wang Amanah Pencen (Malaysia) (KWAP) (the civil servants pension fund), or by a government related agency where the Government has an interest by virtue of a financial or legal exposure, contingent or otherwise. Control is defined as the ability to appoint members of the Board of Directors or senior management who make major decisions (contract decisions, strategic decisions on restructuring, investment & divestments and financing). In the case of ambiguity in the definition of GLCs, some conclusive evidence has been

obtained that shows companies that come under the two main Malaysia's investment arms (Khazanah and Permodalan Nasional Berhad) are considered as GLCs similar to the way Ramirez and Tan (2004) categorised Singapore's GLCs that come under Temasek Holdings (Singapore's investment arm).

Further, ultimate ownership is defined as the sum of shares owned directly or indirectly by a single owner through crossholdings or pyramids. As a measurement a dummy variable of 1 for GLCs & 0 for non-GLCs are used. Other studies that use similar measures include (Gul, 1999; Gugler, 2003; Goergen *et al.,* 2005 and Amidu & Abor, 2006).

5.6.3.4. Family ownership

In a study, family firms are defined as "those in which the founding family or family member or private individual controlled 20 per cent or more equity, and was involved in the top management of the firm" (Mrockowski & Tanewski, 2007). Two variables are used to estimate the impact of family firms: a binary variable that equals one for family firms and zero otherwise (denoted as *family control*) and the percentage of shares held by the family as a group (denoted as *family ownership*). *Family control* captures the impact of the presence of family control (i.e., 20 per cent or more), while *family ownership* helps examine the actual impact of different levels of family holdings. Further, in the case of designing so-called business groups under family control of many companies, it is fairly popular for each company to be connected through the use pyramid ownership structure. Other studies that use the same measures include Gul & Kealey (1999), Kang (1999), Goergen (2003), Lai & Hock (2007) and Gadhoum *et al.,* (2007).

5.6.4. Measurement of the Control Variables

As with prior studies, several variables are found to impact the dividend payout decisions as discussed in chapters 2 and 3. The most common of these are controlled in this study to investigate the relationship between growth and dividend payout. These are (i) firm size; (ii) CEO Duality; (iii) proxy for profitability, namely, Return on assets (ROA); and (iv) leverage.

5.6.4.1. Firm Size

Firm size is included as a control variable as it has been found to be associated with firm characteristics. According to Smith & Watts (1992) firm size is positively associated to various types of corporate governance variables such as debt covenants, dividend policy and management compensation. Firm size is defined as the book value of total assets and logged it to normalise the variable and label it as market capitalisation. It is determined by the use of logarithm of market capitalisation and labelled as LOGMKTC.

Market capitalisation measures the percentage of market captured by the firms. Market capitalisation is widely used in the literature on corporate governance. Black et al. (2006) and Leng & Aik (2007) use market capitalisation in studies related to developing market. In this study, the highest capitalised companies for the 3 years ending at 2004, 2005 & 2006 is chosen as market capitalisation to reflect investor confidence. Usually investments in firms with higher market capitalisation are quite safe compared to firms with lower capitalisation mainly because the shares of a firm having higher market capitalisation are more liquid and stable (Black et al. 2006).

5.6.4.2. CEO Duality

CEO duality is widely discuss in the literature and is widely use as a dummy variable (Daily & Dalton, 1997; Abdullah, 2007; Ponnu, 2008). Duality is defined as a board structure control mechanism which comprise of chief operating officer (CEO) and chairman of the Board as the same person. Duality is determined when the chief operating officer (CEO) and chairman of the Board is the same person and non-duality arises when the chairman and the CEO are two separate individuals. The numerical 1 is used if the chairman is also the CEO and 0 if the roles are separate. In the current study the CEO duality is use as a dummy variable.

5.6.4.3. Return on Assets

ROA is defined as the ratio of earnings before interest and taxes over total assets (Wang *et al.* 1993; Ling *et al.,* 2008 and Imm Song *et al*., 2008). It is determined to gauge the profitability and efficiency of converting the assets of a firm for the sole benefit of the shareholders. In other words, it shows the performance of the assets and how efficiently the assets are utilised to generate returns and earnings for the firm. Bhattacharya (1979) reiterated that instead of using past earnings, the firm's expected future earnings is employed as a proxy of corporate performance to test the signalling role of dividend policy.

5.6.4.4. Leverage

Leverage is proxied by the debt to assets ratio which is defined as the ratio of the book value of long term debt divided by the book value of total assets (debt to assets). It is determine to gauge the extent to which the total assets owned are represented by debts.

Table 5.3 Summary of the Operationalisation of the Research Variables

Variable	Acronym	Operationalisation
Dependent Variable		
Dividend Payout		
Dividend Payout ratio	DPP	Cash dividend paid/Net income (Profit after tax)
Independent Variable		
Investment Opportunity Set Market to book value of equity ratio	MBE	Market to book value of equity at the end of year t [Shares outstanding x shares closing price] / total common equity.
Control variables		
CEO duality	DUAL	Dichotomous with 1 if the chairman is also the chief executive officer (CEO) of the company and 0 other wise.
Firm size		
Industry type based on KLSE classifications	Consumer Trading Properties, Hotel & Others Construction Plant/Mining Industrial	Consumer sector (1) Trading sector (2) Properties, Hotel & others (3) Construction (4) Plantations and Mining (5) Industrial (6)
Log of Market Capitalisation	LOGMKTC	logarithm of Market capitalised companies for the years 2004,2005 & 2006
Return on Assets	ROA	Earnings before interest and tax divided by total assets
Leverage	DTA	Book value of long term debt divided by the book value of total assets
Moderating Variables		
Family Firms	FLYC	The presence of family members on the BOD and the equity ownership of the family firms of at least 20 %. Takes a value of 1 if family firms and 0 otherwise.
Government linked companies	GLC	Shares held by the 10 largest shareholders as a measure of ownership concentration. 1 – Government linked companies; 0 – Non-Government linked companies
Board size	BSIZE	Total number of directors on the board of the company
Board composition	BCOM	The proportion of non-executive directors (NEDs) to total number of directors on the board of the company

Leverage assumes a double and active role in that, it helps to create value by disciplining managers in those companies with no or very scare growth opportunities while it has a negative effect in those firms with best opportunities due to the propensity to forgo profitable projects (Alonso *et al.,* 2005; How *et al.,* 2008; McKnight & Weir, 2009).

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5.7. REGRESSION MODEL

The panel character of the data allows for the use of panel data analysis. Panel data allows the pooling of observations on a cross-section of units over several time periods and provides results that are simply not detectable in pure cross-sections or pure time series studies (Vogelvang, 2005). Pool regression with cross sectional data is used for hypotheses testing and to reveal the relationship between IOS, dividend policy and control variables. The regression is used to specify the relationship among the dependent, independent and control variables in this study.

Ordinary least squares regression is use to test and evaluate the contribution and significance of the hypothesis. Based on the classical regression model, the linear model has exogenous explanatory variables which are considered as deterministic

variables in the equation. The OLS estimator is unbiased, consistent and efficient in the class of linear unbiased estimators (Vogelvang, 2005). The regression tests whether the level of corporate governance moderates the negative association between growth opportunities and dividend policy.

$$DPP = \alpha_0 + \beta_1 MBE_{it} + \beta_2 BSIZE_{it} + \beta_3 BCOM_{it} + \beta_4 FLYC_{it} + \beta_5 GLC_{it} + \beta_6 DUAL_{it} +$$

$$\beta_7 LOGMKTC_{it} + \beta_8 DTA_{it} + \beta_9 ROA_{it} + \sum_{i=1}^{n} \beta_{10} IND\ TYPE + \varepsilon_{it}$$

Where:

DPP	= Dividend payout
MBE	= Market to book value of equity at the end of year t
BSIZE	= Board size
BCOM	= Board composition
FLYC	= Value '1' for family & '0' otherwise
GLC	= Value '1' for government linked & "0" for otherwise
DUAL	= Role duality '1' dual & '0' non-dual
LOGMKTC	= Log of market capitalisation
DTA	= Debt to Total Assets
ROA	= Return on assets
TYPE	= Consumer sector, Trading sector, Properties, Hotel & others, Construction, Plantations and Mining and Industrial
ε,i and t	= Error term, company and time respectively
α_0	= Intercept of the model

5.7.1. Regression Model and Discussion

Pool regression with cross sectional data is use for hypotheses testing and to reveal the relationship among IOS (investment opportunity set), DPP (dividend payout) and control variables. In this regard, appropriate regression tests should incorporate some specific methods under the panel data analysis. These methods include pooled effect (PE), fixed effect (FE) and random effect (RE). PE is only used for robustness check which is quite similar to OLS (ordinary least square) and thus this part is excluded in the study (Verbeek, 2008). However, for modelling purposes, the main focus is to choose either FE or RE as these models take time variant and cross-sectional effect into

consideration (Verbeek, 2008). This could be accomplished by conducting an additional test known as Hausman Test. The following section discusses the fixed and random effect and also the relevance of the Hausman Test.

5.7.1.1. The Fixed Effects model

The fixed effects model is basically a linear regression model in which the intercept terms vary over the individual firms i.e *i.* Hence;

$$y_{it} = \alpha_i + x_{it}^{'}\beta + \mu_{it} \qquad \mu_{it} \sim IID\left(0, \sigma_u^2\right),$$

Where $x_{it}^{'}$ are independent of all μ_{it} . Based on this, the regression model can be re-written by including a dummy for each firm *i* in the model (Verbeek, 2008). This explanation goes in line with Least-Squares Dummy Variable (LSDV) (Gujarati, 2003). The model is as follows;

$$y = \sum_{j=1}^{N} \alpha_j d_{ij} + x_{it}^{'}\beta + \mu_{it}$$

Where $\sum_{j=1}^{N} d_{ij} \sim$ $d_{ij} = 1$ if i = j , N = set of dummy variables , α_i (i = 1,2.3,…N) and β can even be estimated using the OLS method and implicitly known as LSDV. However, data transformation need to be done here to eliminated the individual effects (α_i) and models are given below (notation of each component remains the same).

$$\bar{y}_{it} = \alpha_i + \bar{x}_i^{'}\beta + \bar{\mu}_j$$

$$y_{it} - \bar{y}_i = \left(x_{it} - \bar{x}_i\right)^{'}\beta + \left(\mu_{it} - \bar{\mu}_i\right)$$

Hence, the actual transformed model to be the estimator of the fixed effects is as follows;

$$\hat{\beta}_{FE} = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \left(x_{it} - \bar{x}_i\right)\left(x_{it} - \bar{x}_i\right)^{'} \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} \left(x_{it} - \bar{x}_i\right)\left(y_{it} - \bar{y}_i\right)$$

Where $x_{it}^{'}$ are independent of all μ_{it}, μ_{it} is assumed for normality, $\hat{\beta}_{FE}$ has a normal distribution and it requires $E\{(x_{it} - \bar{x}_i)\mu_{it}\} = 0$.

5.7.1.2. The Random Effects model

As for random effects, the model can be written as follows;

$$y_{it} = \beta_0 + x_{it}^{'}\beta + \alpha_i + \mu_{it}$$

$$\mu_{it} \sim IID(0, \sigma_u^2)$$

$$\alpha_i \sim IID(0, \sigma_\alpha^2)$$

Where $\alpha_i +$ μ_{it} is treated as an error term that comprises of an individual component (does not vary over time) and the remainder component is assumed to be uncorrelated over time.

5.7.1.3. Fixed Effect or Random Effect?

Researchers do have the option to choose the better model between fixed effect method and random effect method. As for this purpose, the Hausman Test (1978) is used in most cases as it tests whether the fixed effects and random effects estimators are significantly different (Verbeek, 2008) and the statistical model can be computed as follows;

$$\xi_H = (\hat{\beta}_{FE} - \hat{\beta}_{RE})'[\hat{V}\{\hat{\beta}_{FE}\} - \hat{V}\{\hat{\beta}_{RE}\}]^{-1}(\hat{\beta}_{FE} - \hat{\beta}_{RE})$$

$[\hat{V}s]$ refers to true covariance matrices. $(\hat{\beta}_{FE} - \hat{\beta}_{RE})$ = 0 (null hypothesis), ξ_H refers to asymptotic chi-squared distribution with K degrees of freedom, where K = number of

elements in β. If the Hausman test is significant at least at 0.05, then the RE models is rejected in favour of the FE and vice versa.

Regression analysis based on the panel data is used to specify the relationship among the dependent, independent and control variables in this study. The equation suggests that the IOS of a firm can be influenced by corporate governance variables and control variables. Specifically, the model is to detect whether the level of corporate governance moderates the negative association between growth opportunities and dividend policy. The Government linked and family owned companies are used to gauge to what extent dividend payout varies based on the Malaysian scenario.

The *R* squared values in the econometric model explains the percentage of the dependent variables explained by the independent variables and they are called goodness of fit. According to Campbell, Lo & MacKinlay (1996) *R* squared lies between the values of 0 and 1. In line with this, the *t test* is used to check the significance of individual parameters or hypotheses in the regression relevant to the study. The individual hypotheses that are referred to are related to the relationship between IOS and dividend payout and board size, board composition, market capitalisation, return on assets, duality, family ownership and government ownership.

The *f test* is use to make the partial slopes of coefficient equal to zero and is use to check the significance of all the parameters (hypotheses) in the model. The significance of the *f statistic* shows a relationship between the dependent variable (dividend policy) and independent variable (IOS). The relationship between the dependent and independent variables is tested by way of accepting or rejecting the alternative hypothesis. In this study, the alternative hypothesis is tested against the null hypothesis

which suggests a lack of relationship between the growth opportunities and dividend policy. However, any violations of the classic linear regression assumptions then the issues such as multicollinearity, autocorrelation and heteroscedasticity would arise.

Cuthbertson (1996) found that multicollinearity takes place in the model when the independent variables are related to each other. Multicollinearity is detected in the event of a high *r square* but insignificant *t* ratios. According to Gujarati (2002) a high standard errors of the variables indicate high collinearity. However, indeterminate coefficients with large standard errors show a perfect collinearity.

5.7.1.4. Autocorrelation

Further, the Durban Watson (DW) test is used to detect autocorrelation in this model. The relation of the error term in the model in the first time period is checked with the corresponding period to detect for any autocorrelation. The problems of autocorrelation emerge in the IOS model if the error terms of the model for two different periods are related to each other. The estimators of the model are inefficient in the presence of autocorrelation but remain consistent and unbiased. Further, all results obtained from the hypothesis development relevant for model are tested for robustness in the presence of autocorrelation. Durban Watson (DW) statistic of *0* is known as no residual autocorrelation whereas DW of between *0 – 2* is known as positive residual correlation and above *2* is categorised as negative residual autocorrelation. Standard remedial measures are use to remove the autocorrelation from the IOS model (Vogelvang, 2005).

5.7.1.5. Heteroscedasticity

According to Vogelvang (2005) the phenomenon of heteroscedasticity in the disturbance occurs only in models for cross-section data. It is also made known that when heteroscedasticity occurs in the model, it is possibly caused by a relationship between disturbance variance or one or more variances. The variance of the error term of the IOS model is observed very closely to detect for the existence of heteroscedasticity. The diagonal measure is use to remove heteroscedasticity in the model. This treatment is use to correct the variance of the error term of the model as it will divide the error term with its variance. The estimation use is different from the OLS estimation because it will minimise the weighted sum of residual squares. Additional econometrics and statistical tests in this study include correlation tests, descriptive tests and multiple regression.

5.7.1.6. Correlation

Correlation is a method to compute several associational statistics. In this study a correlation between the dependent variables and the independent variables is conducted. The Pearson correlation method is used in this study. This method is used where there are two variables that are normal. The correlations range from a very negative relationship or association (-1.0) through no correlation (0) to a perfect positive correlation (+1.0).

5.7.1.7. Descriptive statistics

Descriptive statistics is use to analyse the basic features of the data in this study. An analysis of the individual corporate governance variables is also performed to examine the variables relevant for dividend policy and growth opportunities in an individual manner. The descriptive statistics use in this study consist of mean value to show the central tendency, median, standard deviation, number of variables for each of the variables and the minimum & maximum of the dependent and control variables. As a supplementary test of the robustness of the results, interactions with IOS with the inclusion of two experimental variables i.e board composition and board size are examined.

5.7.1.8. Endogeneity

Love (2011) posits that that there has been no consensus yet on the nature of endogeneity in governance performance studies and the emerging conclusion is that corporate governance is likely to develop endogenously and depends on the specific characteristics of the firm and its environment as a whole. Further, Grosfeld & Hashi (2003) argue that ownership structure can be taken as endogenous however there is a need to look into its determinants and also the degree of uncertainty in the firm's environment. Hence, in this study, it is envisaged that the endogeneity problem does not arise merely due to the separation of the sample data into government and non-government linked companies. This separation of companies into specifically government linked and non-government linked companies clearly depicts that there is clearly distinction on the type of companies.

5.8. CONCLUSION

This chapter discusses the research methodology and the research design employed in this study. A theoretical framework is developed which forms the basis for the development of hypotheses. The theoretical model incorporates three moderating variables that predict their influence on dividend policy and IOS relationship. These are board size, board composition and ownership structure. Five main hypotheses were developed and further segregated to reflect its impact on independent variable. The next chapter discusses the results of the data analysis which was carried out as described in this chapter.