CHAPTER 5

RESEARCH METHODOLOGY

5.0 Introduction

This chapter discusses in detail the research methodology and data used for the thesis. The topics presented in the chapter are research questions, the development of hypotheses and hypotheses statements, research design, estimation methods, some econometric issues, data selection, and variables employed in the regression models.

The aim of this chapter is to develop models that will identify how the government ownership structure may have influenced company performance in Malaysia and Singapore after controlling for company specific characteristics. This study also seeks to determine whether government owned companies would lead to better performance than non-government, controlled companies would. The independent variables represented (also as company specific characteristics) by size, a dummy variable of government ownership, leverage, role of duality, agency costs and growth are regressed against two dependent variables separately, i.e. Tobin's Q and ROA. Besides running panel regression models, this study employs a simple parametric test of mean difference of the characteristics of the sample companies (GLCs) and control companies (non-GLCs). For the 1st and 2nd study, the sample company is GLC and control company is non-GLCs, meanwhile in the 3rd study, which is comparing between two countries, Malaysian GLCs is selected as the sample company and Singaporean GLCs is the control company.

5.1 Research Design

In this research, this study employs two research designs. For comparing between two samples, these studies use a simple parametric test of mean difference for the two samples[10]:

(i) For comparing between GLCs and non-GLCs in Malaysia and Singapore, GLCs is identified as the sample companies, while the control companies are the non-GLCs.

Simple Parametric Test

$$\textbf{t-test} = [\mu_{GLCs} - \mu_{nGLCs}] / [(\sigma_{GLCs}/n_{GLCs}) + (\sigma_{nGLCs} + n_{nGLCs})]$$

Where μ_{GLCs}: mean value of the characteristics of GLCs

μ_{nGLCs}: mean value of the characteristics of control companies or non-GLCs

σ_{GLCs} :the standard deviation of GLCs

σ_{nGLCs} :the standard deviation of non-GLCs

n_{GLCs}: number of GLCs

n_{nGLCs}: number of non-GLCs

[10] This study uses simple parametric test even though sample less than 30. It is because since this study uses panel and pooled data (time period odf study is 11 year i.e 1995-2005), therefore it led to more than 30 observations and no need to test non-parametric test.

(ii) For comparing between Malaysian and Singaporean GLCs, Malaysian GLCs is chosen as the sample companies, while the control companies are the Singaporean GLCs.

Simple Parametric Test

t-test = $[\mu_{MGLCs} - \mu_{SGLCs}] / [(\sigma_{MGLCs}/n_{MGLCs}) + (\sigma_{SGLCs} + n_{SGLCs})]$

Where μ_{MGLCs}: mean value of the characteristics of Malaysian GLCs

μ_{SGLCs}: mean value of the characteristics of control companies or Singaporean GLCs

σ_{MGLCs} :the standard deviation of Malaysian GLCs

σ_{SGLCs} :the standard deviation of Singaporean GLCs

n_{MGLCs}: number of Malaysian GLCs

n_{SGLCs}: number of Singaporean GLCs

Second, this is followed by using a panel based regression model to examine the impact of government control mechanism on company performance using two important measures. These are the accounting-based measure proxies of ROA and market-based measured proxies of Tobin's Q. More specifically, this study uses a fixed cross-sectional time series panel model to capture the equivalence of the parameter estimates between (i) GLCs and non-GLCs and (ii) Malaysian GLCs and Singaporean GLCs.

The functional form of the model is given as follows:

Performance = f {Corporate Governance, Growth and Leverage}

Two models were suggested to be used to test in this study. First, this study adopted a model developed by Ang and Ding (2002) with some amendments suitable for the Malaysian case to examine whether government involvement will have any significant impact on company performance after controlling for company specific characteristics. The second model was then developed to examine whether GLCs perform better than non-GLCs in terms of comparing specific characteristics.

Under panel data regression, the two most common features of the regression are the fixed (FE) and random effects (RE). A panel-based regression is chosen to analyse the data so that it is more informative, there is less variability and less collinearity among the variables with more degrees of freedom and greater efficiency *(*Gujarati, 2002). Second, panel data can minimise the bias that might result if individual or company level data are divided into broad aggregates. Lastly, panel data can better detect and measure effects that simply cannot be observed in pure cross-section or pure time series data.

The operational forms of the two models are given below:

$$\textbf{Performance} = \beta_0 + \beta_1\textbf{Gowned} + \beta_2\textbf{Size} + \beta_3\textbf{nDual} + \beta_4\textbf{Debt} + \beta_5\textbf{AC} + \beta_6\textbf{Growth} + \varepsilon_i$$

(Equation 1)

$$\textbf{Performance} = \beta_0 + \beta_1\textbf{Size} + \beta_2\textbf{nDual} + \beta_3\textbf{Debt} + \beta_4\textbf{AC} + \beta_5\textbf{Growth} + \varepsilon\textbf{i}$$

(Equation 2)

Where:

β_0	- Intercept
Performance	- Tobin's Q (proxy for market measure of performance) and Return on Assets (ROA) (proxy for accounting measure of performance).
Gowned	- government owned share 20% or more in company
Size	- the natural logarithm of the company total assets
nDual	- CEO and Chairman are different persons
Debt	- Ratio of Total Liabilities over Total Assets
AC	- Agency Cost where Total Expenses to Total Sales
Growth	- Ratio of Total Cash over Total Assets.
ε_i	- error term

Table 5.1: Operationalisation of the Research Variables

Variables	Acronym	Operationalisation
Dependent Variables:		
(i) Tobin's Q	Tobin Q	Ratio of the market value of common shares plus total debt divided by the book value of total assets of the company (Haniffa and Hudaib,2006).
(ii) Return on Assets (%)	ROA	Net income by total assets of the company (Sloan, 2008).
Independent Variables:		
(i) Government Ownership	Gowned	A dummy variable that takes on a value of one when government owned share is 20% or more, and zero otherwise (Ang and Ding, 2005).
(ii) Size	Size	The natural logarithm of the company's total assets (Sarkar and Sarkar, 2007)
(iii) Non-Duality Role	nDual	Dichotomous with one if the CEO of company is separate from Chairman, and zero otherwise (MCCG,2000).
(iv) Debt Ratio (%)	Debt	The percentage of total debt to total asset of the company (Grossman and Hart, 1982)
(v) Agency Cost (%)	AC	The percentage of total expenses over total sales (Ang, 2000)
(vi) Growth (%)	Growth	The percentage of total cash over total assets (Wei and Yu, 2007)

5.2 Estimation Method

In order to test the developed models, this study employed panel data regression. A panel data regression has some advantages over regression that runs cross sectional or time series regression independently. Among the obvious advantages are, first, by combining time series and cross section observations, panel data give more informative data, variability, less collinearity among the variables, more degrees of freedom and more efficiency (Gujarati,2002). Second, by making data available for a thousand units, panel data can minimise the bias that might result if individual or company level data are divided into broad aggregates. Lastly, panel data can better detect and measure effects that simply cannot be observed in pure cross-section or pure time series data.

This study adopted the Generalized Least Squares (GLS) method of estimation instead of the Ordinary Least Squares (OLS) to estimate the panel data regression formed. The reason for this is that GLS could overcome the problem of heteroscedasticity because of financial data with size differences or variations (Gujarati, 2002). With respect to the data employed in this study, differences in size are expected to be observed. This is because the sample employed consists of large and small companies collected from the main board and the second board of Bursa Malaysia. Apparently, companies from these two distinct boards have variations in size.

The usual practice of econometric modelling assumes that the error is constant over all periods and locations. If such an assumption is true then it is said that homoscedasticity exists. However, if there are variations of size in the observation, it may cause the variance of the error term produced from the regression not to be constant and, as a result, the problem of heteroscedasticity prevails. Hence, if that occurs, the estimates of the dependent variable become less predictable (Gujarati, 2002). Unlike GLS, estimation using OLS is unable to remedy this problem. This is because OLS adopts the criterion of minimising Σu_i^2 (sum of residual squares). Under this technique, each of the error terms is given equal weight even though some of the errors receive equal importance (unweighted) no matter how close or how widely scattered the individual error is from the sample regression function. The GLS, however, minimises the weighted sum of the residual function. In GLS, the weight assigned to each error term is more closely clustered around their mean than those that are widely scattered about.

Ideally, the estimating scheme should be devised in such a manner that error terms with greater variance are given more weight than those with smaller variance. The usual OLS method does not follow this strategy. Hence, it assigns equal weight or importance to each error term. Unlike OLS, the GLS accounts for such problem by assigning the appropriate weight to different error terms and this produces the ideal constant variance. Thus, the problem is capable of producing estimators that is the best linear unbiased estimator (BLUE) (Gujarati 2002).The Gauss-Markov theorem, states that in a linear regression model in which the errors have expectation zero and are uncorrelated and have equal variances, of the coefficients is given by the ordinary least squares estimator. "Best" means giving the lowest possible mean squared error of the estimate.

The errors need not be normal, nor independent and identically distributed (only uncorrelated and homoscedastic). Therefore BLUE is used as the estimator to reduce the biased and inconsistency in estimating variances and covariances of the coefficients, β in Ordinary Least Square (OLS).

5.2.1 Fixed Effect versus Random Effect Model under Panel Regression Model

Under panel data regression, the two most common models to complement the regression are the fixed effect (FE) model and the random effect (RE) model. Panel data models estimate fixed and/or random effect models using dummy variables. The core difference between fixed and random effect models lies in the role of dummies. If dummies are considered a part of the intercept, it is a fixed effect model. In a random effect model, the dummies act as an error term (see Table 5.2).

The fixed effect model examines group differences in intercepts, assuming the same slopes and constant variance across groups. Fixed effect models use least square dummy variable (LSDV), within effect, and between effect estimation methods. Thus, ordinary least squares (OLS) regressions with dummies, in fact, are fixed effect models.

The random effect model, in contrast, estimates variance components for groups and errors, assuming the same intercept and slopes. The difference among groups (or time periods) lies in the variance of the error term. This model is estimated by generalised least squares (GLS) when the omega matrix, a variance structure among groups, is known. The feasible generalised least

squares (FGLS) method is used to estimate the variance structure when omega is not known. A typical example is the group wise heteroscedastic regression model (Greene 2003). There are various estimation methods for FGLS including maximum likelihood methods and simulations (Baltagi and Cheng 1994).

Fixed effects are tested by the (incremental) F test, while random effects are examined by the Lagrange Multiplier (LM) test (Breusch and Pagan 1980). If the null hypothesis is not rejected, the pooled OLS regression is favoured. The Hausman specification test (Hausman 1978) compares fixed effect and random effect models. Table 5.2 compares the fixed effect and random effect models.

Group effect models create dummies using grouping variables (e.g., country, company, and race). If one grouping variable is considered, it is called a one-way fixed or random group effect model. Two-way group effect models have two sets of dummy variables, one for a grouping variable and the other for a time variable.

Therefore, this study uses the fixed-effect model to control for unobservable firm characteristics that may affect firm performance. Meanwhile, to control for cross-sectional variation effect, the random effect will be used.

Table 5.2: Fixed Effect and Random Effect Models

	Fixed Effect Model	Random Effect Model
Functional form*	$y_{it} = (\alpha + \mu_i) + X_{it}'\beta + v_{it}$	$y_{it} = \alpha + X_{it}'\beta + (\mu_i + v_{it})$
Intercepts	Varying across group and/or time	Constant
Error variances	Constant	Varying across group and/or time
Slopes	Constant	Constant
Estimation	LSDV, within effect, between effect	GLS, FGLS
Hypothesis test	Incremental F test	Breusch-Pagan LM test

* $v_{it} \sim IID(0, \sigma_v^2)$

(Source: Green, 2003)

5.3 Data

The sample of companies comprises most of the companies listed on Bursa Malaysia (BM) and Singapore Exchange Limited (SGX) (where data is available) over the period 1995 until 2005. A longitudinal study has been chosen since company performance tools must be able to correlate with most companies listed on BM and SGX and the period of 11 years would be sufficient to monitor the relationship between performance of companies and company specific characteristics including corporate governance, agency cost, growth, and leverage under varying economic conditions. The period of 11 years has been chosen because it covers the period before the economic crisis (1995-1996) and after (i.e. 1999-2005) while 1997 to 1998 represents the period of economic crisis in ASEAN. From that 11-year period, this study can identify and determine whether there has been any performance improvement in government-involved or government-controlled companies. This study will analyse based on the three different periods – all periods (1995-2005), pre-crisis (1995-1996), and post (1999-2005). The crisis period (1997-

1998) is excluded due to the performance of most companies had dropped tremendously and some companies may even have collapsed (*The crisis periods' results can be referred to Appendices*). Meanwhile in ALL periods, the reason why this crisis period is included in the analysis is because it will give the true picture concerning the movement of a company's performance during all periods of study and also among companies that have already taken some action to improve their performance during the crisis.

The historical or secondary data comprises company financial statements and is used to calculate all ratios used in this research. The ratios are Tobin's Q, stock return, PE ratio, MB ratio, ROA, ROE, Size (ln (Total Assets)), Debt (total debt/total assets), agency cost (total expenses over sales), and growth (cash to total assets). The data were abstracted from the Profit Loss account, Balance Sheet, the Cash Flow statement and financial highlights, which are available from DataStream, Worldscope and the annual reports of companies. Since the financial data that have been obtained are from audited financial statements (i.e. annual reports) and databases from reliable sources, the consistency, reliability, and accuracy of the information are controlled.

In sourcing for the data to be employed, the company ownership data were obtained from company annual reports directly. Other financial data, as well as year-end and market prices, were gathered from DataStream and Worldscope, financial database providers.

This study is limited to public listed companies or limited (Berhad) companies only, in Bursa Malaysia and Singapore Exchange Limited (SGX), Singapore. The company must be active in the business and trade in both stock exchanges. The sample of companies comprises different industries and main boards only.

The companies selected were based on the listing in the Star newspaper (The Star, StarBiz section, dated 12th February 2007) and in Singapore, Singapore Business Times paper dated 15th February 2008 and were categorised according to type of industry under the main board. By categorising companies under type of industry, matching of GLCs with non-GLCs for comparison purposes can then be done according to industry and size.

5.3.1 Sampling Selection

The judgement sampling for non-random sampling was used instead of random sampling since judgement is used in selecting the sample. For the study, all public listed companies on the Bursa and SGX are subject to the required information being available, and complete data are used as a sample. The large numbers of sample companies are expected to make the study more transparent and representative of a cross section of companies in Malaysia and Singapore.

The scope of study only includes companies listed on the Bursa and SGX with the availability of data throughout the sample period, i.e. over the periods 1995 to 2005. The company must be

actively traded on Bursa Malaysia, and should not be classified as PN4 companies. It must have completed a full accounting period and 12 month business operations for each year and the accounting periods must be consistent and have the same year-end throughout the 12-year periods.

Based on the criteria, for the first part of the analysis, this study uses 210 complete samples of Malaysian companies, which involved 2,310 observations to determine whether government control or involvement leads to better performance. From the sample, 27 GLCs were selected as sample companies to match with 27 non-GLCs as control companies to find out which ones have better company performance. In the second part, 177 Singaporean companies were selected for observation and analysis, similar to what the Malaysian companies were subjected to earlier. In the matched analysis, 25 Singaporean GLCs were chosen as sample companies with 25 non-GLCs as control companies. In the last analysis, this study selected 25 Malaysian GLCs to match with 25 Singaporean companies to find which ones perform better. To compare the analyses, these two samples were then matched based on size and industry. For example, a company of GLCs from consumer products industry must be compared with non-GLCs from the same industry. After that, the total assets of that GLCs must be the same or between range with the total assets of the non-GLCs. The reason behind this matching is to make the result valid and avoid any confusion in interpreting the results (Cornett, Guo, Khaksari and Tehranian, 2010; Ramirez, 2004 and Cohen, 1969).

5.4 Econometric Issues

Before estimating the various developed models, the data stationary normality, multicollinearity, autocorrelation, and heteroscedasticity problems and specifications are some of the issues that need to be identified and addressed in the panel estimation techniques. Discussions on the nature of these problems, how to detect them and the proposed remedies are presented below.

5.4.1. Test of Data Stationary Normality and Multicollinearity

To begin the analysis, the data of both GLCs and non-GLCs are tested for stationary normality. This is accomplished by observing the data skewness, the value of the kurtosis (the height) and the value of the Jarque-Bera. For example, data are said to be normally distributed if the value of skewness is equal to zero, the value of kurtosis is less than three and finally the value of Jarque-Bera should not be significant or with a high value of probability (Gujarati,2002). Sample data that is normally distributed should be an efficient estimator, unbiased and consistent.

In detecting multicollinearity in a regression model, economist Gujarati (1995) suggests two ways to identify whether the problem of multicollinearity exists. First, variables with high collinearity are those with the variance inflation factors (VIF) measured by $(1/1\text{-}r^2)$, close to 10. Second, multicollinearity exists when the pair-wise or zero-order correlation coefficient between regressor is in excess of 0.8 (Gujarati, 2002). The problem of multicollinearity can be reduced by dropping one of the collinear variables.

5.4.2 Test of Auto-Correlation

The existence of auto-correlation means the error term u_{t-1}; u_{t-2} and u_{t+1} corresponding to different periods are related to each other (Durbin & Watson, 1951). The presence of auto-correlation means the violation of the classical assumption in the econometric estimation where the error terms corresponding to different periods are unrelated to each other. The problem of auto-correlation can be solved using the Newey-West method. This method provides the standard errors of estimation that are correlated for auto-correlation (Gujarati, 2002)

5.4.3 Test of Heteroscedasticity

The usual practice of econometric modelling is to assume that error is constant over all time periods and locations. If such an assumption is true then it is said that homoscedasticity exists. Alternatively, if the variance of the error term is not constant, there is a heteroscedasticity problem resulting in the estimates of the parameters obtained by the methods of least squares to be no longer a minimum variance unbiased estimator and, over time, the estimates of the dependent variable become less predictable (Gujarati,2002). Hence, it is essential to examine if the model has a heteroscedasticity problem. This can be tested using the White General Heteroscedasticity test.

5.5 Performance measurement

The purpose of performance measurement is to enable the organisation to monitor the implementation of plans or strategies, ascertain the success of these strategies, and find ways to enhance them. Brignall and Ballantine (1996), and Ghalayani and Noble (1996) explained that the system of performance measurement has been built historically to maintain and monitor organisational control and to ensure that the company's objectives are accomplished. In addition, the performance measure has an impact on the philosophy and culture of the company and, hence, it portrays how well the company works in respect of time, cost, and quality (Taikonda and Tatikonda, 1998).

In the early development of performance measurement, researchers only focused on financial accounting measures, which are an extension of the financial reporting systems (Atkinson, Waterhouse, and Wells, 1997). For example, the return on investment (ROI) is widely used to measure a company's objectives and as a standard variable to estimate the effect of various factors on a company's performance. However, this performance measurement has been stated as a traditional performance measure and claimed to help in measuring performance in the new competitive environment (Chow, Haddad and Welliamson, 1997; and Ghalayani et al., 1996).For example, Ghalayani et al. (1996) identified that the financial performance measures were still the most important tool to measure a company's performance until the 1980s. With the changes in the world market environment, new performance studies prospered in anticipation that these new performance measures could enhance the overall effectiveness measures (Meyer and Gupta, 1994). In addition, Waterhouse and Svendsen (1998) consider the development of new

performance because the dynamic economic environment requires dynamic measures in order to formulate more complex strategic decisions.

There has been extensive development of new financial measurement models in measuring a company performance such as Economics Value Added (Stern, Shiely, and Ross, 2001) and the Balanced Scorecard (Kaplan and Norton, 1996). However, the traditional financial performance measure is still used in the business environment and in academic research to gain empirical evidence concerning a company's performance. Eccles (1991), and Waterhouse and Svendsen (1998) stated that financial measures are legitimate and important indicators and that these measures are very useful as residual claims measures are needed for legal economic reasons.

5.5.1 Financial Measurement

This study intends to examine the company value of government linked companies and non-government linked companies by using different tools of performance measurement. In addition, the impact of corporate governance mechanisms on company value will also be analysed to determine if there is any significant difference between governing GLCs and governing non-GLCs. This study has chosen to use financial accounting information, which can be broken up into accounting measures and market measures to acquire the empirical findings concerning the value of the company.

(a) Accounting-Based Measures

Financial accounting information is the company's accounting and external reporting of company performance for a specified period. Financial accounting can be expressed as an area of accounting concerned with reporting financial information to interested external parties such as investors, lenders, management, suppliers, customers, and other users of financial information. Sloan (2001) described that the management of the company must provide financial statements prepared in accordance with the commonly applicable statutory and professional principles. In addition, for corporate governance, the accounting data provides an important information source that can reduce the company agency problems.

The accounting data used to measure company performance can be categorised into operational analysis, resource management, and profitability from the management's point of view, while for investors or company owners, investment returns, disposition of earnings, and market performance are the performance indicators. Nevertheless, not all of these performance measures will be implemented in this study. The selection of performance tools are based on the ease of natural calculation and availability of complete data. Therefore, in this study ROA and ROE are selected as performance measurements.

(b) Market Measurements

Most of the prior studies adopted accounting measures as an indicator of company performance and placed less attention on the market measures. According to Oswald and Jahera (1991), and Chakravarthy (1986), academicians and researchers have made an argument that accounting measures seem to be inadequate as an indicator to evaluate the efficiency of a company's performance. However, Boardman, Shapiro, and Vinning (1997) do not agree with that statement and state that accounting measures are reasonable empirical proxies to measure a company's economic rate of return. This study however, will adopt four types of market measures as tools to measure a company's financial and market performance – Tobin's Q, stock return, PE ratio, and MB ratio.

Currently, the most popular of market measurements is Tobin's Q, which was pioneered by James Tobin who intended to examine the causal relationship between Q value and investment. He introduces the variables of Q as scaled by the ratios of market value to replacement cost (Brainard and Tobin, 1968, 1990; Tobin, 1969, 1978). According to him, companies have an incentive to invest if the margin Q value exceeds unity, since the new capital investment value will exceed its cost (Lindenberg and Ross, 1981).

This study will use the Q value, which is an appointment of Tobin's Q that has been adopted by Ang and Ding (2005), Chung and Pruit (1994), Perfect and Wiles (1994), Mishra et al.

(2001),Amit and Villalonga (2006), and Haniffa and Hudaib (2006). Yermack (1996), McConnell and Servaes (1990), and Morck, Strangeland and Yeung (1988) also use the Q value to measure the market value of the company. In addition, Khanna and Palepu (2000) and Cronqvist and Nilsson (1999) also adopted this similar Q value measure in their studies to examine the relationship between shareholder concentration and company value in India and the corporate structure in Sweden.

Stock market prices can be a good measure and indicator of company performance (Oswald and Jahera (1991) and Chakravarthy (1986)). In addition, Lindenberg and Ross (1981) stressed that stock prices have to reflect the true value of the company where capital market is fully developed in order to use it as a performance measurement. Moreover, the growth revenue and return on assets have a closer relationship with performance of stock price than any other variable. Therefore, the investors believe that macroeconomic performance such as inflation and steady growth is highly related to strong performance. Generally, stock returns are calculated by the changes in stock prices and their performance is assumed to be related to company performance (Madura etal., 1996; LeWellen and Huntsman, 1970).

O'Hara, Lazdowski, Moldovean, amd Samuelson (2000) found that, on average, financial indicators of stock price performance, like dividend per share, cash flow per share, and earnings per share, generate higher returns than the S&P 500 Index. The stock of well-managed companies has been favoured by most investors and is believed to be superior to stock price

performance, and hence, experiences superior growth and profitability (Antunovich, Laster, and Mitnick, 2000). Unfortunately, the disadvantages of market performance measurement are when there is a difference in capital market development for distance will liquidate capital market and lack of timely disclosure could cause bias in the findings of the research (Khanna and Palepu, 1999).

In this study, the main performance measurements used as dependent variables in the multiple regressions are *Tobin's Q* and *return on assets (ROA)*. In addition, other performance measurements include *stock market return, price to earnings (P/E), market to book value (MB)* and *return on equity (ROE)*.

Tobin's Q, the market-based performance measure, is defined as the ratio of the market value of company plus total debt to total assets. In computing a company's Tobin Q, the study does not calculate the replacement costs for two reasons. The first reason being the generally unavailable replacement costs and, second, the tendency of the main component of the replacement costs to cross companies. Tobin's Q is adopted as the dependent variable to relate with other shareholder concentration and determinant factors in influencing company value.

Return on assets (ROA), the ratio of net income to total assets is used as a proxy for the corporate-based performance measure. Any increase or decrease in these two variables may be a signal in market perception of the effectiveness of the company performance and effective utilisation of assets to increase performance.

Stock market return is a calculation of share price today, P_1 minus previous price, P_0 and dividend, D over previous share price, P_0. O'Hara et al. (2000), Madura et al. (1996), Kerr and Bettis (1987), Antunovich et al. (2000), and Surry and Leung (1999) used stock return as an indicator of company performance. This study also uses stock return as one of the measurements for market and financial performance between sample and control companies or countries.

Price to Earnings (PE) ratio is calculated from share price over earnings per share. Total earnings is taken from net profit in profit and loss account then divided into number of common shares available in the company. A high *Price to Earnings (P/E)* ratio can be seen as a lagging indicator in which the market values the company as a growth stock, as it projects considerable future earnings growth to justify such a high valuation given the current earnings.

Market to Book (MB) ratio is a financial ratio used to compare a company's market price over book value. Market price or market capitalisation is the actual price per share times the total number of shares outstanding. Book value is an accounting term denoting the portion of the company held by the shareholders; in other words, the company's total tangible assets less its total liabilities. The calculation can be performed in two ways, however, the result should be the same each way. In the first way, the company's market capitalisation can be divided by the company's total book value from its balance sheet. The second way, using per-share value, is to divide the company's current share price by the book value per share (i.e. its book value divided by the number of outstanding shares).

Return on equity (ROE) is equal to a fiscal year's net income (after preferred stock dividends but before common stock dividends) divided by total equity (excluding preferred shares). It measures a company's efficiency at generating profits from every dollar of shareholders' equity (also known as net assets or assets minus liabilities). It shows how a company uses investment dollars to generate earnings growth.

5.6 Independent Variables and Expected Relationships

Gowned is a dummy variable for companies having a government holding of more than 20% of the voting shares. Studies by Ang and Ding (2005), and Dyck and Wruck (1998) found that companies with more than 20% government-owned shares tend to perform better than non-government owned companies. Therefore, a positive result will be expected when it is related to company performance.

Size is one of the control variables. Company size has an ambiguous effect a priori on company performance. Larger companies can be less efficient than smaller ones because of the loss of control by top managers over strategic and operational activities within company (Himmelberg, Hubbard, and Palia 1999, Sarkar and Sarkar 2000). Lang and Stulz (1994) suggest a decrease in company performance as a company becomes larger and more diversified. This study used the logarithm of total asset (ln (Total Assets)) to control for company size and expected a negative relationship with company performance.

For the variable of *Debt*, this study divided total debt (long and short-term debts) by total debts to determine whether leverage makes any significant difference on company performance. Debt financing may play a significant role in reducing management's discretionary control over free cash flow and their incentive to engage in non-optimal activities (Jensen, 1986, and Stulz, 1990). *Debts* also force managers to consume fewer benefits and become more efficient to avoid bankruptcy, the loss of control as loss of reputation (Grossman and Hart, 1982). *Debt* contracting may result in improved company performance and reduced cost of external capital (John and Senbet, 1998). In short, *Debt* may have a positive disciplinary effect on company performance.

In the context of agency costs, this study uses two variables, which are *nDual* and *AC* (total expenses to sales). In determining the *nDual* variable when the chairperson and the CEO are different persons, a dummy variable is used on one value. Rhoades (2001) found that companies with a separation of the two roles consistently have higher accounting returns compared to those that have the roles combined. Role duality is not common in Malaysian corporations (PwC, 1998), however, the MCCG (Malaysian Code on Corporate Governance) recommended companies to separate the two roles to ensure a proper check and balance of the corporation top leadership. Therefore, this study expects a positive relationship between nDual and performance. In *AC*, a previous study by Ang (2000) indicated that government with lower expense to sales ratio would lead to better performance in government linked companies in Singapore. In this situation, this study expects a negative relationship between *AC* and company performance.

In explaining the *Growth* variable, Morck, Shleifer & Vishny (1998) argued that a high growth rate indicates greater flexibility in future investments, which will lead to better performance. Companies with their own cash reserves can use the cash when the company experiences financial distress, especially during crisis, and a higher cash balance shows that the company has a better cash flow, and, at the same time, provides better performance. Therefore, *Growth*is expected to be positively related to company performance. A summary of all the relationships between descriptive variables and performance is shown in Table 5.3.

Table 5.3: Summary of Expected Relationship between Dependent Variables and Company Performances

Past Studies	Hypothesis	Variable	Obtained sign
(i) Ang and Ding (2005) (ii) Dyck & Wruck (1998)	Significant relationship between government owned and performance	*Gowned*	Positive
(i) Carter (2002) (ii) Yermarck (1996)	Significant relationship between company size and performance	*Size*	Negative
(i) Hermalin & Iisbach (1991) (ii) Weir (2002)	Significant relationship between non-duality and performance	*nDual*	Positive
(i) Ang and Ding (2000) (ii) Johnson (1985)	Significant relationship between agency cost and performance	*AC1*	Negative
(i) Morck, Shielfer & Vishny (1988) (ii) Leach & Leahny (1991)	Significant relationship between growth and performance	*Growth*	Positive
(i) Kaplan (1989) (ii) Mehran (1995) (iii) Chong,R.K, Abdullah R.F.S and Anderson A (2009)	Significant relationship between leverage and performance	*Debt*	Positive

Table 5.4: Summary of Null Hypotheses

Null Hypotheses	Descriptive of Null Hypotheses Development
Hypothesis 1	**Government Involvement Does Not Have Any Significant Impact on Company Performance in Malaysia and Singapore**
H_01_a	GLCs exhibit no significant difference in Tobin's Q compared to non-GLCs
H_01_b	GLCs exhibit no significant difference in stock return compared to non-GLCs
H_01_c	GLCs exhibit no significant difference in return on assets (ROA) compared to non-GLCs
H_01_d	GLCs exhibit no significant difference in return on equity (ROE) compared to non-GLCs

Hypothesis 2	**GLCs Perform Better Than Non-GLCs in Terms of Comparing Company Specific Characteristics in Malaysia and Singapore**
H_02_a :	There is no significant difference in relationship between company size and company performance of GLCs and non-GLCs
H_02_b :	There is no significant difference in relationship between non-duality role and company performance of GLCs and non-GLCs
H_02_c :	There is no significant difference in relationship between agency cost and company performance of GLCs and non-GLCs
H_02_d :	There is no significant difference in relationship between company growth and company performance of GLCs and non-GLCs
H02e :	There is no significant difference in relationship between leverage and company performance of GLCs and non-GLCs
Hypothesis 3	**Malaysian GLCs Will Perform Better than Singaporean GLCs on Market and Financial Performance**
H_03_a	GLCs exhibit no significant difference in Tobin's Q compared to non-GLCs
H_03_b	GLCs exhibit no significant difference in stock return compared to non-GLCs
H_03_c	GLCs exhibit no significant difference in return on assets (ROA) compared to non-GLCs
H_03_d	GLCs exhibit no significant difference in return on equity (ROE) compared to non-GLCs

5.7 Chapter Summary

This study discusses the research design and methodology for the systematic conduct of this study. Models have been developed to identify how the government ownership structure may influence company performance in Malaysia and Singapore after controlling for company specific characteristics. This study also seeks to determine whether government owned companies lead to better performance than non-government controlled companies. Accordingly, this study uses a sample of GLCs matched with non-GLCs and compares Malaysian and Singaporean GLCs to determine which ones perform better. A total of 387 companies, consisting of 210 Malaysian companies and 177 Singaporean companies were chosen based on the availability of data from 1995 to 2005. The period of 11 years has been chosen because it covers the period before the economic crisis (1995-1996) and after (i.e. 1999-2005) while 1997 to 1998 represents the period of economic crisis in ASEAN. From that 11-year time period, this study can identify and determine whether companies in which the government is involved have made any performance improvement. Econometric issues such as data stationary normality,

multicollinearity, auto-correlation and heteroscedasticity problems and specifications are some of the issues that need to be identified and addressed in the panel estimation techniques.