CHAPTER 3 RESEARCH METHODOLOGY

RESEARCH HYPOTHESES

The early analysis of the relation between the performance of firms and ownership was linear in form (Demsetz and Lehn, 1985), while the later analysis of managerial ownership has considered non-linear forms (Morck et al., 1988; Mcconnell and Servaes, 1990, 1995; Kole, 1995; Short and Keasey, 1999). This paper will examine the relationship between firm performance and director ownership using the similar analysis of measures of firm performance, and a more generalised form of the relationship to confirm the general finding of the US and UK literature of a non-linearly relationship between firm performance and managerial ownership.

The hypothesis examined here is that the performance of firms is non-linearly related to the percentage of equity shares held by directors. The sample period begin from 1995 till 1999.

I hypothesise the following :

H_0 : Performance of firms is non-linearly related to the percentage of equity shares held by directors.

H_1 : Better (Weaker) performance of firms is linearly related to the higher (lower) percentage of equity shares held by directors.

In reference to the results produced by Morck al et. Al. (1988), McConnell and Servaes (1990, 1995), Kole (1995) and Short et. Al (1999), I test for a cubic form of the relationship between the performance of public listed companies and directors ownership. The model to be tested is as follows :-

$$\text{Performance} = a + ß_1 DIR + ß_2 DIR^2 + ß_3 DIR^3 + y\text{Control Variables}$$

Three variables are included in the model to describe directors' ownership :

DIR : the percentage of shares owned by directors,

DIR^2 : the square of the percentage of shares owned by directors, and

DIR^3 : the cube of the percentage of shares owned by directors.

This is a general extension of the Morck et. al. piecewise model, allowing the coefficients on the managerial ownership variables to determine their own turning points. Morck al et. al. notes that there is no theoretical guidance for the choice of turning points on the piecewise regression. According to Short et. al. in order not to pre-determine the turning points in the relationship between the performance of firms and managerial ownership, a cubic form of managerial ownership is examined which allows the turning points to be determined endogenously.

SELECTIONS OF MEASURES

I will use the above performance model to test the financial performance of public listed companies (PLC) relating to the percentage of equity shares held by directors.

Variables

The key variables of interest are measures of the financial performance of public listed companies and directors ownership. To smooth fluctuations on an annual basis, the financial performance of PLC and control variables are measured as averages over the period 1995 to 1999 (4 years). The ownership variables are defined, however, as at the beginning of the period under consideration, that is at the beginning of firms' 1998 accounting year-ends (and, hence, taken from the Annual Companies Handbook 1997, which published 1998's companies annual reports). The implicit assumption of the current analysis is that causality runs from ownership to the performance of PLC. However, any relationship between ownership and performance could reflect 'reverse' causality; that is, directors may increase their stakes in higher performing PLC. Ownership variables are measured at the beginning of the period under consideration in an attempt to reduce potential problems of 'reverse' causality arising between the performance of PLC and ownership, but the possibility of reverse causality clearly remains.

TABLE 1
Description of variables

Variables	Description
Dependent variables	
ROSF	Earnings **divided by** total shareholders' fund (Ordinary).
VAL	Market value of equity during the calendar year **divided by** the book value of equity at the accounting year-end.
Ownership variables	
DIR	Percentage of shares held by directors.
Control variables	
SIZE	Logarithm of the PLC's sales.
GROWTH	Average annual growth in sales.
DEBT	Total liabilities **divided by** book value of total assets.

PLC Financial Performance Variables

This paper utilises commonly used accounting and market measures of the performance of PLC. The accounting based measure of the performance of PLC is the return on shareholders' fund (ROSF). The return on shareholders' fund is calculated as earning divided by total shareholders' fund. Earning based on post-tax profit before extraordinary items, after minority interests and pre-acquisition profits, and deducting amount of income or dividends paid to preference shares. Total shareholders' fund is calculated as issued share capital adds reserves add unappropriated profit less intangible assets less preference issued capital.

The market measure used is a valuation ratio (VAL). The valuation ratio VAL is used by Leech and Leahy (1991) and is calculated as the market value of the firm at its accounting year-end, divided by the book value of equity at the accounting year-end. The book value of equity is calculated excluding intangible assets to eliminate differences caused by diverse accounting treatments of brand names, patents and capitalised research and development. This paper utilises the market value during the calendar year of the PLC to be extracted from Annual Companies Handbook. The market value gives an indication of the worth of the company placed by the market,

while the book value of equity measures the investment by shareholders in the assets utilised to generate the income.

Directors Ownership Variables

The directors' ownership data have been manually extracted from the Annual Reports of the sample companies from the years 1995 to 1999. The available data on ownership interests contained in the annual report is determined by the Companies Act 1965 Section 169 (6) (g), the legislation required details of directors' direct and indirect interests in shares or debentures of the company and of every other body corporate (subsidiary or holding company) to be disclosed. Directors' ownership is measured as the percentage of equity shares owned by directors' at the accounting year-end. This measure includes directors' ownership via corporate vehicles, for example, where directors' are majority shareholders in other firms, which have direct ownership stakes in the particular firm under consideration.

Control Variables

A few additional variables are included in the performance regression models to control for other potential influences on the performance of PLC. The variables included are consistent with that of Short et. al. (1999), there are firm sizes, firm growth and debt.

The potential impact of PLC size on the performance of PLC is allowed for by the inclusion of the logarithm of total sales (SIZE). A PLC's size potentially affects performance through at least two different avenues. First, there is a potential financing effect, in that larger PLC may find it easier to generate funds internally and to access funds from external sources. A reduced financing constraint allows the PLC to make greater use of profitable projects. Second, the economies of scale that accompany size enable the firm to create entry barriers with the associated beneficial effects on the performance of PLC.

Firm growth (GROWTH, measured as the percentage annual change in sales, averaged over the sample period) is to control for the impact of growth

on the PLC's performance and for potential linkages between the PLC's performance, financing structure and growth.

The variable DEBT (defined as the book value of total debt divided by total assets) is included to control for a number of factors. First, it controls for the possibility that debt holders exert significant influence over the behaviour and operation of the firm and its management. Stiglitz (1985) argues that control over management actions is effectively exercised, not by shareholders, but by lenders, particularly banks. Second, as suggested by Grossman and Hart (1982) and Jensen (1986), debt may be used by management to signal that they have bonded themselves to achieving the levels of cash flow necessary to meet the debt repayments. Debt may, therefore, be used to resolve conflicts between managers and shareholders as it reduces management discretion to consume excessive perquisites and, hence, should increase the value of the firm's equity (Jensen and Meckling, 1976; Grossman and Hart, 1982).

SAMPLING DESIGN

The sample was chosen from the PLC listed on the Kuala Lumpur Stock Exchange (KLSE) for the period of 1995 to 1999. To be included in the sample, the PLC had to be quoted on the KLSE for at least a year before the date of their accounting year-end for 1995. This condition was imposed to ensure that the performance of firms, capital structure and ownership were not affected as a result of a new listing. A number of 69 ranking public-listed companies as at 30th June 1999 selected for this study.

DATA COLLECTION PROCEDURE

The director ownership data and financial performance data for ROSF is extracted from Annual Companies Handbook and company annual report. The rest of the performance data are calculated manually extracted from the same source.

DATA ANALYSIS TECHNIQUES

Data collected have been processed through analytical quantitative method using computer software package. The software is Statistical Package for Social Science (SPSS) which is used for determination of linear relationship between the directors' ownership and financial performance of PLC.

Multiple Regression Analysis

A regression analysis is a statistical technique used for predicting the values of a dependent or response variable based upon the values of at least 1 explanatory or independent variable. The multiple regression includes more than one independent variable. The general form of the equation is :

$y = a + b_1X_1 + b_2X_2 + ...bnXn$

The model to be tested in this study is :

Performance = $a + ß_1DIR + ß_2DIR^2 + ß_3DIR^3$ + yControl Variables

Where :

a, $ß_1$, $ß_2$, $ß_3$	parameters to be estimated.
y	dependent variable refers to ROSF and VAL,
DIR, DIR^2, DIR^3	independent variable refers to the percentage of shares owned by directors, the square and cube respectively, of the percentage of shares owned by directors.
Control Variables	SIZE, GROWTH and DEBT.

The "a" coefficient is the constant or vertical intercept and gives the value of "y" where "DIR, DIR^2 and DIR^3" equal to zero. "$ß_1$, $ß_2$, $ß_3$" are the slope coefficients. They measure the change in performance with change of "DIR, DIR^2 and DIR^3" respectively.

Coefficient of Multiple Determination (R^2)

It measures the proportion of the total variation in the dependent variable that is explained by the variation in the independent variables or explanatory variables in the regression. In other words, "R^2" actually measure how many

$$R^2 = \frac{\text{Total explained variation}}{\text{Total variation}}$$

However, in order to take into consideration that the number of degree of freedom declines as additional independent variables are included beside the only one independent variable exists in the regression, then we calculate the Adjusted R^2 as :

$$\text{Adjusted } R^2 = 1 - (1-R^2)\frac{(n-1)}{(n-k)}$$

Where,

n = the number of observations or sample data points.

k = the number of parameters or coefficient estimated.

Testing whether the Multiple Regression Model is valid

The existence of a significant linear relationship between the variables x and y can be determined by testing whether ß (the coefficient) is equal to zero, that is the null hypothesis of :

$H_o : ß_1 = ß_2 = ß_3 = 0$

The alternative hypotheses is :

$H_1 : ß_1 = ß_2 = ß_3$ do not equal to 0

If the null hypothesis is true, it implies the regression coefficients are all zero and, logically, are of no use in estimating the dependent variable (ROSF and VAL). I should take a different approach to predict the ROSF and VAL.

To test the null hypothesis that the multiple regression coefficients are all zero, I will employ the F distribution using 0.05 level of significance.

The value of F is :

$$F = \frac{SSR/k}{SSE/(n-(k+1))}$$

Where "SSR" is the sum of squares due to the regression, "SSE" the sum of squares error, "n" the number of observations, and "k" the number of independent variables.

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Turning Points

Linear, quadratic and cubic function has points that are unique. They are called "turning points" (when the curve distinctly changes direction). It had two distinct turning points – one minimum and one maximum. The turning points are found by differentiating y with respect to x, letting dy/dx = 0.

$dy/dx = abx^{b-1}$

I use the following formula to solve the quadratic equation,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

To determine whether x is a maximum or minimum turning point, calculate the value of d^2y/dx^2, it can be obtained by differentiating y twice. If $d^2y/dx^2 > 0$, the turning point is maxima, if $d^2y/dx^2 < 0$, the turning point is a minima.