AN EMPIRICAL STUDY OF THE CAPITAL STRUCTURE OF MALAYSIAN LISTED FIRMS

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1. INTRODUCTION

Most primary evidence on capital structure is based on firms in developed capital markets (Hamada (1976), Myers (1977, 1984), Kim and Sorensen (1986), Gordon and Malkiel (1986)). Capital structure is defined as the mix of debt, equity and hybrid securities issued by a firm to finance its operations. Capital structure is an important variable for decision making within the firm as well as decisions of organisations outside the firm. To date, there is hardly any evidence concerning the capital structure issue and its various aspects using data relating to Malaysian listed firms. This study attempts to document the various aspects of the firm's capital structure in a representative sample of sixty firms from five sectors which are continuously traded on The Kuala Lumpur Stock Exchange (KLSE) from 1975 to 1989. The difference in firms' capital structure across sectors is assessed, the effect of the volatility of earnings on capital structure and the relationship between systematic risk and capital structure are also examined. However, this study does not address the issue of optimal capital structure but explores the problem in the Malaysian context.

2. PREVIOUS STUDIES

The main objective of firms is to maximise their current market value, which is determined by their investment programs. If taxes and liquidation costs are ignored, the financing of the investment programs becomes a separate and unimportant decision (Dobins and Pike (1979)). A firm can resort to borrowings or equity capital to finance its investments.

Equity is more risky than debt and rational investors will expect a higher rate of return on equity. Borrowing is a low cost alternative. In a world with taxation and transaction -

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costs, there ought to be an optimal capital structure (DeAngelo and Masulis (1980)). If interest is tax-deductible, firms can increase their after-tax cashflows by resorting to debt financing. Taxation favours the use of leverage. However, an increase in total borrowings increases the volatility of returns to shareholders and hence increases the financial risk. Shareholders are generally risk-averse and expect higher returns for taking on financial risk in addition to the business risk they accepted by purchasing a stake in the firms' future operational cashflows. If the firm cannot generate enough cashflows to pay investors (debtholders and shareholders) their expected returns, repay the principal amount, and to have extra cashflows left over which will increase the wealth of shareholders, the firm will be eventually forced into liquidation. Liquidation incurs substantial costs and delay for shareholders. Therefore there is a trade-off between the benefits of using debt and the costs of liquidation. To date, the issue of optimal capital structure has not been settled yet (Myers (1986(b)). There is inadequate understanding of corporate financing behaviour and how such behaviour affects firms' value.

Modigliani and Miller (1958) suggest that in a world of no taxes and transaction costs, debt financing would have no impact on firm's value. Miller (1977) argues that even in a world with differential personal taxes, the levels of leverage in a firm is still an irrelevant issue.

DeAngelo and Masulis (1980) suggest that each firm has a unique interior optimum leverage decision due solely to the interaction of personal and corporate tax treatment of debt and equity.

Hamada (1972) showed that 21 to 24 percent of the systematic risk of common stocks can be explained by the added financial risk a firm takes by using debt and preferred stocks.

Myers (1984) suggests that the level of borrowing is determined not just by the value and risk of firm's assets but also the type of assets it holds. He also suggests that average debt ratios vary between industries because of difference in asset type, asset risk and requirements for external funds between industries.

The remainder of this paper is organised as follows: section 3 discusses the data and methodology, section 4 reports the findings and section 5 concludes the paper.

3. DATA AND METHODOLOGY

A sample of sixty firms from the industrial (n=30), plantation (n=10), tin (n=5), properties (n=10) and finance sectors (n=5), all continuously traded on The KLSE from January 1975 to December 1989 were chosen. The firms were randomly chosen and the initial sample was larger than 60 but some firms were dropped from the sample due to incomplete information for analysis. All firms had financial year ending in December.

According to capital structure theory, the higher the levels of debt the higher the financial risk (due to higher costs of financial distress) borne by common stock holders. Financial risk relates to the volatility of the earnings stream that accrues to common stock holders. Generally, the higher the relative amount of debt (i.e the higher the financial leverage) in the capital structure, the larger the volatility of net earnings and therefore the higher the financial risk associated with common stocks. The financial leverage is measured by the ratio of debt to equity (D/E) or the ratio of debt to total asset (D/A) using market or book values. In this study, the ratio of the total debt (excluding trade creditors) to equity and the ratio of total debt to total asset is measured using book values. The reason for using book values being that only a minority of the 295 (December 1989)[1] listed firms in Malaysia have public debt issues and the interest rates are relatively stable for the period of study with few exceptions. Thus the book value of debt is unlikely to differ substantially from the market value of debt. In determining the debt-equity ratio, owners' equity is measured as an annual average of the product of the number of shares outstanding and the year-end share price. In determining the debt-asset ratio, the total asset figure is obtained as reported in the financial statements of the respective firms. The average ratio for each year is estimated by taking a simple average of the ratio over the 15-year period for each firm. To assess the stability of the ratios within and between sectors, the 15 years test period was arbitrarily divided into three sub-periods and the analysis of variance was applied to test the null hypothesis of no difference in the means within and between sectors over the sub-periods.

In ascertaining the association between capital structure and systematic risk of listed firms, both the ordinary least squares (OLS) and the Fowler-Rorke (FR) measures of systematic risk

[1] There are 335 listed firms on the main and the second board of KLSE with estimated worth RM170.5 billion as of February 1992.

were used. The issue of thin trading bias in a developing market context and its effect on systematic risk measures have been examined extensively by Ariff and Lim (1989) for the Singapore market and Annuar and Shamsher (1991) for the Malaysian market. Both studies found that betas estimated using any thin trading adjustment method are more efficient in correcting thin trading bias than OLS beta measures. The betas used in this study are adopted from Annuar and Shamsher (1991). In testing the causality between earnings volatility and the leverage of firms, a one-way Granger causality test as suggested by Geweke (1984) was applied. This test uses the ordinary least squares regression and the following specification is used to test causality between X (Leverage) and Y (Earnings Volatility):

$$Y_t = \alpha_o + \sum_{i=1}^{M} \alpha_1 Y_{t-i} + \varepsilon_t \qquad (1)$$

$$Y_t = \beta_o + \sum_{i=1}^{M} \beta_i Y_{t-i} + \sum_{j=1}^{N} \beta_j X_{t-j} + \mu_t \qquad (2)$$

Where ε_t and μ_t are disturbance terms, α_i and β_i are parameters relating Y_t and its lagged values, and β_i are parameters relating X_t and its lagged variables. As a rule of thumb applied in most causality studies, four lags of X_t were used in this study. A null hypothesis test that X does not cause Y based on equation (1) and (2) is carried out with the F-statistic estimated as follows:

$$F = \frac{[(SSE_1 - SSE_2/N)]}{[SSE_2/T\text{-}M\text{-}N\text{-}1)]}$$

Where SSE_1 and SSE_2 are the sum of squared errors from the OLS regression on equation (1) and (2) respectively. T is the number of time series observations on Y_t and under the null hypothesis, F is distributed with (N, T-M-N-1) degrees of freedom. M and N are the number of lags in the Y and X variables respectively.

4. THE FINDINGS

(i) Capital Structure of Malaysian firms

The average debt-equity ratios (D/E) across industries for the period 1975 to 1989 are presented in Table 1. The industrial and finance sectors have average D/E ratios greater

than one (1.04 and 16.29 respectively) for the 15 years period while the plantation sector has the lowest average D/E ratio (0.39). The low D/E ratio for the plantation sector is probably due to lack of reinvestment in the sector which in turn is related to the depressed commodity prices and the increasing role of the industrial sector as a catalyst of growth in the Malaysian economy. This sector also pays a high dividend per share (Annuar and Shamsher (1992(a)). The overall average D/E for the five industries over the period of study is 1.18 (Table 2). A one-way analysis of variance yielded an F-statistic with a probability value less than 0.0001, thereby rejecting the hypothesis that the mean leverage was the same across industries. The F-statistic (without the finance sector) yields a probability value of less than 0.05. The results are consistent with those observed by DeAngelo and Masulis (1980) in the United States. Table 1 also apparently shows that the leverage of firms in Malaysia is industry-specific, which means that the capital structure between firms in different industries is maintained over the 15 years period. However, findings from Table 3 suggest that apart from the finance sector, there is a significant difference in the leverage ratios of firms within (sub-period F-statistics) and between each sector (Table 1 F-statistic of 34.23) over the 15 years period.

TABLE 1

DEBT-EQUITY RATIOS OF MALAYSIAN FIRMS ACROSS INDUSTRIES, 1975-1989 (N = 60)

Year	Industrial	Properties	Plantation	Tin	Finance
1975	0.84	0.58	0.34	0.53	10.47
1976	0.85	0.42	0.32	0.55	12.11
1977	0.84	0.36	0.34	0.50	13.93
1978	0.85	0.36	0.32	0.60	16.58
1979	0.94	0.67	0.29	0.57	20.74
1980	1.15	0.42	0.29	0.69	31.81
1981	1.31	0.38	0.16	0.64	35.74
1982	1.27	0.36	0.12	0.57	23.53
1983	0.94	0.61	0.43	0.51	12.59
1984	0.97	0.50	0.54	0.45	13.09
1985	1.04	0.53	0.30	0.71	17.30
1986	1.19	0.66	0.55	0.11	19.23
1987	1.31	0.89	0.51	0.20	19.99
1988	1.06	1.45	0.62	0.15	13.35
1989	1.04	0.97	0.89	0.15	13.94
Average	1.04	0.62	0.39	0.43	16.29
F-statistic 34.23*					

* Significant at 5 percent level

The average D/E ratio for the industrial sector is 1.04, properties 0.62, plantation 0.39, tin 0.43 and finance 16.29. The average debt to total asset (D/A) ratios across industries for the test period are presented in Table 2 with the finance sector having the highest average (0.94) and the plantation sector the lowest (0.24). There is a significant difference (F=62.73) in the D/A ratios of the various sectors over the 15 years period.

TABLE 2
DEBT-ASSET RATIO OF MALAYSIAN FIRMS ACROSS INDUSTRIES, 1975-1989 (N = 60)

Year	Industrial	Properties	Plantation	Tin	Finance
1975	0.41	0.32	0.23	0.33	0.91
1976	0.39	0.27	0.22	0.34	0.92
1977	0.40	0.24	0.24	0.31	0.93
1978	0.39	0.23	0.23	0.36	0.94
1979	0.45	0.36	0.21	0.35	0.95
1980	0.46	0.29	0.20	0.33	0.96
1981	0.49	0.26	0.13	0.35	0.97
1982	0.48	0.26	0.10	0.31	0.96
1983	0.45	0.36	0.22	0.28	0.93
1984	0.46	0.31	0.24	0.26	0.93
1985	0.48	0.31	0.20	0.31	0.95
1986	0.49	0.34	0.26	0.27	0.95
1987	0.53	0.36	0.26	0.25	0.95
1988	0.53	0.36	0.27	0.22	0.93
1989	0.47	0.31	0.22	0.29	0.93
Average	0.46	0.33	0.24	0.26	0.94
F-statistic	62.73*				

* Significant at 5 percent level

Similar results were observed when the finance sector was excluded. The highest D/E and D/A ratios for the finance sector are due to the nature of the finance sector's business operations which depends largely on borrowed funds and are low asset based. The lowest D/E and D/A ratios are found in the plantation sector, reason being firms in the plantation sector tend to have large asset base and low borrowings due to dependence on internal funds and lack of positive growth opportunities. The low D/A ratio of Malaysian firms compared to firms listed on most Asian Stock Exchanges with D/A ratios as high as 0.90 (Economist, November 1988) can be explained by the combination of the following possible reasons: most firms are in the advanced growth cycle and therefore do not need much financing; Malaysian market participants are to a large extent risk-averse; equity capital is readily available in Malaysia; differences in asset valuation methods.

(ii) Stability of the leverage ratios

Table 3 summarises the D/E and D/A ratios for the three sub-periods classified into sectors and overall category. The three sub-periods were arbitrarily chosen to test the stability of the ratios over time. Except for the finance sector, the F-statistics indicate that the ratios for all other sectors are not stable over time. The stability of the D/E and D/A ratios of the finance sector is due to close regulation of this sector by the government through the central bank, especially with regard to the capital requirements of firms in this sector. Consistent with the findings in Table 2, there is a significant difference in the ratios within and between sectors. This instability implies that firms, in their bid to finance investment programs, adjust their leverage ratios in response to the changes in the economic environment. For example, the recession (1975-1976) and market crash years (1985 and 1987) and scandals (i.e BMF and Pan El) do affect the availability of debt and equity finance and the ability of firms to resort to such financing. These findings are inconsistent with the theory of optimal capital structure based on firms in developed markets which posits that firms in each sector and the overall category seems to maintain a stable leverage ratio over time (Ariff and Johnson (1990)).

TABLE 3

AVERAGE DEBT-EQUITY (D/E) AND DEBT-TOTAL ASSETS (D/A) RATIOS FOR THE VARIOUS SUB-PERIODS: 1975-1989 (N = 60)

Sectors		1975-1979	1980-1984	1985-1989	F-statistic
Industrial	D/E	0.864	1.128	1.128	5.21*
	D/A	0.408	0.468	0.5	19.39*
Properties	D/E	0.478	0.454	0.9	5.93*
	D/A	0.284	0.296	0.336	4.60*
Plantation	D/E	0.322	0.308	0.574	4.68*
	D/A	0.226	0.178	0.242	6.49*
Tin	D/E	0.55	0.572	0.264	6.27*
	D/A	0.338	0.306	0.268	10.05*
Finance	D/E	14.766	23.352	16.763	2.87
	D/A	0.93	0.95	0.942	2.46
Overall (All sectors)	D/E	3.396	5.163	3.926	2.84*
	D/A	0.437	0.44	0.458	1.13

(iii) Capital Structure and Earnings Volatility

An important issue in the theory of optimal capital structure is the variability of a firm's value at the end of its accounting period. The greater the variability in the end-of-period value, for example, as predicted by the volatility of earnings, the higher the probability of incurring costs of financial distress. Bradley, Jarrell and Kim (1984) suggest an inverse relationship between volatility of a firm's earnings and its leverage ratio. A simple test of this hypothesis using data on the sixty firms in the sample was conducted. The volatility of earnings was estimated by the variance of the earnings per share over the test period. The results from the regression of leverage on earnings volatility are shown in Table 4.

TABLE 4
REGRESSION OF TWO MEASURES OF LEVERAGE ON EARNINGS VOLATILITY OF MALAYSIAN FIRMS (N = 60)

Leverage ratios = $\alpha_o + \alpha_1$ Standard Deviation (EPS)

Dependent Variable	Intercept α_o	Slope α_1	R-Square	F-value
Debt Equity Ratio	1.33 (3.05)	–0.425 (–0.368)	0.003	0.135
Debt-Asset Ratio	0.414 (12.02)	–0.027 (–0.029)	0.002	0.089

t-statistics are in parentheses

When D/E is regressed on earnings volatility, the slope coefficient is not significant (t=-0.368) suggesting there is no relationship. When D/A is regressed on earnings volatility, again a negative slope of -0.027, which is not significant, is observed. However, the slope of the coefficients for both measures are in the predicted direction as suggested by Bradley et.al (1984). This inconsistency can be explained by the relatively low leverage levels of Malaysian firms which have insignificant effects on net earnings.

To substantiate the above findings, a causality test was conducted between earnings volatility and the leverage ratios. The findings are summarised in Table 5.

The findings in Table 5 provide statistically significant support only for the causal relationship between earnings volatility and debt/equity ratio. This is inconsistent with what theory

predicted ie that changes in leverage causes changes in earnings volatility. These findings imply the conservative attitude of Malaysian firms as they resort to leverage only when earnings are stable, and are further constrained by the requirements of the financial institutions which advance loans at reasonable costs only to firms with stable earnings. Also, the readily and relatively easily available equity financing over debt financing, as evidenced by the many fold increase in rights and new issues by listed firms during the period of study (Annuar and Shamsher (1992(b)) substantiates further the findings in Table 5. This partially explains the relatively low leverage ratios of Malaysian listed firms compared to those in other Asian countries.

TABLE 5

CAUSALITY TESTS OF EARNINGS VARIABILITY AND LEVERAGE OF LISTED FIRMS

$$Y_t = \alpha_o + \sum_{i=1}^{M} \alpha_1 Y_{t-i} + \varepsilon_t$$

$$Y_t = \beta_o + \sum_{i=1}^{M} \beta_i Y_{t-1} + \sum_{j=1}^{N} \beta_j X_{t-j} + \mu_t$$

Direction	Lags	F-statistics
Earnings ---- Debt/Equity	4	55.86*
Debt/Equity ---- Earnings	4	0.136
Earnings ---- Debt/Asset	4	1.216
Debt/Asset ---- Earnings	4	0.425

* Significant at 1 percent level

(iv) Capital structure and market risk

Hamada (1972) suggests that the higher the leverage of a firm the higher would be its systematic risk. If this is indeed true, then a significant positive relationship between the systematic risk and the capital structure of firms should be observed. The regression results are presented in Table 6[2].

[2] Similar but not identical results were observed using OLS betas.

TABLE 6

MEASURES OF LEVERAGE ON SYSTEMATIC RISK OF MALAYSIAN FIRMS (N = 60)

Leverage ratios = $\alpha_o + \alpha_1 \beta_{DFR}$

Dependent Variable	Intercept α_o	Slope α_1	R-Square	F-value
Debt Equity Ratio	0.978 (0.744)	0.270 (0.244)	0.001	0.059
Debt Asset Ratio	0.265 (0.265)	0.130 (1.529)	0.053	2.340

t-statistics in parentheses

The findings indicate that for the sample of Malaysian listed firms, there is a positive but not statistically significant relationship between both leverage measures and systematic risk.

The model does not hold and the R-squared is too low to suggest any meaningful relationship between the two variables. It is probable that the relationship is non-linear, which is a subject of future research.

6. CONCLUSION

To recapitulate, this study explores the nature of capital structure of sixty Malaysian listed firms for the period 1975 to 1989. The results suggest that (except for the finance sector) the capital structure of firms differ significantly within and between industries. The average debt to equity (book value) ratio is 1.18 while the debt to asset ratio is 0.41. The instability of the leverage ratios over time and industries imply the response of firms in the various sectors to the changes in the local economic environment caused by the dynamic changes in the world economy.

Anomalous to the findings in developed capital markets, there is no significant relationship between capital structure and volatility of earnings and a causality test shows that stability of earnings determines the level of leverage used by firms. This implies the conservative attitude of the financial institutions in giving loans and/or the easily available equity financing in the capital market.

In contrast to the evidence on developed markets, there is no evidence of any significant relationship between capital structure and systematic risk of Malaysian listed firms. This might be due to structural, economic and regulatory differences between developed and developing markets.

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