Capital Structure, Profitability and Market Structure: Evidence from Malaysia

I. M. PANDEY

PROFESSOR OF FINANCE AND ACCOUNTING, INDIAN INSTITUTE OF MANAGEMENT, AHMEDABAD (IIMA), INDIA

This paper provides new insights into the way in which capital structure and market power and capital structure and profitability are related. Capital structure and market power, as measured by Tobin's Q, are shown to have a cubic relationship, due to the complex interaction of market conditions, agency problems and bankruptcy costs. The study finds a saucer-shaped relation between capital structure and profitability, due to the interplay of agency costs, costs of external financing and debt tax shield.

INTRODUCTION

In corporate finance, the academic contribution of Modigliani and Miller (1958, 1963) about capital structure irrelevance and the tax shield advantage paved the way for the development of alternative theories and a series of empirical research initiatives on capital structure. The alternative theories include the trade-off theory, the pecking order/asymmetric information theory and the agency theory. All these theories have been subjected to extensive empirical testing in the context of developed countries, particularly the United States (US) (see Harris & Raviv 1991 for a review). A few studies report on international comparisons of capital structure determinants (Rajan & Zingales 1995; Wald 1999); and there are some studies that provide evidence on the capital structure determinants from the emerging markets of South-East Asia (Annuar & Shamsher 1993; Ariff 1998; Pandey, Chotigeat & Ranjit 2000; Pandey 2001). The recent focus of corporate finance empirical literature has been to identify some 'stylised' factors that determine capital structure.

With relatively little evidence available on the interaction between capital structure and product market structure, some researchers have recently started investigating this relationship. Brander and Lewis (1986), Maksimovic (1988), Ravid (1988) and Bolton and Scharfstein (1990) variously offer a theoretical framework for the linkage between capital structure and market structure. On a broader front, Harris and Raviv

(1991) and Phillips (1995) provide surveys of both the theoretical and empirical research on the relationship between capital structure and market structure, while studies in the US by Krishnaswamy, Mangla and Rathinasamy (1992), Chevalier (1993) and Phillips (1995) investigate the empirical relationship between capital structure and market structure. In a recent study, Rathinasamy, Krishnaswamy and Mantripragada (2000) examine this issue in an international context using data from forty-seven countries. All these studies establish a linear relationship, either positive or negative, between capital structure and market structure. Differing from the linear theory, this paper argues that the relationship between capital structure and market structure is cubic. It also shows that the relation of profitability with capital structure is U-shaped or saucer-shaped. The results of the present empirical work vindicate these predictions. To their knowledge, the authors of this work are the first to uncover the cubic relationship between capital structure and market structure, and the saucer-shaped relationship between capital structure and profitability. It is also possible that they are the first to carry out the empirical work on the relationship between capital structure and market structure using data from the emerging Malaysian market.

The remaining sections of the paper are organised as follows. Following a review of the literature, the theoretical framework of the study is presented, after which there is a description of the data and research methodology. The results of the statistical analyses are then reported, and the paper ends with a summary of the main conclusions.

LITERATURE REVIEW

Brander and Lewis (1986) and Maksimovic (1988) provide the theoretical framework that links capital structure and market structure. Contrary to the profit maximisation objective postulated in industrial organisation literature, these theories are similar to the corporate finance theory in that they assume that the firm's objective is to maximise the wealth of shareholders. Furthermore, market structure is shown to affect capital structure by influencing the competitive behaviour and strategies of firms. Firms in an oligopolistic market will follow the strategy of maximising their output in favourable economic conditions to optimise profitability (Brander & Lewis 1986). The theory also holds in unfavourable economic conditions; firms would take a cut in production and reduce their profitability. Shareholders, though, while enjoying increased wealth in good periods, tend to ignore a decline in profitability in bad times. This is due to the fact that unfavourable consequences are passed onto lenders because of shareholders' limited liability status. Therefore, the oligopolistic firms, in contrast to firms in competitive markets, would employ higher levels of debt to produce more when opportunities to earn higher profits arise. The implied prediction of the output maximisation hypothesis is that capital structure and market structure have a positive relationship.

In corporate finance, the agency costs theory supports the use of high debt, and it is consistent with the prediction of the output maximisation hypothesis. Jensen and Meckling (1976) argue that the shareholders–lenders conflict has the effect of shifting risk from shareholders and of appropriating wealth in their favour as they take on risky investment projects (asset substitution). Hence, shareholders, and managers as their agents, are prompted to take on more borrowing to finance risky projects. Lenders receive interest and principal if projects succeed, and shareholders appropriate the residual income; however, it is the lender who incurs the loss if the project fails. It is difficult and costly for debt holders to be able to assess and monitor risky projects. Even debt covenants may not be able to

protect them. In terms of the product–market decisions, the implication of the agency theory is that firms will borrow more to pursue an aggressive production policy that will benefit shareholders. Yet another corporate finance theory that justifies the use of high debt is the tax shield theory (Modigliani & Miller 1963). This theory holds that profitable firms borrow more to save taxes since interest costs are tax deductible. The output maximisation by oligopolistic firms is supposed to increase their profitability. Hence, both the agency cost theory and the tax shield theory would predict a positive relationship between capital structure and market structure.

Capital structure increases the chances of financial distress and bankruptcy. Firms face costs of financial distress when they are unable to service debt. They will have high debt ratios if these costs are zero or trivial (Scott 1976; Kim 1978). Since costs of financial distress are non-trivial and highly leveraged firms can actually go bankrupt, firms with a high probability of bankruptcy will have a low debt ratio. The chances of bankruptcy for firms with large reserve funds are relatively less, but unleveraged firms with high profitability and large reserve funds have a great competitive advantage. These firms with 'deep purses' may not only survive but they also gain by driving their rival firms into bankruptcy (Brander & Lewis 1986; Bolton & Scharfstein 1990). Firms in this situation can follow a policy of aggressive production and predatory price cutting to eliminate their rivals by forcing them into financial distress. This strategy pays off, particularly when external funding is not available to the firms that are the target of the predatory price behaviour. The implication of this model is that the unleveraged firm with deep purses (high profitability and reserve funds) have the incentive to increase their output in order to drive their competitors into bankruptcy. Empirically, a negative relationship can be predicted between capital structure and market structure.

Myers (1977) provides a model under which debt causes under-investment (asset substitution). In this scenario, firms reject those profitable, low-risk investment projects that have the possibility of passing on benefits from shareholders to lenders. Furthermore, internal financing is cheaper than external debt or equity financing due to asymmetric information. Higher debt makes higher output costly for a leveraged firm. In a competitive market, unleveraged or low-leveraged rival firms will intensify competition by increasing their output and/or lowering prices. If the leveraged firms continue borrowing to meet the competition, they may face financial distress and bankruptcy. Hence, the pecking order/asymmetric information theory predicts a negative relationship between capital structure and market power.

There are a few empirical studies that have investigated the issue of capital structure and market structure using data of US firms. In these studies, market structure has been measured either in terms of price or quantity data, or one of the following: the Lerner index, the Herfindahl-Hirschman index or Tobin's *Q*. Krishnaswamy, Mangla and Rathinasamy (1992) find a positive relationship between debt and market structure, measured by the Lerner index. Chevalier (1993) provides evidence in support of a negative relationship between capital structure and market structure. This result is consistent with bankruptcy costs or the asymmetric information/pecking order hypotheses. Phillips (1995), using price and quantity data for market structure, finds a positive link between capital structure and market structure, consistent with the output and limited liability effect model. In a study of international firms from forty-nine countries, Rathinasamy, Krishnaswamy and Mantripragada (2000) also report a positive relationship between capital structure, measured by total debt ratio (TDR); and long-term ratio and market structure, measured by Tobin's *Q*. Their finding supports the

output and limited liability effect and agency theoretic risk-shifting model of capital structure and product market interaction. The results also provide support for the free cash flow model of Jensen (1986), in the form of positive relationship between capital structure and profitability.

In empirical studies of determinants of capital structure, the *Q* ratio has also been used as a proxy of future investment opportunities. These studies show mixed results. A number of studies confirm a negative relationship between the *Q* ratio and debt ratio (Titman & Wessels 1988; Barclay, Smith & Watts 1995; Lasfer 1995; Rajan & Zingales 1995; Barclay & Smith 1996) while some find a positive relationship (Michaelas, Chittenden & Poutziouris 1999).

THEORETICAL FRAMEWORK

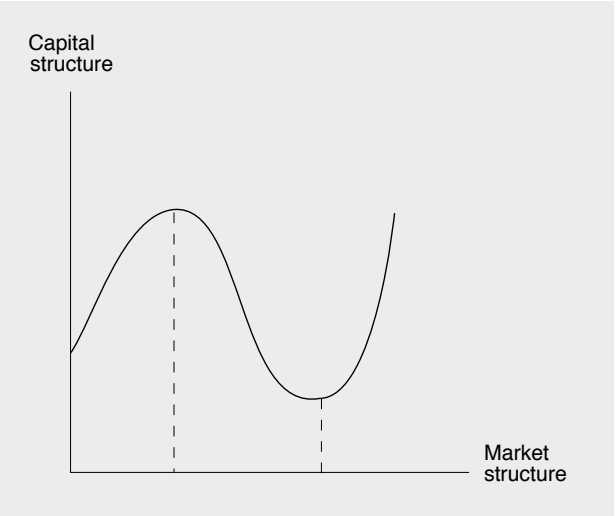
Capital structure can be defined in different ways. In the US, it is common to define capital structure in terms of long-term debt ratio. In a number of countries, particularly the emerging markets, companies employ both short-term and long-term debt for financing their assets, including current assets. It is also common for companies in developing countries to substitute short-term debt for long-term debt and roll over short-term debt. Hence, it is more appropriate, and particularly in the context of developing economies, to define capital structure as TDR. Rajan and Zingales (1995) argue that the definition of capital structure would depend on the objective of the analysis. For example, for agency-problem–related studies, capital structure may be measured by total debt-to-firm value ratio. Debt can be divided into its various components, and numerator and denominator can be measured in book value and market value terms. This study defines the dependent variable—capital structure—as total debt-to-assets (or debt-to-capital employed); it is the measure of capital structure most often used in empirical studies. Total debt includes interest-bearing long-term and short-term debt. Assets include fixed assets and those current assets that are financed by debt. In an accounting sense, this is equivalent to capital employed, including shareholders' funds (equity) and short- and long-term debt.

Market structure is defined here in terms of market power of firms. Market power means control of a firm over price or volume of production. In operational terms, market power implies a firm's monopolistic, oligopolistic or competitive power. Rathinasamy, Krishnaswamy and Mantripragada (2000) state that market structure (power) could be measured by the Lerner index, the Herfindahl-Hirschman index or Tobin's *Q*. Lindenberg and Ross (1981) show that Tobin's *Q* (or simply *Q* ratio) is theoretically a sound, and practically the most powerful, indicator of a firm's market power. In a competitive market, the *Q* of all firms will be equal to one. Firms with a *Q* higher than one are expected to command competitive advantage in the form of either oligopolistic or monopolistic power. Hence, market power is defined here in terms of *Q*. There is also a practical reason for using this definition of market power. In developing countries, price and quantity or segmental data are not available for measuring by way of the Lerner index or the Herfindahl-Hirschman index.

The theoretical definition of *Q* is the ratio of market value of the firm to replacement cost of assets. It is not easy to get replacement cost data in developing countries. Chung and Pruitt (1994) show that *Q* could be effectively defined as the sum of the market value of equity and book value of long-term debt and net current assets (current assets minus current liabilities) divided by the book value of equity, long-term debt and net current assets. Like Rathinasamy, Krishnaswamy and Mantripragada (2000), the current study uses this measurement.

The empirical studies so far have predicted a linear relationship between capital structure and market power. It is argued here that this relationship could be a cubic relationship, the reasons being as follows. A firm in an oligopolistic condition sustains its aggressive production and high-income strategy by employing higher level of debt. Shareholders of the firm gain in terms of increased wealth. In adverse market conditions, their limited liability status provides protection to shareholders against the risk-taking production decision and it is the lenders that would suffer. Thus, a firm's debt level will increase as it gains market power reflected in *Q*. On the other hand, as debt increases, there are significant costs in terms of increased probability of bankruptcy and financial distress. This cost would be accentuated by the behavior of no-debt or low-debt firms with 'deep purses'. They would resort to predatory price behavior and lead their rivals to bankruptcy. This argument suggests a negative relationship between capital structure and *Q*. These two opposing effects point to the possibility of a non-linear relationship between capital structure and market power. As a firm starts gaining market dominance, it will increase debt to increase its production and income; that is, as firms' market power increases, they employ more debt to pursue their output maximisation strategy. This attracts rival firms to intensify competition by cutting price and/or output. At the intermediate level of market dominance when competition intensifies through price cutting, higher costs of debt squeeze the profitability of highly leveraged firms, increasing their chances of financial distress and bankruptcy. Leveraged firms react by reducing debt or by increasing production through improved assets utilisation. However, after consolidating their position, firms at a higher level of market dominance once again leverage the use of debt to expand their production. Firms in a position of strong profitability and high market dominance who have reserve funds can adopt a high-risk production strategy and use more debt. Thus, a cubic relationship can be predicted between capital structure and market power. As shown in Figure 1, firms at relatively lower and higher levels of market power can employ more debt, while firms at an intermediate level of market dominance are vulnerable to rivals' competitive threat and have to reduce their debt.

FIGURE 1
Capital and market structures



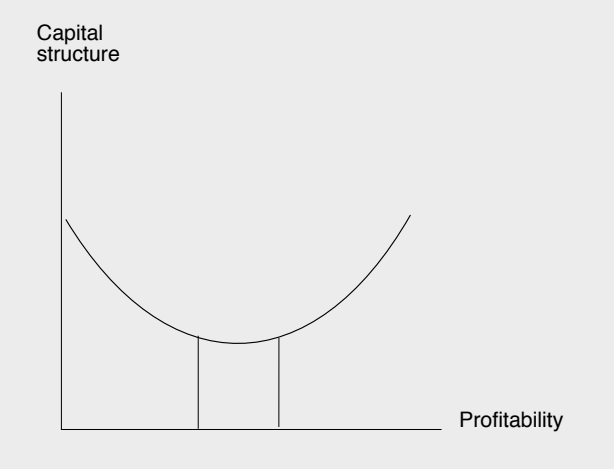
Empirical literature on capital structure finds many variables as its determinants. For example, in a comprehensive comparative cross-country study, Rajan and Zingales (1995) find growth, tangibility (fixed assets to total assets ratio), profitability and size as important determinants of capital structure. Many other studies (Castanias 1983; Bradley, Jarrell & Kim 1984; Titman & Wessels 1988; Barclay & Smith 1996; Pandey, Chotigeat & Ranjit 2000; Pandey 2001) also show risk and investment opportunity as important determinants of debt policy.

Profitability is an important independent variable that has an influence on capital structure. As per the asymmetric information hypothesis of Myers (1977)

and Myers and Majluf (1984), firms, irrespective of their market power, would depend on internally generated funds for their expansion since external funds involve higher costs. This suggests a negative relationship between capital structure and profitability, which results of empirical studies support (Kester 1986; Friend & Lang 1988; Titman & Wessels 1988; Rajan & Zingales 1995; Michaelas, Chittenden & Poutziouris 1999). But the alternative interest/tax shield hypothesis (Modigliani & Miller 1963) predicts a positive relationship between capital structure and profitability. Jensen (1986) and Williamson (1988) consider debt as a disciplining mechanism to ensure that managers pay out profits rather than building their personal empires. In the Jensen model, firms with free cash flow, or high profitability, will have higher debt. Thus, this study predicts that more-profitable firms will employ higher debt and will implement a high-output strategy. Given these conflicting hypotheses, it is plausible to predict a non-linear relationship between capital structure and profitability. Firms at lower levels of profitability would employ more internal funds since external funds are expensive and non-debt tax shields (such as depreciation) may be more than enough to take advantage of tax benefits (DeAngelo & Masulis 1980). At a higher level of profitability, firms have more profits to shield from taxes as well as being able to generate more output by employing assets effectively. These firms employ more debt. Thus, it is plausible to predict a quadratic—U-shaped—relationship between capital structure and profitability. In fact, the relationship, as shown in Figure 2, may be saucer-shaped. There may be some medium range of profitability where firms may not have enough incentive to increase or reduce debt.

According to Myers (1977), the firm's future growth opportunities represent call options. High-growth firms may hold more options for future investments; and, as such, these firms avoid issuing debt. They prefer to issue equity when it is necessary in some future date to exercise an option. Outstanding debt in such an eventuality would transfer wealth from shareholders to lenders. According to Myers' option model and the pecking order hypothesis of Myers and Majluf (1984), firms with high growth should use less debt. The trade-off theory also arrives at a similar prediction. In the event of bankruptcy caused by higher debt, the value of growth opportunities will disappear. Thus, firms with high-growth opportunities are susceptible for larger bankruptcy costs, leading them towards low debt.

FIGURE 2
Capital structure and profitability



Myers (1984) points out the lack of sufficient evidence for a relationship between capital structure and risk. According to the trade-off theory, a higher debt ratio increases the probability of financial distress. With positive financial distress/bankruptcy costs, the risk affects a firm's debt ratio. Ross (1985) demonstrates a theoretical inverse relation between cash flow beta and financial leverage. A theoretically and empirically sound measurement of risk is the firm's unleveraged beta. Chung (1989) shows that the relationship between capital structure and the unleveraged beta is negative. Thus, a negative relationship

can be predicted between leverage and risk; however, it is shown that for a negative relationship between risk and leverage, bankruptcy costs should be quite large (Castanias 1983; Bradley, Jarrell & Kim 1984).

Large firms are likely to be more diversified and less prone to bankruptcy (Rajan & Zingales 1995). They are also expected to incur lower direct costs in issuing debt. Thus, large firms are expected to employ a higher amount of debt than small firms. The empirical evidence is mixed. A large number of studies find a significant positive relationship between size and debt ratio (Lasfer 1995; Rajan & Zingales 1995; Barclay & Smith 1996; Berger, Ofek & Yermack 1997). Kester (1986) and Remmers *et al*. (1974) find no significant effect of size on capital structure.

The agency costs of debt in the Jensen and Meckling (1976) model cause owner-controlled firms (concentrated ownership) to transfer wealth from lenders to shareholders by investing in high-risk projects. Similarly, Myers (1977) argues the case of owners' under-investment in low-risk, valuable projects in order to avoid wealth transfer from debt-holders to shareholders. Because the agency costs of under- and over-investment will be higher for owner-controlled (concentrated ownership) firms, their debt capacity will be lower than the manager-controlled firms (diversified ownership). Thus, a negative relationship is predicted between ownership and debt ratio.

According to the trade-off hypothesis, tangible assets act as collateral and provide security to lenders in the event of financial distress. Collaterality also protects lenders from the moral hazard problem caused by the shareholders–lenders conflict (Jensen & Meckling 1976). Thus, firms with higher tangible assets are expected to have a high level of debt. As regards the empirical evidence, some studies report a significant positive relationship between tangibility and total debt (Titman & Wessels 1988; Rajan & Zingales 1995).

DATA AND METHODOLOGY

The study uses data of companies listed on the Kuala Lumpur Stock Exchange for the period from 1993 to 2000. The analysis covers the data from 1994 to 2000, as the data for year 1993 are used to calculate some variables for 1994. Companies with missing data are excluded from the study. The study also excludes the financial and securities sector companies, as their financial characteristics and use of leverage are substantially different from other companies. Companies with zero sales and negative equity are also omitted. After eliminating outliers, the sample size is 208 companies for each period. The data of those companies is adjusted, which changes their financial year. Such changes result in one year with missing data and the subsequent year's data of more than twelve months. The subsequent year's data is annualised first, and then the missing data is substituted by the mean value.

The estimation model uses panel data. Panel data, unlike cross-section data, allow controlling for unobservable heterogeneity through individual (firm) effect (η_i). Dummies for time variables are also included to measure temporal effect (γ_t). This helps in controlling the effect of macroeconomic variables on capital structure. Thus, the study uses a two-way, fixed-effect model. The fixed-effect model controls for unobservable heterogeneity; but provides biased results if endogenous variables are included. To resolve this problem, this study estimates the model using the Generalised Method of Moments (GMM), which controls the problem of endogeneity by using instrument variables. In the model estimation, this study uses as instrument variables all variables in the model lagged from t–1 to t–4. Furthermore, to eliminate individual effect, the study uses the cross-section first differences of variables in the model estimation. The estimation

equation is as follows:

$$(TDR)_{i,t} = \alpha_0 + \alpha_1 Q_{i,t} + \alpha_2 Q_{i,t}^2 + \alpha_3 Q_{i,t}^3 + \alpha_4 (EBIT/A)_{i,t} + \alpha_5 (EBIT/A)_{i,t}^2 + \alpha_6 (EBIT/A)_{i,t}^3 + \alpha_7 GA_{i,t} + \alpha_8 BETAA_{i,t} + \alpha_9 LnA_{i,t} + \alpha_{10} LnNSH_{i,t} + \alpha_{11} FA/A_{i,t} + \gamma_t + \eta_i + \varepsilon_{i,t}$$

Total debt-to-asset ratio (TDR) at book value is the dependent variable. Independent variables include Tobin's Q, profitability, growth, systematic risk, size, ownership (number of shares) and tangibility. Tobin's Q is calculated as the sum of the market value of equity and book value of long-term debt and net current assets (current assets minus current liabilities) divided by the book value equity, long-term debt and net current assets. Growth (GA) is measured as one plus annual change in assets. Profitability is defined as earnings before interest and taxes, divided by assets or capital $(EBIT/A)$. Systematic risk is measured by unleveraged or asset beta. First, the equity beta for each firm is calculated using the weekly share price data. The calculated equity beta for each company is unleveraged for its level of leverage. In the equation, this is referred to as $BETAA$. Size is measured as the natural log of assets (LnA). Ownership is measured by the natural log of number of outstanding shares $(LnNSH)$. It is assumed that a larger number of shares implies diffused ownership. Tangibility is defined as fixed assets divided by assets (FA/A).

RESULTS

Table 1 (p. 86) provides means and standard deviations of the dependent and independent variables for each year from 1994 to 2000 and for the period 1994–2000. The average TDR for the period 1994–2000 is 30%. However, TDR has been steadily increasing over years, ranging from 25% in 1994 to 32% in 2000. The Q ratio has shown fluctuations during 1994–2000. It was lower in 1997 and 1998, corresponding with the financial and stock market crisis in Malaysia. Assets growth was quite high for each year from 1994 to 1996; but it showed a sharp decline in the last three years to 2000. Profitability also declined significantly in the last three years; that is, crisis and post-crisis period.

Table 2 (p. 87) provides a correlation matrix for the pooled sample of 1,456 firms/years observations.[1] The study finds that size (LnA) and Q ratio have a significant positive relationship with TDR, while risk (unleveraged or asset beta, $BETAA$) and profitability $(EBITA/A)$ have a significant negative relationship. Other significant relationships exist between risk and size and size and ownership $(LnNSH)$. The negative relationship between risk and size implies that the large firms, being more diversified, have lower systematic risk. The positive relationship between size and ownership indicates that the large-sized Malaysian firms have more diffused ownership.

Table 3 (p. 88) presents results of the GMM estimation. The main concern here is to test the specification about the relationship between capital structure (TDR) and market structure (or power) (Q ratio). As predicted, the study finds that the coefficients of variables Q and Q^3 are positive and the coefficient of Q^2 is negative. All these coefficients are significant at the 1% level of significance, which supports a cubic specification for the capital structure – market structure relationship for Malaysian firms. This evidence is interpreted as consistent with the economic theory of output maximisation and the finance theories of agency costs and bankruptcy costs. For a given initial range of Q ratio, any increase in this ratio leads firms to increase output and take more risk to maximise shareholders' wealth. This causes rivalry

TABLE 1
Summary statistics

		1994	1995	1996	1997	1998	1999	2000	1994-00
TDR (leverage)	Mean	0.2472	0.2590	0.2815	0.3181	0.3493	0.3384	0.3234	0.3024
	Std Dev	0.1955	0.2101	0.2122	0.2268	0.2454	0.2591	0.2623	0.2339
Tobin's *Q*	Mean	3.6590	2.9739	3.3597	1.7492	1.9531	2.5186	2.2304	2.6348
	Std Dev	3.1742	1.8647	2.0160	1.8946	1.7683	3.6665	3.7663	2.7996
EBIT/A	Mean	0.1417	0.1331	0.1245	0.0990	0.0483	0.0564	0.0572	0.0943
(profitability)	Std Dev	0.1361	0.1000	0.0987	0.0991	0.1201	0.1144	0.0871	0.1149
GA (growth)	Mean	0.3191	0.4010	0.4713	0.3006	0.0870	0.0259	0.0410	0.2351
	Std Dev	0.6643	0.7152	1.1802	0.5289	0.2401	0.3729	0.3422	0.6682
BETAA (risk)	Mean	0.9938	0.8881	1.0794	0.6194	0.6302	0.7053	0.5579	0.7820
	Std Dev	0.3799	0.4004	0.5686	0.3205	0.3351	0.3579	0.3220	0.4344
LnA (size)	Mean	5.4800	5.5936	5.7111	5.8052	5.8314	5.8300	5.8308	5.7260
	Std Dev	0.5138	0.5198	0.5201	0.5275	0.5461	0.5309	0.5407	0.5431
LnNSH	Mean	11.7331	11.8938	12.0167	12.1065	12.1454	12.1686	12.2373	12.0430
(ownership)	Std Dev	1.1291	1.1231	1.1083	1.1126	1.1130	1.0973	1.0840	1.1194
FA/A (tangibility)	Mean	0.4989	0.4777	0.4646	0.4502	0.4599	0.4695	0.4873	0.4726
	Std Dev	0.2875	0.2952	0.2923	0.2772	0.2849	0.2956	0.3753	0.3025

in the market and competition intensifies, particularly from unleveraged firms. The fear of bankruptcy and loss of investment and profitability obliges leveraged firms to reduce debt. Hence, for some intermediate range of Q the competition forces leveraged firms to lessen debt. Finally, for well-established, profitable firms with a very high Q ratio and low probability of financial distress and bankruptcy, the output maximisation seems to dominate the relationship between capital structure and the Q ratio.

The study also finds expected signs of the coefficients of profitability variables, $EBIT/A$, $(EBIT/A)^2$ and $(EBIT/A)^3$. The coefficients of $EBIT/A$ and $(EBIT/A)^3$ are, respectively, negative and positive and statistically significant at the 1% level of significance. The coefficient of $(EBIT/A)^2$ is not statistically different from zero. Thus, these results confirm a saucer-shaped relationship between debt ratio and profitability. This evidence is interpreted as a trade-off between the effects of asymmetric information, agency costs and tax benefits. For a given initial range of profitability, any increase in this ratio leads firms to internally finance their output growth and minimise their cost of financing. It is also likely that at relatively lower levels of profitability, firms may not have much incentive to issue debt, as other non-debt tax shields may be available to them. There may also exist an intermediate range of profitability

TABLE 2
Correlation matrix
(1,456 firms/years pooled observations)

	TDR	*Q*	*EBIT/A*	*GA*	*BETAA*	*LnA*	*LnNSH*	*FA/A*
TDR	1.0000							
Q	0.3552	1.0000						
EBIT/A	-0.3284	0.0895	1.0000					
GA	-0.3284	0.0411	0.0575	1.0000				
BETAA	-0.3284	0.0266	0.0575	0.0034	1.0000			
LnA	-0.3284	-0.0457	-0.0343	0.0255	-0.3609	1.0000		
LnNSH	0.0867	-0.0498	-0.0071	-0.0473	-0.1423	0.8716	1.0000	
FA/A	-0.0570	-0.0498	0.0562	-0.0887	-0.0067	-0.0936	-0.0888	1.0000

where firms do not have sufficient incentive either to increase or decrease debt any further. Finally, firms that have higher levels of profitability can exploit their market power in a situation of intensifying competition by increasing their borrowings to expand their output. This strategy is also of benefit in that such firms have more profits to shield from taxes. Furthermore, agency costs will be higher once firms reach high levels of profitability.

The coefficients of other control variables are also statistically significant. Consistent with the option model of Myers (1977) and the pecking order hypothesis of Myers and Majluf (1984), the results of this study show a significant negative relationship between growth and debt ratio. The study also finds a negative relationship between (systematic) risk and debt ratio, which is consistent with the trade-off theory. The positive relationship between size and debt ratio is evidence in favour of the hypotheses that larger firms tend to be more diversified and less prone to bankruptcy and the transaction costs of issuing debt is smaller. The negative relationship between debt ratio and the size of shareholding means that more diffused ownership results in lower leverage, which supports the agency hypothesis. The current results indicate a significant positive relationship of tangibility (*FA/A* ratio) with debt ratio, which vindicates the trade-off theory that postulates a positive correlation between debt ratio and tangibility since fixed assets act as collateral in debt issues.

The two-way (firm and time) fixed effects model and the fixed firm effects model were also employed (results not reported). Both models gave results similar to the GMM results. The fixed firm effects model was estimated with standard and White's heteroscedasticity-consistent *t*-values as well as with autocorrelation correction. For all variables, White's heteroscedasticity-consistent *t*-values were significant at the 1% level, and the autocorrelation-corrected estimates of variables also remained significant and were as per prediction. Thus, the results of estimations of the fixed firm effects and the two-way effects models were similar to the results obtained from the more robust GMM estimation.

TABLE 3
Results of the GMM model on panel data

$$(TDR)_{i,t} = \alpha_0 + \alpha_1 Q_{i,t} + \alpha_2 Q_{i,t}^2 + \alpha_3 Q_{i,t}^3 + \alpha_4 (EBIT/A)_{i,t} + \alpha_5 (EBIT/A)_{i,t}^2 + \alpha_6 (EBIT/A)_{i,t}^3 + \alpha_7 GA_{i,t} + \alpha_8 BETAA_{i,t} + \alpha_9 LnA_{i,t} + \alpha_{10} LnNSH_{i,t} + \alpha_{11} FA/A_{i,t} + \gamma_t + \eta_i + \varepsilon_{i,t}$$

Transformation: First differences
Sample period: 1994–2000
No. of firms (cross-sections): 208
Total panel (balanced) observations: 1,248
White period standard errors & covariance (d.f. corrected)
Instruments: All variables lagged from *t*-1 to *t*-4

Variable	Coefficient	*t*-Statistic	Prob.
Q	0.07763	7.96	0.0000
Q^2	-0.00383	-4.73	0.0000
Q^3	0.00005	3.93	0.0001
$(EBIT/A)$	-0.27341	-7.26	0.0000
$(EBIT/A)^2$	0.07767	1.03	0.3050
$(EBIT/A)^3$	0.26353	3.47	0.0005
BETAA	-0.05170	-7.33	0.0000
GA	-0.01242	-2.41	0.0159
LnA	0.38244	8.26	0.0000
LnNSH	-0.13815	-5.59	0.0000
FA/A	0.04925	1.74	0.0814
R-squared	0.4848		
Adjusted *R*-squared	0.4781		
Sum squared residuals	8.3107		
J-statistic	1231.00		

Notes: Variable definitions

a) (TDR) = total debt ratio or leverage = total debt divided by asset at book value.

b) Q = Tobin's Q = the sum of market value of equity and book value of long-term debt and net current assets divided by the book value equity, long-term debt and net current assets.

c) $(EBIT/A)$ = profitability = earnings before interest and taxes divided by assets or capital.

d) *BETAA* = risk = unleveraged or asset beta.

e) *GA* = growth = one plus annual change in assets.

f) *LnA* = size = log of assets.

g) *LnNSH* = ownership = log of number of shares.

h) FA/A = tangibility = fixed assets divided by assets.

CONCLUSION

This study empirically examines the relationship between capital structure and market structure using data for 208 Malaysian companies for the period from 1994 to 2000. The estimation method uses the GMM on panel data. The study provides new insights into the way in which the capital structure, measured by total debt-to-assets ratio; and market structure or power, measured by Tobin's *Q* ratio, are related. The results support the prediction that capital structure and market structure/power have a cubic relationship; that is, at the lower and higher ranges of Tobin's *Q*, firms employ higher debt; and at intermediate range, they reduce their debt. This is due to the complex interaction of market conditions, agency costs and bankruptcy costs. The study also shows a saucer-shaped relationship between capital structure and profitability because of the interplay of agency costs, costs of external financing and the interest/tax shield. In addition to the *Q* ratio and profitability, other independent variables are included in the estimation. Size and tangibility are found to have a positive influence; and growth, risk (systematic) and ownership have a negative influence on capital structure.

ENDNOTES

1. Correlation coefficients, based on pooled Ordinary Least Squares (OLS), do not control for individual firms and time effects.

REFERENCES

Annuar, M.N. & Shamsher, M. 1993, 'Capital structure', *Capital Market Review*, 1(2): 171–77.

Ariff, M. 1998, *Stock Pricing in Malaysia—Corporate Financial and Investment Management*, UPM Press, Selangor, Malaysia.

Barclay, M.J. & Smith, C.W. 1996, 'On financial architecture: leverage, maturity and priority', *Journal of Applied Corporate Finance*, 8(4): 4–17.

Barclay, M.J. & Smith, C.W. 1999, 'The capital structure puzzle: another look at the evidence', *Journal of Applied Corporate Finance*, 12(1): 8–20.

Barclay, M.J., Smith, C.W. & Watts, R.L. 1995, 'The determinants of corporate leverage and dividend policies', *Journal of Applied Corporate Finance*, 7(4): 4–19.

Berger, P.G., Ofek, E. & Yermack, D.L. 1997, 'Managerial entrenchment and capital structure decisions', *Journal of Finance*, 52(4): 1411–38.

Bolton, P. & Scharfstein, D. 1990, 'A theory of production based agency problems in financial contracting', *American Economic Review*, 80(1): 59–581.

Bradley, M., Jarrell, G.A. & Kim, E.H. 1984, 'On the existence of optimal capital structure theory and evidence', *Journal of Finance*, 39(3): 857–78.

Brander, J.A. & Lewis, T.R. 1986, 'Oligopoly and financial structure: the limited liability effect', *American Economic Review*, 76(5): 956–70.

Castanias, R. 1983, 'Bankruptcy risk and optimal capital structure', *Journal of Finance*, 38(5): 1617–35.

Chevalier, J.A. 1993, 'Capital structure and product-market competition: empirical evidence from the supermarket industry', *American Economic Review*, 85(3): 415–35.

Chung, K.H. 1989, 'Debt and risk: a technical note', *Journal of Business Finance & Accounting*, 16(5) (Winter): 719–27.

Chung, K.H. 1993, 'Asset characteristics and corporate debt policy: an empirical test', *Journal of Business Finance and Accounting*, 20(1): 83–98.

Chung, K.H. & Pruitt, S.W. 1994, 'A simple approximation of Tobin's Q', *Financial Management*, 23(3): 70–74.

Crutchley, C.E. & Hansen, R.S. 1989, 'A test of the agency theory of managerial ownership, corporate leverage, and corporate dividend', *Financial Management*, 18(4): 36–46.

DeAngelo, H. & Masulis, R.W. 1980, 'Optimal capital structure under corporate and personal taxation', *Journal of Financial Economics*, 8(1): 3–29.

Ferri, M.G. & Jones, W.H. 1979, 'Determinants of financial structure: a new methodological approach', *Journal of Finance*, 34(3): 631–44.

Friend, I. & Lang, L.H.P. 1988, 'An empirical test of the impact of managerial self-interest on corporate capital structure', *Journal of Finance*, 43(2): 271–81.

Harris, M. & Raviv, A. 1991, 'The theory of capital structure', *Journal of Finance*, 46(1): 297–355.

Jensen, M.C. 1986, 'Agency costs of free cash flows, corporate finance and takeovers', *American Economic Review*, 76(3): 323–29.

Jensen, M.C. & Meckling, W.H. 1976, 'Theory of the firm: managerial behavior, agency costs and capital structure', *Journal of Financial Economics*, 3: 305–65.

Kester, C.W. 1986, 'Capital and ownership structure: a comparison of United States and Japanese manufacturing corporations', *Financial Management*, 15(1): 5–16.

Kim, E.H. 1978, 'A mean-variance theory of optimal capital structure and corporate debt capacity', *Journal of Finance*, 33(1): 45–63.

Krishnaswamy, C.R., Mangla, I. & Rathinasamy, R.S. 1992, 'An empirical analysis of the relationship between financial structure and market structure', *Journal of Financial and Strategic Decisions*, 5(3): 75–88.

Lasfer, M.A. 1995, 'Agency costs, taxes and debt: the UK evidence', *European Financial Management*, 1(3): 265–85.

Lindenberg, E.B. & Ross, S.A. 1981, 'Tobin's Q ratio and industrial organization', *Journal of Business*, 54(1): 1–32.

Maksimovic, V. 1988, 'Capital structure in repeated oligopoly', *Rand Journal of Economics*, 19: 389–407.

Michaelas, N., Chittenden, F. & Poutziouris, P. 1999, 'Financial policy and capital structure choice in UK SMEs: empirical evidence from company panel data', *Small Business Economics*, 12: 113–30.

Modigliani, F. & Miller, M.H. 1958, 'The cost of capital, corporation finance and the theory of investment', *American Economic Review*, 48(3): 261–97.

Modigliani, F. & Miller, M.H. 1963, 'Corporate income taxes and the cost of capital: a correction', *American Economic Review*, 53(3): 433–43.

Myers, S.C. 1977, 'Determinants of corporate borrowing', *Journal of Financial Economics*, 5: 147–75.

Myers, S.C. 1984, 'The capital structure puzzle', *Journal of Finance*, 39(3): 575–92.

Myers, S.C. & Majluf, N.S. 1984, 'Corporate financing and investment decisions when firms have information that investors do not have', *Journal of Financial Economics*, 13: 187–221.

Pandey, I.M. 2001, Capital structure and the firm characteristics: evidence from an emerging market, Working paper 2001-10-04, Indian Institute of Management, Ahmedabad, India.

Pandey, I.M., Chotigeat, T. & Ranjit, M.K. 2000, 'Capital structure choices in an emerging capital market: case of Thailand', *Management and Change*, 4(1): 1–14.

Phillips, G.M. 1995, 'Increased debt and industry markets: an empirical analysis', *Journal of Financial Economics*, 37(2): 189–238.

Rajan, R.G. & Zingales, L. 1995, 'What do we know about capital structure? Some evidence from international data', *Journal of Finance*, 50(5): 1421–60.

Rathinasamy, R.S., Krishnaswamy, C.R. & Mantripragada, K.G. 2000, 'Capital structure and product market interaction: an international perspective', *Global Business and Finance Review*, 5(2): 51–63.

Ravid, S.A. 1988, 'On the interactions between production and financial decisions', *Financial Management*, 17(3): 87–99.

Remmers, L., Stonehill, A., Wright, R. & Beekhuisen, T. 1974, 'Industry and size as debt ratio determinants in manufacturing internationally', *Financial Management*, (Summer): 24–32.

Ross, S. 1985, 'Debt and taxes and uncertainty', *Journal of Finance*, 40(3): 637–57.

Scott, J.H. 1976, 'A theory of optimal capital structure', *Bell Journal of Economics*, 7: 33–54.

Titman, S. & Wessels, R. 1988, 'The determinants of capital structure choice', *Journal of Finance*, 43(1): 1–19.

Wald, J.K. 1999, 'How firm characteristics affect capital structure: an international comparison', *Journal of Financial Research*, 22(2): 161–87.

Williamson, O.E. 1988, 'Corporate finance and corporate governance', *Journal of Finance*, 43(3): 567–91.

NOTES ON CONTRIBUTORS

H. YOUNG BAEK graduated from Yonsei University in Seoul with a BBA *cum laude* and received a full scholarship to pursue his Master of International Business Studies degree from the University of South Carolina, from which he also received his PhD in international finance in 1999. Dr Baek is currently Chair and Associate Professor of Finance at H. Wayne Huizenga School of Business and Entrepreneurship at Nova Southeastern University, Florida, USA. His research interests are in the areas of international corporate finance, agency theory, management compensation, foreign direct investment and real estate. Dr Baek has published in leading journals like *International Review of Economics and Finance*, *Journal of International Business Studies (JIBS)*, *Journal of Multinational Financial Management (JMFM)*, *Multinational Business Review (MBR)* and *Quarterly Journal of Business and Economics*. Dr Baek and Dr Jose Pagan won the Best Paper in Corporate Finance Award from the Midwest Finance Association in 2002. Dr Baek has also been actively serving the academic community as an ad hoc reviewer for *JIBS*, *JMFM*, *MBR* and *Review of Financial Economics*, and as a program reviewer for AIB, EFA, FMA, MFA, SFA and SWFA.

S.J. CHANG is Professor of Finance in the College of Business at Illinois State University in Normal, Illinois, USA. His research interests lie in the areas of capital market efficiency and market microstructure, behavioural finance, corporate management and cultural diversity, and global business education. Professor Chang has published articles in *Financial Review, Global Finance Journal, Review of Quantitative Finance and Accounting, Journal of Financial Education, International Review of Economics and Finance*, and *Journal of Business Finance and Accounting*, among others. He has also written books about global corporate management, conceptual understanding of economic fundamentals, and American culture and language. Professor Chang was a distinguished visiting professor at the Korea Banking Institute, KAIST Graduate School of Management, and School of Business Administration at Seoul National University in Seoul, Korea. He is on the editorial board of *Financial Services Review, Journal of Economics and Finance Education, Finance and the Common Good*, and *American Business Review*. While serving as one of the managing editors for the *Korean-American Science & Technology News*, Professor Chang is also the current President of the Korea–America Finance Association.

LANYING HUANG is an Associate Professor in the Department of Business Administration at National Changhua University of Education (NCUE) in Taiwan. Her research interests lie in the areas of international business and investment. Dr Huang has co-authored several chapters in books as well as articles in journals such as *Journal of American Academy of Business*, *Journal of Applied Management and Entrepreneurship*, and *International Journal of Family Business*. She teaches international management, international business strategy and international human resource management at NCUE and other universities.

I.M. PANDEY has a PhD degree in Finance from Delhi School of Economics, University of Delhi. He is Professor of Finance and Accounting at the Indian Institute of Management, Ahmedabad (IIMA), India. He has served as Dean (1991–94), Acting Director (Jan.–June 1994), Chairman of the Doctoral Programme (1988–90) and Chairman of Finance and Accounting Area (1982–83 and 1986–88) at IIMA. Professor Pandey has taught at the College of Business Administration, Kansas State University, USA; Graduate School of

Management, ESCP, France; Graduate School of Management, ESSEC, France; School of Management, Asian Institute of Technology, Thailand; and School of Management, University Science Malaysia (USM). He has published ten books, six research monographs and about sixty articles and forty management cases in academic journals. He has been a consultant to several public and private sector organizations in India and external agencies such as the Asian Development Bank, the World Bank and the European Union on problems of reorganization and restructuring, turnaround strategy, costing and pricing, and infrastructure development. Professor Pandey is on the board of directors of Industrial Finance Corporation of India and Cochin Shipyard Company. He has received the Award of Excellence, ABI Awards of Excellence, USA (name entered in the International Directory of Distinguished Leadership, Seventh Edition, the American Biographical Institute, USA); Best Case-writer of the Year 1996 Award, First Asian Conference on Management Education and Case Research, USM, Malaysia, August 1996; Teacher of the Year 1996 Award, School of Management, Asian Institute of Technology, Thailand; and Best Course and Teacher Award, 1986, Indian Institute of Management, Ahmedabad. Professor Pandey is the editor of IIMA's journal, *Vikalpa: the Journal for Decision Makers*, and he is on the editorial board of eight journals including *Global Business and Finance Review (USA)* and *International Journal of Accounting, Auditing and Performance Evaluation* (Inderscience Enterprises Ltd., UK).

MERVIN L. POBRE is a Research Fellow in the Osaka School of International Public Policy (OSIPP), Osaka University, Japan. He was awarded his PhD in Economics from the Graduate School of Economics at Osaka University in 2001. His research interests lie in the application of econometric techniques to financial and monetary development issues. Dr Pobre's research publications include *Saving and Credit Constraints in Asian Economics, Sources of Shocks and Monetary Policy in the 1997 Asian Crisis* and *Credit Crunch in East Asia: A Retrospective*. He has presented papers at several international conferences, including the East Asian Economic Association International Convention in Singapore (2000), Kuala Lumpur (2002) and Hongkong (2004); Japan Society of Monetary Economics National Conference in Shiga, Japan (2003); and the Asian Crisis V International Conference in Chuncheon, Korea (2004). Dr Pobre also served as a discussant at the 2002 East Asian Economic Association International Convention in Kuala Lumpur, Malaysia. He has been the recipient of several research grants and awards, including the Japan Society for the Promotion of Science Fellowship Award, the Nomura Foundation Research Award and the Japanese Government Monbusho Scholarship Grant.

JORDAN SHAN is an Associate Professor in the School of Applied Economics, Faculty of Business and Law at Victoria University, Australia. In 2004 and 2005, he took leave from his position of Associate Dean (international) at the Faculty to take up the professorship of Economics and Finance in Guanghua School of Management, Peking University (PKU), where he also heads the Institute of the Chinese Economy and WTO Studies. He has a wide interest in the application of econometrics in international trade and finance as well as in Asian economies. Jordan has published over thirty refereed publications in journals such as *Applied Economics*, *Applied Financial Economics*, *Australian Economic Papers*, *International Review of Applied Economics, Review of International Economics* and *International Economic Journal*. He has also co-authored (with Qi Jianhong) a text, *International Finance*.