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EVIDENCE ON THE DETERMINANTS OF CAPITAL STRUCTURE OF NON-FINANCIAL CORPORATES IN MAURITIUS

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KEYWORDS: capital structure, trade off theory, pecking order theory, panel data, Mauritius

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1. Introduction

This paper reviews the capital structure debate and aims to empirically study the determinants of capital structure of non-financial firms quoted on the stock exchange market of Mauritius. Consistent with Rajan and Zingales (1995) the motivation is to assess whether, or which, of the various capital structure theories can stand the test of different markets. If this is the case then firm characteristics that have been found important in determining the capital structure of US firms should be similarly correlated with the leverage ratios of Mauritian firms. However, where the nature of correlation between leverage and other firm characteristics in Mauritius differs from the pattern recorded for US data, this does not necessarily imply a rejection of the underlying theory. Indeed, such deviation could still support theory to the extent that it may be explained by differences in the institutional structure of the Mauritian market.

Capital structure theories are concerned with explaining how the mix of debt and equity in the firm's capital structure influences its market value. Since Modigliani and Miller's (1958) Proposition I, the debate has focused on how capital structure influences the value of the firm when their assumptions are relaxed. Particular attention has been paid to how taxation, financial distress costs, information asymmetries, and agency costs influence the relationship between capital structure and firm value.

The trade off theory introduces into the capital structure debate the benefit of the debt tax shield on the one hand and the cost associated with financial distress on the other. The implication of this theory is that each firm has an optimal debt ratio that maximises value, although this level may vary between firms. Moreover, the trade off theory is often further extended to incorporate agency considerations. This is in the spirit of Jensen and Meckling (1976) who note that debt is valuable in reducing the agency costs of equity but at the same time debt is costly as it increases the agency costs of debt.

Information asymmetries between managers and outside shareholders introduce further complications to the capital structure debate. When managers know that the value of the firm is above its current market value, they will be reluctant to issue equity. Under such circumstances outsiders rely on managers' actions as signals regarding the true value of the firm, and an issue of equity is likely to be interpreted as a bad signal. Thus, to avoid sending bad signals mangers will rely primarily on internal funds. When these are insufficient, managers will prefer debt to equity because debt is less sensitive to information asymmetries. This results in what Myers (1984) terms the pecking order theory.

Thus there is a sharp conflict between the trade off theory, which predicts an optimal capital mix and the pecking order theory, which predicts a financing order. Hence, to distinguish between these competing views researchers often examine the nature of the correlation between leverage and many other firm characteristics. However this approach is not always fruitful as the direction of correlation between leverage and a particular firm characteristic can often be explained by more than one theory. Bearing this limitation in mind, the study progresses as follows. Section 2 gives a brief description of the Mauritian economy and corporate sector as a background to the empirical sections that come next. Section 3 presents the model and the theoretical predictions while Section 4 describes the database. Empirical procedures are described in Section 5, estimation and results are given in Section 6, and Section 7 concludes.

2. The Mauritian economy and corporate sector

Dating back to the period of the French colonisation, the Mauritian economy has been based on sugar cultivation and milling. Indeed, this is an important feature that has traditionally characterised the country's economy. However, following the high world sugar price in the

1970's, much of the profits of the sugar sector were invested in sectors other than agriculture. Thus following a successful diversification of its economic activities away from sugar, the economy rests besides agriculture on three other sectors, namely manufacturing, tourism and financial services.

Another important feature that has traditionally characterised the Mauritian economy is its fairly concentrated ownership structure, with a predominance of family owned groups. Indeed, private ownership of companies and the importance placed on preventing dilution in control is widespread. For example, out of a total of 616 public companies at 31st December 1997, only 46 are on the official list (Registrar of Companies). However, many of these 616 public companies are subsidiaries of companies listed on the Stock Exchange of Mauritius (SEM).

SEM was set up by the Stock Exchange Act of 1988, and it operates two markets. These are the Official Market on which are traded the securities of listed companies, and the over-the-counter (OTC) market for trading securities of unlisted companies. The Official Market began its operations with five listed companies, a market capitalisation of Rs1.4 billion and turnover of Rs14.3 million. However, by 1999 the Mauritian stock market has expanded to list over forty domestic companies, two foreign companies and some sixteen debentures. Table 1 gives the main indicators of the SEM for the period 1989 to 1999.

[Table 1 about here]

Though there has been an increase in the number of individual investors on the market from around 6,000 in 1991 to 30,000 at the end of 1996, the latter figure still represents only about 5% of the total population. Indeed, despite good corporate results, local investors tend to shy away from the market. Both the individual and institutional investors tend to cling to

their holdings, leading to undue upward pressure on prices under booming market conditions as well as lack of demand for undervalued stocks leading to undue downward pressure on prices during bearish periods. Analysis of the market turnover ratio of the SEM for the past ten years shows that this is between 1% and 5% for most companies, with an average of around only 2.2%. Such a situation of low liquidity leads to high price volatility and renders entry and exit conditions difficult and therefore impacts the informational efficiency of the market in a negative manner.

Thus the Mauritius Stock market is far from the typical capital market. Indeed, the SEM, by virtue of the size of the economy and the restricted business landscape, does not display the breadth and depth of sophisticated stock markets. Further, unlike in developed countries where the stock markets are perceived to broadly replicate the economy, this is not the case in Mauritius. None of the garments manufacturers, which are the largest export earner and a key GDP contributor, is listed on the market. There is a relatively high degree of market concentration, reflecting the special feature of the Mauritian business, which is dominated by a few large companies and conglomerates. For instance, the top ten listed companies on the Exchange account for seventy percent of the total market capitalisation. Likewise, the top five represents sixty one percent of market capitalisation.

To summarise, there is a firm belief that after ten years of existence, the stock market has had a positive impact on increased savings and investment, on the creation of shareholders' wealth and on overall economic growth. However, the market still suffers from the absence of a strong domestic investor base, over concentration of stock market activities on equities, low level of liquidity and lower standard of disclosure of corporate information than the better-regulated markets. It will be many years before the stock exchange in Mauritius, like those in other developing countries, becomes efficient and more than of minor importance in the capital allocation process. Nevertheless, it is companies on that stock

exchange that constitute the database for the empirical procedure, which is discussed next.

3. A theoretical model of the determinants of capital structure

3.1. The model

Based on the capital structure theories discussed in the introduction, and on the basis of previous empirical studies as reviewed in Prasad et al (2001), it is useful to specify a generic model of capital structure as follows:

(1)

$$(LEVERAGE)_{i,t} = ? + ?_1 (AGEINCOR)_{i,t} + ?_2 (SIZE)_{i,t} + ?_3 (AVPROFIT)_{i,t} + ?_4 (GROWTH)_{i,t} + ?_5 (RISK)_{i,t} + ?_6 (ASSETS)_{i,t} + ?_7 (TXSHIELD)_{i,t} + ?_{i,t}$$

where LEVERAGE is the ratio of short term plus long term liabilities to total assets; AGEINCOR is the number of years since the year of incorporation; SIZE is the natural log of turnover; AVPROFIT is a measure of profitability and is the average ratio of profit before interest and exceptional items to total assets for a period of three years; GROWTH is the annual percentage increase in total assets during the two years up to the current year; RISK is the volatility of earnings which is represented by stock price volatility. A measure of stock price volatility is based on the residuals obtained from a regression of the natural log of the daily stock price on a constant and time; ASSETS is the asset structure, given by the ratio of fixed assets to total assets; TXSHIELD is a proxy for non-debt tax shield measured as the ratio of depreciation to total assets; A more detailed description of all the variables in Equation (1) is contained in the Appendix, Table A1.

3.2 Theoretical predictions

Given the special case of Mauritius, it is assumed that the pecking order theory should be the more appropriate theory in explaining the capital structure decisions of firms operating in this economy. Specifically, the pecking order theory is predicted to fit the Mauritian case because it is an emerging economy. Indeed, as an emerging economy, and based on the problems characterising the capital market as reviewed in Section 2, the finance gap and information asymmetries which Mauritian companies face are expected to be particularly severe. Thus the hypothesised directions of influence of the explanatory variables on the leverage variable under each of the competing theories is given below, and the expectation is that the empirical findings should be consistent with the direction implied by the pecking order theory.

Age

Based on trade off considerations, it may be argued that as the firm matures, its debt capacity increases implying a positive impact on leverage. However, it may also be argued that as the firm matures it builds reputation leading to better access to equity markets. The latter view implies that age should be negatively related to leverage, and is consistent with pecking order theory. Thus in the case of age the sign on the estimated coefficient distinguishes between the trade off theory, when the sign is expected to be positive, and pecking order considerations, when a negative sign is expected.

Size

A trade off based argument for a positive relationship between size and leverage, is that as the firm grows bigger it becomes more diversified, less risky, and thus less prone to bankruptcy. Larger firms, therefore, have higher debt capacity and a positive link is expected between size and leverage if the trade off theory is valid.

Profitability

In the context of the pecking order theory, profitable firms are likely to have sufficient internal finance that ensures they do not need to rely on external sources. Moreover, in an agency theory framework, if the market for corporate control is inefficient, managers of profitable firms will use the higher levels of retained earnings in order to avoid the disciplinary role of external finance. These two explanations suggest a negative relationship between profitability and leverage. However, it is also possible that as its profitability increases, the firm becomes the target of lenders, who tend to prefer borrowers with high current cash flows. Moreover, in an agency theory framework, if the market for corporate control is efficient, managers of profitable firms will seek debt because they regard it as a commitment to pay out cash in the future as in the context of Jensen (1986). These two explanations support a positive sign on the estimated coefficient of the firm profitability variable.

Growth (investment opportunities)

In line with agency theory of debt, conflicts between owners and lenders should lead to a negative relationship between growth and debt levels. These conflicts include two of the agency costs of debt, namely under investment and risk shifting. Considerations based on the trade off theory also point to negative correlation between growth and leverage. For example, although growth opportunities add value, the firm cannot use growth opportunities as security for lenders (Titman and Wessels, 1988). However, in line with pecking order theory growing firms, that need funds, prefer debt to external equity. Thus based on pecking order considerations, the relationship between growth opportunities and leverage is predicted to be positive.

Earnings volatility (risk)

Risk is negatively associated with leverage due to trade off considerations. Particularly, the probability of being unable to meet financial obligations increases with the volatility of earnings. As the present value of the costs of financial distress increases with the probability of being financially distress, risky firms prefer less debt. Further, the agency theory of debt also predicts a negative association between debt and risk. Particularly, risk increases the probability of expropriation of debt holders' wealth through risk shifting or under investment, as equity holders are aware that there may be insufficient funds to pay them. Hence risky firm will use less debt, and there should be a negative association between debt and risk.

Asset structure

The ratio of fixed to total assets represents the degree of assets' tangibility, which the trade off theory predicts to be positively related to debt levels. Particularly, tangible assets often reduce the costs of financial distress because they tend to have higher liquidation value. For this reason tangible assets normally provide high collateral value relative to intangible assets, which implies that these assets can support more debt. Further, Viswanath and Frierman, (1995) note that it is usually more difficult to alter the variance of the cash flows generated from tangible rather than intangible assets. Thus asset tangibility reduces the scope for risk shifting and, consistent with agency theory, firms with tangible assets will support more debt. However, Titman and Wessels (1988) provide an agency theory based argument for a negative relationship between the tangibility of the firm's assets and leverage. Accordingly it is easier to monitor the use of tangible rather than intangible assets, which means that firms with intangible assets will tend to use more debt for monitoring purposes.

Non-debt tax shield

In the context of the trade off theory, non-debt tax shields provide alternative to interest tax shield. Therefore firms with high non-debt tax shields, such as accelerated depreciation and investment tax credits, relative to their expected cash flows, should use less debt. Thus the trade off theory predicts the variable measuring non-debt tax shield to have a negative impact on leverage.

4. The database

This study utilises accounting data and daily stock prices for all non-financial firms listed on the official market in Mauritius for the period 1990 to 2000. However, in spite of having data for eleven years, the empirical analysis covers only the nine years from 1992 to 2000. The reason for the loss of the two earliest years (1990 and 1991) is due to the way some of the variables in the model are defined. In particular, as detailed in the Appendix, Table A1, the variable GROWTH and the variable AVPROFIT are based on data for the current and previous two years.

There are twenty-four non-financial companies on the official market, distributed across five industry sectors as follows. Seven firms are classified under Commerce while a further seven are classified under Industry. Four firms are in Leisure and Hotels, five are in the traditional Sugar business and one is in Transport[1]. The number of years per firm with all the required price and accounting data ranges from four to nine years. Thus the number of available firm/year observations is 165. However, one firm/year observation is dropped due to change in year ending date, leaving a sample size of 164.

Companies names, their age, average leverage and other variables averaged over the

[1] In addition to the five non-financial sectors, there are another two financial sectors on the official market, which were excluded from this study. These are the Banks and Insurance sector and the Investments sector.

period studied are presented in Table A2 of the Appendix. Table A2 confirms the previously mentioned deep roots of the Mauritian economy in the sugar industry. Indeed, the Table shows that listed firms in the sugar industry have, in general, been incorporated much earlier compared with listed firms in other industries. Another interesting observation from Table A2 is the distribution of the average gearing ratios across firms from the same industrial sector. Looking at this distribution, it is not obvious that firms in the same sector have similar capital structures. For example, LEVERAGE in the Commerce sector ranges from just over 20 percent (CMPL) to nearly 70 percent (Rogers & Co). This is in contrast to the observation in Harris and Raviv (1991) where it is noted as a basic stylised fact that firms within an industry tend to have similar capital structures[2]. It is likely, however, that this apparent lack of industry trend in the present sample is due its small size[3].

Table 2 presents descriptive statistics of the variables of interest for the 24 firms pooled over the period 1992 to 2000. The correlation matrix of Table 2 does not point to high correlation among the explanatory variables. The highest correlation coefficient (in absolute terms) is that between the proxy for firm profitability, AVPROFIT, and age since incorporation, AGEINCOR, at -0.53. The second highest is the correlation coefficient between the proxy for non-tax shield, TXSHIELD, and AVPROFIT at 0.38. The only other correlation coefficient with an absolute value greater than 0.30 is that between AGEINCOR and TXSHIELD at -0.32.

[2] The observation in Harris and Raviv (1991) is consistent with a number of empirical studies. For example, Bradley, Jarrell and Kim, (1984), conclude that debt ratios are strongly related to industry classification even when regulated firms are excluded. Titman and Wessels (1988) suggest that the type of assets firms hold is influenced by their industry and for that reason industry classification should also influence debt levels. Hussain (1997) suggests that some industries may enjoy better access to loans due to government policy.

[3] The apparent lack of trend in the debt ratios of the sample firms across industries, is puzzling and may be an indication that by excluding non-quoted firms, the sample is not a good reflection of the Mauritian corporate sector as a whole. The fact that this study does not consider industrial classification is due to the small sample size properties of the data.

[Insert Table 2 about here]

To assess more directly whether the sample suffers from near multicollinearity, the Variance Inflation Factor (VIF) procedure was applied to the data. The results show that the values for all the VIFs are relatively small, and none of the factors exceeds the value of 2. Consistent with the observation made from studying the correlation matrix of Table 2, the explanatory variables associated with the highest VIF values include AVPROFIT (1.73), AGEINCOR (1.54) and TXSHIELD (1.42) [4]. Thus as the VIFs as well as the descriptive statistics presented in Table 2 appear reasonable, the next stage is the empirical analysis.

5. Empirical procedure

The initial empirical analysis is based on variables as defined in Equation (1). However the analysis is then expanded, by exploring alternative proxies to measure some of the variables of interest. In particular alternative proxies are used to measure four of the explanatory variables namely asset structure, non-debt tax shield, firm size and firm age. There are thus sixteen different variations of Equation (1)[5].

For each of the sixteen variants of Equation (1), the PANEL command in TSP 4.4 produces four regressions: the TOTAL model, the FIXED effects model, the BETWEEN model and the RANDOM effects model. The first three models produce Ordinary Least Squares (OLS) estimates while the RANDOM effect model produces Feasible Generalised Least Squares (FGLS) estimates. The FIXED and RANDOM effects models relax the assumption that the intercept coefficients are constant across firms. The FIXED effects

[4] Results of the VIFs can be obtained from the authors.

model takes $?_i$ to be firm-specific constant terms while the RANDOM effects model takes $?_i$ to be firm-specific disturbance terms that are constant across time for each firm.

Various tests are also produced to assist in selecting the most appropriate model. For example, to assist in deciding between the TOTAL and FIXED effect model, TSP 4.4 prints the results of an F-test for the significance of the firm-specific effects, where the null hypothesis is that there are no firm-specific effects: $?_1 = ?_2 = \ldots. = ?_{n-1} = 0$. Providing the FIXED effects model is preferred to the TOTAL specification, the question is whether the RANDOM model should be preferred to the FIXED effects model. For this purpose, the TSP 4.4 PANEL command generates the Hausman's Test for fixed verses random effects. Under the FIXED effects specifications there is no need to assume that the firm specific effects, $?_i$, are uncorrelated with the other regressors. However, under the RANDOM effects specifications the specific effects are random and part of the disturbance terms. Under such specifications, if the firm specific effects are correlated with any of the explanatory variables, this would lead to the omitted variable problem resulting in the estimated coefficients becoming inconsistent.

The Hausman Test utilises this difference to test for the RANDOM effects model verses the FIXED effects model. In particular the null hypothesis is of no correlation between the random firm-specific effects and any of the explanatory variables. In this case both the OLS estimates from the FIXED effects regression and the FGLS estimates from the RANDOM effects regression are consistent but the former are inefficient due to autocorrelation in the disturbance terms. Under the alternative hypothesis the OLS estimates from the FIXED effects regression are consistent but the FGLS estimates from the RANDOM effects regression are inconsistent due to correlation between the disturbance terms and the explanatory variables.

[5] The definitions for the additional proxies are presented in Table A1 of the Appendix.

Based on this observation and on the idea that the covariance of an efficient estimator with its difference from an inefficient estimator is zero, the Hausman Test can be derived as shown in Greene (1997, pg. 632-633). Rejection of the test statistic is a rejection of the null hypothesis that the coefficient estimates from the RANDOM effects model are consistent, leading to preference for the FIXED effects model over the RANDOM effects model.

6. Estimation and testing results

The results for the sixteen variations of Equation (1) are given in Table 3. Table 3 reports only the results from the RANDOM effects specification. Indeed, as indicated, the Hausman Test statistic for all but one specification (Model 15) does not reject the null hypothesis. The results across the sixteen specifications are generally consistent and tell an interesting story.

[Insert Table 3 about here]

The estimated coefficient on age since incorporation, AGEINCOR, enters with a negative sign in the eight specifications in which it is included (Model 1- Model 8). Furthermore, it is consistently significant at the 1 percent significance level. Similarly, the estimated coefficient on age since listing on the SEM, AGELIST, enters with a negatively signed estimated coefficient, in seven out of eight models in which it is included (It is positively signed in Model 16). However, unlike age since incorporation, age since listing on the SEM is never significant. As discussed in Sub-section 3.2, the impact of age on leverage is consistent with pecking order considerations but not with the trade off theory. Further, the relative importance of age since incorporation, as opposed age since listing on the SEM, may be explained in terms of the recent origin of the SEM and may point to the unimportant role it

plays as a source of capital for firms.

Strong and positive relationship emerges from the empirical analysis between firm size and leverage. Whether size is measured as the log of turnover (SIZE) or as the log of total assets (SIZE2), the estimated coefficients under all specifications are consistently positive and significant at the 1 percent level. These findings are inconsistent with Titman and Wessels (1988), but are in line with the general findings in Alderson and Betker (1995), Rajan and Zingales (1995), Wiwattanakantang (1999), Jordan et al (1998), Hussain (1997) and Hirota (1999), amongst others. Furthermore, the results for the size variable are the only findings of this study, which offer strong support for the trade off theory.

The estimated coefficient on the firm profitability measure, AVPROFIT, is negatively signed across the sixteen specifications and is also significant at the 5 percent level or more in all models but Model 16. A negative association between profitability and leverage is inconsistent with the trade off theory but is in line with the pecking order theory and with agency theory when the market for corporate control is inefficient. Indeed it appears that Mauritian firms, which are typically associated with particular families, do not like the restrictions or the disclosure of information that come with debt. Thus when profits are sufficient to meet their financing needs, leverage tends to be lower. Other studies including Titman and Wessels (1988), Rajan and Zingales (1995), Wiwattanakantang (1999), and Hirota (1999) generally find profitability to be negatively related to leverage. However, it is not uncommon to find differing empirical results in the literature. For example, in Hussain (1997) the estimated coefficient on the profitability measure is positive and significant in the case of Korea, but negative and significant in the case of Malaysia. Likewise Jordan et al (1998) find the sign on the estimated coefficients on the profitability variable to be consistently positive, although insignificantly so in the FGLS regression.

The measure of growth in total assets, GROWTH, appears with a positive estimated

coefficient across all specifications. GROWTH is also significant at the 10 percent level at least, in all models apart of Model 8. A positive link between firm growth and leverage is consistent with pecking order theory but inconsistent with the trade off and agency theories. Furthermore, previous studies have, on the main, reported negative association between growth and leverage. For example, negative but insignificant relationship between growth and leverage is reported in Titman and Wessels (1988) and in Jordan et al (1998). Similarly, Rajan and Zingales (1995), Wiwattanakantang (1999), and Hirota (1999) report negative and significant impact of growth on leverage. However, in the Mauritian context a positive association between firm growth and leverage could be rationalise as follows. Mauritian firms basically rely on bank loans and retained earnings. Indeed this is reflected in the small number of corporate debentures traded on the Mauritian capital market and in the relatively thin trading that takes place on the SEM as discussed in Section 2. Thus as the choice is essentially between loans and retained earnings, growing firms with little of the latter have no choice but to seek debt finance. This could explain the positive association between GROWTH and the dependent variable.

The proxy that is meant to measure earnings volatility and firm risk is the variable RISK, which is measured in terms of stock price volatility. The estimated coefficient on RISK is consistently positive and insignificant across all specifications. These findings are inconsistent with the prediction of a negative impact of risk on leverage based on the trade off and agency theories. However, failure to find strong evidence for the importance of risk in the firm leverage decision is also reflected in the results of other studies. Specifically, Bradley et al (1984) show the estimated coefficient on the firm risk variable to be negative and significant while Jordan et al (1998) show it to be significant but positive. In Titman and Wessels (1988), Wiwattanakantang (1999) and Hirota (1999) evidence concerning risk is generally weak. Moreover, in the context of Mauritius it could be argued that stock price

volatility does not reflect earnings volatility, because of the inactive nature of the SEM.

The results are relatively strong for the asset structure of the firm, whether it is measured by the ratio of fixed to total assets, ASSETS, or by the ratio of fixed assets plus inventories to total assets, TANGIBLE. The estimated coefficients on both proxies are consistently negatively signed and significant, although the first measure (ASSETS) shows stronger results as it is consistently significant at the 1 percent level. This negative association between tangibility and debt is inconsistent with the trade off based explanations given in Sub-section 3.2. It is also inconsistent with the agency rationale according to which leverage will be higher for firms with many tangible assets because it is more difficult to engage in risk shifting when tangible assets are already in place. Furthermore, these findings are inconsistent with the results in Rajan and Zingales (1995), Wiwattanakantang (1999), Jordan et al (1998) and Hirota (1999). However, a negative relationship between asset structure and leverage, is consistent with the agency-based rationale concerning the monitoring role of debt. Furthermore, many fixed assets may imply high operating leverage, which leads firms to seek lower financial leverage. This explanation fits particularly well with the observation that when tangibility is measured in terms of fixed assets alone (ASSETS) it appears more significant compared to when it is measured in terms of fixed assets plus inventories (TANGIBLE).

The non-debt tax shield is measured alternatively by the ratio of depreciation to total assets (TXSHIELD) and by the ratio of total expenses less interest to turnover (TAX). Both proxies are included as measures of the availability of non-debt tax shields. However, while depreciation relates to investment in capital assets as a means to reduce tax burden, expenses relate to operation of the company. Since the subject of this paper is capital structure, there is possibly greater justification for using the original proxy, namely TXSHIELD. Nonetheless, irrespective of whether TXSHIELD or TAX is included, the estimated coefficient is

consistently positively signed. In the case of TAX it is also consistently significant at least at the 5 percent level, while in the case of TXSHIELD it is significant in five out of eight models in which it is included. A positive association between non-debt tax shields and the use of leverage is contrary to the trade off based prediction as discussed in Sub-section 3.2. It is also at odds with the negative and significant association between non-debt tax shields and leverage as arising from the general results in Wiwattanakantang (1999) and Hirota (1999). In contrast Alderson and Betker (1995) and Titman and Wessels (1988) show weak results with regards the association between the non-debt tax shield and leverage. Still, although the rationale for a positive relationship between alternative tax shield and the use of debt is puzzling, it is not uncommon in the literature. For example Bradley et al (1984) also report a positive and significant association between the non-debt tax shield and leverage.

Lastly, the intercept, C, is consistently negatively signed and significant at the 10 percent level or more. Although no prediction was made regarding the sign on the intercept, a negative sign is consistent with the results in Hussain (1997)[6]. It is inconsistent, however, with other empirical results including Bradley et al (1984), Alderson and Betker (1995), and Jordan et al (1998). As the constant, C, is the last variable in Table 3 to be discussed, attention is now turned to the concluding remarks.

7. Conclusions

In general the results from the panel data procedure seem to support the pecking order theory and reject the trade off theory of capital structure. Indeed the signs of the variables age, profitability, growth, asset structure, non-debt tax shield and risk contradicts the trade off based predictions. (Although the variable risk does not appear important in explaining the

[6] Hussain (1997) finds the constant to be negative and significant for both Korea and Malaysia in all but two of the total regressions.

leverage decision of non-financial Mauritian listed firms). At the same time the results with respect age, profitability, and growth support the pecking order theory. In contrast, firm size provides strong evidence in support of the trade off theory. Thus, unless the positive sign between size and leverage can be explained by other theories, such as agency theory, than this inconsistency clearly calls for further investigation.

However, the Mauritian set up also offers a unique opportunity to testing capital structure theories. This is because the market for publicly traded corporate debt is limited thus the financing choice is basically between internal funds, private loans and external equity. Further, due to three features of the Mauritian market, the choice of finance for Mauritian firms is practically between internal funds and private loans. These three features include the family ownership orientation of the typical Mauritian business, the apparent inefficiency of the market for corporate control, and the development stage of the capital market for equity. Indeed the empirical results reflect these three features of the Mauritian business environment as summarised below.

First, the importance of maintaining control with existing owners is reflected in the negative association between profitability and debt and the positive association between growth and debt. Specifically, firms with insufficient retained earnings prefer external debt to external equity because the former does not involve giving up control. For the same reason growing firms with greater needs for external funds rely more heavily on external debt.

Second, the inefficiency of the market for corporate control is also reflected in the nature of the association between debt and both profitability and growth. Particularly, the negative association between profitability and debt implies that when they have the opportunity to do so, managers prefer to avoid the discipline associated with external funds. Likewise it could be argued that had the market for corporate control been efficient, a negative relationship should have emerged between debt and growth as growing firms would

have preferred external equity to external debt.

Third, the small part played by the equity market as a source of funds for Mauritius firms is reflected in the importance of age since incorporation relative to age since listing on the SEM. Similar conclusions emerge from the inadequacy of stock price volatility to reflect firm risk.

Thus the empirical results highlight three distinctive features of the Mauritian business environment and could therefore be of particular value to policy makers. For example the apparent narrow choice over sources of finance for corporate investment should be of concern to policy makers as expansion of these sources may contribute to economic growth. Second, there is also indication that the impact of setting up a capital market in an emerging country like Mauritius may have insignificant impact on the capital structure decisions of firms, at least in the short term. Thus policies other than those concerned with developing the capital market may need to be considered if firms are to be encouraged to optimise their capital structure.

Finally the results with respect to asset structure and the availability of non-debt tax shields are inconsistent with both the theoretical prediction and previous work. A possible explanation for the negative impact of asset tangibility on leverage could be operational leverage, which heavy investment in fixed assets reflects. However, the positive impact of the availability of alternative tax shields is puzzling. Clearly more research is required to explore these inconsistencies which may be due in part to inadequate selection of proxies.

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Table 1
Main indicators of the Stock Exchange of Mauritius

#	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
No of listed Co Equity	6	13	19	21	29	34	39	42	42	42	43
No of listed Cos (including debentures)	6	14	20	22	30	35	41	45	46	47	48
Market Capitalisation (Rs Million)	1437.1	3792.7	4862.5	6598.9	1490.7	2853.6	2781.7	3337.7	3693.5	4533.5	4173.1
SEMDEX	117	171	154	183	302	474	344	353	391	466	435
Change in SEMDEX	-	45.9	-9.9	18.8	65.2	56.5	-27.2	2.6	10.6	19	-6.4
Traded Value (Rs'milion)	14.2	88.5	81.2	158.6	691.6	1555.5	1232.6	1601.7	2997	2556.1	1978.1
Traded Volume p.a (shares)	0.6	3.6	4.5	8.7	37.3	52.5	60.7	92	164.1	98.9	85.3
Trading Sessions	26	51	50	99	97	147	149	148	160	248	250
Average Turnover per session (Rs'million)	0.5	1.7	1.6	1.6	7.1	10.6	8.3	10.8	18.7	10.3	7.9
Weekly Frequency	1	1	1	2	2	2:03	3	3	3:5 *	5	5
P/E Ratio	7.4	8	7	11.6	12	16.5	11.12	14.46	14.06	11.58	8.46
Dividend Yield - %	7.2	6.2	6.1	6	4.2	3.32	5.14	3.97	4.3	4.03	5.54
No of Stockbrokers	27	27	27	27	30	30	31	37	38	39	27
US Dollar Rate	15.41	14.89	15.71	15.58	17.7	18.08	17.8	19.71	21.05	24.51	25.39
Annual Turnover in US$ million	0.92	5.95	5.17	10.18	39.07	86.03	69.25	81.26	142.37	104.3	77.9
Ave Turnover per session US $ million	0.035	0.117	0.103	0.103	0.403	0.585	0.464	0.549	0.89	0.421	0.311
Market Cap in US $ million	93.3	254.7	309.5	423.5	842.2	1578.3	1562.8	1693.4	1754.6	1849.9	1643.3

As at end of period
* Trading sessions were held thrice weekly until 24th November when daily trading started
The 1997 figures include transaction between SMB and Nedbank : 76.88 ML shares traded for Rs961 ML
Source: Constructed from different sources

Table 2
Results of Covariance procedure for 164 firm/year observations for 24 non-financial firms listed on the Stock Exchange of Mauritius, 1992-2000.

Panel A: Descriptive Statistics

	Mean	**Std Dev**	**Skewness**	**Kurtosis**
LEVERAGE	0.362	0.190	0.291	-0.658
AGEINCOR	42.043	37.844	2.061	4.075
SIZE	20.117	1.175	0.516	-0.013
AVPROFIT	0.094	0.050	0.400	0.347
GROWTH	0.143	0.141	1.853	6.555
RISK	0.060	0.038	1.977	4.921
ASSETS	0.604	0.196	-0.321	-0.429
TXSHIELD	0.037	0.026	1.345	1.363

Panel B: Correlation Matrix

	LEVE-RAGE	AGE-INCOR	SIZE	AV-PROFIT	GROWTH	RISK	ASSETS	TX-SHIELD
LEVERAGE	1.000							
AGEINCOR	-0.425	1.000						
SIZE	0.602	-0.202	1.000					
AVPROFIT	0.119	-0.529	-0.008	1.000				
GROWTH	0.062	-0.067	0.206	0.225	1.000			
RISK	0.054	0.063	0.008	-0.072	-0.080	1.000		
ASSETS	-0.455	0.171	-0.247	-0.090	0.122	-0.249	1.000	
TXSHIELD	0.200	-0.319	-0.120	0.381	-0.262	-0.065	-0.060	1.000

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Table 3

Results of panel procedure: RANDOM effects for 164 firm/year observations for 24 non-financial firms listed on the Stock Exchange of Mauritius, 1992-2000.

Panel A: Models 1-4 with AGEINCOR and SIZE, and with alternative measures for asset structure and for non-debt tax shield

Dependent: LEVERAGE **Model:**	**1**			**2**			**3**			**4**		
F test of A B=Ai B: F(23 133)	22.663 [.0000]			23.798 [.0000]			26.265 [.0000]			26.990 [.0000]		
THETA	0.034			0.032			0.029			0.028		
Adjusted R-squared	0.526			0.488			0.507			0.474		
LM het. Test	0.021 [.884]			2.082 [.149]			1.166 [.280]			5.022 [.025]		
Std. Error of regression	0.131			0.136			0.134			0.138		
Hausman test CHISQ(7)	4.362 [.7373]			5.631 [.5834]			3.399 [.8458]			3.194 [.8665]		
Variable	**Coefficient**	**t-statistic**	**P-value**	**Coefficient**	**t-statistic**	**P-value**	**Coefficient**	**t-statistic**	**P-value**	**Coefficient**	**t-statistic**	**P-value**
AGEINCOR	-0.002	-3.048	[.002]	-0.002	-3.135	[.002]	-0.002	-3.117	[.002]	-0.002	-3.179	[.001]
SIZE	0.059	4.306	[.000]	0.062	4.264	[.000]	0.066	4.706	[.000]	0.069	4.720	[.000]
AVPROFIT	-0.917	-4.250	[.000]	-0.913	-4.080	[.000]	-0.683	-3.029	[.002]	-0.659	-2.815	[.005]
GROWTH	0.130	2.946	[.003]	0.122	2.674	[.008]	0.107	2.528	[.011]	0.097	2.208	[.027]
RISK	0.066	0.472	[.637]	0.092	0.646	[.518]	0.104	0.763	[.445]	0.132	0.943	[.345]
ASSETS	-0.285	-4.112	[.000]				-0.267	-3.875	[.000]			
TANGIBLE				-0.206	-2.721	[.006]				-0.185	-2.472	[.013]
TXSHIELD	0.679	1.180	[.238]	0.734	1.241	[.215]						
TAX							0.248	2.969	[.003]	0.261	3.051	[.002]
C	-0.529	-1.762	[.078]	-0.597	-1.848	[.065]	-0.874	-2.693	[.007]	-0.976	-2.815	[.005]

Table 3

Results of panel procedure: RANDOM effects for 164 firm/year observations for 24 non-financial firms listed on the Stock Exchange of Mauritius, 1992-2000.

Panel B: Models 5-8 with AGEINCOR and SIZE2, and with alternative measures for asset structure and for non-debt tax shield

Dependent: LEVERAGE **Model:**	**5**			**6**			**7**			**8**		
F test of A B=Ai B: F(23 133)	23.176 [.0000]			24.632 [.0000]			28.026 [.0000]			28.693 [.0000]		
THETA	0.033			0.031			0.027			0.026		
Adjusted R-squared	0.539			0.482			0.467			0.414		
LM het. test	0.248 [.618]			2.021 [.155]			0.105 [.746]			1.994 [.158]		
Std. error of regression	0.129			0.137			0.140			0.146		
Hausman test CHISQ(7)	6.737 [.4568]			6.897 [.4397]			5.766 [.5673]			6.950 [.4342]		
Variable	**Coefficient**	**t-statistic**	**P-value**	**Coefficient**	**t-statistic**	**P-value**	**Coefficient**	**t-statistic**	**P-value**	**Coefficient**	**t-statistic**	**P-value**
AGEINCOR	-0.003	-4.045	[.000]	-0.003	-4.025	[.000]	-0.003	-4.036	[.000]	-0.003	-4.075	[.000]
SIZE2	0.073	5.150	[.000]	0.076	4.905	[.000]	0.064	4.508	[.000]	0.065	4.315	[.000]
AVPROFIT	-0.727	-3.328	[.001]	-0.703	-3.044	[.002]	-0.584	-2.516	[.012]	-0.554	-2.276	[.023]
GROWTH	0.104	2.353	[.019]	0.092	1.996	[.046]	0.085	1.930	[.054]	0.074	1.600	[.110]
RISK	0.077	0.561	[.574]	0.106	0.757	[.449]	0.101	0.743	[.457]	0.131	0.933	[.351]
ASSETS	-0.276	-4.084	[.000]				-0.280	-4.084	[.000]			
TANGIBLE				-0.173	-2.290	[.022]				-0.182	-2.401	[.016]
TXSHIELD	1.723	2.894	[.004]	1.791	2.903	[.004]						
TAX							0.212	2.561	[.010]	0.222	2.612	[.009]
C	-0.871	-2.739	[.006]	-0.960	-2.705	[.007]	-0.791	-2.475	[.013]	-0.867	-2.465	[.014]

Table 3

Results of panel procedure: RANDOM effects for 164 firm/year observations for 24 non-financial firms listed on the Stock Exchange of Mauritius, 1992-2000.

Panel C: Models 9-12 with AGELIST and SIZE, and with alternative measures for asset structure and for non-debt tax shield

Dependent: LEVERAGE **Model:**	**9**			**10**			**11**			**12**		
F test of A B=Ai B: F(23 133)	24.670 [.0000]			27.738 [.0000]			29.103 [.0000]			31.403 [.0000]		
THETA	0.031			0.027			0.026			0.024		
Adjusted R-squared	0.429			0.341			0.373			0.300		
LM het. test	5.650 [.017]			6.718 [.010]			13.510 [.000]			14.821 [.000]		
Std. error of regression	0.145			0.156			0.151			0.159		
Hausman test CHISQ(7)	14.471 [.0434]			13.796 [.0549]			14.754 [.0393]			12.581 [.0830]		
Variable	**Coefficient**	**t-statistic**	**P-value**	**Coefficient**	**t-statistic**	**P-value**	**Coefficient**	**t-statistic**	**P-value**	**Coefficient**	**t-statistic**	**P-value**
AGELIST	-0.002	-0.608	[.543]	0.000	-0.090	[.929]	-0.002	-0.760	[.447]	-0.001	-0.268	[.788]
SIZE	0.065	4.058	[.000]	0.064	3.812	[.000]	0.073	4.381	[.000]	0.073	4.224	[.000]
AVPROFIT	-0.788	-3.472	[.001]	-0.718	-3.008	[.003]	-0.561	-2.414	[.016]	-0.480	-1.975	[.048]
GROWTH	0.130	2.924	[.003]	0.117	2.569	[.010]	0.101	2.386	[.017]	0.088	2.017	[.044]
RISK	0.061	0.431	[.666]	0.103	0.713	[.476]	0.101	0.734	[.463]	0.143	1.011	[.312]
ASSETS	-0.287	-3.853	[.000]				-0.272	-3.669	[.000]			
TANGIBLE				-0.166	-2.002	[.045]				-0.151	-1.848	[.065]
TXSHIELD	0.949	1.645	[.100]	0.936	1.556	[.120]						
TAX							0.260	3.076	[.002]	0.268	3.096	[.002]
C	-0.733	-2.268	[.023]	-0.792	-2.303	[.021]	-1.105	-3.101	[.002]	-1.198	-3.196	[.001]

Table 3

Results of panel procedure: RANDOM effects for 164 firm/year observations for 24 non-financial firms listed on the Stock Exchange of Mauritius, 1992-2000.

Panel D: Models 13-16 with AGELIST and SIZE2, and with alternative measures for asset structure and for non-debt tax shield

Dependent: LEVERAGE **Model:**	**13**			**14**			**15**			**16**		
F test of A B=Ai B: F(23 133)	29.369 [.0000]			34.228 [.0000]			35.694 [.0000]			38.765 [.0000]		
THETA	0.026			0.022			0.021			0.020		
Adjusted R-squared	0.347			0.221			0.200			0.097		
LM het. test	6.034 [.014]			3.507 [.061]			1.549 [.213]			0.066 [.797]		
Std. error of regression	0.154			0.168			0.172			0.183		
Hausman test CHISQ(7)	18.453 [.0101]			15.618 [.0288]			19.928 [.0057]			17.939 [.0122]		
Variable	**Coefficient**	**t-statistic**	**P-value**	**Coefficient**	**t-statistic**	**P-value**	**Coefficient**	**t-statistic**	**P-value**	**Coefficient**	**t-statistic**	**P-value**
AGELIST	-0.005	-1.372	[.170]	-0.002	-0.608	[.543]	-0.001	-0.444	[.657]	0.001	0.246	[.806]
SIZE2	0.080	4.199	[.000]	0.076	3.647	[.000]	0.057	3.122	[.002]	0.053	2.747	[.006]
AVPROFIT	-0.641	-2.843	[.004]	-0.553	-2.304	[.021]	-0.466	-1.965	[.049]	-0.374	-1.492	[.136]
GROWTH	0.105	2.345	[.019]	0.093	1.974	[.048]	0.093	2.063	[.039]	0.083	1.748	[.080]
RISK	0.053	0.385	[.700]	0.103	0.724	[.469]	0.098	0.709	[.478]	0.144	1.018	[.309]
ASSETS	-0.301	-4.052	[.000]				-0.283	-3.741	[.000]			
TANGIBLE				-0.152	-1.818	[.069]				-0.138	-1.655	[.098]
TXSHIELD	2.109	3.244	[.001]	1.967	2.880	[.004]						
TAX							0.210	2.513	[.012]	0.212	2.469	[.014]
C	-1.105	-2.770	[.006]	-1.106	-2.507	[.012]	-0.768	-2.001	[.045]	-0.785	-1.896	[.058]

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Appendix Table A1
Variable definitions

Variable	Definition
LEVERAGE	The dependent variable: (Long term liabilities + Short term liabilities) / Total assets
AGEINCOR	Firm age: Number of years since the year of incorporation (YEAR – Year of incorporation)
AGELIST	Firm age: Number of years since the year of listing (YEAR - Year of listing)
SIZE	Firm size: Natural log of turnover
SIZE2	Firm size: Natural log of total assets
AVPROFIT	Firm profitability: Average of [(PROFIT,t),(PROFIT,t-1),(PROFIT,t-2)], where PROFIT for year t is defined as PROFIT,t = Profit Before Interest & Exceptional Items / Total assets
GROWTH	Rate of annual growth in assets over current and past 2 years. Defined as: [(TOTAL ASSETS t) / (TOTAL ASSETS t-2)]^{½} –1
RISK	Volatility of earnings: The mean of the absolute values of the residuals obtained from yearly regressions for each firm, i, of the form: Natural Log of (Daily adj. Price) on a constant and time. The price regressions were run for each of the 24 firms in each of the 9 years from 1992 to 2000. However, only 192 regressions were run because in 24 firm/year cases no daily price data was available. These 24 cases include: 10 firms in 1992; 7 firms in 1993; 5 firms in 1994; 2 firms in 1995. For the 192 regressions, the number of daily price observations per regression varies from 10 (one firm in 1994) to 250 (all firms in 1999). The average number of observations per regression is 147 and the median is 146. Finally, as the year 2000 was not over when the data was collected, the number of observations for each of the 24 regressions for the year 2000, is 26.
ASSETS	Asset structure: Fixed assets / Total assets
TANGIBLE	Asset structure: (Inventory + Fixed assets) / Total assets
TXSHIELD	Non-debt tax shield: Depreciation / Total assets
TAX	Non-debt tax shield: (Total expenses – Interest) / Turnover

Appendix Table A2

Means for 24 non-financial firms listed on the Stock Exchange of Mauritius, 1992-2000 (Unbalanced data: minimum time periods per firm = 4 years; maximum time periods per firm = 9 years; total firm/year observations = 164)

Firmid	COMPANY NAME	LEVE-RAGE	AGE-INCOR	SIZE	AV-PROFIT	GROWTH	RISK	ASSETS	TX-SHIELD
	Commerce								
1	CMPL	0.215	22.5	18.704	0.030	0.022	0.068	0.822	0.031
2	COURTS (MAURITIUS) LTD	0.430	12.0	20.339	0.125	0.183	0.101	0.167	0.012
3	HAPPY WORLD FOODS LTD	0.392	24.5	20.714	0.116	0.267	0.044	0.542	0.032
4	HAREL MALLAC & CO. LTD	0.407	39.5	20.035	0.105	0.124	0.068	0.358	0.035
5	IRELAND BLYTH LTD	0.570	25.0	21.991	0.062	0.125	0.067	0.391	0.037
6	ROGERS & COMPANY LTD	0.681	47.5	22.643	0.085	0.146	0.092	0.555	0.031
7	SHELL MAURITIUS LTD	0.610	6.0	21.354	0.125	0.057	0.053	0.451	0.051
	Industry								
8	GAMMA-CIVIC LTD	0.621	36.0	20.084	0.098	0.238	0.069	0.484	0.063
9	MAURITIUS BREWERIES LTD	0.187	36.0	20.254	0.133	0.191	0.062	0.724	0.055
10	MCFI (Mauritius Chemical & Fertilizer Industry Ltd)	0.285	20.5	20.070	0.071	0.077	0.042	0.486	0.042
11	MAURITIUS OIL REFINERIES LTD (MOROIL)	0.305	27.0	19.586	0.091	0.139	0.057	0.634	0.038
12	MAURITIUS STATIONERY LTD	0.442	29.5	18.910	0.114	0.109	0.044	0.623	0.043
13	PLASTIC INDUSTRY (MTIUS) LTD	0.576	25.0	17.764	0.119	0.044	0.065	0.469	0.081
14	THE UNITED BASALT PRODUCTS LTD	0.366	42.5	19.952	0.141	0.088	0.060	0.517	0.090
	Leisure & hotels								
15	AUTOMATIC SYSTEMS LTD	0.283	5.5	19.664	0.163	0.053	0.044	0.793	0.110
16	GRAND BAIE HOTEL LTD	0.271	16.0	19.146	0.216	0.299	0.035	0.911	0.019
17	NEW MAURITIUS HOTELS LTD	0.418	33.5	21.029	0.098	0.269	0.037	0.911	0.021
18	SUN RESORTS LTD	0.412	13.0	21.028	0.104	0.228	0.039	0.859	0.018
	Sugar								
19	HAREL FRERES LTD	0.290	35.5	20.404	0.049	0.159	0.053	0.780	0.024
20	MON DESERT ALMA LTD	0.187	168.5	19.477	0.006	0.062	0.064	0.741	0.019
21	MON TRESOR & MON DESERT LTD	0.115	69.5	19.811	0.119	0.298	0.056	0.686	0.016
22	SAVANNAH SUGAR ESTATES LTD	0.150	113.0	19.473	0.045	0.101	0.058	0.602	0.017
23	THE MOUNT SUGAR ESTATES LTD	0.070	82.5	18.682	0.040	0.126	0.078	0.693	0.011
	Transport								
24	AIR MAURITIUS LTD	0.705	30.5	22.480	0.060	0.186	0.043	0.467	0.024