On the dynamic relation between Stock Market Development and Capital Structure of Firms: Evidence from a developing country

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-ABSTRACT-

This paper attempts to empirically investigate the link between stock market development and firms' capital structure, an often overlooked relationship in finance theory, for the case of 38 firms listed on a small and relatively young stock exchange, namely that of the Stock Exchange Mauritius (SEM) for the period 1994-2006. To deal with the largely ignored issue of dynamics in such a relation, the paper uses dynamic panel data approach as well. Results from the panel estimates suggest that further development of the market has been associated with debt financing for non financial firms while this is not the case for financial firms which have been substituting equity for debts. An overall positive relationship between the size of the banking sector and leverage exists as well. The other major determinants of capital structure in Mauritius are reported to be profitability, size, tangibility and liquidity and other factors such as business risk, growth opportunities while Non Debt Tax Shield do not seem to have any significant impact on capital structure. Dynamic panel data analysis confirms previous results on the overall and interestingly suggests the existence of a preferred leverage ratio with relatively low adjustment process.

Key Words: *Financial Markets, Capital Structure, Panel Data, Small Island Developing States***.**
JEL : C23, G32 G15, G20

I. INTRODUCTION

Capital structure has attracted a considerable number of empirical studies from the classical works of Taggart (1977) and Marsh (1982) to recent ones of Wald (1999), Bevan and Danbolt (2002, 2004) and Gaud et al. (2005). These works have been attempting to test various explanatory variables that explain capital structure of firms. Most of the finance literature assumed that profitability, size, growth opportunity, assets' structure, cost of financial distress, liquidity and tax shields were among the most important determinants. However another determinant of corporate financing choices that the literature has largely overlooked is the level of development of financial markets, especially equity markets as pointed out by Demirguc-Kunt and Maksimovic (1996) in their pioneering work on the hypothesis. Since then there have been some sparse attempts to analyse the relationship. In fact corporate finance theory suggests that corporations optimally structure their capital in an attempt to reduce the economic costs that result from taxes and from imperfections in financial markets. Development of financial markets will lead to changes in the comparative significance of different imperfections thus the issuance of specific securities may become more or less advantageous for certain categories of firms. Therefore there may be a relationship between financial market development and financing choices.

The few empirical studies on the hypothesized link that stock market development affects debt to equity ratios have so far been confined on cross country analysis and on developed economies cases (See Demirguc-Kunt and Maksimovic, 1996, Giannetti, 2003; Jõeveer, 2006). Little work has been done for developing countries cases (except Agarwal and Mohtadi, 2004) and none for small island developing states (SIDS) cases. Empirical evidences from the latter are expected to supplement the existing literature given the fact that such economies have different institutional structures and have specificities of their own as far as the financial markets and the economy in general are concerned. Indeed these economies used to rely heavily on financial intermediaries as a source of finance until lately and it is a fact that they have undergone substantial transformation during the previous decade as witnessed by their recent move towards the

privatization /free market, coupled with the widening and deepening of various financial markets including the capital market.

The article thus attempts to supplement the existing literature by providing additional evidences from the case of small island economy in transition namely Mauritius, on the association between the level of development of financial markets and the financing choices of the firm. Mauritius present an interesting case study as despite been one of the smallest country of the continent with a relatively small and young stock market, it remains one of the best performers of the Africa and where listed companies have been performing relative better as compared to those of other developing countries. Although relatively young and small, the stock market of the island has undergone a continued deepening and has slowly emerged as an important source of finance for the major firms, and thus providing an alternative to debt which has been the overwhelming finance source until recently. In fact, financial liberalization has changed the operating and institutional environment of firms in Mauritius and there has been more flexibility for the Mauritian financial managers in choosing the capital structure of the firm. Interestingly capital structure of major Mauritian firms has a specific different feature as well as there is evidence that Mauritian companies have less long term debt, less total liabilities compared to their counterparts in both developed countries and some large developing countries The study is built on data from firms listed on the Stock Exchange of Mauritius over the year 1994-2006.

Moreover, our analysis methodologically depart from most existing empirical works on developing economies which have largely ignored the fact that capital structure decisions are dynamic by nature and should be modeled as such. Indeed it is argued that if there is a target leverage ratio, then firms will likely take the appropriate steps to converge to such objective. It is noteworthy that even the few empirical works analyzing the stock market development- capital structure link (including Demirguc-Kunt and Maksimovic, 1996, Giannetti, 2003, Agarwal and Mohtadi, 2004 and Jõeveer, 2006 among others) have largely ignore such an important issue in their respective methodological framework. We also use recent dynamic panel data analysis, namely the Generalised Methods of

Moments (GMM) to address the above issues in the stock market development-capital structure modelling. Since there has been a lot of debate on the appropriateness of comparison the capital determinants with regards to firms in financial and non financial sectors, further analysis is also carried out by decoupling the panel set into financial and non financial sectors for more comparative insights.

The rest of the paper is organised as follows. In section two we provide a brief review of the debate and previous empirical studies. Section 3 provides a brief summary and discussion of the leverage position in Mauritius, Section 4 describes the research methodology, data collection and discusses the findings and the last section summarises the outcomes.

II. LITERATURE REVIEW

Theoretical Literature.

The finance literature suggests that stock markets are very important even in those economies in which a well-developed banking sector already exists. The reason usually advanced is that equity and debt financing are in general not perfect substitutes. In effect due to the conflicts of interest that may arise between different stakeholders in the firm equity financing, stock market may play a key role in the management of such conflicts. Stock markets provide entrepreneurs with liquidity and with opportunities to diversify their portfolios as well. Stock trading transmits information about the firm's prospects to potential investors and creditors (see Allen, 1993). As a result of the different attributes of debt and equity, the development of markets that facilitate the issuance and trade of equity should be reflected in the financing decisions of individual firms.

Demirguc-Kunt and Maksimovic (1996) provides a comprehensive (refer to Demirguc-Kunt and Maksimovic, 1996) theoretical review on the relationship. They considered three classes of imperfections that may result from inadequately developed financial markets namely that investors and entrepreneurs face insufficient opportunities for diversification of portfolios, that firms lack financing contracts appropriate for its

investment projects and that asymmetries of information between investors and the firm occur because stock markets do not efficiently aggregate information. They posited that generally a firm operating in an environment without a well developed equity market would be characterized by financing from inside equity, trade credit, and bank borrowing and the firm's initial debt-equity ratio will not be an economic optimum and limited access to equity markets suggests that such a firm is likely to have a sub-optimally high debt-equity ratio. With stock market development one would expect the firm's owners to move away from the initial debt-equity ratio and thus alter the financing decision.

The authors then further argued that three direct effects on a firm's capital structure might arise from more developed equity markets might result in. As outside equity is substituted for outside debt by firms that had previously been constrained to issue only debt, a substitution effect is likely to follow, thus decreasing the firm's debt equity ratio. Secondly, outside equity may also be substituted for inside equity resulting in no effect on the firm's capital structure. Furthermore expansion may be more attractive with increased firm's ability to diversify risks and the effect of such expansion on the firm's debt-equity ratio is ambiguous and will depend on the optimal financial structure of the firm. In addition, development of a stock market may also have an indirect effect on the firm's leverage as such markets aggregate information that investors possess about firms thus making monitoring cost less costly with a positive impact on external financing. It should be cautioned that it is not straightforward which of external equity or debts would increase more as both become less risky. 'To the extent that debt is provided by the product market and by banks, who are probably already well informed, we would expect to see a decrease in leverage as financial markets reduce the costs of monitoring to investors' argued Demirguc-Kunt and Maksimovic (1996). Moreover, they also warned that all of the above arguments are conditioned on the hypothesis that equity markets develop relative to the market for debt as otherwise the effects may be reversed.

Empirical studies.

Empirical studies on the debate have been particularly scarce and we review the few that we could find from an extensive literature search. Pioneering empirical work was

performed by Demirguc-Kunt and Maksimovic (1996) and they analyzed the effects of stock market development on firms' financing choices using aggregated firm-level data from thirty developing and industrial countries from 1980 to 1991. Taking all the countries in the sample together, they found that there was a statistically significant negative correlation between stock market development, as measured by market capitalization to GDP, and the ratios of both long-term and short-term debt to total equity of firms. A statistically significant positive relationship between the size of the banking sector and leverage was also observed. Further analysis showed that initial improvements in the functioning of a developing stock market produce a higher debt-equity ratio for firms and thus more business for banks. In stock markets that are already developed, further development leads to a substitution of equity for debt financing. Thus further development of stock markets may affect firms differently in economies where the markets already play a significant role than in those where they do not. One possible explanation of these results as suggested by the authors is that 'at early stages of stock market development, improvements in information quality, monitoring, and corporate control may be large enough to induce creditors to lend more. For these firms, debt and equity finance are complementary'. The authors also interestingly reported that in developing stock markets, large firms become more levered as the stock market develops, whereas small firms do not appear to be significantly affected by stock market development.

Giannetti (2003) also examined how firms' characteristics, legal rules and financial development affect financing decisions for firms. Using data on companies in 26 European countries for the period 1993-1997, she showed that firms are more leveraged in countries where the stock market is less developed. Moreover the author also reported that unlisted firms appear to be more indebted than listed companies even after controlling for firms characteristics such as profitability, size and the ability to provide collateral.

Agarwal and Mohtadi (2004) empirically explored the effects of financial market development on the financing choice of firms for a sample of 21 emerging markets from

1980-1997. They reported that stock market development was significantly and negatively associated with the firms debt levels relative to their equity position, while banking sector variables were significantly and positively associated with debt equity ratio. These results were the opposite of those from Demirguc-Kunt and Maksimovic (1996).

More recently Jõeveer (2006) evaluated the importance of firm-specific, country institutional and macroeconomic factors in explaining changes in capital structure. The analysis was based on firm-level data from nine Eastern European countries over the period 1995–2002. The author found that the largest share of listed firm leverage variation is explained by industry factors. The unquantifiable country institutional factors explain less than 10% of leverage variation. Particularly, a negative coefficient of stock market development was obtained confirming results from the work of Demirguc-Kunt and Maksimovic (1996).

A summary of the literature review reveals that little work has been done to enhance our knowledge of the determinants of capital structure, particularly with respect to stock market development, within developing countries that have different institutional structures. To the best of our knowledge none is available for the case of small island developing economies. Given the specificities of the financial markets and the economy in general in these economies and coupled with the fact that they have relatively 'young' stock markets and underwent substantial transformation during the previous decade, empirical evidences from the latter are expected to yield important insights on the debate and to supplement the existing literature.

III Leverage Position in Mauritius

The table below provides a summary data on the distribution of two capital structure ratios namely Total Liabilities ratio and Long term debt ratio across 11 largest developing countries[1] as compared to a small developing economy like Mauritius. The comparison is

[1] The data on the distribution of the two capital structure ratios namely Total Liabilities ratio and Long term debt ratio for the 10 developing countries (excluding China) and G-7 countries were obtained from Booth

also extended against G-7 countries. From the table below it can be observed that the capital structure of Mauritian companies has a specific different feature and is worthwhile investigating to supplement the literature. Although the practice of the General Accepted Accounting Principles (GAAP) varies across the world and a rigorous comparison in capital structure across countries is impossible, we have clear evidence that Mauritian companies have less long term debt, less total liabilities compared to their counterparts in both developed countries (e.g U.S.A, Japan, Germany, France, Italy, UK, and Canada) and some large developing countries (e.g India, China Pakistan, South Korea and Turkey). In fact, the total liabilities ratio of the Mauritian listed firms is 39% while the same ratios for G-7 countries are from 54% to 73 %. Similarly, the long term debt ratio for Mauritian firms is 24% while the same ratios for G-7 countries are from 28% to 53 %.

Why do Mauritian firms have much lower long term debt or total liability ratio? One possible explanation is the fact that Mauritian debt market is still in an infant stage of development. Banks are the major or even can be said to be the only source of firms' external debt. As a result, firms have to rely on trade credit, where firms owe each other in the form of accounts payable and other sources of finance. Moreover, the bank lending rates in Mauritius are indeed very high as compared to other countries and thus can explain another reason for firms in Mauritius to have lower level of debt ratio in view of the high cost of borrowing.

Figure two in the Appendix below shows the level of the average total liabilities and long term debt of all the 38 Mauritian listed firms for the period 1994 to 2004. It can be noted that the level of total liabilities and long term debt follow an upward trend but they are nevertheless lower on average as compared to many other countries.

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et al. (2001). The data on Total Liabilities ratio and Long term debt ratio for China was reported by Huang and Song (2005).

Table 1- The extent of leverage in Mauritius and some other countries

COUNTRY	No. of Firms	Time period	Total liabilities ratio (%)	Long term debt ratio (%)
Mauritius	38	1994-2004	39	24
China	1216	2003	51	25
Brazil	49	1985-1991 1985-1987	30.3 30.7	9.7 8.4
Mexico	99	1984-1990 1985-1987	34.7 35.4	13.8 15.6
India	99	1980-1990 1985-1987	67.1 66.1	34.0 35.7
South Korea	93	1980-1990 1985-1987	73.4 72.8	49.4 50.3
Jordan	38	1983-1990 1985-1987	47.0 44.7	11.5 10.9
Malaysia	96	1980-1990 1985-1987	41.8 40.9	13.1 13.1
Pakistan	96	1980-1987 1985-1987	65.6 65.2	26.0 32.5
Thailand	64	1980-1990 1985-1987	49.4 50.9	n/a n/a
Turkey	45	1980-1990 1985-1987	59.1 61.8	24.2 24.5
Zimbabwe	48	1980-1988 1985-1987	41.5 40.3	13.0 11.4
United States	2,580	1991	58	37
Japan	514	1991	69	53
Germany	191	1991	73	38
France	225	1991	71	48
Italy	118	1991	70	47
United Kingdom	608	1991	54	28
Canada	318	1991	56	39

n/a: Not Available

-The relevant values for Brazil, Mexico, India, South Korea, Jordan, Malaysia, Pakistan, Thailand, Turkey, Zimbabwe, US, Japan, German, France, Italy, UK and Canada are from Booth at al. (2001).
-The relevant value for China is from Huang and Song (2005).

IV.RESEARCH METHODOLOGY

Economic model and Econometric Specification.

Our economic model is largely derived from previous empirical literature on the determinants of capital structure (as given in Table 1 below) and we follow Demirguc-Kunt and Maksimovic (1996) by extending a classical function to include indicators of both banking and stock market development. Our work is different though from the above authors in that we study a transitional developing country's case and also accounts for the possibility of endogeniety in the modeling The panel set is also split into non-financial and financial firms for more insights. We thus posit that leverage can be explained by the following determinants.

LEVERAGE= *f* (*Profitability, Size, Tangibility, Growth Opportunities, Business Risk, Tax Shields Effects, Liquidity, Stock Market Development, Banking Development*) (1)

The econometric model of equation 1 is specified as follows:

$LEVER = \alpha + \beta_1 ROA + \beta_2 LNSALE + \beta_3 TANG + \beta_4 GROWTH + \beta_5 RISK + \beta_6 NDTS + \beta_7 LIQ + + \beta_8 STOCK + \beta_9 BANK +$ *error* (2)

The independent variables are the proxies used for the determinants and are defined in Table 2 below. The study employs the Book Total Liabilities Ratio as the measure of leverage (LEVER). This has been extensively used in the literature and recently by Booth et al. (2001) and Huang and Song (2005). It is defined as total liabilities divided by total liabilities plus book value of equity. Book Total Liabilities Ratio is believed to be appropriate for this study because firstly because if the strong theoretical support in the local context. In fact when a firm wants to obtain more debt, the creditors consider not only how much the firm's long term debt is, but also how much the firm's current debt and total liabilities are. So, the portion of other liabilities also affects the debt capacity of

a firm. Secondly, many companies in Mauritius use trade credit as a means of financing, so accounts payable should also be included in the measure of leverage. Lastly, it is true that trade credit does not provide tax shield. We also use book Long Term Debt Ratio, though we do not report the results, defined as total liabilities less current liabilities divided by total liabilities less current liabilities plus book value of equity, as a measure of leverage (LEVER) for robustness checks.

STOCK is the variable of interest to the study and measures stock market development. It is proxied by an equally weighted index composed of the following widely used indicators (see Pagano 1993, Demirguc-Kunt and Maksimovic, 1996; Demirgüç-Kunt and Levine, 1996; Levine and Zervos, 1996, 1998 and Jõeveer, 2006 among others) namely 1) the market capitalisation ratio, which equals the value of listed shares divided by GDP. The assumption behind this measure is that overall market size is positively correlated with the ability to mobilize capital and diversify risk on an economy-wide basis, 2) Total Value of Shares Traded Ratio, the value traded ratio, which equals the total value of shares traded on the stock exchange divided by GDP. This ratio measures the organized trading of firm equity as a share of national output and therefore should positively reflect liquidity on an economy-wide basis. The total-value-traded ratio complements the market capitalisation ratio: although a market may be large, there may be little trading. 3) Turnover Ratio**:** This ratio equals the value of total shares traded divided by market capitalization. Even if it is not a direct measure of theoretical definitions of liquidity, high turnover is often used as an indicator of low transaction costs. The turnover ratio complements both the market capitalisation ratio and the total value traded ratio. Indeed a large but inactive market will have a large market capitalization ratio but a small turnover ratio. In addition the total-value-traded ratio captures trading relative to the size of the economy, turnover measures trading relative to the size of the stock market. A small liquid market will have a high turnover ratio but a small total value traded ratio. The index (STOCK) was constructed from data obtained from the Stock Exchange of Mauritius and the IFS as well.

The Banking development indicator (BANK) is also measured by an index composed as the average of two widely used measures in the literature (see McKinnon, 1973; King and Levine 1993a; Demirguc-Kunt and Maksimovic, 1996 and Levine and Zervos, 1996) namely ratio of bank's liquid liabilities to GDP and also the ratio of private credit to GDP. The ratio of banks' liquid liabilities (the M3 money supply) to GDP is an indicator of the size of the banking sector in relation to the economy as a whole. This indicator has been used in several studies of the effect of the financial sector on the growth of the economy. The value of credits by financial intermediaries to the private sector divided by GDP is a measure of financial development and is more than a simple measure of financial sector size. It measure isolates credit issued to the private sector, as opposed to credit issued to governments, government agencies, and public enterprises. Furthermore, it excludes credits issued by the central bank. This measure has been used extensively as an indicator because it improves on other measures of financial development (Levine et al, 2000). Higher levels of such ratio are interpreted as higher levels of financing services and therefore greater financial intermediary development. This is a typical measure has been widely used. The data used to construct the indicators are drawn from IMF (various issues).

Error is the random error term. All variables are measured in book values and not market values because of data limitation and all series are in logarithm terms.

Table 2 provides a summary of the other independent variables used as proxies for the determinants of capital structure (as per equation 1), the definition of the measurement of those variables, the predicted theoretical signs of their coefficients and lastly the associated studies where they have been used.

Table 2- Independent variables and definitions

Determinants *(Abbreviation)*	**Definitions**	**Theoretical Predicted Signs**	**Related Empirical Literature**
PROFITABILITY *(ROA)*	Percentage of pre-tax profit divided by total assets	+/-	Kester (1986) Friend and Lang (1988) Titman and Wessels (1988), Rajan an Zingales (1995), Wald (1999), Wiwatta nakantang (1999), Booth et al. (2001)

			Deesomsak, Paudyal and Pescetto(2004
SIZE ***(LNSALE)***	Natural logarithm of Sales	+/-	Marsh (1982), Kester (1986), Rajan an Zingales (1995), Wald (1999), Booth et al. (2001).
TANGIBILITY ***(TANG)***	Fixed Assets divided by Total Assets	+	Marsh (1982), Friend and Lang (1988) Harris and Raviv (1990), Rajan and Zin gales(1995),Wiwattanakantang(1999), Hirota (1999), Wald (1999), Booth et a (2001), Bevan and Danbolt (2002), Dee somsak, Paudyal and Pescetto (2004) Chen (2004).
GROWTH OPPORTUNITIES ***(GROWTH)***	Growth of Total Assets (due to the absence of R&D and advertising expenditure data)[2]	+/-	Kester (1986), Rajan & Zingales (1995) , Kim and Sorensen (1996), Wald(1999) ,Ozkan (2001), Booth et al. (2001) Cassar & Holmes (2003), Chen (2004).
BUSINESS RISK/VOLATILITY ***(RISK)***	Absolute value of the variation in ROA[3]	-	Marsh (1982), Bradley, Jarell and Kim (1984), Titman and Wessels (1988) Chaplinsky and Niehaus (1993), Jung Kim and Stultz (1996), Booth et a (2001), Cassar and Holmes (2003) Wald (1999), Chen (2004).
TAX SHIELD EFFECTS ***(NDTS)***	Net Profit before tax less (Corporate tax payments divided by corporate tax rate of 25%*)[4]	-	Bardley, Jarrel and Kim (1984), Harri and Raviv (1990) ,Chaplinsky an Niehaus (1993) Wald (1999), Hirot (1999)
LIQUIDITY ***(LIQ)***	Ratio of current assets to current liabilities	-	Rajan and Zingales (1995), Wal (1999), Ozkan (2001), Panno (2003) Deesomsak, Pandyal and Pescett (2004).

* The tax rate used is 25% which is the prevailing corporate tax rate applicable to Mauritian firms in the last decade.
"+" means that leverage increases with the factor; "-"means that leverage decreases with the factor; and "+/- " means that positive and negative relationships between the factor are possible theoretically.

Data

The study uses data (except for the construction of the stock market and banking development proxies) for the period 1994 to 2006 from the Handbook annually published by the Stock Exchange of Mauritius (SEM). The Handbook provides detailed reports of the income statement and balance sheet for the past five years along with relevant statistics of all the Mauritian listed companies. Initially we chose all 40 companies currently quoted on SEM. However, given that the accounting information for firms is

[2] See Titman and Wessels (1988).
[3] See Chen (2004).
[4] See Titman and Wessels (1988) and Hirota (1999).

different from the other remaining 38 listed companies and in an attempt to be consistent as far as data is concerned, these two firms were excluded from our final sample. We closed on a panel of 38 listed firms over a 13-year time series giving a total number of observations of 418. The analysis will be undertaken for the case of the aggregate panel consisting of all the 38 listed firms and subsequently for two sub panels namely comprising of non financial firms and financial firms to investigate the possibility that stock markets may have different effects on firms' financing decision for these two sectors.

EMPIRICAL ANALYSIS

Correlation Analysis

Table 3 in Appendix presents Pearson correlation coefficients for the variables used to assess the determinants of capital structure measured by leverage variable Total liabilities ratio. It is observed that the dominant correlation values between the stock market variables (equity) and leverage is positive and same is observed the banking variables and leverage case. The simple correlations between debt and the level of development of the stock market and the banking sector suggest that equity is a complement. Leverage is also negatively correlated with profitability, tangibility, business risk (volatility of earnings) and liquidity. Except for tangibility where a positive relationship was expected, the other variables support the theory and give the expected results. For the remaining three determinants of capital structure, only the variable non-debt tax shields is not supportive of the trade-off theory. This is, however, in line with the findings of Harris and Raviv (1984) study. This positive relation for growth opportunities and business size is consistent with the pecking order theory and trade-off theory respectively.

However, care must be exercised while interpreting the Pearson Correlation coefficients because they cannot provide a reliable indicator of association in a manner which controls for additional explanatory variables. Examining simple bi-variate correlation in a conventional matrix does not take account of each variable's correlation with all other

explanatory variables. Our main analysis will be derived from appropriate multivariate models, estimated using regression analysis.

Panel Unit Root Test

A central issue before making the appropriate specification, often ignored by past researchers, is to test if the variables are stationary or not. We thus carry out panel unit root tests on the dependent and independent variables. We follow the approach of Im, Pesaran, and Shin (IPS) (1995), who developed a panel unit root test for the joint null hypothesis that every time series in the panel is non stationary. This approach is based on the average of individual series ADF test and has a standard normal distribution once adjusted in a particular manner. Assuming that the cross-sections are independent, IPS propose to use the following standardized *t*-bar statistic .The IPS panel unit root test

$$y_{\bar{t}} = \frac{\sqrt{N}\left\{ \bar{t}_{NT} - \frac{1}{N}\sum_{i=1}^{N} E\left[t_{iT}(p_i,0)\right] \right\}}{\sqrt{\frac{1}{N}\sum_{i=1}^{N} Var[t_{iT}(p_i,0)]}}$$

N is the number of panels, $\bar{t}_{NT}$ is the average of the ADF test for each series across the panel. The values for $E[t_{iT}(p_i,0)]$ and $Var[t_{it}(p_i,0)]$ are obtained from the Monte Carlo simulations. The standardized *t*-bar statistic $\Psi_{\bar{t}}$ converge weakly to a standard normal distribution as N and T $\rightarrow \infty$. The panel unit root inference is conducted by comparing the obtained Ψ statistic to critical values from the lower tail of the $N(0,1)$ distribution.

Results of this test applied on our time series in levels are reported in table 4 below. In every case we reject a unit root in favor of stationarity (the results were also confirmed by the Fisher-ADF and Fisher-PP panel unit root tests) at the 5 percent significance level and it is deemed safe to continue with the panel data estimates of the above econometric specification (equation 2). Similar results have been obtained for the same of the two sub samples.

Table 4: Panel unit root tests on levels of variables.

Variables	IPS Statistics
LEVER	*-5.34*
ROA	*-4.33*
LNSALE	*-5.12*
TANG	*-5.63*
GROWTH	*-4.12*
RISK	*-5.12*
NDTS	*-4.64*
LIQ	*-4.23*
STOCK	*-5.23*
BANK	*-5.23*

Variables are in natural logarithmic forms.The test statistic, calculated as the difference between the average *t*-value and the expected value, and adjusted for the variance, has a N (0,1) distribution under the null of non-stationarity, with large negative values indicating stationarity (Canning ,1999).

Regression Analysis

In this section we use both static and dynamic (Generalised Methods of Moments) techniques to identify and compare the determinants of capital structure, focusing on stock market development, in the country. However we start by reporting some the main results from preliminary studies based on cross section (averaged over the sample period 1995-2006) and pooled OLS estimates (containing countries and year dummies).

Cross sectional results from preliminary analysis for the aggregate case shows a positive coefficient estimated for the stock market development (STOCK) and indicates that firm leverage increases with a marginal development in stock markets. This might be an indication that firms tend to take more debt relative to equity and means that there banks and stock market have been complementary. Disaggregated panel estimates a priori reveal that this is particularly true for non financial firms whereas financial firms are observed to behave contrarily as witnessed by their negative sign of the STOCK variable. These firms may have substituted equity financing for debts. The positive coefficient of BANK confirms that more development in this sector has been generally accompanied by more debt financing though this appears different for financial firms. The other determinants are observed to have the correct signs and significance in general. Pooled

OLS analysis also tends to confirm the above results. We do not infer more insights from the above analysis as the limitations of using a single-equation OLS cross sectional regression model and pooled OLS are known[5] (see Kennedy 2003). The paper still reported the results for comparative purposes and to get a broad overview the above estimates.

Table 5:Cross-Country and Pooled OLS estimates

Dependent variable LEVER

	Cross Section estimates			**Pooled OLS estimates**		
Variable	***Aggregate sample***	***Non financial Firms***	***Financial firms***	***Aggregate sample***	***Non financial firms***	***Financial firms***
Constant	*-0.91*	*-0.57*	*-0.14*	*-0.64*	*-0.64*	*-0.67*
	*(-4.04)****	*(-1.04)*	*(0.05)*	*(-3.53)****	*(-2.31)***	*(-1.92)***
ROA	*-0.13*	*-0.0067*	*-0.015*	*-0.12*	*-0.0094*	*-0.013*
	*(-1.68)**	*(-1.15)*	*(- 0.23)*	*(-6.82)****	*(-5.23)****	*(-2.64)***
LNSALE	*0.26*	*0.24*	*0.23*	*0.23*	*-0.24*	*0.34*
	*(5.65)****	*(2.45)***	*(1.78)**	*(18.5)****	*(-10.3)****	*(10.4)****
TANG	*-0.36*	*-0.323*	*-0.16*	*-0.36*	*-0.35*	*-0.24*
	*(-3.06)***	*(-1.6)****	*(-1.98)**	*(-11.2)****	*(-8.23)****	*(-1.82)**
GROWTH	*0.034*	*-0.0006*	*0.003*	*0.006*	*0.00004*	*-0.0003*
	*(1.88)**	*(-0.25)*	*(0.75)*	*(2.14)***	*(0.11)*	*(-1.24)*
RISK	*0.0013*	*-0.0012*	*-0.001*	*-0.0005*	*0.0013*	*-0.0013*
	(1.54)	*(-1.65)**	*(-0.23)*	*(-4.21)****	*(5.32)****	*-(2.54)****
NDTS	*-7.13e-08*	*1..03e-07*	*1.09e-06*	*1.03e-0.7*	*-7.13e-08*	*-4.51e-07*
	-(0.44)	*(0.67)*	*(0.45)*	*(1.23)*	*(1.00)*	*(1.11)*
LIQ	*-0.00732*	*-0.023*	*-0.0014*	*-0.04*	*-0.04*	*-0.0013*
	(-0.95)	*(-1.77)**	*(-0.078)*	*(-3.13)*	*(-7.61)****	*(-0.94)*
STOCK	*0.24*	*0.25*	*-0.14*	*0.26*	*0.33*	*-0.144*
	*(2.55)***	*(1.98)**	*-(2.11)**	*(2.13)**	*(1.93)**	*-(1.12)*
BANK	*0.13*	*0.25*	*0.04*	*0.15*	*0.15*	*-0.184*
	*(1.85)**	*(1.88)**	*(0.05)*	*(0.66)*	*(2.34)***	*-(1.65)**
R^2	*0.66*	*0.54*	*0.44*	*0.54*	*0.54*	*0.64*

[5] In fact the most serious limitations being that simple cross section may produce biased and inconsistent estimates since they may not take into consideration the endogeneity of some of the regressors. It ignores dynamics and throws away information (Attanasio et al., 2000) and may suffer from omitted variable bias.

*significant at 10%, ** significant at 5%, ***significant at 1%.
The small letters denotes variables in natural logarithmic.
The quantities in brackets are the heteroskedasticity robust t-values.
No serial correlation was detected according to Bhargava, Franzini and Narendranathan (BFN) (1982).
Year and Countries dummies are not reported in the table for the case of pooled OLS.

Panel Estimates

Use of panel data allows not only to investigate dynamic relations, but also to control for unobserved cross country heterogeneity. With panel data, the issue is to determine which of the fixed or random panel technique is more appropriate to estimate our model. The Hausman specification test is employed to test the fixed effects model versus the random effect model in each of the above panel sets. Results of the Hausman Test and model selection are shown in table below and favor fixed effects estimates for the aggregate set and random effects for the two sub panels. The estimates reported are the robust estimates and have been corrected for heteroscedasticity where required.

Table 6: Panel data estimates

Dependent variable LEVER

Variable	***Aggregate sample***	***Non financial Firms***	***Financial firms***
	Fixed effects	*Random Effects*	*Random Effects*
Constant	*-0.16*	*-0.18*	*-0.44*
	(-0.74)	*(-0.632)*	*(-1.23)*
ROA	*-0.04*	*-0.06*	*-0.013*
	*(-6.23)****	*(-10.1)****	*(-2.43)****
LNSALE	*0.08*	*0.154*	*0.734*
	*(1.85)**	*(5.12)****	*(2.44)****
TANG	*-0.35*	*-0.421*	*-0.16*
	*(-2.12)***	*(-3.23)****	*(-2.24)***
GROWTH	*0.00024*	*-0.00002*	*0.0002*
	*(3.34)****	*(-0.13)*	*(2.34)***

RISK	*0.0002*	*0.0007*	*-0.004*
	(0.35)	*(2.53)***	*(-1.23)*
NDTS	*1.63e-0.7*	*4.46e-0.8*	*4.71e-07*
	(1.32)	*(1.05)*	*(1.16)*
LIQ	*-0.0033*	*-0.04*	*-0.02*
	*-(2.34)***	*(-5.34)****	*(-2.13)***
STOCK	*0.26*	*0.343*	*-0.16*
	*(2.33)***	*(2.12)***	*(-2.43)***
BANK	*0.15*	*0.25*	*-0.04*
	*(2.15)***	*(1.87)**	*(-0.23)*
R^2	*0.41*	*0.65*	*0.65*
Hausman Test	*Prob>Chi2=0.003*	*Prob>Chi2=0.9707*	*Prob>chi2=0.532*

Table 6 reports a positive coefficient of stock market development index, except for financial firms where a negative and significant relationship is obtained. The results are to a large extent similar to the preliminary analysis. The positive coefficient suggests that further development of the market has been associated with debt financing and that it may have led to opportunities for risk sharing and for aggregation of information that allowed firms to increase their borrowing. These results are consistent with those of Demirguc-Kunt and Maksimovic (1996) for the case of developing stock market similar ours. The authors also reported that for the case of developed markets further stock market development in fact led to a substitution of equity financing for debt so that the stage of stock market development matters indeed. Our results are however different from those of Agarwal and Mohtadi (2004) for the case of developing economies, at least for the case of non financial firms. Interestingly it is observed that a positive relationship exists for financial firms and the latter have been substituting equity for debts as the stock market have been developing. This might be because of the larger risks associated with financial businesses and the need to be well capitalised. Indeed this is obvious as it can seen that lately most of the new firms on stock market or new issue of shares on the SEM have been from financial firms. It should be noted that the banking variable is also

associated with a rise in the debt/equity ratio but is insignificant for the case of financial firms.

The other determinants of capital structure of the country have generally their predictive signs and significance and are consistent with findings from recent literature Rajan and Zingales (1995), Wald (1999) and Booth et al. (2001) among others. For instance the relationship between profitability and leverage is negative and postulates that profitability is an important determinant of leverage and evidence emerges that profitability of firms exert a negative influence on firms' borrowing decisions in Mauritius. This is consistent with the pecking order theory that predicts a preference for internal finance rather than other external finance. This also confirms that the tax advantage of debt financing does not have much relevance in Mauritius. Firm size has a positive significant impact on leverage for all financial and non-financial firms in Mauritius. This result is in line with the trade-off and agency theories, confirming that larger firms tend to have better borrowing capacity relative to smaller firms. This evidence may reflect several features. First, larger Mauritian firms may have better access to financial markets to raise long term debts. Second, the ratio to the bankruptcy costs to the firm value in Mauritius may be higher for smaller firms since these costs include fixed costs, which can be negligible for larger firms. Tangibility tends to be associated with decreases in debt ratio. This implies that a firm with more tangible asset will use less of debt. This observation also implies that less can be borrowed against long term assets in Mauritius. The relationship between tangibility and leverage in Mauritius is inconsistent with the findings of Rajan and Zingales (1995), Wiwattanakantang (1999), Hirota (1999) and Chen (2004) but consistent with prior findings of Booth et al. (2001) and Bevan and Danbolt (2002). The negative association may reflect the fact that debt may not more readily be available to a firm which has high amounts of collateral upon which to secure debt. Another plausible explanation for this negative association can be because agency problem that arises from the tendency of a firm's manager to consume more than the optimal level of perks, which reduces the value of a firm. The Mauritian firms may be using a high debt level as a

monitoring instrument to mitigate this problem[6]**.** Growth in total assets, used to measure a firm's growth opportunity, has a coefficient of growth which is insignificant. Though this may be inconsistent with the agency cost hypothesis these results indicate that growth opportunities add value to the firm and hence increase its long term debt taking capacity. The relationship between business risk/volatility and total liabilities and long term debt ratios respectively is mixed for non-financial and financial firms. NDTS have positive but insignificant coefficient for all panel sets and is thus not an important determinant of capital structure in Mauritius. Liquidity has a negative and significant relationship with leverage for Mauritian firms and the findings are in line with the view that liquidity of firms exerts a significant negative impact on firms borrowing decisions and also supports the pecking order theory.

On the overall results on the determinants for LTD are almost similar to TOTLIAB although in some cases a little weaker. Capital structure model in Mauritius does seem to have predictive power. This partially answers the central question of whether the factors that influence capital structure choices in other developed and developing countries have similar effects in Mauritius. In this section, we discuss on each of the determinants used for analysis.

Disaggregated industry (financial and non financial) level analysis suggests that there does not seem to be any significant intra industry differences in the other determinants affecting capital structure in the non financial sector. Profitability, size, tangibility and liquidity are the major firm specific factors influencing leverage. Risk, growth opportunity and NDTS have no impact on leverage.

[6] Grossman and Hart (1982) argued firms with less collaterised assets are more vulnerable to such agency costs since monitoring the capital outlays is more difficult for such firms. Therefore, a negative association can be expected between leverage and collaterisable assets.

Dynamic Panel Data Estimates

We also examine the robustness of the results and their sensitivity to model selection particularly with respect to the inclusion of panel dynamic considerations. In fact the possibility of endogeneity of the explanatory variables and thus the loss of dynamic information might still exist even in panel data framework. Indeed capital structure decisions are dynamic by nature and should be modeled as such. If there is a target leverage ratio, then firms should take the appropriate steps to reach this objective (see Gaud et al, 2005).

Following the above argument and incorporating transaction costs that arise with the adjustment process, we can write the following model

$$LEVER_{it} - LEVER_{it-1} = l\,(LEVER^{*}_{it} - LEVER_{t-1}) \qquad \textbf{(3)}$$

The above equation is showing the adjustment process of firm i in period t to its preferred debt to equity ratio, $LEVER^{*}_{it}$.

The coefficient λ shows of speed of adjustment in the system and is between 0 and 1. It is argued to be inversely related to adjustment costs. In fact from equation 3 if $\lambda = 0$, then there is no move toward the preferred debt ratio ($LEVER_{it} = LEVER_{it}$) maybe because of the high adjustment costs. In contrast when $\lambda = 1$, it suggests that there is virtually no adjustment cost and thus fast and frictionless adjustment towards the preferred leverage ratio ($LEVER_{it} = LEVER^{*}_{it}$)

The latter can be estimated by the following equation

$$LEVER^{*}_{it} = a_{t} + bx_{it} + m_{it} \qquad \textbf{(4)}$$

where x_{it} is equal to the vector of explanatory variables, that is x = [*ROA, LNSALE, TANG, GROWTH, RISK, NDTS, LIQ, STOCK, BANK*] and βs are the respective

coefficients. α_t is the period specific intercept term and μ_{it} is the time variant idiosyncratic error term.

Combining equation 3 and 4 above results in

$$LEVER_{it} = a_t + (1-l)LEVER_{it-1} + l\,b x_{it} + c_i + e_{it} \qquad \textbf{(5)}$$

c_i is the unobserved firm specific and time invariant effect, that is the unobserved fixed effects.

The above can also be written in first difference which in fact eliminates the firm specific and time-invariant component, c_i.

$$\Delta LEVER_{it} = a_t + (1-l)\Delta LEVER_{it-1} + l\,b\Delta x_{it} + \Delta e_{it} \qquad \textbf{(6)}$$

Since $LEVER_{t-1}$ might be endogeneous to the error terms through $u_{it-1,}$ a problem of endogeneity exists and it will therefore be inappropriate to estimate the above by OLS. To overcome this problem of endogeneity, an instrumental variable need to be used for $\Delta LEVER_{it-1}$. Two approaches, namely the Instrumental Variable and the two GMM estimators, first and second step respectively (Anderson and Hsiao, 1982), can be used in this regard. We opted for the latter technique, as the IV approach leads to consistent but not necessary efficient estimates of the parameters (see Baltagi, 1995). Moreover, the first step GMM estimator is used since it has been shown to result in more reliable inferences. The asymptotic standards errors from the two step GMM estimator have been found to have a downward bias (Blundell and Bond, 1998).

In what follows we estimate the dynamic panel by running equation (9) using the Arellano-Bond (1991) first step GMM estimator for the aggregate panel set and subsequently for the two sector-wise sub panel sets (Table 3).

Table 7: Dynamic Panel Data Estimation (First Step GMM estimator)

Dependent variable LEVER

Variable	*Aggregate sample*	*Non financial Firms*	*Financial firms*
Constant	*-0.005*	*-0.00002*	*-0.001*
	(-0.83)	*(-0.05)*	*(-0.46)*
LEVER(Lagged)	*0.62*	*0.42*	*0.32*
	*(6.14)****	*(5.21)****	*(4.32)****
dROA	*-0.045*	*-0.005*	*-0.0024*
	*(-2.34)****	*-(7.11)****	*-(0.88)*
dLNSALE	*0.23*	*-0.14*	*0.062*
	(0.78)	*(-2.27)***	*(1.89)**
dTANG	*-0.23*	*-0.31*	*-0.14*
	*-(2.43)****	*-(3.33)***	*(-0.73)*
dGROWTH	*0.0005*	*0.00033*	*0.00043*
	*(7511)****	*(1.23)*	*(12.65)****
dRISK	*-0.00023*	*-0.000*	*0.000*
	*-(1.96)**	*(-0.34)*	*(0.42)*
dNDTS	*2.06e-08.*	*1.67e-08.*	*9.06e-08.*
	(0.5)	*(0.32)*	*(0.76)*
dLIQ	*-0.0031*	*-0.032*	*-0.0001*
	(-0.6)	*(-4.43)****	*(-0.39)*
dSTOCK	*0.093*	*0.12*	*-0.25*
	(1.97)	*(1.92)*	*-(1.96)**
dBANK	*0.153*	*0.15*	*0.082*
	*(1.74)**	*(2.34)****	*(0.45)*
Diagnosis tests			
Sargan Test of Overidentifying restrictions	*prob>chi2= 0.16*	*prob>chi2= 0.08*	*prob>chi2= 0.52*
Arellano-Bond test of 1st order autocorrelation	*prob>chi2= 0.24*	*prob>chi2= 0.56*	*prob>chi2= 0.34*
Arellano-Bond test of 2nd order autocorrelation	*prob>chi2= 0.166*	*prob>chi2= 0.58*	*prob>chi2= 0.32*

Analysis and Discussion.

Results fro the dynamic panel data estimates validates the previous ones and indicates that stock market development have been complementary to debt financing for the aggregate set. However mixed results are obtained when the panel is split with the results confirmed for the case of non financial firms but the opposite relation for financial firms. Banking development exerts a positive effect on capital structure though it is not always significant. The other control variables are on the overall well behaved and consistent with the literature.

Importantly and referring to the estimates from the aggregate sample, the positive and statistically significant coefficient of the lagged dependent $TOTLIAB_{t-1}$ suggests that capital structure is of a dynamic nature in Mauritius and that firms adjust to a preferred leverage ratio. The value of 0.62 obtained suggest that a rather slow adjustment process ($\lambda = 0.38$) as compared to existing empirical results. In fact Shyam-Sunder and Myers (1999) find a λ value of 0.6 for the USA, Kremp et al (1999) a λ value of 0.55 for Germany, Ozkan (2001) a value of 0.6 for the UK and Miguel and Pindado (2001) a λ of 0.8 for case of Spain. The adjustment speed reported in the study is indeed closest to Kremp et al. (1999) who reported a speed of adjustment of 0.28 for France and to very recent work from Gaud et al (2005) who found λ to be in the range of 0.62-0.86.

As argued before coefficient λ is inversely related to adjustment costs to moving to the preferred leverage ratio and thus the low λ reported in our case might suggest high adjustment cost in the case of Mauritius due to institutional factors present in the country. For instance it is not always fluent to make an addition of shares on the market due to relatively large bureaucracy and to the uncertainty as a result of asymmetric information that are present in the market. Another factor that could explain the low adjustment pace is Mauritian firms have low transaction costs when borrowing funds from banks and as Miguel and Pindalo (2001) argued such financing leads to lower agency costs between creditors and shareholders. Moreover economic growth in Mauritius during the period of study registered a slowdown as compared to previous booming decades. Level of

investment consequently was on the low side with firms relying on internal financing and turned to debt mainly to finance their investment when external funds were needed. It should be pointed out that the adjustment process is seen to be slightly lower for the case of financial firms as compared to non financial ones.

The study also used book Long Term Debt Ratio (but not reported), defined as total liabilities less current liabilities divided by total liabilities less current liabilities plus book value of equity, as a measure of leverage (LEVER) for robustness checks. On the overall, results while using the above proxy as the dependent variable yields almost similar to the case of the variable used in the study. This tends to confirm that the results are robust and that capital structure model in Mauritius does seem to have a predictive power.

V CONCLUSIONS

This paper uses both static and dynamic panel data framework to explore the effect of financial market development, particularly stock market development, on the financing choices of firms for the case of the small island developing state of Mauritius. We used firm-level data for a sample of thirty 38 firms listed ton the Stock Exchange of Mauritius for the year 1994-2006. Results from the static panel estimates both the aggregate and non financial firm suggests that further development of the market has been associated with debt financing and that it may have led to opportunities for risk sharing and for aggregation of information that allowed firms to increase their borrowing. These results are consistent with those of Demirguc-Kunt and Maksimovic (1996) for the case of developing stock market like ours. Interestingly it is observed that such is not the case for financial firms and the latter have been substituting equity for debts as the stock market have been developing. This might be because of the larger risks associated with financial businesses and the need to be well capitalised. There is also a positive relationship between the size of the banking sector and leverage, though not always statistically significant. The other major determinants of capital structure in Mauritius are profitability, size, tangibility and liquidity and other factors such as business risk, growth opportunities while Non Debt Tax Shield (NTDS) do not seem to have any significant

impact on capital structure. Dynamic panel data analysis confirms previous results on the overall and interestingly suggests the existence of a preferred leverage ratio. Moreover the adjustment process is reported to rather slow and this is due to institutional factors, low transaction costs when borrowing funds from banks and macroeconomic factors.

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APPENDIX 1.

Distribution of 38 listed firms by industry classification

Industry	*No. of firms*
NON-FINANCIAL FIRMS	
Transport, Leisure & Hotels	4
Commerce	7
Industry	7
Sugar	5
	23
FINANCIAL FIRMS	
Investment Holdings	11
Insurance & Finance	4
	15

Appendix 2: Level of the average total liabilities and long term debt of all the 38 Mauritian listed firms for the period 1994 to 2004

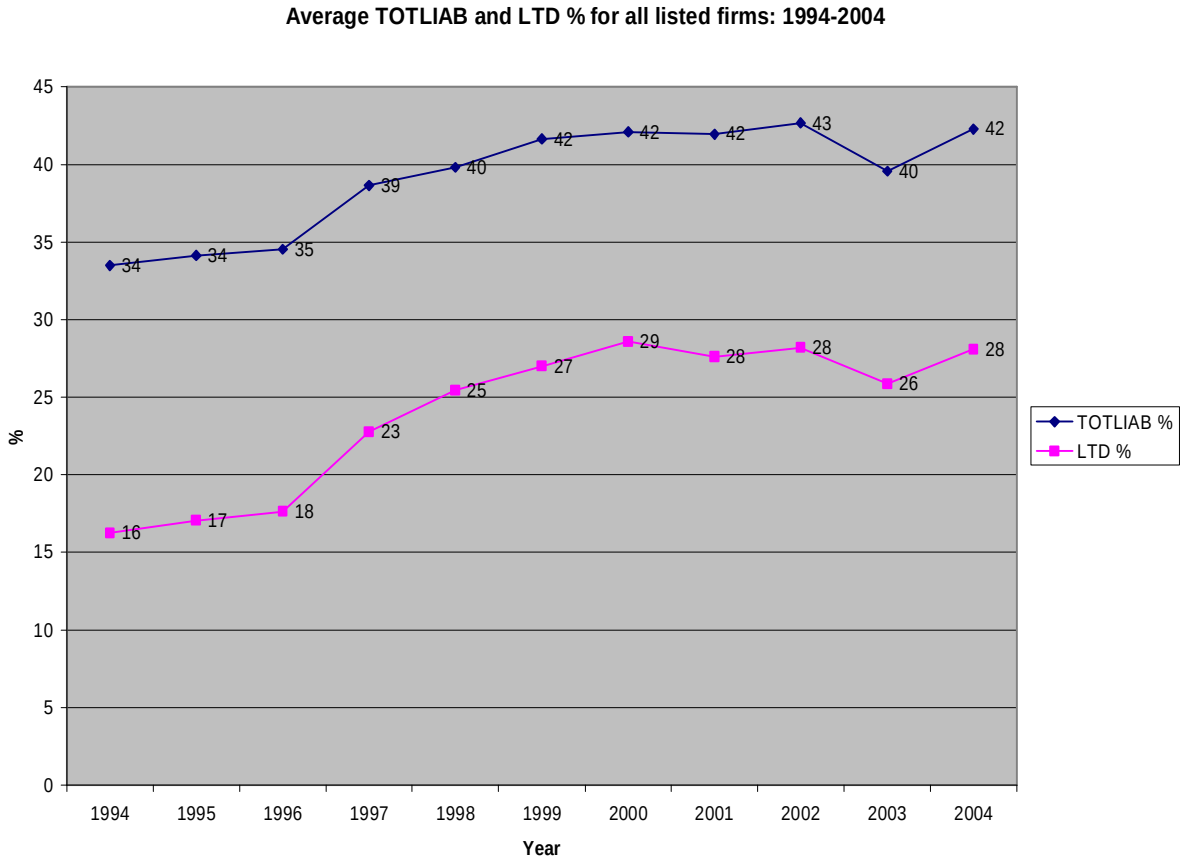

Table 3

Pearson Correlation Coefficient

38 Listed Companies, 1994 – 2004: 418 Firm- Year Observations

	LEVER	ROA	LNSALE	TANG	RISK	NDTS	GRTA	LIQUID	STOCK	BANK
LEVER	1.0000									
ROA	-0.254	1.0000								
LNSALE	0.572	0.009	1.000							
TANG	-0.134	0.08	0.388	1.000						
RISK	-0.181	0.295	-0.351	-0.075	1.000					
NDTS	0.183	0.225	0.4001	0.222	-0.092	1.000				
GRTA	0.141	-0.061	0.035	-0.088	-0.061	0.014	1.000			
LIQUID	-0.154	0.1778	-0.079	-0.096	0.109	0.034	0.027	1.000		
STOCK	0.059	-0.05	-0.1001	0.042	.0000	-0.061	0.089	-0.027	1.000	
BANK	0.135	0.113	0.218	-0.088	0.000	0.143	-0.046	0.110	0.49	1.000