

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

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Introduction and Purpose of Study

- Capital structure – considerable number of empirical studies from the classical works (Taggart, 2007, Marsh 1982) and recent ones (Wald, 1999 and Bevan and Danbolt, 2002,2004)
- Most common set of determinants of capital structure – profitability, size, growth opportunity, assets' structure, cost of financial distress, liquidity and tax shield
- One determinant largely ignored within existing literature – the level of development of equity markets (Demirguc-Kunt and Marsovic, 1996) – few attempts to look at this 'possible' determinant
- Corporate finance theory – corporations optimally structure their capital in an attempt to reduce the economic costs that result from taxes and from imperfections in financial markets = possible relationship between financial market development and financing choices
- Few empirical studies looking at the possible link that stock market development affects debt-to-equity ratios on cross country analysis and on developed economies cases Demirguc-Kunt and Marsovic (1996), Giannetti, (2003), Joeveer (2006).

Introduction and Purpose of Study

- Small island developing state- Mauritius
 - One of the best stock market performers in African continent even though it's small and young.
 - Financial liberalisation led to changes in the operating and institutional environment, providing more flexibility in choosing the right capital structure.
 - Study on listed firms on the SEM over the period 1994-2006
 - Our analysis is different from the most developing countries' studies as capital structure decisions are dynamic by nature (that has been ignored in literature; (Demirguc-Kunt and Maksimovic, 1996, Giannetti, 2003, Joeveer, 2006 etc..) - not included in their methodological framework
 - Use of dynamic panel data analysis – Generalised Methods of Moments (GMM) to address the missing aspect of the stock market-capital structure modelling.

Literature Review

- Finance literature => stock markets are important in well developed banking sector economies
- Demirguc-Kunt and Maksimovic (1996) provides a theoretical review of the relationship by considering three classes imperfections from inappropriate financial markets.
 - Investors and entrepreneurs find insufficient borrowing and investing choices for portfolio diversification
 - Assymetries of information between investors and firms
 - Lack of financing contracts for firms' investment projects.
- Demirguc-Kunt and Maksimovic (1996) further explained possible benefits from a developed and efficient stock market:
 - Outside equity may replace outside debt (substitution effect) = lower debt-equity ratio)
 - Outside equity may replace inside equity resulting in no effect on the capital structure
 - Indirect effect on firms' leverage as information available to investors will lower monitoring cost and having a positive impact on external financing

Literature Review – Empirical studies

- Relatively few studies - Demirguc-Kunt and Maksimovic (1996) analysed the effects of stock market development on firms' financing choices using data from 30 developing countries (1980-1991) :
 - ve correlation between SMD to total equity and ratios of long term and short term debt to total equity.
 - But +ve correlation between size of banking sector and leverage
 - Initial SMD's functioning produce a higher debt-equity ratio.
- Giannetti (2003) – Characteristics, legal rules and financial development affect financial decision – leverage is negatively correlated with stock market development (looked at 26 European countries)
- Agarwal and Mohtadi (2004) – looked at effects of financial market development on financing choices (21 emerging markets from 1981-97). SMD –ve correlated to debt-equity ratio but banking sector variables +ve correlated to it. Opposite to Demirguc-Kunt and Maksimovic (1996)
- So, existing literature doesn't look at different institutional structures within developing countries and SIDS such as Mauritius

Leverage position in Mauritius

- Looked at two capital structure ratios – Total liabilities ratio and Long term debt ratio across 11 largest developing countries (sourced from Booth et al (2001)) and G-7 countries
- Mauritian companies :
 - have less long term debt and total liabilities compared to other counterparts in both developed countries and some large developing countries.
 - Mauritian debt market is still in infant stage of development. Banks are the major source of external debt
- The level of total liabilities and long term debt over the period 1994-2004, follow an upward trend; but is relatively lower to many other countries (appendix)

Economic modelling

- Extension of Demirguc-Kunt and Maksimovic (1996) to include indicators of both banking and stock market development.
- Our model is different as we looking at a transitional country's case and accounts for possible endogeneity.

$$\text{LEVERAGE} = f(\textit{Profitability, Size, Tangibility, Growth Opportunities, Business Risk, Tax Shields Effects, Liquidity, Stock Market Development, Banking Development}) \quad (1)$$

- The econometric model of equation 1 is specified as follows:

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

Independent variables explanation

<u>Determinants</u> <u>(Abbreviation)</u>	<u>Definitions</u>	<u>Theoretical Predicted Signs</u>	<u>Related Empirical Literature</u>
PROFITABILITY (ROA)	Percentage of pre-tax profit divided by total assets	+/-	Kester (1986) Friend and Lang (1988), Titman and Wessels (1988), Rajan and 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 and 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 Zingales(1995),Wiwattanakantang(1999), Hirota (1999), Wald (1999), Booth et al. (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) ^[1]	+/-	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 ^[2]	-	Marsh (1982), Bradley, Jarrell and Kim (1984), Titman and Wessels (1988), Chaplinsky and Niehaus (1993), Jung, Kim and Stultz (1996), Booth et al (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%*) ^[3]	-	Bardley, Jarrel and Kim (1984), Harris and Raviv (1990) ,Chaplinsky and Niehaus (1993) Wald (1999), Hirota (1999)
LIQUIDITY (LIQ)	Ratio of current assets to current liabilities	-	Rajan and Zingales (1995), Wald (1999), Ozkan (2001), Panno (2003), Deesomsak, Pandyal and Pescetto (2004).

DATA COLLECTION

- 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).
- Other Data are from the International Financial Statistics and the CSO
- We closed on a panel of 38 listed firms over a 13-year time series giving a total number of observations of 418.

Empirical Analysis – Pearson Correlation Coefficient

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

Empirical Analysis – Pearson Correlation Coefficient

- Stock market variables (equity), the banking variables hold positive correlations with leverage
- The simple correlations between debt and the level of development of the stock market and the banking sector suggest that equity is a complement.
- Except for tangibility where a positive relationship was expected, the other variables support the theory and give the expected results

Empirical Analysis – Panel Data

<i>Variable</i>	<i>Aggregate sample Fixed effects</i>	<i>Non financial Firms Random Effects</i>	<i>Financial firms Random Effects</i>
<i>Constant</i>	-0.16 (-0.74)	-0.18 (-0.632)	-0.44 (-1.23)
<i>ROA</i>	-0.04 (-6.23)***	-0.06 (-10.1)***	-0.013 (-2.43)***
<i>LNSALE</i>	0.08 (1.85)*	0.154 (5.12)***	0.734 (2.44)***
<i>TANG</i>	-0.35 (-2.12)**	-0.421 (-3.23)***	-0.16 (-2.24)**
<i>GROWTH</i>	0.00024 (3.34)***	-0.00002 (-0.13)	0.0002 (2.34)**
<i>RISK</i>	0.0002 (0.35)	0.0007 (2.53)**	-0.004 (-1.23)
<i>NDTS</i>	1.63e-0.7 (1.32)	4.46e-0.8 (1.05)	4.71e-07 (1.16)
<i>LIQ</i>	-0.0033 (-2.34)**	-0.04 (-5.34)***	-0.02 (-2.13)**
<i>STOCK</i>	0.26 (2.33)**	0.343 (2.12)**	-0.16 (-2.43)**
<i>BANK</i>	0.15 (2.15)**	0.25 (1.87)*	-0.04 (-0.23)
<i>R²</i>	0.41	0.65	0.65
<i>Hausman Test</i>	<i>Prob>Chi2=0.003</i>	<i>Prob>Chi2=0.9707</i>	<i>Prob>chi2=0.532</i>

Empirical Analysis – Panel Data

- Results from the Hausman test favour fixed effects estimates for the aggregate set and random effects of the two sub panels
- Positive coefficient of stock market development index, except for financial firms where a negative and significant relationship is obtained. Those results are consistent with Demirguc-Kunt and Maksimovic (1996) and the preliminary analysis conducted.
- Different from Agarwal and Mohtadi (2004) for the case of non financial firms. +ve relationship exists for financial firms as the latter have been substituting equity for debts as SMD occurred
- Relationship between tangibility and leverage is inconsistent with 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) -- ***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.
- 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
- 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.

Dynamics in Capital Structure modelling

- 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).
- The above issue can be taken care by using dynamic panel data analysis, particularly in our case the GMM framework. This imply the following formulation

$$\Delta LEVER_{it} = a_t + (1 - I) \Delta LEVER_{it-1} + I b \Delta x_{it} + \Delta e_{it}$$

Dynamics in Capital Structure modelling

$$\Delta LEVER_{it} = \alpha_t + (1 - I) \Delta LEVER_{it-1} + I b \Delta x_{it} + \Delta e_{it}$$

- where x_{it} is equal to the vector of explanatory variables, that is $x = [ROA, LNSALE, TANG, GROWTH, RISK, NDTS, LIQ, STOCK, BANK]$ and β s are the respective coefficients. α_t is the period specific intercept term and μ_{it} is the time variant idiosyncratic error term.
- c_i is the unobserved firm specific and time invariant effect, that is the unobserved fixed effects.

Dynamic Panel Data Estimation (First Step GMM estimator)

<i>Variable</i>	<i>Aggregate sample</i>	<i>Non financial Firms</i>	<i>Financial firms</i>
<i>Constant</i>	-0.005 (-0.83)	-0.00001 (-0.01)	-0.001 (-0.44)
<i>LEVER(Lagged)</i>	0.62 (6.14)***	0.47 (5.57)***	0.32 (6.62)***
<i>dROA</i>	-0.045 (-2.34)***	-0.006 (-8.18)***	-0.002 (-0.87)
<i>dLNSALE</i>	0.23 (0.78)	-0.12 (-2.37)**	0.065 (1.74)*
<i>dTANG</i>	-0.23 (-2.43)***	-0.344 (-3.71)**	-0.1 (-0.78)
<i>dGROWTH</i>	0.0005 (7511)***	0.0003 (1.41)	0.0004 (15.38)***
<i>dRISK</i>	-0.00023 (-1.96)*	-0.000 (-0.54)	0.000 (0.39)
<i>dNDTS</i>	2.06e-08. (0.5)	1.67e-08. (0.52)	9.06e-08. (0.66)
<i>dLIQ</i>	-0.0031 (-0.6)	-0.03 (-4.4)***	-0.0001 (-0.34)
<i>dSTOCK</i>	0.093 (1.97)	0.15 (1.96)	-0.22 (-1.89)*
<i>dBANK</i>	0.153 (1.74)*	0.11 (2.61)	0.085 (0.42)
<i>Diagnosis tests</i>	<i>prob>chi2=0.16</i>	<i>prob>chi2=</i>	<i>prob>chi2=</i>
<i>Sargan Test of Overidentifying restrictions</i>	<i>prob>chi2=</i>	0.09	0.54
<i>Arellano-Bond test of 1st order autocorrelation</i>	0.24	<i>prob>chi2=</i>	<i>prob>chi2=</i>
<i>Arellano-Bond test of 2nd order autocorrelation</i>	<i>prob>chi2=</i>	0.53	0.21
	0.166	<i>prob>chi2=</i>	<i>prob>chi2=</i>
		0.55	0.53

GMM: Analysis

- Results from the dynamic panel data estimates validate the previous ones and indicate that stock market development has been complementary to debt financing for the aggregate set. However, mixed results are obtained when the panel is split, with 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 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 0.64 obtained suggests that a rather slow adjustment process ($\lambda = 0.36$) as compared to existing empirical results

GMM: Analysis

- 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.

GMM: Analysis

- The study also used book Long Term Debt Ratio (but not reported), defined as $\frac{\text{total liabilities less current liabilities}}{\text{total liabilities less current liabilities plus book value of equity}}$, 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

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 on 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.
- 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

CONCLUSIONS

- 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.