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Debt, tax shield and bankruptcy costs: Some evidence from JSE

1. INTRODUCTION

One of the contentious issues of corporate finance is the theory of capital structure. Modigiliani and Miller (1963) show the 'irrelevance' of capital structure in the absence of market imperfections. This conclusion however changes when market imperfections are invoked. When corporate taxes are considered and the firm is allowed to source its finances both from owners and lenders, the value of the levered firm becomes higher than the unlevered one. The algebra that demonstrates this conclusion is simple.[1]

Miller (1977) extended Proposition II and stated that when personal taxes are considered in the value model, the advantage of debt vanishes at equilibrium.[2] In his Nobel Memorial Prize Lecture, Miller (1991:479) provides a further clarity to the 1963 and 1977 works. He states that value cannot be enhanced by merely leveraging as investors would not pay a premium for this strategy because they could always leverage up their own holdings by borrowing on personal account. Hence, Miller's (1977) equilibrium theory suggests the absence of the notion of 'optimal' capital structure for the individual firm. Indeed, in practice one does not see firms abandoning equity financing. In fact, with the exception of East Asian firms, one rarely finds average debt ratio (total debt to total assets) going beyond 50 percent. That is, there is a cross-sectional regularity in the average debt ratios of firms. A further insight to the Miller (1977) work was provided by Senbet and Taggart (1984) and Ronn and Senbet (1995) where they attribute the cross sectional regularity of debt ratio to market imperfection and incompleteness. Ronn and Senbet (op cit) contend that incompleteness theory has the potential to explain debt level differences among different economies. Similar to Miller (1977), they underscore the indeterminate nature of an individual company's 'optimal' debt ratio.

Most textbooks approach the problem of capital structure from the conventional paradigm of cost-benefit. They state that the benefits of using debt, primarily stemming from the tax deductibility of interest, should be compared against its potential costs. Thus, the 'conventional' theory of capital structure does not as such negate MM II, but modifies it by including bankruptcy costs in the value formula. The net gain from leverage is thus defined as the difference between the present value of the interest tax shield and the present value of the costs of financial distress and bankruptcy.

A review of the North American literature about the size of the tax benefit indicates the absence of consensus among researchers. A similar discrepancy is found in the bankruptcy cost literature. A key factor in these papers has been the ability of the researcher to meaningfully quantify and measure the benefits and costs of leverage in the framework of real institutions. Other than this, the choice of capital structure for a given economy becomes a trivial issue as the problem by and large boils down to an empirical question.

This paper is organized as follows. The theory of capital structure and the associated evidence is reviewed in Section 2. Section 3 depicts the institutional setting of this research and Section 4 contains a hypothesis that helps to define the benefit-cost function for leverage. The same section will outline the research method. Section 5 reports the result and Section 6 provides summary and direction for future research.

2. LITERATURE REVIEW

There is a well documented literature on capital structure and much of the work is fairly recent. Harris and Raviv (1991) identified four categories of capital structure studies. They are based on agency theory, information asymmetry, contest (in the product and input markets) and competition for corporate control. These are broad categories and cannot be mutually exclusive. The extensive literature review of Harris and Raviv (op cit) however did not propose an operational formula that can be used to measure the trade off between the benefits and costs of using interest bearing debt.

Lee and Barker (1977) show that optimal debt capacity can be found at a point where the present value of tax shield is equal to the present value of the marginal cost of the crises of bankruptcy. Similar formulations can be found elsewhere (Bierman and Thomas 1972, Donaldson 1961). Thus, from a pure mathematical-economic perspective, formulating the capital structure problem is not difficult. Several issues however arise. Most formulations assume that a marginal increase in debt triggers corporate ruin. Secondly, there are also other potential explanations (unrelated to capital

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[1]See for example Copeland and Weston (1983:386) and Ross, Westerfield & Jaffe (1999:404-415) for reviews.

[2]$V_L = V_U + G$ where V_L is the value of a levered firm and V_U is that of the unlevered one. In Modigiliani and Miller, MM (1963) $G = T_cD$ while in Miller (1977) $G = [1 - (1-T_C)(1-T_{PS})/(1-T_{PB})]^* D$. T_c refers to corporate tax rate, T_{PB} is personal tax rate on income from bonds, T_{PS} is tax rate on income from shares and D is the market value of corporate debt. According to Miller (1977) the gain from leverage vanishes at a point where $(1-T_{pB}) = (1-T_c)$.

structure decisions) as to why firms are loading themselves with debt. These reasons range from managerial opportunistic behavior to institutional matters. Use of debt as an entry deterrent (Fulghieri and Nagarajan 1996), as takeover defense (Israel 1991, Stulz 1988), as a contractual agreement between employees and investors (Chang 1992) and for invoking disciplinary measures to management (Mackie Mason 1990) are some of the motivations. These benefits are difficult to measure and remain endogenous in the cost-benefit function.

As noted earlier, studies on the benefits of leverage have been reporting mixed results. Kane, Marcus and McDonald (1984), Titman and Wessels (1988), Fama and French (1998) conclude that the tax benefit of leverage is not significant. In contrast, Mackie-Mason (1990: 1489) reported that tax shields affect the value of incremental debt in so far as they lower the effective marginal tax rate on interest on debt. Copeland and Weston (1983:470) state that the gain from leverage is between 10 and 20 percent of the market value of the firm.

On the cost side, there are direct and indirect costs of leverage. Direct costs are usually defined as out of pocket costs, characterized by legal, liquidation and accounting fees. In other words they are administrative costs. They can be measured directly, with a relative ease and in many cases they are statutory. Empirical research in the United States has shown that the magnitude of these costs is not significant (Warner 1977: 3%, Ang, Chua and McConnell 1982: 7.5%, Weiss 1990: 3.1%, Wruck 1990: 3.5%) of the market values of the firms. There are no comparable studies on the South African data.

Indirect costs however are controversial and include opportunity costs associated with the firm's entry into financial distress. Few studies have tried to measure indirect costs and when they do, the studies suffer either from data unsuitability or use of proxies for the variables that they wanted to measure. Ceteris paribus these problems, Wruck (1990: 442) reported that indirect costs of distress reach as high as 9 to 15 percent of value while Altman (1984) stated that on average bankruptcy costs range from 11 to 17 percent of firm value. More recently Andrade and Kaplan (1998) put the cost of distress (both direct and indirect) between 10 and 20 percent of firm value. Thus, when one sums up the North American research on the benefits and costs of using debt, the net gain from leverage becomes minuscule. Nonetheless, many factors complicate the accurate measurement of the variables that are considered.[3] The implications and relevance of these studies to our research environment are mixed.

3. THE INSTITUTIONAL SETTING

In South Africa very few corporate debt securities are publicly traded.[4] The proportion of long-term debt in the capital structure is small (less than 10 percent of total assets). It is owed to banks (in the form of secured loans). A large percentage of the reported interest expense is related to bank overdraft and short-term borrowings. Debentures had a redeemable character, and carried fixed interest rates. Corporations are taxed at a flat rate.

The Insolvency Act of 1936 as amended, (latest Act 122 of 1998) governs the bankruptcy practice. The Act defines the word "insolvent" as "a debtor whose estate is under sequestration". Key factors in the Insolvency Act are "judgment", not having sufficient disposable property to the extent of the judgment, prejudicing the creditors and inability to pay debts as they arise. In sum, similar to many Roman-Dutch laws, the Act makes reference to the flow-based definition of bankruptcy and diminution in the value of the assets of the debtor (to the extent of the debt). The Act also specifies the administrative costs of liquidation. The Second Schedule specifies the fees for the Sheriff (Tariff A) while the Third Schedule contains the fees for the Master's office. Tariff B (Second Schedule) specifies the remuneration of the trustee(s), the curator and provisional trustee(s). Tariff B contains the substantial part of the administration costs of liquidation in RSA.[5]

[3]The term structure of interest rates, debt maturity (Brick and Ravid 1985, Wiggins 1990), the tax regime (Graham 1996), the effects of debt restructuring, self initiated bankruptcies and reorganizations (Tashjian, Lease and McConnel 1996, Gilson, John and Lang 1990), the association between firm level leverage, macroeconomic variables and managerial opportunistic behavior (Harris and Raviv 1988, Gilson 1997, Lang, Ofek, Rene and Stulz 1996, Shleifer and Vishny 1992) are examples.

[4]By the beginning of 2000 there were 20 gilts listed in the bond market. They were issued by state owned enterprises and the Reserve Bank. Most had a duration maturity of ten years.

[5]The fees are expressed as percentages of the gross proceeds from liquidation.

- On gross proceeds from the sale of movable (other than shares and land) 10%
- On immovable property (land and rights associated with it) 3%
- Cash and receivables 1%
- On gross turnover (sales: during the period of liquidation) 6%
- Liquidating dividends and all forms of distributions 2%
- Any disbursement of secured assets 5%

In practice the liquidation team takes about 25% of the gross proceeds and there are also other "hidden" costs. In terms of the pecking order, the liquidation team comes first, then secured debts. Discussion with liquidation specialists revealed that the average money paid to ordinary trade creditors (as a final settlement) is about six cents in a Rand.

4. HYPOTHESIS, METHODOLOGY AND DATA

Before formulating the cost-benefit problem, it is important to note that distress, reorganization and liquidation are three separate events and therefore cannot normally occur concurrently. Figure 1 illustrates the sequence of events. With the exception of an agent who trades on inside information, costs that are associated with financial distress cannot be observed by outsiders, at least until the news of the crisis reaches the stock market at time (t_3). The bad news is impounded on the share price between time t_3 and t_4. The time between t_4 and t_5 is sensitive. Liquidation does not start until t_8, even then liquidation occurs only if the firm can not be sold in one pack. The value of (inside) information will reach maximum for the buyer of the shares of a distressed company, as sellers would rush to dump their inventory. As a result, trade volume is expected to be heavy and bid (buy) price is likely to show a significant downward trend.[6]

Many errors can occur while estimating the costs of insolvency. First, it is important to note that all financial distresses will not be followed by reorganization. It is also true that every distress will not lead to liquidation. It follows then that distress and reorganization costs are not always followed by liquidation costs. Second, in the study about bankruptcy costs, there is no clear consensus as to what form of data should be used. Most studies extracted information from actual court documents. However, bankruptcies are sensational news items and stock price changes are dramatic. The level of wealth reduction that the investor faces as a result of the price change cannot be properly accounted for by GAAP based financial statements and/or by extracting figures that are found in court papers. An additional sets of reasons why financial statement based numbers are not proper proxies is spelt out in Haugen and Senbet's (1988:31-34) critique of Altman's (1984) work. Third, there are too many input variables and as a result, the correct estimation of bankruptcy cost is dependent on the accuracy of the input variables.

In order to examine whether the benefits of leverage are outweighing the associated costs, the following equation was formulated.

$$G_i = \sum_{t=1}^{t=T} \left[\frac{[Tc_{it}(I_{it})](1-P(b_{it}))}{(1+K_{Dt})^t} - \frac{P(b_{it}[LC_{it}+RC_{it}+DC_{it}]}{(1+WACC_{it})^t} \right]$$

where:

G_i = Net Gain from leverage for firm i.

T_c = Corporate tax rate. (Tc_{eit}) is effective tax rate for firm i in year t and (Tc_{st}) is the statutory rate $Tc_{eit} = (Tax_{it} - STC_{it})/(EBIT_{it} - I_{it})$

I_{it} = Gross Interest expense for firm i in year t

STC_{it} = Secondary Tax on Companies (tax on dividends) for firm i in year t.

Tax_{it} = Aggregate tax (profit tax plus secondary tax) paid by firm i in year t.

K_{Dt} = Cost of default free debt in the economy. Nominal and real rates will be used.

$P(b_{it})$ = Likelihood of distress and liquidation for firm i in year t. It is the sum of Microeconomic (M_i) and macroeconomic (M_a) failure indicators. Thus, $P(b_{it}) = P(M_i)_{it} + P(M_a)_t - [P(M_i)_{it} * P(M_a)_t]$; since $P(M_{it})$ and $P(M_a)_t$ are not independent.

LC_{it} = Direct cost of liquidation, defined as the difference between value of the firm as a going concern and value at liquidation less liquidation administration costs.

= Maximum [0, [(MV_{it}/BV_{it} (Tangible $Assets_{it}$)) – Liquidation value of Tangible $Assets_{it}$] + [25% * Liquidation value of Tangible Assets $_{it}$]].

= 0 if the firm is facing temporary distress and/or reorganization. MV_{it}/BV_{it} is the price to book ratio for firm i at time t.

RC_{it} = Reorganization cost for firm i at time t.

DC_{it} = Cost of distress for firm i in year t.

= Likelihood of distress x Amount of distress x Price of distress.

= $P(b_{it})$ x $[\sum(B_{it} - B_{i(t-1)})*SSI_{it}]* N_{it}$ Where B_{it} is the bid (buy) price of share i at quarter t, N_{it} is the number of ordinary shares for firm i in quarter t and SSI_{it} is a share split index for year t. $DC_{it} \neq 0$ if in two successive quarters $B_{it} < B_{i(t-1)}$, otherwise $DC_{it} = 0$

$(WACC_{it})$ = Weighted average cost of capital for firm i in year t

Thus, if the calculations for the majority of the firms in the sample results in $G_{it}/V_i(t) > 0$, where $V_i(t)$ is the market value of the firm's common shares at time t, then the

[6]Discussion with liquidation specialists revealed that the time gap between t_2 and t_4 and t_5 and t_6 is small (matter of days) while between t_1 and t_6 it is three to six months. The average time between start of insolvency proceedings and de-registration of the firm from the Register ranges between 12 and 18 months.

implication for corporate debt policy of the individual firm is straightforward.

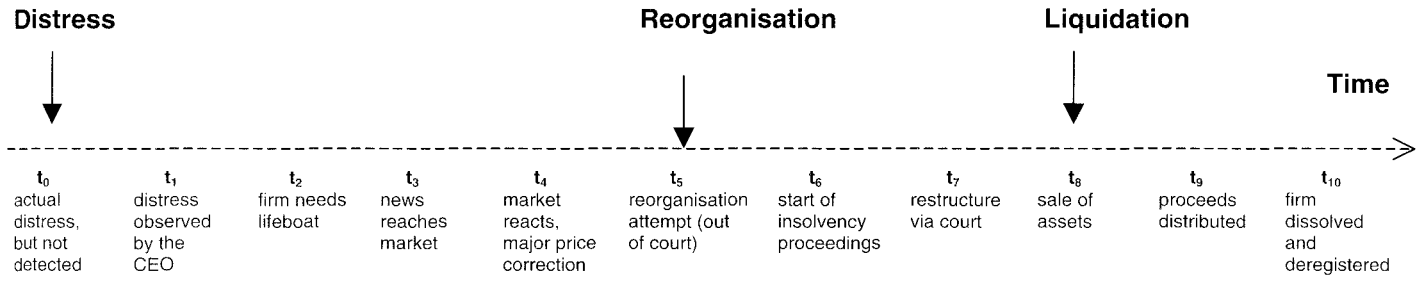

Figure 1: Sequence of events

In order to measure the tax shield, the effective tax rate for each firm in each year was computed. The effects of loss carry-overs and debt maturity were ignored. When perpetual time period was considered, it was assumed that the firms will maintain the same level of interest bearing debt in their capital structure for an infinite period and loss carry-overs will not change over time. These may seem to be strong assumptions since leverage levels change over time. However, it is also equally true that whether the change in leverage ratio is caused as a result of market sophistication (the existence of so-called exotic and thinly disguised debt securities) or other factors requires a separate study. Inflation is another factor that has a bearing on the tax shield. The data also shows that long-term debentures generally carried fixed interest rates. Hence, at the beginning one can see that the distant interest payments are expressed in nominal terms and therefore the value of the tax shield is eroded by inflation. Prime rate, both before and after adjustment for inflation is used to discount the tax shield.

One factor that affects the estimation of bankruptcy costs is the accuracy of the failure prediction model.[7] Ratio analysis, multiple discriminant analysis, logit regressions, probit analysis, recursive partitioning, principal components, factor analysis and neural networks are identified as useful prediction methods. Multiple discriminant analysis has been by far the most widely used method.

Four observations can be made from the review of the prior work. First, corporate failure prediction studies have tended to classify the data into the dichotomy of failed and none-failed firms. Unlike other empirical works, the sample size of the studies has been small and surviving and failed firms' characteristics are compared in a 'paired-matched sample'. This presumes that 'the disease' that 'caused' the death of one company will almost certainly kill the other companies. Such an approach to the problem confines the causes of failures to a limited set of (predictable) variables. Second, the variables that are identified as determinants of distress/bankruptcy are similar across economies, illustrating the robustness of such models. Third, despite advances in the sophistication of the statistical method used (from ratio studies to the use of neural networks), the prediction 'success rate' has not changed dramatically. Fourth, with the exception of few studies, exogenous shocks to the firm (example: macroeconomic swing which is a typical characteristic of developing economy) are not explicitly incorporated in the models.

There is an extremely limited reliable research on the South African debt related data. The Bureau of Financial Analysis of the University of Pretoria (De la Rey 1981) follows the methodology of Altman (op cit) to develop what he referred to as "K-Scores".[8] Court, Radloff and van der Watt (1999) proposed what they call a "two stage Bayes-Fisher discriminant model".[9]

Since this research does not aim to predict the actual failure of a particular company, it was decided to use

[7]For a comprehensive review of the work in this area, see Altman (1993) and the 1984 and 1998 special issues of the Journal of Banking and Finance.

[8]De la Rey's K-score is computed as: K = -0,01662a + 0,0111b + 0,0529c + 0,086d+ 0,0174e + 0,01071f – 0,068811 where:

a = (total outside financing/total assets) x100%
b = (PBIT/average total asset) x 100 %
c = (total current asset + listed investment)/current liability
d = (PAT/ total assets) x 100 %
e = cash flow after tax/average total assets x 100%
f = total stocks/inflation adjusted total assets x 100%

[9]The first stage attempts to set the prior probability of failure based on observed macroeconomic indicators. The macroeconomic indicators considered were total advances by banks, consumer price index, index of the value of share transactions and visits by foreigners. Only bank advance (in a lagged form) was significant. The rest of the variables in the discriminant model (stage two) are not very different from those reported in previous research.

The strength of the Court et al ((op cit) work is its attempt to include the macroeconomic variables in the failure prediction process. Nonetheless the data is old and therefore its relevance to the present period is not obvious. Second, the reason(s) for linking Bernoulli's type events (stage one) with Baye's theorem (stage two) is not clear.

two of the already available bankruptcy models.[10] Thus, de la Rey's K-score will be computed to establish a microeconomic indicator $(M_i)_{it}$ and following Ohlson (op cit), a pseudo probability of failure will be established for each firm by taking the inverse of the score (1/K). A second failure index was established by following Tamari (1984:294). The weights of five key ratios were used to compute the second failure index.[11] As in the first case, the inverse of Tamari's score (1/T) was computed. Both 1/K and 1/T generated a data set that has the characteristics of probabilities. Thus, $P(M_i)_{it} \approx 1/K_{it}$ and similarly $P(M_i)_{it} \approx 1/T_{it}$. The Pearson correlation coefficient between the two indices, over a four-year period, was unsurprisingly strong. Nonetheless for the four consecutive years in a row, the $1/T_{it}$ series gave smaller failure indicators than the $1/K_{it}$ series.[12]

Liquidation (LC_{it}) costs were estimated using statutory information, financial statement numbers and interview data. The interview was conducted both on a face-to-face basis and by telephone. Three liquidation experts from two of the big-five audit firms, the national chairperson of the Association of Insolvency Practitioners of South Africa and two persons from two auctioning companies participated. The questions were identical.[13] The time taken for the telephone interview ranged between twenty and forty minutes while the face-to-face interview took about one hour. Interviewees were asked to determine the cash realizable value of tangible assets (detailed as debtors, inventory, investment in shares, land, building: factory, building: general office, plant and machinery, motor vehicles and cash). They were asked to express the liquidation value of the asset as a percent of the book value of total asset(s).[14]

Data trimming reduced the sample size to sixty three firms.[15] Annual reports that are available at the libraries of Wits University (Edmunds) and South African Institute of Chartered Accountants were used. All the firms in the sample were listed on the industrial sector of JSE. The period covered by the study is 1995-1998 inclusive. Consolidated (group) figures were used. Macroeconomic data were obtained from Statistics South Africa and McGregor's 'Who Owns Who'. Tax and interest rate figures were obtained from the publications of Grant Thornton and Kessel Feinstein Fiscal Handbook of 1999. Quarterly buy (bid) and sell (ask) prices of shares were obtained from 'The Citizen' newspaper.

5. RESULTS

Table 1 shows a profile of the research environment. The proportion of long term debt in the capital structure stabilized at about nine percent of total assets. Effective tax rate averaged at about thirty percent and the difference between the inflation and prime bank overdraft rate was rather high.

The net gain was calculated in two stages. In stage one the tax shield component was determined while in stage two the liquidation and distress components were computed. The present value of the tax shield was calculated under two scenarios and using two tax rates. Marginality and issues that are associated with the endogeneity of corporate tax rates were ignored. First perpetual period was assumed and later the analysis was confined to a finite period of four years. When perpetual period was considered average figures were used. Thus, average statutory tax rate (Tc_s) for the four year period was 36,25% while average prime bank overdraft rate E (K_D) was 19,8% and inflation averaged at about 7,7%.

Assuming corporate debts are secured, the inflation free cash flows (tax shields) were discounted at an estimated real prime overdraft rate of 12,bf1%. In sum, given constant debt size, constant interest expense and constant cost of "risk free" debt, the present value of the tax shield ranges between 14 and 18 percent of the market value of ordinary shares. Table 2 provides the tax shield over the perpetual period. Note that the

[10]Court, Radloff and van der Watt's(1999) model was not used because (a) three of their six microeconomic variables are in the de la Rey and Tamari models, and (b) data for the other three variables was not readily available.

[11]Tamari (op cit) reached at the weights after interviewing commercial bankers, credit managers of non-financial corporations and financial analysts in Israel, the USA and the UK. The consensus was to assign:
(1) equity capital plus reserves as a percentage of total assets: 25 points
(2) profit trend: 25 points
(3) current ratio (current assets/current liabilities): 20 points
(4) inventory/value of production (sales plus change in inventory): 10 points
(5) working capital to value of production: 10 points

[12]There are two issues that affect the result of this research. First, analysts in South Africa are also expected to give the same wait to various accounting ratios as their counter parts in Europe, USA and Israel. The second and more serious limitation is that the probabilities in essence state that de la Rey's coefficients are stationary.

[13]Pilot questionnaire was faxed to potential respondents. Based on the feedback the final questionnaire was prepared.

[14]Most respondents tended to depend on the valuation that they do just before the auctions and stressed that book values are irrelevant. In situations when a respondent expresses hesitations, the interviewee was asked to indicate best and worst scenarios.

[15]Chao-Chao Wu, a junior lecturer and an articled clerk at Arthur Anderson's Johannesburg office, collected the data for his Masters thesis.

table excludes the effect of (1-P(b_{it})) on the size of the tax shield.

Table 1: Debt related statistics (N=63)

	1998		1997		1996		1995		1995-98
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean
(a) Financial statistics									
LTD_t / TA_t	0,093	0,102	0,09	0,10	0,086	0,101	0,088	0,101	0,09
TD_t / TA_t	0,483	0,171	0,48	0,20	0,474	0,186	0,471	0,172	0,48
$EBIT_t / TA_t$	0,132	0,145	0,143	0,156	0,137	0,11	0,126	0,052	0,14
CA_t / CL_t	1,78	1,06	1,703	0,902	1,76	0,98	1,724	0,858	1,74
PAT_t / TA_t	0,101	0,134	0,11	0,149	0,102	0,106	0,09	0,03	0,10
$(CFO_t - TAX_t)/ TA_t$	0,03	0,09	0,044	0,06	0,042	0,086	0,03	0,06	0,04
MVE_t / BVE_t	3,50	7,38	6,67	18,03	7,26	22,04	9,44	35,02	6,72
$[TAX_t - STC_t]$ * $[EBIT_t - I_t]$	0,285	0,14	0,298	0,126	0,302	0,13	0,301	0,138	0,30
(b) Macro statistics									
Statutory corporate tax rate	0,35		0,35		0,35		0,40		0,3625
Inflation rate (CPI)	0,06		0,09		0,07		0,09		0,077
Prime overdraft rate	0,22		0,19		0,20		0,18		0,198
Business failure rate +	0,06		0,04		0,04		0,05		0,046

* Tax_t is aggregate tax paid by the firm for year t as reported in the cash flow statement.

\+ Voluntary & compulsory liquidations. Rate based on McGregor's "Who owns Who " (1998).

Key:

LTD = Long term debt
TD = total (short term and long term) debt
EBIT = Earnings before interest and taxes
CA = current assets
CL = current liabilities
TA = total assets
PAT = profit after tax
CFO = cash flow from operations
BVE = book value of equity
MVE = market value of equity

Table 3 shows the yearly tax shield as a percentage of the firm's market capitalization and total assets. For the finite period (1995-1998), the annual tax shield is smaller (about 4.2 % in 1998) than the perpetual period. When statutory tax rate (maximum potential) is used, the gain ranged between 4 percent (in 1995) and 6 percent (in 1998) of the market value of the shares in the respective years.[16]

Having seen the size of the tax shield in stage one, in phase two, distress and liquidation costs were estimated. Distress and reorganization costs were put together as it is difficult to measure them separately. Table 4 contains the result. Note that "best" and "worst" values of tangible assets were arrived after interviewing insolvency practitioners. Average data from the interview was used and best situation was defined as obtaining 70 percent of the book values of the assets and similarly, worst situation was defined as obtaining 60 percent. As noted earlier the proxies for the microeconomic failures indicators (in a particular year) were the inverse of de la Rey (op cit) and Tamari (op cit) scores. Business failure rate was used as proxy for macroeconomic failure indicators.

Liquidation costs (LC_{it}) were further disaggregated into capital losses as a result of liquidation and administration expenses of the liquidation process. Except for the 1998 year, the expected administration costs ranged between three and four percent of market capitalization. These figures are comparable to what has been reported in the North American research (Warner 1977, Ang et al 1982).

Table 5 shows the sum of the expected costs of financial distress (DC_{it}) and reorganization (RC_{it}) as a percentage of the market value of the firms in the sample. The two types of costs cannot be decoupled easily. The most conservative estimate of these costs puts them at about 4 percent of market value. Note that the sample size became very small and varied from year to year because of the way distress was measured. On the whole, when one looks at tables 4 and 5, the aggregate cost figure for bankruptcy (distress, reorganization and liquidation administration) is disturbingly high. This conclusion is reached without the need to estimate the WACC of each company.

6. CONCLUSION AND DIRECTION FOR FUTURE RESEARCH

This paper has attempted to estimate whether the net gain from leverage is positive. Using four years time series data from 63 firms that are listed on the JSE the following conclusions are made. On balance and as suggested in MM II the potential gain from leverage over an infinite period was significant. The figures obtained in this research are comparable to what is reported in North American studies. Nonetheless, actual gains were not as implied by MM II as the effective tax rate for most firms was lower than the statutory rate. That is, other non-debt related tax minimization efforts reduce the significance of interest

[16]Note that in 1998 there was a major stock market crash.

deductions. On a year-by-year basis the gains became smaller. When capital losses as a result of liquidation and financial distress were invoked the net gain from leverage (at best) became zero. This conclusion is reached without the need to calculate (1-P(b_{it})) and WACC variables in the cost-benefit formula.

Table 2: Tax shield over perpetual period (N = 63)

Present value of average tax shield as Percentage of	When tax rate is	Cost of debt $E(K_D)$			
		$E(K_{Dt})$ = 0.198 Average Nominal		$E(K_{Dt})$ = 0.121 Average Real	
		Before Tax	After Tax	Before Tax	After Tax
a) $\frac{Tc\ I_{it}}{E(K_{Dt})/MV_{it}}$ average market capitalization	Average statutory	0,11	0,18	0,18	0,29
	Average effective	0,08	0,13	0,14	0,09
b) $\frac{Tc\ I_{it}}{E(K_{Dt})/TA_{it}}$ average total Assets	Average statutory	0,02	0,03	0,03	0,05
	Average effective	0,02	0,01	0,03	0,02

Table 3: Estimated tax shield (1995-98) (N= 63)

	When tax rate is	1998	1997	1996	1995
$\frac{Tc\ I_{it}}{MV_{it}}$ Tax shield as a percent of market value of equity	Effective rate	0,042	0,028	0,024	0,016
	Statutory rate	0,059	0,033	0,064	0,039
$\frac{Tc\ I_{it}}{TA_{it}}$ Tax shield as a percent of total assets	Effective rate	0,005	0,006	0,008	0,006
	Statutory rate	0,008	0,009	0,011	0,008

Table 4: Estimated liquidation cost (N = 63)

	1998				1997				1996				1995			
FAILURE INDEX	de la Rey		Tamari		de la Rey		Tamari		de la Rey		Tamari		de la Rey		Tamari	
LIQUIDATION VALUE	Best	Worst	Best	Worst	Best	Worst	Best	Worst	Best	Worst	Best	Worst	Best	Worst	Best	Worst
$\frac{P(bit_t)\ LC_{it}}{MV_{it}}$ Expected liquidation cost as a percent of market value	0,46* (0,80)	0,60 (0,71)	0,27 (0,50)	0,36 (0,43)	0,32 (0,41)	0,45 (0,47)	0,11 (0,12)	0,15 (0,12)	0,21 (0,20)	0,24 (0,24)	0,08 (0,07)	0,09 (0,08)	0,35 (0,44)	0,36 (0,44)	0,14 (0,15)	0,14 (0,15)
$\frac{P(bit)\ LC_{it}}{TA_{it}}$ Expected liquidation cost as a percent of total assets	0,41 (0,95)	0,55 (1,29)	0,33 (0,82)	0,38 (0,83)	1,10 (2,76)	1,11 (2,78)	1,10 (2,62)	1,15 (2,64)	0,51 (1,36)	0,59 (1,58)	0,21 (0,59)	0,24 (0,69)	1,60 (6,24)	1,61 (6,24)	0,66 (2,55)	0,66 (2,56)
$\frac{P(bit_t)\ ADM_{it}}{MV_{it}}$ Expected administration cost as a percent of market value	0,27 (0,79)	0,23 (0,68)	0,17 (0,51)	0,15 (0,44)	0,12 (0,31)	0,11 (0,27)	0,04 (0,10)	0,03 (0,08)	0,08 (0,08)	0,07 (0,06)	0,03 (0,03)	0,03 (0,02)	0,06 (0,09)	0,05 (0,08)	0,03 (0,04)	0,02 (0,03)
$\frac{P(bit)\ ADM_{it}}{TA_{it}}$ Expected administration cost as a percent of total assets	0,03 (0,01)	0,03 (0,01)	0,02 (0,01)	0,02 (0,01)	0,03 (0,01)	0,02 (0,01)	0,01 (0,00)	0,01 (0,00)	0,19 (0,50)	0,16 (0,43)	0,08 (0,20)	0,07 (0,19)	0,03 (0,01)	0,03 (0,01)	0,01 (0,00)	0,01 (0,00)

*mean values, standard deviations (in brackets)

Table 5: Capital cost of financial distress and reorganization

	98		97		96		95	
	de la Rey	**Tamari**	**de la Rey**	**Tamari**	**de la Rey**	**Tamari**	**de la Rey**	**Tamari**
$\frac{\sum (B_t - B_{t-1})N_i \times P(b_{it}) \times SSI_{it}}{MV_{it}}$	0,17* (0,32) N = 40	0,11 (0,15) N = 40	0,118 (0,212) N = 19	0,088 (0,166) N = 22	0,10 (0,21) N = 15	0,07 (0,13) N = 15	0,043 (0,04) N = 14	0,06 (0,16) N = 15
Change in JSE Industrial index (Year to year)	-16%		-6,4%		-1,0%		+14,0%	

* Average and figures in brackets indicate standard deviation.

The paper has many limitations. Most of the inputs into the cost-benefit formula were estimates by themselves. Discount factors, failure indicators, capital losses had to be approximated. Distress, reorganization and liquidation were seen as having the same likelihood. The present values of the cost figures have not been computed to avoid further bias to the estimation process. The coefficients of the bankruptcy prediction models were assumed to remain stationary. The period covered by the study is small. Nonetheless, the limitations are not peculiar to this research. Thus, the conclusions of the paper must be examined in the light of the methodological difficulties of doing this type of research. Future research should find ways of mitigating the above limitations and examine whether there is a positive association between corporate tax rate and debt.

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