Journal of Finance and Economics
Volume 4, Issue 1 (2016), 58-69
ISSN 2291-4951 E-ISSN 2291-496X
Published by Science and Education Centre of North America

Profits, Firm Size, Growth Opportunities and Capital Structure: An Empirical Test

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Received: September 30, 2015 Accepted: December 09, 2015 Online Published: January 21, 2016

DOI: 10.12735/jfe.v4i1p58 URL: http://dx.doi.org/10.12735/jfe.v4i1p58

Abstract

This study aims to answer three very basic questions regarding the capital structure of firms by testing the predictions made by the trade-off theory of capital structure. It employs a variety of data specification to test the relationship of financial leverage with profits, growth and firm size and takes help from existing literature for and against the trade-off model. It aims at testing the relatively aged literature, which widely disregarded the trade-off model with later studies that suggested that adequate data structure does report this theory to be empirically valid. The variety of specifications of data does lead the author to the general result that although most of the predictions of the trade-off model hold true empirically, the results of estimation on profits and leverage still hold that the model only had limited validity empirically.

JEL Classifications: G3, G30, G32, G34

Keywords: profits, financial leverage, capital structure

1. Introduction

The question of how do firms finance their operations and the reasons behind the use of various modes of financing has funneled researchers for a long time in developing a number of capital structure theories that aim to explain the use of equity in general and debt in particular. The evolution of using debt in the capital structure, from traditional bank loans to selling debt instruments to the general public, has garnered the immense realization of tax saving as a result of the use of leverage (Myers, 1977; Fischer, Heinkel, & Zechner, 1989; Hovakimian, Opler, & Titman, 2001). This does advocate the maximum use of debt since all the tax saving are supposed to go to the shareholders, either in the form of dividends or capital gains (Solomon, 1963). However, a

How to cite this paper: Butt, U. (2016). Profits, firm size, growth opportunities and capital structure: An empirical test. *Journal of Finance and Economics*, *4*(1), 58-69. http://dx.doi.org/10.12735/jfe.v4i1p58

close look at this theoretical framework suggests a corollary embedded in it – that as the debt in the capital structure goes up so does the chances of bankruptcy. Of course it would be unjustified to imply that taxes are the only reason that firms take up debt, given that debt financing was common long before the introduction of corporate income taxes[1].

Earlier literature (Auerbach, 1985; Titman & Wessels, 1988) placed a lot of emphasis on the identification of an optimal capital structure that would balance the tax benefits received from the use of debt with the costs associated with perceived bankruptcy such that the marginal cost of bankruptcy is exactly offset by the marginal benefits received from the tax saving (Graham & Harvery, 2001; van Binsbergen, Graham, & Yang, 2010). In a frictionless market with no issuance cost the firm would always remain at this optimal level by issuing or retiring securities on a regular basis. Certainly we do not observe this in practice since markets are not frictionless and the cost of issuing securities is significant (Lee, Lochhead, Ritter, & Zhao, 1996). Therefore, the firms should, at least in theory, be trying to readjust their capital structure given that the optimal level of debt deviates by a certain percentage and that the cost of issuance of the securities is offset by the increase in firm value as a result of the readjustment (Leary & Roberts, 2005). This very basic idea formed the basis of the trade-off theory of capital structure.

The elementary description of the trade-off theory cultivated from the deliberation over the Miller-Modigliani theorem, which stated the benefit of debt as shielding earnings from taxes. Since there was no assumed offsetting cost of debt, this implied 100% debt financing (Solomon, 1963). Further discussions on the M&M proposition, however, presented bankruptcy as a potential candidate for the offsetting cost of debt. The optimal leverage reflects a trade-off between the tax benefits of debt and the deadweight costs of bankruptcy (Kraus & Litzenberger, 1973) and implies that a firm that follows the tradeoff theory sets a target debt-to-value ratio and then gradually moves towards the target, which gets determined by balancing debt tax shields against the cost of bankruptcy (Myers, 1984).

Existing trade-off models leave open three main questions. Do more profitable firms have higher leverage ratios? Does the size of the firm affect its ability to follow the trade-off theory of capital structure? Do future growth opportunities affect the firm's choice of capital structure? The answers to these questions form the basis forms the basis of this study.

The trade-off theory makes three implicit predictions. Firstly, it implies that more profitable firms should have more debt in their capital structure for the simple reason that more profits generated with debt would give higher returns to the shareholders than if financed through equity. On the other hand, firms with lower profitability would tend to have less debt and more equity because besides bankruptcy costs, the fixed obligation of interest payments could seriously hinder their progress. Secondly, it implies that large firms have more debt in their capital structure and the size of the firm affects the amount of leverage that the firm might opt to choose in its capital structure. The implicit anticipation is that large firms should have higher debt ratios and small firms should opt for lower debt levels (López-Gracia & Sogorb-Mira, 2008). The proportion of tangible assets in the total asset base of the company do play an important role here since tangibility should be directly proportional to the level of debt that the company can afford given the requirement of collateralized loans. Thirdly, it implies that the growth opportunities of the firm do play an important role in determining the future prospects of the firm. The theory predicts that firms with more investments have less leverage because they have strong incentives to avoid underinvestment and asset substitution inefficiencies that can arise from the stockholder-bondholder

[1] For example, in 1731 the French council in Genoa wrote: "Lack of confidence keeps money in short supply; so those who usually do business on credit, which means most of the merchants in the city, are doing very little. The best pursuits are shut" (Braudel, 1982)

agency problems. Besides this there is less need for the discipline of debt payments to control free cash flow problems. This paper attempts to answer these three questions by attempting to generate empirical evidence from available data.

Prior literature on trade-off theory in general has not accounted for the size of the firm and the growth opportunities that derive the value of the firm. This papers attempts to not only look at the financing behavior of the firms given the difference in the size but also attempts to look at the role of research and development expenditure and capital expenditure of the firm in order to determine the effect of these driving factors in determining the leverage ratio of the firm. The paper hypothesizes that firms with higher levels of R&D expenditure and expectation of capital expense would follow the predictions of the trade-off theory.

2. Literature

Earlier empirical research on the trade-off model generally disregarded the trade-off model on the basis of its inability to explain the negative association between profits and financial leverage. Myers (1984) suggests that firms use internal financing before using debt to finance future projects thus resulting in higher retained earnings and consequently lower leverage values. This observation does suggest that for highly profitable firms with higher retained earnings the leverage ratios would be substantially lower. Lee *et al*. (1996) present the basis for the firm's choice of using internally generated funds by reporting that IPOs of equity cost on average 11 percent of the proceeds and for straight debt issues the direct costs average 2.2 percent, although they are strongly related to the credit rating of the issue. However, the inability of this paper and subsequent research to justify dividends and the non-readjustment of leverage when the potential benefits exceed the costs has marked a serious dent into its credibility. It does however deliver a very important piece of information in that it provides the theoretical grounds for changes in leverage ratios of the firms.

Earlier studies (Fama & French, 2002; Hackbarth, Hennessy, & Leland, 2007) consider the negative relationship between leverage and profitability as a serious rejection of the trade-off model. They have classified their results that net new issues of common stock are trivial for dividend payers and that debt is indeed the residual variable in financing decisions as a scar on the trade-off model. A peculiar area of interest in their model is that they have opted for book leverage[2], instead of market leverage[3], by contending that the model scales most of the variables by assets and as a result most predictions apply directly to book leverage. Later research (Strebulaev, 2007) casted doubt on the validity of such tests and proposed alternatives models to test the theories of capital structure.

This paper improves on earlier research by contending that these variables could be scaled by using the market value of assets with the simple application of using the ratio of book value of debt to the book value of debt and market value of equity [Lt/ (Lt+MVEt)]. This makes the predictions of the trade-off model applicable to the market structure of firms. The use of book value could be deceiving since the market value of assets could be substantially different. The reporting of profitability at market value also asserts the use of market values measures to test the trade-off theory.

Frank and Goyal (2009) attempted to correct for this by using market value of debt and attempt to explain the role of and impediments created by security issuance costs in order to explain the inefficiency of market players in rebalancing their capital structure to reflect the empirical position

[2] L_t/A_t (the ratio of debt to book value of assets)

[3] L_t/V_t (the ratio of debt to the market value of assets)

of the trade-off theory. The most important outcome of the estimation is that profits positively affect debt issuances and negatively affect equity issuances – a result consistent with trade-off model. They conclude by stating that the relationship between profits and corporate debts has been widely misrepresented in the earlier studies and as a matter of theory the trade-off theory of capital structure is empirically valid. The influence of a few big firms has in past tended to disregard the theory as a whole but if tested acutely the empirical facts do indeed validate the trade-off theory of capital structure. However, Frank and Goyal (2009) trimmed the data by including only those firms that had issued debt in excess of 5% of total assets and this resulted in a majority of the firms being eliminated from the study.

This papers attempts to overcome these gaffes in the existing literature by bringing in proxies for the market values of the variables under study. Not only does this study include the market value of leverage and test it against profitability but it also account for future growth opportunities and expenditure on research and development. The trade-off model presented by Frank and Goyal (2009) is retested in this paper by trimming the data based on the criteria presented in their study.

3. Data Description and Variables

The discussion of the trade-off model largely focused on the predictions about how leverage is affected by profitability, firm size and growth opportunities. The predictions outline that higher profits lead to higher leverage and the model used a lag value of profits to ascertain its empirical relevance. The size of the firm is also predicted to be positively related to leverage and for this reason we use a lag value of firm size to test the prediction that the bigger the size of the firm the higher the leverage. The term growth of the firm was rather ambiguous in the sense that it not only encompasses the growth opportunities available to the firm but also the actual growth in the firm. This implies using a contemporaneous variable to test the trade-off predicted negative relationship with leverage. As was mentioned earlier, taxes could not be the only reason why firms take up debt we included some important variables, the details of which are provided subsequently. The model is as follows:

$$\begin{aligned} Leverage\ t = {} & a + bx \log SALE_{t-1} + cx(mkt - to - bk)_t + dxProfit_{t-1} + exTANG_{t-1} \\ & + fxCFVol_{t-1} + gx \log(CAPEX)_t + hx \log(R\&D)_{t-1} + ixINTAN_{t-1} \\ & + jxAb\_Return_{t-1} + kxDep_{t-1} \end{aligned}$$

As described in Table 1, the data are constructed from Compustat database. The objective was to cover the whole of the 1990s since this period is associated with a strong phase of boom. The data thus encompasses the 1990-2012 period i.e. till just around the time the economic meltdown concluded, for non-financial industries. The study used the data for all the firms in the non-financial sector (All Firms) and for the ones that are still operational today (Surviving Firms). The standard 1% cut off rule was applied to do away with any outliers in the data. The data uses a variety of variable as proxies to test the predictions of the trade-off model.

Earlier literature (Hovakimian *et al*., 2001) has used book leverage to test the trade-off theory as a proxy for leverage. This paper however contends that given the nature of the theory to be tested we should use a market value of leverage to test the model. It uses the book value of debt in current liabilities (dlc) and the long-term debt (dltt) as a proxy for the total long-term debt of the company and computes leverage as a ratio of long-term debt (dlc+dltt) to long-term debt and market value of equity (dlc+dltt+MVE). The calculation of book leverage is not that different from that of the market leverage with the only difference that instead of using the market value of equity as in the above specification we use the book value of equity.

One of the three research questions that this papers attempts to answer, deals with the impact of the size of the firm on the ability to raise debt. For this purpose Sales is used as a choice to represent

the size of the firm as this represents the deriving factor behind comparison of the sizes of the firms in the market. This of course is not the only variable that we use as a proxy rather we use the tangibility of assets to determine the firm's ability to borrow. The paper also uses the ratio of net property, plant and equipment (PPEt) to the market value of the assets of the firm (Tangt = PPEt/Vt). Some studies have added inventory to PPE to represent tangibility but the author contends that since this paper includes the use of long-term debt in the specification it would be better to use only long term tangible assets.

Table 1. Summary statistics

Variable	All Firms		Survivors	
	Mean (Median)	SD	Mean (Median)	SD
Book Leverage	0.2825	0.3716	0.2653	0.3085
	(0.1991)		(0.1961)	
Market Leverage	0.2548	0.2582	0.2384	0.2449
	(0.1755)		(0.1600)	
Log(Sales)	1.9097	1.1581	2.0287	1.1343
	(1.9373)		(2.0666)	
Market to Book (Assets)	2.4136	4.1796	4.8471	451.7437
	(1.4842)		(1.5308)	
Profitability	-0.0968	0.4210	-0.1492	0.6354
	(0.0144)		(0.0154)	
Tangibility	0.2699	0.2594	0.2758	0.2591
	(0.1806)		(0.1913)	
Risk Free Rate (%)	3.8958	0.5835	3.8987	0.5529
	(3.9900)		(3.9900)	
Cash Flow Vol. (%)	7.9861	37.8129	32.3181	79.8804
	(0.1983)		(5.0601)	
Log(CAPEX)	0.6205	1.1779	0.7214	1.2088
	(0.6306)		(0.7519)	
Log(R&D)	0.5478	0.9906	0.5906	1.0270
	(0.6120)		(0.5740)	
Intangible Assets	109.2160	451.1454	129.1296	466.7091
	(0.2840)		(0.5100)	
Abnormal Return (%)	-0.1357204	0.4209824	-0.1881035	0.6353772
	(-.0240404)		(-.0230803)	
Depreciation	55.05152	179.2077	62.48414	183.029
	(3.6220)		(3.8705)	

$$Book\ Leverage = \frac{Book\ Value\ of\ Assets}{Book\ Value\ of\ Assets + Book\ Value\ of\ Equity}$$

$$Market\ Leverage = \frac{Book\ Value\ of\ Assets}{Book\ Value\ of\ Assets + Market\ Value\ of\ Equity}$$

$$Market\ to\ Book = \frac{Market\ Value\ of\ Assets}{Book\ Value\ of\ Assets}$$

$$Profitability = \frac{Net\ Income}{Market\ Value\ of\ Equity}$$

$$Tangibility = \frac{Property\ Plant\ \&\ Equipment}{Market\ Value\ of\ Assets}$$

$$Cash\ Flow\ Vol. = standard\ deviation\ of\ three - year\ volatility\ in\ cash\ flows$$

$$Abnormal\ Re\ turns = Profitability - risk\ free\ rate$$

Previous studies in the discipline have used market to book ratio as a proxy for growth of the firm. The author however contends that besides using market to book of assets, which represents only a very imprecise measure of growth, Capital expenditure and research and development expenditure should be included in the specification.

As mentioned earlier, the specification implies a requirement of a lag and a contemporaneous variable to represent growth opportunities and actual growth respectively. To comply with this parameter, the author has used lag R&D expenditure to represent growth opportunities under the assumption that higher expenditure on R&D would result in higher growth potential. To comprehend the actual growth the paper has used contemporaneous capital expenditure to represent the actual growth under the assumption that higher capital expenditure symbolizes higher growth.

Trade-off model's biggest prediction of the positive relation of leverage with profitability has long been the subject of empirical debate. For the purpose of investigation this paper uses the ratio of net income to total market equity (NI/MVE) as a choice for profitability. The literature on trade-off models has implicated the use of leverage to assert its usefulness in boosting the returns to the shareholders by shielding earnings from taxes. The use of market value of profits and equity gives a better realization of the returns garnered by the shareholders, something that the use of leverage aims to bolster. Furthermore, firms that generate higher profits relative to investments benefit from the discipline that debt provides in mitigating the free cash flow problem (Jensen, 1986). The volatility of cash flows again plays an important role and hence has been used as an explanatory variable in the paper. Since the tax shield provides an important role in the trade-off model the paper included depreciation as an explanatory variable as well to see if it has a countering effect on leverage.

The paper also used a few other variables in the specifications such as risk free rate, abnormal return (the difference of profitability and risk free rate) and intangible assets to ascertain their significance on leverage. All of these have their relative importance as one can argue that abnormal returns should be used instead of overall returns to test the theory but the lack of existing literature would not allow for this specification to hold its validity. One could also argue the importance of intangible assets since the validity of this specification is still to be tested. These however were not used in the model specified for the paper since they are not considered under the predictions of the trade-off model and are not part of the research questions that this paper attempts to answer.

4. Multivariate Analysis

To test the validity of the trade-off theory the paper test equation (1) on a number of specifications for all the firms except financial firms and regulated utilities since their debt ratio are inflated and profits regulated respectively. The model is also tested on surviving firms in the financial sector to accomplish robustness across sectors.

Table 2. The estimation results of regressing market leverage over the specifications

	All Firms (Market Leverage)$_t$				Survivors (Market Leverage)$_t$			
	1	2	3	4	1	2	3	4
$LogSALE_{t-1}$	0.0656511	0.0503635	0.094837	0.1024858	0.0526046	0.0483353	0.0964756	0.0983298
	(50.56)	**(24.51)**	**(44.05)**	**(35.45)**	**(42.82)**	**(23.79)**	**(45.72)**	**(38.36)**
[Market to Book (Assets)] $_t$			-0.02551	-0.0325725			-0.023035	-0.020844
			(-61.55)	**(-56.97)**			**(-51.7)**	**(-41.74)**
$Profitability_{t-1}$	0.3540746		0.060437	-0.2246187	0.2670311		-0.079274	-0.113772
	(2.61)		(0.48)	**(-29.17)**	(1.84)		(-0.49)	**(-16.3)**
Tangibility $_{t-1}$			0.26229	0.2849609			0.2491525	0.2892061
			(51.34)	**(42.49)**			**(45.76)**	**(45.07)**
[Cash Flow Vol.] $_{t-1}$				-0.0001753				-0.0001
				(-4.99)				**(-2.96)**
[Log(CAPEX)] $_t$		0.013446	-0.0448	-0.0458771		0.0113175	-0.055447	-0.060036
		(7.13)	**(-21.43)**	**(-16.37)**		**(5.73)**	**(-27.3)**	**(-25.38)**
[Log(R&D)] $_{t-1}$		-0.0340719	-0.02195	-0.0197222		-0.0328792	-0.018156	-0.018554
		(-28.74)	**(-19.71)**	**(-14.01)**		**(-25.43)**	**(-14.46)**	**(-13.08)**
[Intangible Assets] $_{t-1}$		0.0000058				-0.0000067		
		(1.03)				(-1.17)		
(Abnormal Return) $_{t-1}$	-0.4883		-0.26688		-0.292862		-0.0415	
	(-3.6)		**(-2.13)**		**(-2.02)**		(-0.26)	
Depreciation $_{t-1}$		0.0000302		-0.0000306		0.0001615		0.0001357
		(1.43)		(-1.16)		**(6.99)**		**(5.12)**
Constant	0.0925171	0.1553813	0.065099	0.0604839	0.1270153	0.1379838	0.0668328	0.0379298
Adjusted R-square	0.0465	0.0531	0.1887	0.2256	0.0394	0.0679	0.204	0.2171
No. of Observations	71,526				50,611			

Note: The values under the coefficients depict the t-values with the bold numbers indicating t-value significant at the 1% level. The regression results were run for all the firms and for the survivors. The data consisted of non-financial industries from 1990-2012.

The biggest challenge to the validity of the trade-off model has been its empirical inability to live up to its prediction of positively linking profitability to leverage. The analysis used lag value of profitability under the hypothesis that current profits results in increasing future leverage ratios. Since the size of the firm is measured by sales, this paper used the prediction of the trade-off model that bigger firms can borrow more and used the lag value of log of sales. The underlying assumption is that size of the firm in the previous year assists in increasing the firm's ability to borrow money. The value of assets that the firm owns also establishes the control of the firm over its power to borrow and tangible assets play an important role in this determination. This paper uses lag values of the proportion of tangible assets to total assets to ascertain this power.

Table 2 specifies the regression results obtained for the various specifications for all and surviving firms using equation (1). The first specification determines the importance of the size of the firm in determining the leverage and furthermore uses abnormal returns in the regression model to test the trade-off model. The results indicate that for all firm profitability is indeed significantly positively related with leverage, which was the prediction of the trade-off model. This however does not hold entirely true for surviving firms because although profitability is positively related the results are not significant. The results also indicate that intangible assets have an insignificant result on the determination of leverage though the sign changes from positive to negative for surviving firms and abnormal returns are not significant for the specification.

The regression results specify a few important facts. The size of the firm has a significantly positive effect on the firm's ability to borrow money (significant at 0.01% level), which indicates that large firms tend to include more debt in their capital structure. This is of course not to say that the same does not hold true for small firms and the results are reported later in the paper. These results in general answer our question regarding the size of the firm having a significant impact on the leverage of the firm. The results indicate the relationship to be significantly positive for the All Firms and Surviving Firms sample.

The results also answer our second question of relationship of growth of the firm with leverage. The predictions from the trade-off models indicated a negative relationship and we used one traditional (MTB) and two new (R&D and CAPEX) to ascertain this relationship. The results indicate that the trade-off theory holds its prediction correctly in this case as well, with market to book, $\log CAPEX$ and $\log$ R&D having a significant negative relationship with leverage (significant at the 0.01% level). We used depreciation in our analysis since the basic idea behind trade-off theory is the saving received from tax shield and depreciation also assists in guarding earnings from taxes. The assumption is that the use of tax shielding variables would have a negative effect on leverage since they generate the same benefits without the counter cost of bankruptcy (Fama & French, 2002). The analysis however shows that depreciation has an insignificant impact in determining the debt in the capital structure of the firm. This does present a contradicting result since tangibility of assets is evidenced to be directly related with leverage ratio.

To test for robustness of the results, the paper used fixed effect specification to correct for changes in the elements surrounding the business environment in a specific year. Table 3 shows the regression results from our model and compares them with the fixed effect model to account for any sudden changes that might have arisen because of a particular year. The estimation results showed the inability of the trade-off model in explaining the relationship with profitability but were consistent in its predictions about growth and firm size. The estimation results of the fixed model are not too different from what was concluded from our basic regression. While it is true that the coefficients did go down for the fixed effect model, however the coefficients were still significant even at the 0.1% level. The only variable that did show notable movement was R&D, where for All Firm the coefficient went from being significant to insignificant and for Survivors the coefficient went from negative significant to positive significant.

Table 3

The estimation results of regressing market leverage the model to be tested. The regression estimation was tested for year fixed effect to rule out year specific results that might clout the results. The values under the coefficients for the variables depict the t-values with the bold numbers indicating t-value significant at the 1% level. The regression results were run for all the firms and for the survivors. The data consisted of non-financial industries from 1990-2012.

	All Firms		Survivors	
	Market Leverage t		Market Leverage t	
	Fixed Effect		Fixed Effect	
LogSALE t-1	0.1024858	0.1251931	0.0983298	0.0853133
	-35.45	**-30.83**	**-38.36**	**-22.21**
[Market to Book (Assets)] t	-0.03257	-0.0046567	-0.020844	-0.0040456
	(-56.97)	**(-8.91)**	**(-41.74)**	**(-8.93)**
Profitability t-1	-0.224618	-0.1075264	-0.11377	-0.0658517
	(-29.17)	**(-15.72)**	**(-16.3)**	**(-10.79)**
Tangibility t-1	0.2849609	0.1071192	0.2892061	0.1055208
	-42.49	**-8.7**	**-45.07**	**-8.89**
[Cash Flow Vol.] t-1	-0.00017	0.00000335	-0.0001	-0.000016
	(-4.99)	-0.01	**(-2.96)**	(-0.52)
[Log(CAPEX)] t	-0.045877	-0.087163	-0.0600362	-0.074552
	(-16.37)	**(-33.75)**	**(-25.38)**	**(-30.16)**
[Log(R&D)] t-1	-0.01972	-0.0068282	-0.018553	0.0114666
	(-14.01)	(-1.58)	**(-13.08)**	**-2.91**
Depreciation t-1	-0.000031	0.0000275	0.0001357	0.0003224
	(-1.16)	-0.92	**-5.12**	**-8.82**
Constant	0.0604839	0.0294689	0.0379298	0.0639477
Firm FE		**Yes**		**Yes**
Adjusted R-square	0.2256		0.2171	
No. of Observations	71,526		50,611	

The coefficients for profitability for all and surviving firms signify the same problem encountered by earlier testing of the trade-off model. The significance of the coefficients however does give an important insight into the behavior of these different sized firms. Large firms tend to do away with leverage the fastest while medium and small sized firms hold their order in the status quo. This is in contrast to the earlier studies, which suggested that large sized firms would take on more debt. Though the estimation results clearly present a negative relationship between profitability and leverage, the deduction that large firms are the quickest to do away with leverage when profitability goes up suggests the risk-averse nature of the managers which results in lesser emphasis towards shareholders' wealth maximization.

The third prediction of the trade-off model, that growth is negatively related to leverage, holds true for all sizes of firms with large firms holding a firm ground in this respect. The coefficients are significant for the All Firms and Surviving Firms sample regardless of the size with large firms appearing most consistent in holding this prediction true. A very interesting result of this segregation was that for surviving firms of all size the coefficients of depreciation were significantly positive. This does present a contrast to the predictions of the trade-off model but

given that they coefficients were insignificant for the same sized firms sample it gives an interesting insight particularly when we look at the fact that for the All Firm sample this variable was insignificant for small firms.

Frank and Goyal (2009) in their paper on profits and capital structure report that structural assumptions have led to a misinterpretation of the evidence on how firms react to profitability. They contend that this misspecification have resulted in the widely held belief that typically profitable firms reduce their debt. The structure of the data used entailed a 5% cut-off rule i.e. they take into account only those firms that issue debt in excess of 5% of the value of their assets. Their estimation as a result of this specification shows that more profitable firm issue more debt and thus the trade-off theory holds its stature. The criticism of their study however was that they did not take into account the fact that the market value of equity of profitable firms is much higher and thus their model of debt issuance of firms is not consistent with the trade-off model, given that the issuance of the debt and subsequent rise in the value of equity may result in lower leverage levels for profitable firms. This paper attempts to use the same data by applying the 5% cut-off rule to keep only those firms in the data set that issue debt in excess of 5% of the market value of the assets.

Table 4

The estimation results of regressing market leverage the model to be tested. This specification tests the model by accounting for only those firms that had issued at least 5% of long-term debt over the 1990-2012 periods. The values under the coefficients for the variables depict the t-values with the bold numbers indicating t-value significant at the 1% level. The regression results were run for all the firms and for the survivors to see if the trade-off model holds for firms issuing significant levels of debt under the study period.

	All Firms		Survivors	
	[Market Leverage] t		[Market Leverage] t	
		5% or more debt issuance		5% or more debt issuance
LogSALE t-1	0.1024858	0.1417945	0.09833	0.0835182
	35.45	**28.46**	**38.36**	**14.38**
[Market to Book (Assets)] t	-0.0325725	-0.0002112	-0.02084	-0.002921
	-56.97	**-2**	**-41.74**	**-7.36**
Profitability t-1	-0.2246187	-0.013583	-0.11377	-0.005768
	-29.17	**-5.54**	**-16.3**	**-3.2**
Tangibility t-1	0.2849609	0.4023749	0.289206	0.1745406
	42.49	**30.69**	**45.07**	**12.51**
[Cash Flow Vol.] t-1	-0.0001753	-1.02E-05	-0.0001	0.0000472
	-4.99	-0.46	**-2.96**	6.39
[Log(CAPEX)] t	-0.0458771	-0.1027964	-0.06004	-0.0766032
	-16.37	**-23.53**	**-25.38**	**-14.63**
[Log(R&D)] t-1	-0.0197222	-0.0151359	-0.01855	-0.009172
	-14.01	**-5.47**	**-13.08**	**-3.36**
Depreciation t-1	-0.0000306	-0.0001613	0.000136	0.0000173
	-1.16	**-4.08**	**5.12**	**5.47**
Constant	0.0604839	-0.0752264	0.03793	0.2130869
Adjusted R-square	0.2256	0.1618	0.2171	0.0627
No. of Observations	71,526	7,468	50,611	6,403

The results of the estimation of the regression on this new structure of data are consistent with the results reported earlier. The coefficients are significant at the 1% level. For All Firms the coefficient for profitability goes from -0.23 to -0.014 and for survivors the coefficients go from -0.11 to -0.006, which indeed is a considerable drop but the results maintain their significance even with the extremely trimmed data. Other variables important to this paper hold their results even under this description of the data and although the answer to two of our questions i.e. relationship of leverage with growth and firm size meet the predictions of the trade-off model, the most important prediction of the trade-off model regarding profitability does not meets its mark. This result concludes that the study by Frank and Goyal (2009) inhibit in it an inherent flaw of not testing the ratio of leverage with profitability since this is what the trade-off model predicts.

5. Conclusion

The main aim of this paper was to clear the ambiguity that has prevailed in the finance literature regarding the trade-off model of capital structure. While earlier studies have generally disregarded the theory, later analysis used smart data structure techniques to identify the validity of the model. This paper tested the three main predictions of the model and used a variety of specifications to understand the relationship of leverage with profitability, firm size and growth. While the initial estimation result of the paper coincided with the literature that disregarded the model, a closer look at the evidence suggests that the other predictions of the model are empirically valid. The asset size of the firm also appears to have no significant impact on the results but it does give a very useful insight into the tendency of large asset based firms to have lower leverage levels by doing away with debt.

The estimation results obtained after adjusting the data structure to the likeness of empirically valid test of the trade-off model suggests the same hindrances that have obstructed the development of the trade-off model. The paper thus presents a complete version of the analysis of earlier studies i.e. the trade-off model is empirically valid with respect to its predictions regarding the relationship of leverage with firm size, when measured with respect to sales, and growth. The evidence does suggest a negative relationship between leverage and profits, but given that profits are a subset of the sales of the firm one can conclude a rather softer version of the trade-off model i.e. leverage is directly proportional to the sales of the firm. The author therefore concludes that although the trade-off model is not able to explicitly draw on empirically evidence for profitability, its general predictions are rather pragmatically valid.

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