Firm-Specific Determinants of Capital Structure: Implication of Pecking Order Theory in Automotive Industry of Pakistan

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Abstract

The paper studies static trade-off and pecking order theories, which are widely tested theories around the globe in examining the capital structure of non-financial firms. A balanced sample of 21 automotive firms listed on Pakistan Stock Exchange are investigated for simple/robust random and fixed effect models. A rigorous methodology is adopted where the models are tested for presence of multicollinearity, heteroscedasticity, omitted variable bias and normality of residuals. Six determinants of capital structure such as, liquidity, size, profitability, non-debt tax shield, capital intensity and effective tax rate showed significant relationship with the pecking order theory. The results show automotive firms have applied conservative approach as no significant evidence has supported inclusion of debt in the capital structure. The researchers suggest that these firms do not operate at an optimal capital structure, as there is no support found for static trade off theory. The inclusion of debt can benefit firms in terms of tax shield, growth and investment opportunities.
Keywords: Capital structure, Pecking order theory, Static trade-off theory, Hausman's robust models

Capital structure primarily refers to the fraction of debt and equity in the financial structure of a firm (Akingunola, Olawale, & Olaniyan, 2018). The appropriate choice of capital structure helps an organization to speed up its performance more effectively and ensures the consistency of operations to achieve its planned goals (Hossain & Hossain, 2015). In addition, it maximizes shareholder's value and, distributes risk and power among a diverse type of stakeholders. However, choosing the right capital structure to finance the organization's operations has challenged both academics and experts (Handoo & Sharma, 2014).

There are several theories linked to the optimal capital structure in the literature of corporate finance, however, there is no definite theory as studies provide varying evidence about this complicated decision (Naseem, Zhang, & Malik, 2017). Some suggest that pecking-order theory fits best (Chipeta & McClelland, 2018) other says that trade-off theory describes the capital structure better (Singh & Kumar, 2012). Many propose that both trade-off and pecking order theories can be used simultaneously for inclusion of debt in the capital structure (Serrasqueiro & Caetano, 2015). The first question while deciding the capital structure is whether a firm is managing its financial resources on adequate knowledge or following a random process based on historical figures (Ting & Chin, 2017).

Prior researches have examined which factors affect or help in understanding the capital structure decision of firms in the United States and other countries. (Öztekin, 2015). Few variables that affect the capital structure in developing countries are firm size, profitability, liquidity and growth opportunity (Alipour, Mohammadi, & Derakhshan, 2015). However, inclusion of debt and equity also varies as per firm level specifications (Chaudry & Guidi, 2013). Specifically the capital structure of automobile sector of Pakistan is determined by the debt tax shield, tax provision, liquidity, asset structure, non- debt tax shield, size and profitability of the firms (Afza & Hussain, 2011).

Automobile industry is extremely important to the economy of Pakistan. Automotive industry is one of the fastest growing industries not only in Pakistan but also, in the entire south Asian region, with an approximate 4% contribution to the country's GDP. Large scale manufacturing in the country grew by 5.6% in Fiscal Year (FY) 2016-17, of which 25% of the contribution was from the automobile industry. Currently, there are three major players in the industry, Suzuki, Toyota (Indus Motors) and Honda that are currently enjoying their oligopolistic market to the fullest and maximum of profits. The auto policy 2016-21 has recently attracted a lot of investment into this automobile industry of Pakistan with an estimated $800 million investment by some of the new expected entrants into the market. According to statistics the market still has a lot of potential to grow since only 10 out of 1000 potential customers own a vehicle. All these

facts fascinated the author to look into the other possible reasons behind a remarkable success of the industry. One possible explanation for such facts could be the optimal capital structure of these firms that is the backbone of every progressing organization.

The aim of this research is to identify the firm-specific factors that impact the decision of optimal capital structure and whether pecking order or static trade off theory is followed in the automobile industry of Pakistan. The study used three different proxies of capital structure (i) book value of short-term debt to total asset ratio (Huang & Song, 2006), (ii) book value of long-term debt to total asset ratio (Titman & Wessels, 1988) and (iii) book value of total debt to total asset ratio (Burgman, 1996) to study the impact of eight firm specific factors namely profitability, liquidity, capital intensity, effective tax rate, size of firm, investment opportunity and growth on debt. The study answers the following questions: What firm-specific factors have an impact on the capital structure of automotive firms listed on the Karachi Stock exchange of Pakistan? The following objectives are set: To identify the significant firm-specific factors that explain the changes in the capital structure of the automotive firms of Pakistan. To find the factors that support the pecking order theory. To highlight the factors that support the static tradeoff theory. To shed light on those factors that have significant relationship with the three proxies of the capital structure.

Literature review

Static Trade off theory

As per trade-off theory the optimal ratio of debt is where the marginal cost of raising one dollar of debt and marginal benefit of one dollar interest payment in terms of tax deductibility are equal (Abel, 2017). A number of researches support the trade-off theory by which company determines its debt ratio in a way so that financial benefits of debt financing due tax shield can overcome the costs of financial distress and bankruptcy (Lupi, Myint, & Tsomocos, 2017).

Pecking order theory

Pecking order theory of capital structure exhibits how managers could decrease ineffectiveness in the existence of information asymmetry in the source of finance (Dada & Ukaegbu, 2015). A firm may try to finance its current and viable growth, through internal financing, then equity and consider debt as a last resort (Eldomiaty, Azzam, El Din, Mostafa, & Mohamed, 2017).

Determinants of Capital Structure

Profitability: Profitability is an important determinant under both trade-off and pecking order theory. According to the trade-off theory profitable firms can take advantage of larger tax-shield and pecking order suggests that profitable firms can depend on internal financing (Dierker, Kang, Lee, & Seo, 2017). A profitable firm add more debt to its capital structure as it has higher capacity to pay interest expense, which increases its tax-shield (Aurangzeb & Haq, 2012).

Liquidity: The companies with higher liquidity incur high cost on debt issuance than equity, therefore such firms prefer equity financing over debt financing in their capital structure (Sharma & Paul, 2015). Pecking order theory shows a negative relation between debt and liquidity (Afza & Hussain, 2011).

Size: Firm size is one of the traditional variables studied in previous researches on capital structure (Yang, Albaity, & Hassan, 2015). As the size of business increases, the chance of companies borrowing money from an external source also increases. Similarly, small and medium sized businesses face a higher cost of external financing as compare to large size (Jiang, Dong, & Du, 2018).

Effective tax rate: Trade-off theory suggests that an increase in the effective tax rate lead to external borrowing. Therefore, a direct relation exists between debt and effective tax rate. (Ahmed, Haq, Nasir, Ali, & Ullah, 2011). Further, researches confirm a significant relationship of effective corporate with the capital structure choice. (Faccio & Xu, 2015).

Capital Intensity: The Capital Intensity is defined as the debt financing capacity of firms during financial distress. Capital Intensity ratio has direct impact on capital structure. However, such firms have higher portion of debt in their balance sheet, as Anderson and Campbell (1990) and Shen (2008) that showed negative relationship as well.

Non-debt tax shield: Capital Intensive firms incur huge depreciation cost that acts as a tax shield. The research show that non-debt tax shield is negatively associated with debt (Jovanovic, 2015; Yang, Albaity, & Hassan, 2015).

Growth rate: The growth rate supports the static trade-off theory as it has an indirect association with long-term debt ratio and total debt ratio. Companies having high growth opportunities tend to have this negative relationship because they use limited debt (Hossain & Hossain, 2015).

Investment opportunities: Titman and Wessels (1988) along with Barclay and Smith (1996) suggest an inverse effect of investment opportunities on capital structure of a corporation.

Methodology

Data Collection

The three proxies of capital structure (short-term debt to total asset ratio, long term debt to total asset ratio and total debt to total asset ratio) and eight independent variables (profitability, non-debt tax shield, growth, investment opportunities, effective corporate tax rate, liquidity, capital intensity, and size) were calculated by using Financial Statement Analysis issued by State Bank of Pakistan (SBP) for "joint stock companies listed on the Karachi Stock Exchange" (SBP 2005, SBP 2011, SBP 2012).

Population and Sampling

The study concentrated exclusively on a single industry of Pakistan's economy in order to have a detailed analysis of the automotive industry. A sample size of 21 firms listed on Pakistan's largest stock exchange. Twelve years data was collected from fiscal year 2000 to fiscal year 2011.

Measurement and Instrumentation

Table 1 shows the measurements for all the variables studied in this paper.

Table 1: *Determinants of the Capital Structure*

Determinants	Measure	Literature
Profitability	Profitability = Net Income after taxes/Total Sales	Aurangzeb & Haq (2012), Dieker, Kang, Lee & Seo (2017), Serrasqueiro & Caentano (2015)
Growth	Percentage increase in total assets	Sheikh & Wang (2011).
Investment Opportunity	Growth in sales / Growth in total assets	Sheikh & Wang (2011).
Effective Corporate Tax Rate	Corporate Income Tax Amount / Gross Profit	Ahmed, Haq, Nasir, Ali, & Ullah (2011), Faccio & Xu (2015).
Non-debt Tax Shield	Yearly Depreciation Expense	Jovanovic (2015), Yang, Albaity, & Hassan (2015).
Liquidity	Current assets/ current liabilities	Sharma & Paul (2015), Afza and Hussain (2011).
Capital Intensity	TA /Sales	Anderson & Campbell (1990).
Size	Natural log of sales OR Interest Paid / Interest Bearing Debt (both short and long term)	Yang, Albaity, & Hassan, (2015), Awan & Amin (2014), Jiang, Dong & Du (2018), Allini, Rakha, McMillan, & Caldarelli (2017).

Source: Author's Resource

Research Design

This study then tested whether Gauss-Markov's assumptions were realized to determine OLS estimators as Best Linear Unbiased Estimator (BLUE). For this, various tests were conducted to check whether the data met the requirements of multiple linear regressions. The 3.12 mean value of Variance Inflation Factor (VIF) showed absence of multicollinearity among the independent variables. The p-values for homoscedasticity in Cameron and Trivedi (1992), and White (1980)'s tests were very low (less than 0.05); hence the null hypothesis for homoscedasticity was rejected for all three models. Due to the presence of heteroscedasticity in all three research models, OLS assumption of equal variances among the residuals was violated. Omitted and irrelevant variables in the regression analysis is depicted by a "model specification link test for single-equation models". The link test showed that _hatsq was insignificant for only Model 2 (shown below), showing that the model did not have any specification error. However for

Model 1 (shown below) and Model 3 (shown below), there were model specification errors due to 0.05 significance level for p-values of _hatsq. Omitted variable bias was tested by Ramsey's (1969) regression specification test which showed omitted variables at 0.05 significance level for all three models.

Both random and fixed effects were checked against the three models of this study, but choosing the most accurate output was based on Hausman's specification test (1978). Unfortunately, simple Hausman was only applicable in Model 3 where the null hypothesis was rejected and fixed effect model was preferred. In case of Model 1 and Model 2, due to presence of severe heteroscedasticity and serial correlation, a robust version of the Hausman test had to be applied (Wooldridge, 2002). The robust Hausman test accounts for huge differences in variances of error terms. As this study is based on micro panel data, therefore serial correlation and cross sectional dependence does not have any impact on the relationships between independent and dependent variables (Baltagi, 2008).

In Model 1, Model 2 and Model 3 all eight independent variables were part of the multiple linear regression analysis to test the impact of the few significant independent variables.

Model 1

$$Y_{it} = \beta_0 + \beta_1 Profitability_{it} + \beta_2 Size_{it} + \beta_3 NonDebtTaxShield_{it} + \beta_4 EffectiveCorporateTaxeRate_{it} + \beta_5 Growth_{it} + \beta_6 InvestmentOpportunity_{it} + \beta_7 Liquidity_{it} + \beta_8 CapitalIntensity_{it} + \mathcal{E}_{it}$$

Where Y_{it} is the dependent variable (book value of short term debt to total assets ratio), β_0 is the intercept for regression line, β_1 to β_8 are the coefficients for each independent variable and $\mathcal{E}it$ is the error term

Model 2

$$Y_{it} = \beta_0 + \beta_1 Profitability_{it} + \beta_2 Size_{it} + \beta_3 NonDebtTaxShield_{it} + \beta_4 EffectiveCorporateTaxeRate_{it} + \beta_5 Growth_{it} + \beta_6 InvestmentOpportunity_{it} + \beta_7 Liquidity_{it} + \beta_8 CapitalIntensity_{it} + \mathcal{E}_{it}$$

Where Y_{it} is the dependent variable (book value of long term debt to total assets ratio)

Model 3

$$Y_{it} = \beta_0 + \beta_1 Profitability_{it} + \beta_2 Size_{it} + \beta_3 NonDebtTaxShield_{it} + \beta_4 EffectiveCorporateTaxeRate_{it} + \beta_5 Growth_{it} + \beta_6 InvestmentOpportunity_{it} + \beta_7 Liquidity_{it} + \beta_8 CapitalIntensity_{it} + \mathcal{E}_{it}$$

Where Y_{it} is the dependent variable (book value of total debt to total assets ratio).

Each independent variable will have three distinct hypotheses for each proxy of the capital structure.

H1: Firm-specific variables significantly affect the Book value of short-term debt to total asset ratio (capital structure) of automotive firms.

H2: Firm-specific variables significantly affect the Book value of long-term debt to total asset ratio (capital structure) of automotive firms.

H3: Firm-specific variables significantly affect the Book value of total debt to total asset ratio (capital structure) of automotive firms.

Data Analysis

As per Hausman's specification test, robust fixed effects model showed significant results of both short-term debt to total asset ratio and long term debt to total asset ratio for model 1 and model 2, however, for model 3, a simple fixed effects model was significant. Amongst the three research models, the highest overall significance (F-statistic) at the 0.001 level was for Model 2 (670.24) following which, Model 1 (80.69) and Model 3 (12.34) had lower overall significance. The significant relationships supported the pecking order theory at 0.001 significance level (see Table 2).

Table 2: *Significance of the Research Models*

Classification	Model	Hausman Test	Fixed or Random Effects	Model test	p-value
	SDTA	Robust	FE	80	0.000
	LDTA	Robust	FE	670.24	0.000
Three Research models	TDTA	Simple	FE	12.34	0.000

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We found that there is a negative relationship of Liquidity and size (see Table 3) with the capital structure (total debt to total asset ratio), which implies that firms with high liquidity would depend on internal financing than debt (Sharma & Paul, 2015). Further, larger firms will also prefer internal financing instead of opting debt from any outside source (Awan & Amin, 2014). Non-debt tax shield found to have a negative relationship with capital structure (total debt to total asset) (Ilyas, 2008). Capital Intensity has also shown a negative relationship with total debt to total asset ratio supported by Anderson and Campbell (1990). Profitability is a negatively related with the capital structure (long-term debt to total asset ratio) (Serrasqueiro & Caetano, 2015). However, this relationship refutes few previous researches, where relationship of profitability with short-term and long-term debt were found to be insignificant (Kumar & Kaushal, 2017), but it supports the results of Gill, Biger, & Mathur (2011). For effective corporate tax rate and capital intensity, the results were negatively related with the capital structure of automotive firms. The theory suggests that firms opt for increase in debt ratio to avail the advantage of tax shield of debt, therefore result in direct relationship between debt and profitability (Dierker, Kang, Lee, & Seo, 2015). However, the growth and investment opportunity shows an insignificant relationship with the growth and investment opportunity, negating Hossain & Ali (2012).

Table 3: *Findings on Capital Structure of Automotive Firms in Pakistan*

Models	Variables	p-value	Sign	Theory	Supporting International studies	Supporting Pakistani studies
SD/TA Model 1 (Robust Fixed Effects)	Profitability	0.026	-ve	Pecking Order	Huang & Song (2006), Titman & Wessels (1988), Dieker, Kang, Lee & Seo (2017).	Shiekh & Wang (2011), Ahmed, Haq, Nasir, Ali, & Ullah (2011), Aurangzeb & Haq (2012).
	Liquidity	0.004	-ve	Pecking Order	Sharma & Paul (2015).	Ahmed, Haq, Nasir, Ali, & Ullah (2011), Shiekh & Wang (2011).
	Capital Intensity	0.009	-ve		Anderson & Campbell (1990).	
LD/TA Model 2 (Robust Fixed Effects)	Profitability	0.000	-ve	Pecking Order	Huang & Song (2006), Titman & Wessels (1988).	Shiekh & Wang (2011), Ahmed, Haq, Nasir, Ali, & Ullah (2011).
	Effective Corporate Tax Rate	0.000	-ve		Faccio & Xu (2015).	Ahmed, Haq, Nasir, Ali, & Ullah (2011), Shiekh & Wang (2011).
	Capital Intensity	0.001	-ve		Anderson & Campbell (1990).	
TD/TA Model 3 (Simple Fixed Effects)	Profitability	0.000	-ve	Pecking Order	Huang & Song (2006), Titman & Wessels (1988), Dieker, Kang, Lee & Seo (2017).	Shiekh & Wang (2011), Awan & Amin (2014) Aurangzeb & Haq (2012).

Non-Debt Tax Shield	0.001	-ve	Pecking Order		Ilyas (2008), Yang, Albaity, & Hassan (2015).
Liquidity	0.000	-ve	Pecking Order	Jovanovic (2015).	Ahmed, Haq, Nasir, Ali, & Ullah (2011), Shiekh & Wang (2011).
Capital Intensity	0.000	-ve		Anderson and Campbell (1990).	
Size	0.000	-ve	Pecking Order	Yang, Albaity, & Hassan (2015).	Ahmed, Haq, Nasir, Ali, & Ullah (2011)

Author's Resource

Discussion and Conclusions

The study explains financing behavior of the automobile industry of Pakistan; it highlights the effect of some firm specific factors on debt inclusion in automobile industry. The results showed a negative relationship between the firm specific factors like profitability, size, capital intensity, non-debt tax shield, liquidity and effective tax rate has a negative relationship with capital structure which confirms the implication of pecking order theory in Pakistan. This implies that Pakistani automotive firms do not include debt in their capital structure, whereas the factors with insignificant relation such as investment opportunities and growth does not affect the capital structure of firm.

In Pakistan, the firms are using very conservative approach while deciding on capital structure due to several reasons. We found that most of the firms have less than 10% long-term debt in their capital structure. Moreover, firms in Pakistan are dependent on bank debt because the bond market is small and underdeveloped in Pakistan. Moreover, most of the commercial banks in Pakistan prefer to give short-term loans on conservative terms instead of long term loans due to this reason firms prefer equity to finance their long-term investment (Sheikh & Wang, 2010).This also explains an insignificant relationship of debt with investment opportunities and growth. As Pakistani firms have low profitability and pay dividends, therefore after paying dividends they are left with a negligible pool of free cash flows available for financing investment opportunities (Sheikh J. A., 2012). This restrict firms to avail new investment opportunities which restricts growth. Further, we found that most of these firms are family owned where majority of shares are held by family members therefore they enjoy more decision power and due to strict religious believes regarding interest they don't prefer debt financing.

Limitations and Future Research Direction

- The research is focused on only automobile industry of sector of Pakistan.
- The results may not be applicable to other industries or other countries.
- Only balanced data is part of the sample, therefore the recently listed firms have not been included in the study.
- The robustness of the research findings can be tested for other non-financial firms.
- Only the debt component of the capital structure has been studied. Future studies can include equity in the capital structure to test the research models.
- Total capital structure (debt and equity) can be studied in examining the impact of financial determinants mentioned above.
- More observations can be included to further test the robustness of the models as this study included micro-panel data.
- Findings of the study offer an exclusive opportunity for corporate managers and researchers to identify some other similar factors that might affect debt inclusion in other industries.
- Other financial determinants such as payout ratio, business risk and asset tangibility can be part of the theoretical framework.
- It would be interesting to study the impact of the macro-economic variables along with the financial variables to study their impact on the capital structure.

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