



PECKING ORDER AND SIGNALING THEORIES APPLICABILITY: EVIDENCE FROM MANUFACTURING SECTOR IN SOUTH AFRICA

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Abstract

This study sought to empirically test the pecking order and signaling theories of capital structure among listed manufacturing firms in South Africa. The specific aim is to ascertain if the firms follow the pecking order, as well as, conform with signaling theory prepositions in their financing choice. In doing this, we employed the advance dynamic panel estimation, Two Step System General Method of Moment techniques. The data covered 2010 to 2019 with a sample of twenty nine (29) listed manufacturing firms in Johannesburg Stock Exchange. The empirical outcomes indicate that the firms prefer to use moderate proportion of leverage after retained earnings has been exhausted to the use of equity financing. Empirical findings show that with respect to pecking order theory, the coefficients of both the short-term and long-term debt to equity ratios respectively, indicate negative and statistical significance impact on the cashflow from operations, while with respect to signaling theory, result shows that the lag of the capital structure variables positively and significantly impact on the free cashflow to asset ratio. These results imply that both theories are applicable amongst quoted firms sampled in the sector under review in South Africa. The empirical evidence therefore, suggests that financing

decisions among the listed manufacturing firms in South Africa, does conform to the pecking order and signaling theories propositions. We therefore suggest that more research be conducted to test the implications for the pecking order theory on the market value of the firms in the manufacturing sector in South Africa in order to validate or violate the Modigliani and Miller (1958) proposition that capital structure is irrelevant to determining the value of the firm.

Keywords: capital structure, pecking order theory, signaling theory, cashflow

INTRODUCTION

Modigliani and Miller (1958) provide the foundation of capital structure theory in economics and finance after the initial attempt by David Durand in 1955. Modigliani and Miller (1958) seminar work does underpin greater proportions of the researches investigating the factors that influence choice of capital structure and the impact on firms' value. Every other theory is linked to it directly or indirectly. One of these theories commonly used to evaluate the impact of capital structure on firms' value is the pecking order theory. The pecking order theory was propounded by Myer and Majluf (1984), after the initial attempt of it by Donaldson in 1961. The pecking order theory states that firms select capital structure in the preference order of internal finance (retained earnings), debt and followed by equity (Wanja & Muriu, 2020). Myers and Majluf (1984) opined that firms do use retained earnings because they are less costly, followed by the use of debt, which has a minimal information cost, and then, finally employ equity capital which attracts more transaction and asymmetric information costs. Descriptively, the pecking order can be said to have a pyramid structure; with retained earnings at the lower pyramid, debt at the middle pyramid and equity at the upper pyramid. This pyramidal structure is a reflection of the firm's appetite for risk in a descending order. When retained earnings are insufficient, firms prefer to use debt than equity because of lower information costs associated with debt issuance, while equity is rarely issued.

Overtime, these lofty ideas were intellectually polished into empirical testable predictions. For example, Shyam-Sunder and Myers (1999) were the first researchers to conduct a study to test the impact of pecking order theory on firms' financing choice (Hsu, Chiang & Liao, 2019). In the views of Hsu, Chiang and Liao (2019), the pecking order theory is emphasized on as a result of the short fall in the internal funds of a firm. The short fall in a firm's internal funds is usually due to persistent loses in earnings, the amount of capital outlay earmarked for viable projects, variability in current assets, excess of dividend payout in yearly earnings, drastic reduction in cash flows from operations and high fixed charges payments emphasis. The size of the short fall in earnings and inadequacies of retained earnings also tend

to influence the tendency for a firm to resort to external financing, such as raising debt capital from the capital market or issuing shares through initial public offering from the equity market.

Shyam-Sunder and Myers (1999) had emphasized that debt financing is used to fill the internal financing gap, which emanates from dividends, investment and variations in working capital, less internal cash flows. The deficit in earnings which pushes a firm to move from internal to external financing in relation to use of debt, attracts principal issues. One of the issues relate to a low non-debt tax shield arising from leverage employment. The aftermath of this is increase in the profitability and cash flows of a firm. More often, highly profitable firms are likely to be less leveraged than those performing poorly. Highly profitable firms do have more internal funds available, and this helps them to lower their financing deficits (Shyam-Sunder & Myers, 1999). Conversely, increase in a firm's debt, increases the interest tax shield, thus minimizes the corporate tax payable by firms and enhances cash inflows from operation (Barclay & Smith, 2005).

Different firms are likely to follow the pecking order theory in their financing choice. This may cause them to have varying signaling effects. Pettit and Singer (2005) note that pecking order theory is relevant for firms in the manufacturing sector because the cost of internal financing is higher for them than for large firms. The argument of the pecking order theory is that the decision of a firm to increase debt against equity in its financing choice will send either a positive or negative signal to investors in the market. McConnel and Servaes (2015) opine that the choice of debt structure is very relevant and the way in which it matters varies among firms with few positive net present value projects. Leland and Pyle (2017) note that managers and investors do take debt-equity ratio as a signal. In their view, high leverage implies higher bankruptcy risk (cost) for firms. Since managers always have information advantage over the outsiders, the debt structure may be considered as good or bad signal to the market, hence, the firm is required to be cautious. Stulz (1988), Aggarwal and Kyaw (2006) argue that debt can have positive or negative and/or signaling effects on a firm value.

Similarly, when firms have surplus cash inflows, debt could force managers to pay out funds that might be appealing for investment in negative net present value projects. Increase in cash inflows from operations may affect a firm if it furthers embarks on equity financing choice. Further engagement in equity financing certainly could result to high or low dividend payout, subject to the dividend policy of the firm. In addition, the payment of fixed charges from use of debts and dividends payout from the employment of equity has consequential effects on the cash flow of the firms. This is in affirmation with Shenoy and Koch (1995) who opined that pecking order theory focuses on the contemporaneous relationship between cash flow and leverage. Similarly, signaling theory is valid where there is a positive association between

previous cash flow variables and current year cash flows. This presupposes that the pecking order theory and signaling theory have a simultaneity effect on cash flows and value of a firm, this paper was prompted to provide further empirical conclusions especially in the region under reference.

LITERATURE REVIEW

The Pecking order theory suggests that firms have a particular preference order for capital used to finance their businesses (Myers & Majluf, 1984). Owing to the information asymmetries between the firm and potential investors, firms will prefer retained earnings to debt, short-term debt over long-term debt and debt over equity. Myers and Majluf (1984) further argue that if firms issue no new security but only use retained earnings to support the investment opportunities, the information asymmetric can be resolved. Zhao, Katchora and Barry (2004) posit that in the context of asymmetric information, pecking order theory is a financing order model for firms, which seeks to establish an inverse association between their cash flow and leverage. Since the emergence of the pecking order theory, a lot of researches have been advanced to investigate its impact on firms' choice of financing decision.

The pecking order theory has been tested under both the developed and developing economies. Some of the studies that have tested this theory include Jiran et al. (2012) who tested the pecking order theory in Pakistan using non-financial firms using panel-data regression analysis for the period 2001-2008. They found that firms in Pakistan follow the pecking order theory. Shyam-Sunder and Myers (1999) was the first study to test the pecking order theory (Hsu, Chiang & Liao, 2019). The argument of Shyam-Sunder and Myers (1999) is that debt capital is employed by firms to cushion the internal financing gap, emanating from aggregating dividends, investment and change in working capital minus internal cash flows. The authors found strong support for the pecking order theory among a sample of 157 firms that had traded continuously during the period from 1971 to 1989.

Using the same idea and model, some studies that followed have provided mixed evidence of this view. For instance, Frank and Goyal (2003) analyzed US listed companies from 1971 to 1998 but did not find support for the pecking order theory, especially for small, high growth firms. Ngugi (2008) used 22 firms operating in Kenya from 1991 to 1999 to test the pecking order theory. They found better support for the pecking order than the trade-off theory when a J-test is applied. Ni and Yu (2008) used companies listed in China in 2004, and their results showed that only the large companies in the sample followed a pecking order, whereas small- and medium-sized companies did not. Lin, Hu and Chen (2008) used Taiwan listed firms and found that man

Bundala (2012) sought to investigate if Tanzanian listed firms practice pecking order theory, agency cost theory or trade-off theory. The study used secondary data from eight of the non-financial companies listed in Dar Es Salaam Stock Exchange from 2006-2012. The study used the multiple regressions model to test the theoretical relationship between the financial leverage and characteristics of the firms. The study indicates that there is no strong evidence for validation of static trade off theory, made little support of pecking order theory, but the agency cost theory was confirmed to be valid and practiced in Tanzanian listed firms. Arsalan (2011), in a research, tests the pecking order theory of capital structure on the textile firms listed on the Karachi Stock Exchange covering a period of six years from 2004–2009. The result shows that the firms follow a pecking order of financing, preferring internal finance to external finance and debt to equity. The paper shows that firms do indeed prefer internal financing to external financing. The study concludes that the role of preferring debt to equity is ambiguous and requires further research on empirical fronts as well as theoretical fronts.

The size of a firm is one of the factors often considered in examining the impact of pecking order theory on firms' financing choice. Pecking order theory tends to predict a negative relationship between size and debt (López-Gracia, Sogorb-Mira 2008). According to Myers (1984), greater firm size lessens the problems of information asymmetry between managers/owners and creditors, allowing firms to obtain debt on more favourable terms. A positive relationship between size and debt may be expected in the pecking order approach (Psillaki & Daskalakis, 2009). According to Pecking Order Theory, the relationship between size and debt can be positive or negative. Size plays an important role in capital structure (Booth et al, 2001; Amidu, 2007; Abor and Biekpe, 2006; Abor and Biekpe, 2009;). Small firms are often managed by very few managers whose main objective is to minimize the intrusion in their business and this is why internal funds will lie in the first place of their preference of finance. If internal funds are not enough, small firms will prefer debt to new equity mainly because debt means lower level of intrusion and lower risk of losing control.

Hussain and Matlay (2007) assert that small firms strive for external sources of finance only if the internal sources are exhaust. Small firms try to meet their finance their finance needs with a pecking order of personal and retained earnings, debt and issuance of new equity. The pecking order theory can be easily applied in small firms because small firms borrow as their investment needs rather than an attempt to achieve an optimal capital structure (Daskalakis and Psillaki, 2008). Pettit and Singer (1985) have argued that tax considerations are of little attention for small firms because these firms are less likely to generate high profit and therefore are less likely to use debt for tax shields. Large firms have an incentive to employ more debt because

they have tax deductible such as depreciation, research and development expense and investment deductions.

RESEARCH METHODOLOGY

This study tested the pecking order theory and signaling theory among listed firms in the manufacturing sector in South Africa. The nature of the study necessitated the use of causal research design. Twenty nine (29) listed manufacturing firms were selected from the Johannesburg Stock Exchange, using the purposive sampling technique coupled with data filtering based on set criteria for the period 2010 to 2019. This represents three hundred and eighty-five (385) firms' annual observations. The rationale behind the data selection is based on availability of authenticated and valid data at the time of the study. Descriptive statistics, correlation tests and the Two-step System General Method of Moment were employed to analyze the data. The model used is based on the works of Shyam-Sunders and Meyers (1999); Fama and French (2002); Leary and Roberts (2004). This study modified and adapted the models as follows:

Model Employed to test Pecking order theory

$$COA_{it} = \alpha_0 + \alpha_1 STDE_{it-1} + \alpha_2 LTDE_{it-1} + \alpha_3 TDE_{it-1} + \alpha_4 FSZ_{it} + \alpha_5 FAG_{it} + \mu_{it} \quad (1)$$

Model Employed to test Signaling theory

$$FCA_{it} = \beta_0 + \beta_1 STDE_{it-1} + \beta_2 LTDE_{it-1} + \beta_3 TDE_{it-1} + \beta_4 FSZ_{it} + \beta_5 FAG_{it} + \varepsilon_{it} \quad (2)$$

Where,

COA represents cash flow from operation to asset ratio which the dependent variable of the first model; FCA represents free cash flow to asset which form the dependent variable of the second model; $STDE$ represents short term debt to equity ratio, $LTDE$ represents long term debt to equity ratio; TDE represents total debts to equity ratio. The battery of control variables in the model are: FSZ represents firm size and FAG is firm age; i represents individual company in the sample size; t represents the periods the study covers; the lagged value of short term debt to equity ratio, $STDE_{it-1}$ represents the signaling effect of debt-equity employment of the firms' value; and μ_{it} and ε_{it} are the error terms while α_0 and β_0 are the intercept terms. The *a priori* expectations of this study are that $\alpha_1, \alpha_2, \alpha_3 < 0$ in stochastic model 1, that is, they are expected to be negative. However, $\beta_1, \beta_2, \beta_3 > 0$ in stochastic model 2 are expected to be positive.

With respect to the necessary conditions under which each theory is considered applicable based on the theoretical considerations, for the pecking order theory, the expectation is that the coefficients of the capital structure variables must be negative and statistically significant. While for signaling theory applicability, the coefficient of the lag of both short and long term debt to equity ratios variables respectively, are expected to be positive and statistically significant. But where the total debt to equity ratio is considered, the coefficient of the lag of the variable is expected to be negative and statistically significant.

RESULTS AND DISCUSSION

The empirical analysis in this section starts with summary statistics; diagnostics tests results and the Two-Step System Generalized Method of Moment results on the variables of the study. The Two-Step System Generalized Method of Moment is employed to analyze the impact of the pecking order and signaling theories on the value of the manufacturing firms.

Descriptive Statistics

Table 1 reports the descriptive statistics results of the indicators of pecking order and signaling theories used in our panel regression analysis.

Table 1 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
COA	296	0.062525	0.0734162	-0.3297	0.2693
FCA	291	-4.71495	24.11345	-101.239	63.3101
STDE	296	31.38507	15.08455	0	79.6201
LTDE	296	37.94234	69.91672	-225.7925	429.146
TDE	296	1.153592	1.322008	0	16.0803
FSZ	296	6.397182	1.117991	0	7.9536
FAG	296	18.57095	19.17047	0	76

Source: Researcher's Computation from STATA 14 (2021)

The mean value of cash flow from operating assets (COA) is 6% while the average value of free cash flow to asset is -4.71%. It is an indication that both the pecking order and signaling theories contribute far below average on the listed firm value in South African emerging market. Short term to equity ratio averaged 31.38% with a standard deviation of 15.08. It suggests that the sample firms employ less proportion of short term debts than equity in their financing choice and as such, are not likely to be predisposed to financial distress. The proportion of long term

debt to equity of the sample firms in the period considered is 37.94% with a variability of 69.91%.

It can be deduced that the more the firms employ a higher percentage of long term debt than short term debt in relation to equity, the higher the risk of sliding into bankruptcy cost, and consequently lead to a negative effect on the firm value, proxy as cash flow from operation to total asset ratio. The mean value of total debt to equity is 1.15% while the standard deviation is 1.32. The firm size is 6.397182 with a standard deviation of 1.11. It suggests that the manufacturing firms are relatively small. The firm age averaged approximately 19 years, which suggests that majority of the listed manufacturing firms in South Africa Johannesburg Exchange are relatively young which justifies their small size in nature.

Correlation Analysis

The essence of the correlation test is to reveal the association among variables of interest. The variables could be weak, strong, negative or positively correlated. In addition, it seeks to reveal the tendency for multicollinearity problem where there is evidence of perfect correlation between two explanatory variables in the specified models. The threshold level for variables to be perfectly correlated is 70%. Moreover, the crucial issue about this statistic is the direction of the variables in relation to each other. The result is as presented below in table 2.

Table 2 Correlation Matrix

	COA	FCA	STDE	LTDE	TDE	FSZ	FAG
COA	1	-					
FCA	-	1					
STDE	0.0581	0.098	1				
LTDE	0.0459	-0.1124	-0.0644	1			
TDE	-0.0012	-0.0753	0.4242	0.7058	1		
FSZ	0.1581	0.0306	0.3814	0.1845	0.2268	1	
FAG	0.0795	0.0875	0.0412	-0.0149	-0.052	0.2679	1

Source: Researcher's Computation from STATA 14. (2021)

Table 2 above presents the results which indicate the nature and degree of association among cash flow from operation to asset ratio (COA) and Free Cash flow (FCA) to asset ratio being the dependent variables respectively, and the explanatory variables.

The correlation between cash flow from operating asset ratio and short-term debt to equity is positive and very weak ($r = 0.0581$). While the association among cash flow from operating asset ratio and long-term debt to equity is positive and very weak as well ($r = 0.0459$). With respect to cash flow from operating asset and total debts to equity ratio, the results indicate a very weak and negative association ($r = -0.0012$) across the sampled firms in South Africa.

Furthermore, the association between short term debt to equity ratio and long-term debt to equity ratio is negative but in a very weak manner ($r = -0.0644$); while the test reveals a positively perfect association between long-term debt to equity ratio and total debt to equity ratio. This result suggests that we drop the total debt to equity ratio in the model for regression to avoid multicollinearity problem.

Additionally, for the control variables, the firm size and firm age both indicate very weak though positive association with cash flow from operation to asset ratio and free cash flow respectively. The correlation between free cash flow to asset ratio and short term debt to equity ratio as well as long term debt to equity ratio is positive ($r = 0.098$). However, the association between free cash flow to asset ratio, long term debt to equity ratio and total debt to equity ratio is negative. This could connote that free cash flow from asset is not enhanced when firms follow the pecking order theory; and this has the tendency of signaling negative effect on the firm value in the emerging market of South Africa. The size of the firm has a positive association with short term debt to equity ratio, long term debt to equity ratio and total debt to equity ratio; meaning the size of a firm is important when following the pecking order theory to influence its market value in South Africa.

In the same vein, adoption of long term debt and total debt to equity ratio is negatively associated with firm value. It can be deduced that young firms are careful to following the pecking order theory when embarking on a decision to increase free cash flow in order to avoid creating adverse signaling effect in the market.

Dynamic Panel Regression Results

Table 3 reveals that the conditions of the significant p-value of the first-order serial correlation AR(1), the absence or insignificant results of both the second-order serial correlation AR(2) and the Hansen test are satisfied. This confirms that the validity of the instrumental variables and they were uncorrelated with residual term in the two empirical models (Blundell & Bond, 1998).

Table 3 Two-Step Generalized Method of Moments Results

Model	(1) COA	(2) FCA
Lagged value of cash flow from operation to asset ratio	0.442 [0.04]***	
Lagged value of free cash flow to asset		0.171 [0.02]**
Short term debt to equity ratio	-0.001 (0.001)***	-0.357 [0.16]
Long term debt to equity ratio	-0.021 [0.001]***	-0.032 [0.03]
Firm size	0.015*** [< 0.001]	5.153*** [1.76]
Firm age	-0.0001*** [< 0.001]	0.076** [0.04]
Observations	227	220
No. of instruments	38	38
No. of groups	29	29
Arellano-Bond: AR(1)	0.003	0.002
Arellano-Bond: AR(2)	0.275	0.066
Hansen test (p-value)	0.887	0.765

Standard errors in brackets; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

In Table 3 above, the result of model 1 indicates that the coefficient value of the lag cash flow from operating assets ratio (LCOA) is positive and statistically significant. Commenting on the impact of pecking order theory indicators on firm value, it can be observed that short term debt to equity (STDE) has a significant negative impact on firm value. Long term debt to equity (LTDE) has a positive significant sign. Total debts to equity (TDE) have a statistically significant positive effect on firm value. The result suggests the firms follow the pecking order theory in their choice of capital structure towards enhancing the market value in South Africa. The finding supports the empirical results of Myers and Majluf (1984); López-Gracia, Sogorb-Mira (2008) and Myers (1984).

Firm size is positive and statistically significant. The implication is that size is very germane towards the choice of capital structure by listed firms in South Africa. The finding is in tandem with the research outcome of Daskalakis and Psillaki (2008); Hussain and Matlay (2007); (Booth et al (2001); Amidu (2007); Abor and Biekpe (2006); Abor and Biekpe (2009).

Firm age has a negative significant impact on firm value. The implication is that the incorporation age of the firms is not a prerequisite in their choice of capital structure at influencing market value in a pecking order manner in South Africa clime. The finding is in consonance with the research outcome of Zhao, Katchora and Barry (2004).

In Table 4, the result of model 2, indicates that the coefficient value of the lag free cash flow to assets ratio (FCOA) is positive and statistically significant. Commenting on the impact of the signaling theory indicators on firm value, it can be observed that short term debt to equity (STDE) has a significant negative effect on free cash flow of the firms. Long term debt to equity ratio (LTDE) has an insignificant negative effect on free cash flow to asset ratio. Similarly, total debts to equity ratio is negative and statistically insignificant. The implication of the result is that the decision to increase debt in previous years as against equity will signal a negative current cash flow though insignificant. It further means that the decision to use debt as against equity provides managers and shareholders with a signal that cash flow is going to change insignificantly. Firm size has statistically positive significant impact on firm value. The implication is that size is very germane towards the choice of capital structure by listed firms in South Africa. The finding is in tandem with the research outcome of Daskalakis and Psillaki (2008); Hussain and Matlay (2007); (Booth et al (2001); Amidu (2007); Abor and Biekpe (2006); Abor and Biekpe (2009). Firm age has a positive significant impact on firm value. The implication is that the incorporation age of the firms is a prerequisite in their choice of capital structure at influencing market value in a pecking order manner in South Africa clime. The finding is in consonance with the research outcome of Zhao, Katchora and Barry (2004).

CONCLUDING REMARKS

Our objective in this paper was to ascertain empirically the applicability of the pecking order and signaling theories of capital structure among quoted firms in the manufacturing sub sector in South Africa. As a first step, we examined the relevance of these theories towards the financing pattern of the capital structure of firms. We also identified and discussed the firm specific variables considered to work in unison with components of capital structure to influence the level of cashflow generated which form a necessary condition to determine the applicability of the theories under review. Such variables include short term and long term debt to equity ratios respectively, firm size and firm age.

The model specified in the study was estimated using STATA 14 econometric software package. The estimation of the model entailed testing the data on the variables in the specifications for stationarity and normality, as well as against perfect correlation among the

variables to avoid multicollinearity problem too. Furthermore, the study used advance dynamic panel estimation, which is the Two Step System General Method of Moment.

The results obtained were generally satisfactory. One major finding which is the major objective, show both short term and long term debt ratios to equity respective, does impact the cash flow from operation to asset ratio positively and in a significant manner. This is a necessary condition to establish applicability of the pecking order theory. The findings implies that the firms preferred to use moderate proportion of leverage after retained earnings have been exhausted and then considers the use of equity financing as last resort. This has contributed positively to the magnitude of cash flow of the firms, and therefore favourably signal to the investors of adequacy of cash for reinvestment, consequently, affect possible expected returns. Going by the major empirical outcomes, the study concludes that the sampled firms to a great extent exhibit some attributes that associate with the pecking order and signaling theories in their financing strategies. Overall, the findings are indicative that listed manufacturing firms in South Africa follow both pecking order and conform to signaling theory preposition as evidenced in their capital structure decisions / implications. For further studies in this area, we suggest that more elongated data should be considered in terms of the series as well as other sectors, and possibly quarterly data which is believed would be more revealing to guarantee more robust outcome.

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