

Impact of Weighted Average Cost of Capital and Value of Firm on Firm's Investment Decision

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Abstract: The intention of this study was to examine the impact of Weighted Average Cost of Capital and value of firm on firm's investment decision. The yearly data of all variables of Food sector was taken from PSE (Pakistan Stock Exchange) for the year 2008 to 2014. The set of variables used in this study as regressor are WACC and Value of firm whereas regressand is Investment. The techniques that used in this study includes Regression Analysis, Variance Inflating factor and Generalized Least Square Method. Data lie under micro panel category due to its nature where $(n > t)$. Empirically, we find that weighted average cost of capital plays an important role in investment decision. The results showed that there is negative relationship between Weighted Average Cost of Capital and Investment Decision (which means the high weighted average cost of capital leads to low investment and vice versa) whereas Value of firm has positive relationship with the firm's Investment Decision.

Keywords: Weighted Average cost of capital (WACC), Investment, Leverage, Cost of Debt and Equity.

JEL Classification: E22, D63, H63, E22

1. Introduction

The study finds out that how does the weighted average cost of capital, leverage, growth and value of firm affect the corporate investment? And how it effects the decision of investors while making investment? To answer these questions, firm level data of food and personal goods sector of Pakistan has been taken from Pakistan Stock Exchange for the years 2008 to 2014. The following techniques Regression Model, Variance Inflating factor and generalized least square model used to examine the role of corporate investment. These models predict that a high cost of capital and leverage lead to less investment which means a firm with high cost of capital tends to do less or no investment in that particular firm whereas firms with high profitability tend to have more investment. This is because; high profitability or value attracts the investors to make more investment in exchange of high return and vice versa.

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The Weighted average cost of capital is a measurement of company's cost of capital in which proportion weights are given to each item of the capital of the company. WACC consists partially on cost of debt and on cost of equity. It is one of the most important measurements to make decision for investment policies because it shows the return that stakeholders expect to receive by making investment in the company. And for the company it is the minimum rate of return at which company yields the return to its investors.

To find out the impact of WACC on investment, firstly cost of debt and cost of equity should be computed individually. There are many method to compute cost of debt, we focus on firms own cost of debt. The complexity of impact is that how the cost of equity is to be measured. The cost of equity can be measured by various methods. Here, four different methods are used to compute the cost of equity and their respective effects are obtained. The methods are Capital Asset Pricing Model (CAPM), Gordon Growth Model, Earning price ratio approach and Dividend price approach.

The value of firm have direct link with the firm's profitability. A firm whose aim is to maximize its profit is actually maximizing its firm's value. By examining impact of value of firm on investment, it is concluded that there is significant and positive relationship between value of firm and corporate investment which shows that high value of firm leads to more corporate investment. The growth and leverage are negatively related with the investment. Leverage is calculated by financial debt ratio. The findings of leverage are the same as the predictions and with the others findings. This negative relation shows that a firm with high leverage leads to less investment.

2. Literature Review

In literature review, research gap as well many researchers' opinions are explained. This paper aims to examine how does investment has been influenced? What are the factors that influence the investment? Scrutinize the impact of value of firm, leverage, growth, weighted average cost of capital and its components on firms' investment decision. There are few researches conducted earlier who determined the impact of WACC on investment but a number of studies have been conducted to check the

impact of leverage, cash flow, interest rate, dividend and cost of debt on investment in foreign countries economic. There are many factors which influence the corporate investment decision.

Simmons and Banu (2016) examined the role of cost of capital, leverage, dividend and Tobin's q while making decision for corporate investment. They find out the relationship between these independent variables with investment by taking quarterly data from 1987 to 2013. VAR methodology was used to examine and they finally concluded that the leverage has positive effect on investment whereas cost of capital triggers significantly negative response from investment.

Some of the researches have been conducted to identify the impact of weighted average cost of capital on investment decision of firm such as Frank and Shen (2015) empirically investigated that the weighted average cost of capital matters for corporate investment. Weighted average cost of capital was calculated with the combination of cost of debt and cost of equity. In this study cost of equity was calculated in two ways. The one way to measure cost of equity was capital asset pricing model and the other way which used to measure was implied cost of capital. The implied cost of capital approach used the Gordon growth model to measure cost of equity. The results concluded that when implied cost of capital was used to measure cost of equity, the firms with a high cost of equity invested less. Whereas when cost of equity was measured through CAPM model then the firms with a high cost of equity invested more. In this study they suggested that implied cost of capital can measure better required return on capital than the CAPM model.

Jagongo and Mutswenje (2014) revealed in their study that investment is often supported by decision tools. The individual and market investment decision is influenced by the information structure and the factors present in the market. They concluded by using different techniques that the most important factors from which investment decision influenced are reputations of firm, firm's status, expected earnings, profit, past performance firms stock, price per share, cost of capital and expected dividend by investors. These factors identify the investors' behavior towards investment decision.

Newell and Seabrook (2006) identified some other factors such as financial, location, diversification and economic which effect the investment decision. However, this study emphasized on cost of capital, status, performance of firm and profit on corporate investment decision.

Aivazian *et al.*, (2005) used two different empirical models in their study to examine the impact of financial leverage on firms' investment decision. They use LAGRANGIAN Multiplier and HAUSMAN Specification test to measure the impact. Additionally, they used the instrumental variable approach to handle the problem of ENDOGENEITY between the leverage and investment. They reached to the result that the leverage has significantly negative relation with the investment. This negative relation is in favor of low growth firms rather the high growth firms. The result of their study provided support to agency theories of corporate leverage.

McConnell and Servaes (1995) explained in their study that the focus of their research was to investigate the relationship between corporate value or value of firm with the leverage and owners' equity. They concluded that for high growth firms the corporate value has negative relationship with leverage whereas low growth has positive relationship with the leverage.

All these researchers analyzed the impact of cost of debt or leverage on investment using different measures but theses researches do not focus on the impact of cost of equity. In this study cost of debt and cost of equity has been calculated jointly. The cost of debt in this study has been measured by firms' on debt value whereas cost of equity is measured by four methods and thus weighted average cost of capital shows different results for each method.

Kothari *et al.*, (2014) concentrated on behavior of corporate investment. Corporate investment varies with the change of time and it is also influenced by a number of factors including firms' profitability, risks, access to capital, manager incentives, investor sentiment and stock valuations. This study based on how past and future changes relates to investment. A multiple regression technique was used to identify the behavior of aggregated corporate investment. After applying the technique they concluded that the investment growth is strongly effected by change in profit and stock prices but weakly related to changes in interest rate, stock

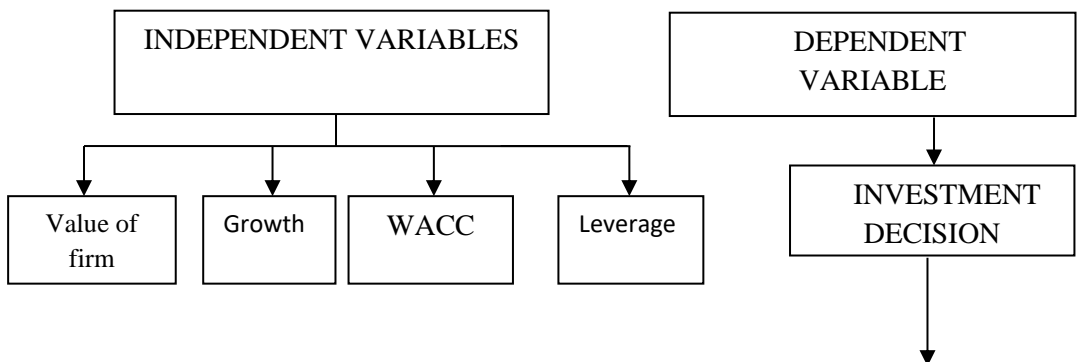
volatility and default spread and also showed that investment growth is negatively related to future profits.

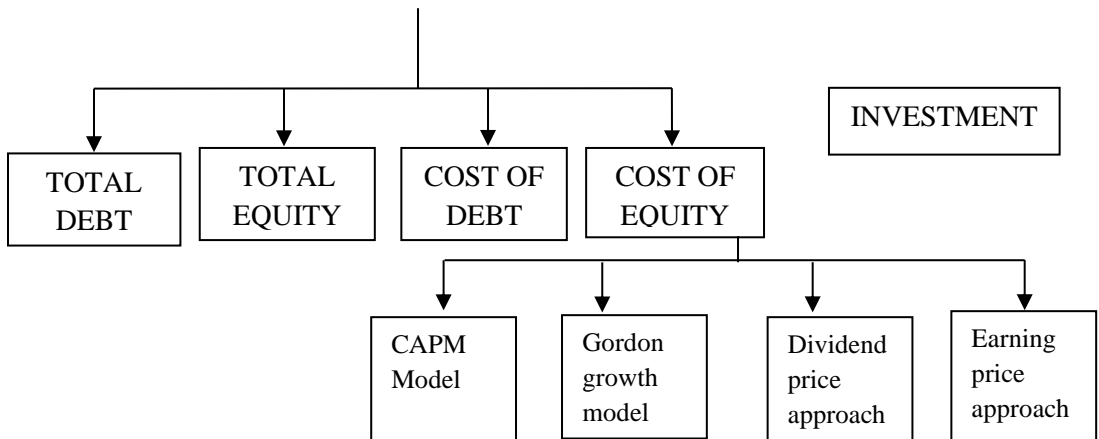
Gilchrist and Zakrajsek (2007) examined in their study the relationship of investment and cost of capital using corporate bond market as evidence. They focused on the variation occur in interest rate on investment spending and their effects on investment decision. The regression model has been applied and concluded that with 1 percent increase in cost of capital leads to reduction in investment of 50 to 70 points.

Chatelain and Teurlai (2003) used regression, correlation, heteroscedasticity and generalized method to estimate the effect of cost of capital and cash flow on investment or divestment decision and also examined investment behavior. They concluded that cost of capital has large effect on investment or divestment decision. It also concluded the investment behavior of user and states that the long run users who invest, there cost elasticity will close to one whereas those who divest, there cost elasticity will close to zero. They showed that investment and divestment decisions of users may improve the estimates of cost elasticity of users.

The above mentioned studies have been conducted to examine the effect of leverage, cost of debt, cost of equity, profit and many more on firm's investment decision. The study which was conducted to measure the factors that influence the investment shows that the factors doesn't limit to only profit and leverage but investment is also affected by the WACC, growth, firm's performance, investor behavior and market compatibilities. Our focus is to finds out that how WACC, Performance, leverage, profit and value of firm influence the investor decision for making investment.

3. Conceptual Framework





Source: Author's own formulation

4. Data and Variables

The data is collected from Pakistan Stock Exchange (PSE). The focus of this study has been on food and personal goods sector of Pakistan firms listed on Pakistan stock exchange. The data was collected from secondary sources by using income statements and balance sheets of firms. There are 16 firms included in this sector which was taken as sample size, and the data took for this study was for 7 years i.e. from 2008 to 2014 which has been taken since after the world great depression. The sample size is reduced to 15 firms because of no data properly available to find out the impact of weighted average cost of capital.

The value of firm is calculated through the profitability of firms. It is an economic measure that reflects the company's market value. It is an important measure to investigate the corporate investment. Leverage also plays an important role for corporate investment decision. It is the use of various financial instruments. It helps the investors and firm both form making investment and taking operations respectively. If investor makes investment decision by only use of leverage then the risk factor is becomes high because if investment moves against the investor then the loss will be very higher. Here leverage is calculated by leverage or debt ratio. This ratio is calculated, dividing the total liabilities of firm by the total assets of firm. WACC is the required rate of return that a company expects to get from its investors. It is used for calculating the cost of capital of the firm in which weights are given to each category of the capital. The sources of capital include common stock, bond, preferred stock and long term debts.

Weighted average cost of capital was measured by four ways due to different measures used to calculate the cost of equity. The statistical equation of weighted average cost of capital is as follow:

$$WACC = \frac{E}{V} * Re + \frac{D}{V} * Rd * (1 - Tc) \quad (1)$$

Where:

Re: denotes the cost of equity of capital;

Rd: denotes the cost of debt of capital;

E: denotes the firm's equity;

D: denotes the firm's debt;

V: denotes the total firm's financing (equity and debt);

Tc: denotes the corporate tax rate.

For computation of WACC, the measurements of Re, Rd, E, D, and V are required. For measuring each factor there are different ways. Some proxies are most common than others.

The amount of debt was taken from its own firms' debt and cost of debt was measured through the following equation.

$$Rd = Kd (1 - T) \quad (2)$$

Where:

Kd = Before tax rate

T = Marginal tax rate

The other component of weighted average cost of capital is cost of equity. The measurement of cost of equity is a complex concept so that the cost of equity was calculated in four different ways.

The methods used to calculate weighted average cost of capital are Gordon growth Model, Capital asset pricing model, Dividend Price approach and Earning Price approach. The detail of each measurement is as follows:

$$Re = [\text{Dividend per share} \div \text{current market value of stock}] + \text{Growth rate} \quad (3)$$

$$CAPM = R_f + \beta (R_m + R_f) \quad (4)$$

Where:

R_f denotes risk free rate

β denotes beta which measures fluctuation or change

R_m denotes return on market value

$$R_e = [\text{Dividend per share} \div \text{Market Share Price}] \quad (5)$$

$$R_e = [\text{Earning per share} \div \text{Market share price}] \quad (6)$$

The quantitative technique was used to examine the data and research model was developed to view the impact of weighted average cost of capital, growth, leverage and value of firm on corporate investment decision.

4.1 Model

$$\text{Model 1 } I = \alpha + \beta_1 (\text{WACC}_{\text{CAPM}}) + \beta_2 (V) + \beta_3 (G) + \beta_4 (\text{Lev}) + \varepsilon \quad (7)$$

$$\text{Model 2 } I = \alpha + \beta_1 (\text{WACC}_{\text{GM}}) + \beta_2 (V) + \beta_3 (G) + \beta_4 (\text{Lev}) + \varepsilon \quad (8)$$

$$\text{Model 3 } I = \alpha + \beta_1 (\text{WACC}_{\text{DPA}}) + \beta_2 (V) + \beta_3 (G) + \beta_4 (\text{Lev}) + \varepsilon \quad (9)$$

$$\text{Model 4 } I = \alpha + \beta_1 (\text{WACC}_{\text{EPR}}) + \beta_2 (V) + \beta_3 (G) + \beta_4 (\text{Lev}) + \varepsilon \quad (10)$$

The purpose of making above given models is to examine the effect of WACC, growth, leverage and Value of firm on the corporate investment. These four models are prepared due to different techniques used to calculate the cost of equity. Thus each cost of equity gives different value of weighted average cost of capital and makes different equation. To test the underlying hypothesis, linear regression and generalized least square technique is used. Results are calculated through STATA and gives statistical values.

5. Empirical Results

To measure the impact of WACC, growth, leverage and value of firm on corporate investment, the regression analysis is used. Results of first model are shown in the Table 1 and 2. According to the first model the hypothesis 1 has been accepted at 5% significance level and indicates that there is negative impact of growth, leverage and weighted average cost of capital on corporate investment whereas hypothesis 2 has been rejected and indicates that value of firm has positive impact on investment. Here weighted average cost of capital is measured through the CAPM model.

This shows that firm leads to high corporate investment when there is low cost of capital and leverage but high profit. This Table also shows the value of R squared and adjusted R square. The value of R square is 80% and adjusted R square is 79.9%. It shows that predictors are capable to explain the variable investment by 79%. The value of probability indicates that the overall model shows significant results.

Table 1: Summary Model 1

Model	No. of obs.	R Squared	Adj. R-squared	Prob.>F	F(4,100)
1	105	0.8072	0.7994	0.0000	104.64

Table 2: Coefficient Model 1

Variable	Coefficient	Std. Error	T- statistics	Prob.
VOF	.0122518	.0055374	2.21	0.029*
Growth	-.071991	.0037587	-19.15	0.000***
WACC _{CAPM}	-6922542	5554211	-1.25	0.216
Leverage	-2.09e+07	3.21e+07	-0.65	0.515
_cons	1.87e+07	1.64e+07	1.14	0.256

***, **, * are 1%, 5% and 10% level of significance respectively.

Table 3 and 4 show the second regression model results. Here weighted average cost of capital is measured through the Gordon Growth Model. Results show the negative impact of growth, leverage and cost of capital on investment whereas profit positively influences the investment. In this Table the value of R square is 80% and adjusted R square is 79.9%. It shows that predictors are capable to explain the variable investment by 79%. The value of probability is less than the significance level so it indicates that the overall model shows significant results.

Table 3: Summary Model 2

Model	No. of obs.	R Squared	Adj. R-squared	Prob.>F	F(4,100)
2	105	0.8070	0.7992	0.0000	104.51

Table 4: Coefficient Model 2

Variable	Coefficient	Std. Error	T- statistics	Prob.
VOF	.0122098	.0055411	2.20	0.030*
Growth	-.0719199	.0037537	-19.16	0.000***
WACC _{GM}	-.6652523	.5515023	-1.21	0.231
Leverage	-2.28e+07	3.17e+07	-0.72	0.474
_cons	1.97e+07	1.64e+07	1.20	0.233

***, **, * are 1%, 5% and 10% level of significance respectively.

Table 5 and 6 show the third regression model results. Here weighted average cost of capital is measured through the Dividend Price Approach. Results show the negative impact of growth, leverage and cost of capital on investment whereas profit positively influences the investment. In this Table the value of R square is 80% and adjusted R square is 79.9%. It shows that predictors are capable to explain the variable investment by 79%. The value of probability is less than the significance level so it indicates that the overall model shows significant results.

Table 5: Summary Model 3

Model	No. of obs.	R Squared	Adj. R-squared	Prob.>F	F(4,100)
3	105	0.8070	0.7993	0.0000	104.53

Table 6: Coefficient Model 3

Variable	Coefficient	Std. Error	T- statistics	Prob.
VOF	.0122098	.0055411	2.20	0.030*
Growth	-.0719435	.0037565	-19.15	0.000***
WACC _{DPA}	-6719001	5536394	-1.21	0.228
Leverage	-2.20e+07	3.19e+07	-0.69	0.492
_cons	1.91e+07	1.64e+07	1.16	0.248

***, **, * are 1%, 5% and 10% level of significance respectively.

Table 7 and 8 show the last one regression model results. Here weighted average cost of capital is measured through the Earning Price Approach. Results show the negative impact of growth, leverage and cost of capital on investment whereas profit positively influences the investment. In this Table the value of R square is 80% and adjusted R square is 79.9%. It shows that predictors are capable to explain the variable investment by 79%. The value of probability is less than the significance level so it indicates that the overall model shows significant results.

Table 7: Summary Model 4

Model	No. of obs.	R Squared	Adj. R-squared	Prob.>F	F(4,100)
4	105	0.8070	0.7991	0.0000	104.42

Table 8: Coefficient Model 4

Variable	Coefficient	Std. Error	T- statistics	Prob.
VOF	.012152	.0055393	2.19	0.031*
Growth	-.0719389	.0037628	-19.12	0.000***
WACC _{EPA}	-6559217	5582316	-1.17	0.243
Leverage	-2.18e+07	3.21e+07	-0.68	0.499
_cons	1.88e+07	1.64e+07	1.15	0.254

***, **, * are 1%, 5% and 10% level of significance respectively.

Generalized Least Squares is a technique to estimate the unknown parameters in a regression line. It also uses to measure the correlation between the residuals. This Model applied to investigate the impact on investment. This model gives the same results as regression model gives. The weighted average cost of capital, leverage and growth shows the negative impact on investment whereas profit shows the positive impact on investment. The negative measure of coefficient shows that there is negative relation exists between independent and dependent variables whereas positive sign shows that there is positive relation. The statistical measures of this test are given below in Table 9:

Table 9: Coefficients Summary

Investment	Coefficient	Std. Error	Z statistics	Prob.
VOF	.012152	.0054058	2.25	0.025*
Growth	-.0719389	.0036721	-19.59	0.000***
Leverage	-2.18e+07	3.13e+07	-0.69	0.487
WACC _{CAPM}	-6922542	5420355	-1.28	0.202
WACC _{GM}	-6652523	5382111	-1.24	0.216
WACC _{DPA}	-6719001	5402968	-1.24	0.214
WACC _{EPA}	-6559217	5447783	-1.20	0.229
_cons	1.88e+07	1.60e+07	1.18	0.239

***, **, * are 1%, 5% and 10% level of significance respectively.

6. Conclusions

The study focused to examine the impact of WACC and value of firm, leverage and growth on the corporates investment decision. We reached the major conclusion that there is an impact of WACC on corporate investment decision, because debt and equity both are the sources of finance for the firm.

Regression and Generalized Least Square Models are applied to find out the impacts. Empirically, we find that WACC has negative impact on investment decision which makes sense that a firm with high cost of capital generates less return or give less return to its shareholders/stakeholders in order to reserve their future cost which attracts less the investor for making investment. It is measured by four different ways but gives the same results. The value of firm shows the significant and positive impact on corporate investment which means a firm with high value attracts more investors to make investment because there will be less risk . The leverage and growth also show the negative impact on corporate investemnt but grwoth shows the significant impact on investment whereas leverage impact is insignificant on investment. Growth also plays an important role because usually investors tends to invest in high growth firms than to small firms. Its negative results show that investors tend to invest less in small firms rather than medium and firms.

We come to this conclusion that we do no reject our first hyothesis that made to examine the negative impact of WACC, leverage and growth on investment. The second hypothesis has been rejcted because value of firm shows the positive impact on corporate ionvestmet. This means the high cost of capital and leverage lead to low investment but high value of firm leads to more investment and vise versa. A full account of that relation can have implications that extend beyond our focus on the impact of the cost of capital on corporate investment.

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