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## CONTENTS

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# 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 Genralized Least Square Method. Data lie under micro pannel 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 then 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

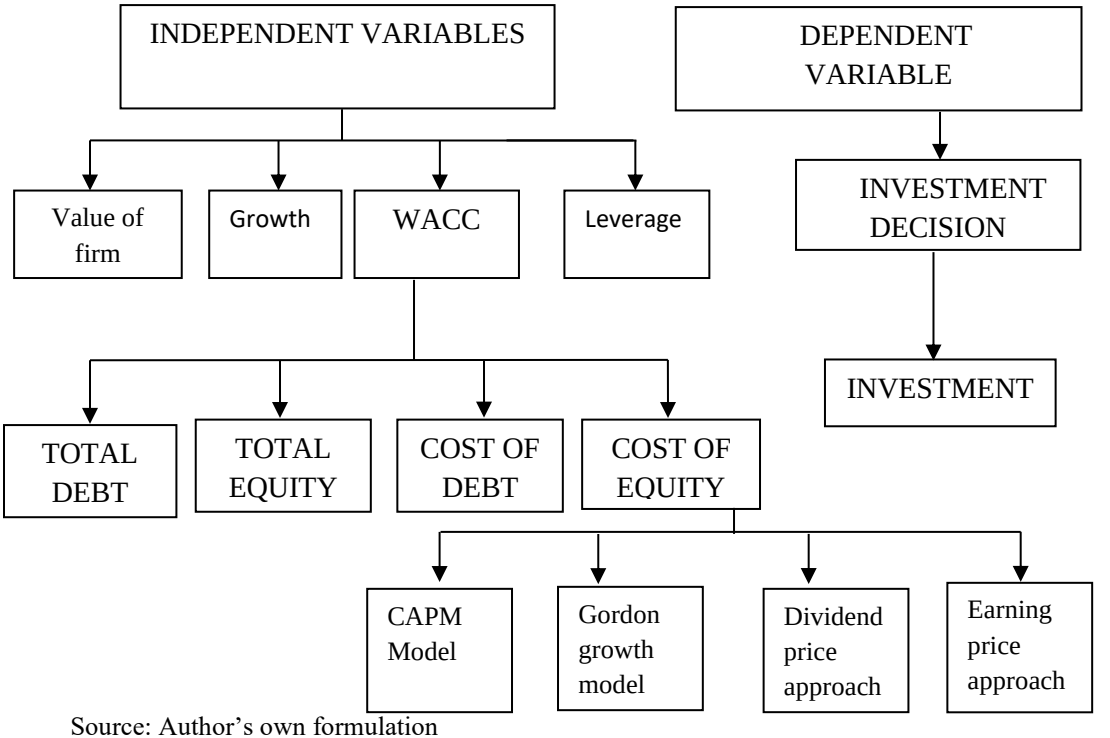
valuations. This study based on how past and future changes relates to investment. A multiple regression technique was used to identify the behavior of aggregated corporate investment. After applying the technique they concluded that the investment growth is strongly effected by change in profit and 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 evidnece. 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:

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

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

Where:
$R_f$ denotes risk free rate
$\beta$ 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 examined the data and research model was develop to view the impact of weighted average cost of capital, growth, leverage and value of firm on corporate investment decision.

### 4.1 Model

$$\text{Model 1} \quad I = \alpha + \beta_1 (WACC_{CAPM}) + \beta_2 (V) + \beta_3 (G) + \beta_4 (Lev) + \varepsilon \quad (7)$$
$$\text{Model 2} \quad I = \alpha + \beta_1 (WACC_{GM}) + \beta_2 (V) + \beta_3 (G) + \beta_4 (Lev) + \varepsilon \quad (8)$$
$$\text{Model 3} \quad I = \alpha + \beta_1 (WACC_{DPA}) + \beta_2 (V) + \beta_3 (G) + \beta_4 (Lev) + \varepsilon \quad (9)$$
$$\text{Model 4} \quad I = \alpha + \beta_1 (WACC_{EPR}) + \beta_2 (V) + \beta_3 (G) + \beta_4 (Lev) + \varepsilon \quad (10)$$

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 shareholers/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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# Impact of access to Improved Water Source on Agricultural Labor Productivity: Case Study of Asian Developing Countries

Hafiz Ahmar Javed* and Saima Sarwar**

**Abstract**: Access to improve water source has become a vital element of basic social infrastructure of countries around the world even in Asian developing countries. Accordingly, this study empirically test the influence of access to safe drinking water on agriculture labor productivity for a panel of 19 Asian developing countries. The data set of 12 years (2002-2013) shall be taken from World Development Indicators (WDI) and United Nations Development Program (UNDP). Using fixed effects with Driscoll and Kraay (1998) standard errors, agriculture labor productivity positively influenced by access to improved source of water and statistically significant. Variables are taken for this study are agriculture labor productivity, access to safe water source in rural areas, access to better sanitation facilities in rural areas, age dependency ratio, agriculture land, human development index and consumption of fertilizer. The results shall try to draw the attention of the authorities of developing countries towards the issue of insufficient investment in basic social infrastructure i.e. access to improved water source while making development policies, especially in rural areas.

**Keywords:** Agriculture labor productivity, Access to improved source of water, fixed effect estimation with Driscoll and Kraay standard errors, Panel data, Consumption.
**JEL Classification:** Q18, L95, J43, C23, E21.

## 1. Introduction

Every year, lack of safe water for drinking and unimproved sanitation facilities jointly kill above 1.6 million children whose age is less than 5 years globally. Universally, provision of access to safe water for drinking and better facilities for sanitation caught importance, about 2.6 billion and 2.1 billion of people have increased access to safe water source for drinking and sanitation facility respectively since 1990.

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In 2015, 663 million people still used unimproved source of water for drinking globally (WHO, 2015). Although gaining access improved for both water and sanitation but still, eight people out of ten survived without improved water sources while seven people out of ten survived without sanitation facilities in rural areas.

As the issue is crucial, the world has acknowledged that unsafe water for drinking can harm people health, lower the productivity level and living standards. Officially, first time the UN declared the ten year time period (1981-1990) as the Water Decade and acknowledged the importance of improved water for drinking and adequate sanitation facilities. This declaration has been varying time to time since 1990 and later UN announced time span from 2005 to 2015 as “Water for Life”. Access to improved water for drinking and fundamental sanitation facilities recognized clearly in the seventh MDG.

Gaining access to safer water for drinking and better sanitation supposed to be crucial in rural areas where possibility of access to infrastructure limitedly exist. Historically, access to improved source of water and satisfactory facilities for sanitation in rural areas of Asian developing countries has recorded low as compared to advanced countries. According to Rosen and Vincent (1999), time can be saved by reducing the distance for water collection. Woman, children, and peasants still have to cover long distances to gather the drinking water on foot.

The limited facilities can be explained by the lack of investments for infrastructure of providing better water supply and sanitation facilities. Generally, issue of repairing and maintaining the infrastructure exist even in the zones where these investments have been in sufficient amount.

Nankhuni and Findeis (2004) has initiated that time spent by children for water and wood collection have negative impact on school presence. Besides, Jabeen et al. (2011) scrutinized the influence of poor situation of water and sanitation facilities on health and argued that in rural areas the situation of water and sanitation is worse. Furthermore, by providing the access to safe water and better sanitation help to decrease the problem of diarrhea. Since, attendance of children in school, health of people and

women income generating activities have increased by providing safe drinking water. Therefore, investments is required for providing safe water in rural areas helps to promote agricultural labor productivity.

According to Ruttan (2002) productivity in agriculture is the measure of efficiency through which inputs used in agriculture to produce specific level of output. When the combination of inputs provides maximum level of output then this productivity is supposed to be an optimal. Planning and development decision-making measurement of productivity is considered as a vital tool (Dayal 1984). It indicates the features of present performance as well as future tendencies.

A hundred years back, population of the whole World was not more than 2 billion while current population of the World is more than 7.5 billion. Asia is most crowded region as more than 4.4 billion people lived in this largest continent of the World. Most of developing countries of Asia are crowded and to feed this huge population, sufficient food is required. These developing countries rely mainly on agriculture sector.

In most developing countries, especially in rural parts, the rate of access to safe water for drinking and better services for sanitation are historically low. Access to safe drinking water have positive relationship with health of people, children attendance to school and women income generating activities. As these variables can affect the labor productivity so, trying to investigate how to access improved source of water in rural areas are influenced agricultural labor productivity of developing countries in Asia. The main objective of this research is to investigate the relationship of access to improved water source in rural areas and agricultural labor productivity level in developing regions of Asia.

## 2. Theoretical Framework

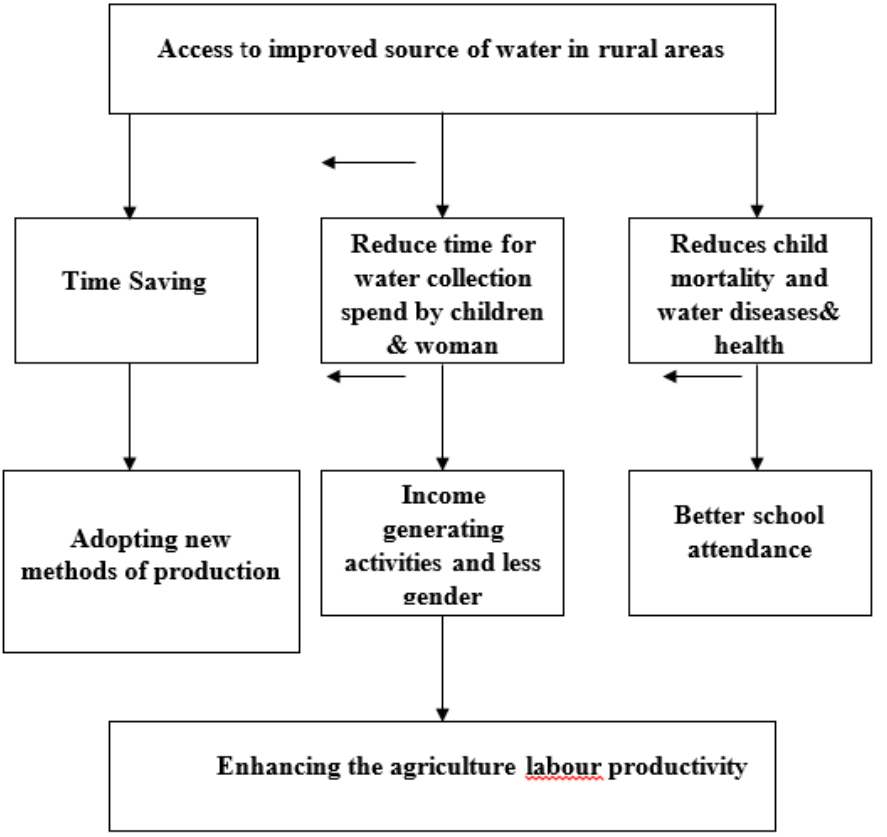
According to world health organization and UNICEF joint monitoring program (2015), children and women spend 125 million hours for collecting water daily and it is the prime responsibility of women and children in the household. Access to safe water for drinking is one of the most significant goal and assumed that it will be encouraged to execute the other MDG targets.

UN Human Rights Council has announced that the access of safe drinking water and sanitation is the human right on the basis of resolution A/HRC/RES/16/2 passed in 2011. The theoretical framework of this study which is shown figure 1, first discuss that by providing access of safe water for drinking directly helps to save time Rosen and Vincent (1999). This additional time save permits farmers to expand their activities in farms and increase production by adopting new production techniques. Women can also utilize this additional time by working in farms, this will lead to increase the agriculture production in rural areas of Asian developing countries.

Second, by providing access to improved water source leads to decrease the water collection time for children and woman as well. It will helpful to increase the school attendance of children. Women will also spend their time in income generating activity instead of spending long hours for gathering water. Furthermore, it will also reduce the gender inequality by lessen the condition on women to collect water and provide opportunity to take part in other productive activity for generating income (Koolwal and Van De Walle, 2013). According to Noga and Wolbring 2012, founded that lack of access to safe water and sanitation have negative impact on education and ability to work.

Third, it improves the health of country's people by reducing the child mortality, diarrhea, and other water related diseases. According to World Health Organization and UNICEF joint monitoring program (2015), a child dies due to water related disease in every 90 seconds. Jabeen et al. (2011) argued that situation of health has been worse in rural areas due to lack of improved water and sanitation. Improvement in health promotes better school attendance of children especially in girls and natural productivity of labor. Both of these effects help to minimize the inequality gap between women and men and this will lead to rise productivity of labor.

**Figure 1: Theoretical Link between Access to improved water source and Agriculture labour productivity**




Source: Author's own compilation.

## 3. Literature Review

Rosen and Vincent (1999) discovered that the decline in the distance covered for water collection benefits in terms of time saving. The issue of long distance covered is more important for women as she have to look after the education of children and household work. They scrutinized 12 studies and from their result, they conclude that each daytime spent for household work and time spent for each water carrier is 134 minutes and 60 minutes respectively.

Khan et al., (2001) tried to explain the effect of developed watercourses in the upper Chenab canal system of Punjab, Pakistan and for this purpose, data was collected through a survey about socio-economic condition of farmers in the district of Gujranwala and Sheikhupura. It was concluded that after improvement in watercourses increased 20% cropping strength, to irrigate a hectare 1 hour and 33 minutes saved, cropping pattern changed and farmers concerned to grow crops which require more water.

Hussain and Hanjra (2003) inspected the impact of irrigation water on alleviation of rural poverty in south-east and South Asia. The occurrence and severity of poverty falls with more access to irrigation water, influence of irrigation water on poverty is at peak where the equitable landholding distribution exist, poor communities should be targeted for the improvement of irrigation to reduce the rural poverty, discriminatory distribution of agricultural water leads to unequal distribution of land.

Nankhuni and Findeis (2004) examined the impact of children time spend for natural resources like fuel wood and water collection on children schooling in Malawi. In this analysis, data collected from 1997 to 1998 through a survey, which was conducted by MNSO and concluded that environment degradation have negative impact on children education. Study also suggested that to improve the negative effect of deforestation on education in Malawi, environment programs should be encouraged and primary school scholarship given to children in concerned areas.

Ahmad et al. (2005) examined the factors affecting the profitability of carrot cultivation and variation in its yield, during 2002 to 2003 data was collected from two districts of Punjab province. Out of total 100 farmers, 50 from each district were interviewed and Cobb Douglas production function technique applied. Study revealed that the factors i.e. seed, fertilizer, and sowing of carrot in September and October have positive impact on carrot yield as compare to the factors like input high prices, lack of financial resource and insufficient accessibility of labor during peak season.

Bakhsh et al. (2006) determined the indicators of higher yield in radish cultivation. During July-August 2003, data was collected through purpose

sampling technique from Sheikhupura and Sahiwal districts in Punjab province, Pakistan where total 97 radish growers, 50 from Sheikhupura district and 47 from Sahiwal district were interviewed. The outcome of study revealed that seed, use of fertilizer nutrients, Labour used for weeding, educating the farmers, good quality seeds and measures for plant protection have positive impact on radish production and these all found to be crucial factors which affecting the radish crop.

Damisa and Yohanna (2007) studied the role of females in farm management decision making in rural areas of Chikum and Lgabi of Kaduna State. A double stage random sampling was employed in attaining the desired sample for the study. Four villages were randomly selected out of which 50 women were selected randomly from each village to form the required sample size of 200. The response collected on age in years, wealth status, education level, land holding size, and religion. Likewise, 10 aspects of decision-making were also recorded in this study to conclude the role of rural women in decision making in agriculture sector.

Okoye et al. (2008) explored the determinants of labor productivity of small cocoyam farmers in Anambra State, Nigeria. In 2005 data was collected from 120 cocoyam farmers belongs to three out of four agriculture regions in the state through a multi stage random sampling method and to explain the labour productivity log linear model derived from Cobb-Douglas function used in this study. The study suggest policies with targeted to raise planting materials, fertilizer, capital inputs, inspiring experienced growers to remain in production, measures for birth control and access to productive resources to small farmers of cocoyam.

Ogunlela and Mukhtar (2009) examined the issue of gender and role of women in agriculture and rural development in Nigeria. The authors are off the view that most of the farmers in Nigeria work at the survival and they are smallholder of agricultural land in large agricultural system while security of food for the country and development of agriculture chiefly depend on them. It is further founded that the rural women take the lead in agricultural activities than their male counterparts. The ratio of participation of men and women in agriculture sector 60-80 percent of

labour total force.

Geere et al. (2010) analyzed the domestic water carrying and its consequences on health in Limpopo province of South Africa. In this study, data was collected from six rural villages of province through semi-structured interview, observations and measurement to discover water carrying done by people. To identified the significant relationship between potential risk factors and self-reported pain linear regression models was used and results revealed that water container lifted mostly by women or children on their head and 69 % spinal (neck or back) pain reported. Study concludes that water carrying effect the health through musculoskeletal disorders like neck or back pain and linked disability.

Boone et al. (2011) discovered the effects of household characteristics and distance travel to water on the water source choice, and the factors of time spend in water collection in the household by different persons. Study used detail survey data on the characteristics of household individuals, information on household wealth and assets from 73 rural and urban communities across Madagascar. It usually consist of 2190 households, which concluded that woman and girls spend more time to collect water. The response of reducing the distance travel to water source changed with gender, age of household individuals also differs in case of rural and urban areas.

Noga and Wolbring (2012) examined the benefit and cost of accessing safe water and better sanitation for the disable persons. The study concluded that isolation of safe drinking water, cleanliness and sanitation have inverse influence on health of persons, education, working ability and ability to take part in social events. It generates a conceptual framework that providing the infrastructure of safe water and sanitation for disable persons, where it is not available, may result in social and economic benefits like regained gross domestic product, decrease unemployment, improved the productivity and these benefits offset the cost associated with provision of clean water as well as sanitation for disable individuals.

Mkondiwa et al. (2013) attempted to establish a relationship between

poverty and lack of access to sufficient safe water in rural areas of Malawi. Data was collected through a survey of randomly selected 1,651 households and applied Canonical Correlation Analysis technique. Finding of study revealed that there is positive correlation present among the poverty and lack of access to safe and adequate water. Accordingly, study suggest that Integrated Rural Water Resources Management should intervene to encounter the problems of poverty and lack of access to safe water in rural areas of Malawi.

Steve et al. (2014) attempted to explain the influence of adult education on the agricultural productivity of small-scale female farmers in Nigeria. The data for the study was collected from randomly selected 60 female participating in farming activities and 60 nonparticipants. Multiple regression analysis revealed that age, education level, experience of farming and extension contact significantly associated to output. There was statistical difference exist between the output and earnings of participant and non-participant females. The study concludes that there is a positive impact of education on the agricultural productivity of small-scale female maize growers.

Hauff and Mistri (2015) checked the relation of EKC with safe drinking water, ground water and waterborne diseases in India. In this study log-log, quadratic and cubic models used to investigate the income and five environmental indicators relationship for data set of 11 years (2001-2012) taken from the 32 Indian states. It is concluded that from the panel data analysis there is no EKC relation occur with environmental indicators. Moreover, income growth is present but there was no significant effect found on all environmental indicators.

## 4. Methodology and Data Sources

### 4.1. Model

In order to determine the empirical relationship between the variables, the following functional form has been used.

$$ALP = f (IWSR, ISFR, LAND, ADR, FC, HDI)$$

Here the agriculture labour productivity which is a function of improved water source in rural area (IWSR), other controlled variables like improved sanitation facilities in rural area (ISFR), agricultural land (LAND), age dependency ratio (ADR), consumption of fertilizer (FC) and index for human development (HDI) which are expected to be linked to agriculture labour productivity. All the variables used in this analysis are in the form of natural log except IWSR, ISFR, and HDI. HDI is an index and its value ranges from 0 to 1 while IWSR and ISFR are already in percentage.

Econometric specification of above function is as follows:

$$(\ln ALP)_{it} = \beta_0 + \beta_1 (IWSR)_{it} + \beta_2 (ISFR)_{it} + \beta_3 (\ln Land)_{it} + \beta_4 (\ln ADR)_{it} + \beta_5 (\ln FC)_{it} + \beta_6 (HDI)_{it} + \mu_i + V_t + \varepsilon_{it} \quad \ldots\ldots(1)$$

Where,

ALP = Agriculture value added per worker inconstant 2010 US$

IWSR = Improved water sources in rural area (Percentage of rural population with access)

ISFR = Improved sanitation facility in rural area (Percentage of rural population with access)

LAND = Agricultural Land (Percentage of land area)

ADR = Age Dependency Ratio (Percentage of working age population)

FC = Consumption of Fertilizer (Kg per hectare of arable land)

HDI = Human Development Index

$U_i$ = Unobserved individual effect

$V_t$ = Time specific effect

$\varepsilon_{it}$ = Error term that differs both over time and across individuals

## 4.2. Data

The data set of 19 Asian developing countries consist of Azerbaijan, Armenia, Bangladesh, China, Cambodia, Indonesia, India, Jordan, Kazakhstan, Malaysia, Mongolia, Maldives, Philippines, Pakistan, Sri Lanka, Saudi Arabia, Turkey, Thailand and Vietnam has been taken over

the period of 2002-2013 from World Development Indicators (WDI) and United Nations Development Program.

### 4.3. Methodology

Panel data set consists of both cross section and time series data. To determine the link between variables by using panel data allow us to capture the changes of cross section in one time along with same cross section in different period of time. Larger number of observations in panel data gives more precise estimated results and greater degree of variability in panel data reduces multi-collinearity problem which leads to get better results of estimation. In this investigation, we used variables of 19 developing countries of Asia having the 12 year time span from 2002 to 2013.

Therefore, to estimate the relationship between the stated variables the panel data techniques for the estimation of micro panel has been applied namely the fixed effects and random effects models were used to determine the relation. The other issues of the panel data models namely panel heteroscedasticity and serial correlation has also been addressed by the technique which is robust to this estimation problems. As for the estimation procedure concerns, the data over time which covers the twelve years represents the micro panel, therefore the desired estimation technique here is the fixed and random effects estimation. The estimation procedure under the fixed effects model is carried out by the use of least square dummy variable technique (LSDV), within estimation or the transformation or the maximum likelihood technique.

A test for the presence of the individual effects can be constructed as a simple F-test comparing the pooled OLS and the fixed effects estimates. And to choose between the fixed effects and random effects the Hausman test has been applied. Under the null hypothesis of the Hausman test, the random effect model is consistent and efficient but the fixed effect model is consistent only but not the efficient.

As it can be seen from the Pesaran cross sectional dependence test in the results section that the model is facing with the problem of the cross

sectional dependence. Therefore, relying on the results obtained from the fixed and random effects would be totally misleading. In this context, the Driscol and Kraay (1998) standard errors were applied to obtain the consistent and robust errors. Driscol and Kray (1998), proposed that the standard non-parametric co-variance matrix can be modified in such a way that it is robust to the very general form of the cross sectional dependence. Adjusting the standard errors in this way guarantees the consistent covariance matrix, independent of the cross sectional units even when the$N \to \infty$. Thus, the problem faced by the PCSE was resolved.

## 5. Estimation Results

For the estimation of panel data, various tests are conducted and the detail is given below.

### 5.1 Test for Multi-Collinearity

Initially, the study check the presence of multi-collinearity among the regressors with the help of Variance inflation factors (VIFs). Generally, if the VIF of variables is greater than 10 then it indicates the problem of multi collinearity present..

**Table 2: Test for Multicollinearity**

| Variable | VIF | 1/VIF |
|---|---|---|
| IWSR | 3.00 | 0.332991 |
| ISFR | 6.30 | 0.158811 |
| LAND | 1.83 | 0.546902 |
| ADR | 1.80 | 0.556969 |
| FC | 1.98 | 0.505169 |
| HDI | 4.66 | 0.214591 |
| Mean VIF | 3.26 | |

Source: Author's own Compilation

As VIF of all the independent variables are less than 10 reported in table 4.1which concludes that there is no multi collinearity exist in our analysis In case of heterogeneity present among the cross sections due to dissimilar traits like social, cultural and other aspects then Fixed or Random effect model should be used instead of OLS because of incomplete specification problem in OLS model. In panel data analysis following are two test are used as instrument to decide about the appropriate estimation technique.

**5.2 Breusch and Pagan (LM) Test for Panel Effects or OLS**

LM test allow us to decide whether the panel effects (fixed or random effects) or simple OLS model is suitable. Results of LM test illustrated in table 5.2 indicates the low p-value as 0.000 which leads to rejection of null hypothesis at 1% level of significance and concludes that the panel effects are present.

**Table 3: Breusch-Pagan Lagrange Multiplier (LM)**

| $H_o$: Var (u) =0 or No panel effect. | |
|---|---|
| chibar2(01) | 1053.18 |
| p-value>chibar2 | 0.000 |

Source: Author's own compilation

**5.3 Hausman Test: Choice between FE and RE regressions**

To decide whether fixed or random effect regression suitable and for this purpose Hausman test is applied after estimating both the regressions. The results of Hausman test described in table 5.3 suggests null hypothesis of preferring RE rejected at 1% level of significance.

**Table 4: Hausman Test**

| Ho: Preferred random effects | |
|---|---|
| Value | Decision |
| p-value>$\chi^2$ =0.0002 | Reject $H_o$ and preferred fixed effect |

Source: Author's own Compilation

### 5.4 Fixed Effects Estimates

As the result of Hausman test suggested that fixed effect are suitable and results of fixed effect estimation illustrated in table 5 showed that the variables IWSR, LAND, HDI, and ISFR are statistically significant at 1% level of significance. P-values of these explanatory variables smaller than 0.01 but ADR and FC are not statistically significant even at 10% due to their high p-value as 0.128 and 0.518 respectively.

**Table 5: Fixed Effects Estimation**

| Independent Variables | Fixed Effects Estimation (Ordinary Least Square, OLS) ALP as Dependent Variable | Remarks |
|---|---|---|
| | Coefficient | p-value |
| Improved Water Source in Rural Areas (IWSR) | 0.0072** (0.0028) | 0.011 |
| Improved Sanitation Facilities in Rural Areas(ISFR) | -0.0160*** (0.0024) | 0.000 |
| Agriculture Land | 0.3905*** | 0.001 |

| | | |
|---|---|---|
| (LAND) | (0.1181) | |
| Age Dependent Ratio (ADR) | -0.4082*** (0.1408) | 0.004 |
| Fertilizer Consumption (FC) | -0.0153 (0.0160) | 0.341 |
| Human Development Index (HDI) | 4.8326*** (0.4991) | 0.000 |
| Constant | 5.3542*** (0.8629) | 0.000 |
| | $R^2$ | 0.7667 |
| | F(6, 203) | 111.17 |
| | p-value > F | 0.000 |

Parentheses contain standard errors., *** Shows 1% level of Significance.,** Shows 5% level of Significance.

Access to improved water source in rural areas (IWSR) positively affect the agriculture labor productivity as the value of its coefficient 0.00723 explained that against 1 unit increase in improved water source in rural areas will lead to increase labor productivity by 0.00723% and its coefficient is statistically significant at 5%. Result of our study are consistent with the past study Noga and Wolbring (2012) and Kiendrebeogo (2012).

Sign of coefficient of agriculture land in our analysis is positive and above table shows that 1% rise in agriculture land will lead to increase agriculture labour productivity by 0.3905622% and its coefficient is statistically significant at 1%. By increasing the relative areas of agricultural land in total land area increases the labour productivity. This result is consistent with Ahmad et al. (2005), Steve et al. (2014). As the people living in rural areas of developing countries are more attached to their land. They have affection for land people work hard on their piece of land that indicates increase in agriculture output while availability of more land for agriculture reduces the cost associated with new production

techniques and machinery because mechanization on large holding results in more agriculture production.

Paradoxically, in our analysis, we note that better sanitation facilities in rural areas have negative impact on agriculture labor productivity as the results indicate that against 1 unit increase in improved sanitation facilities of rural areas leads to decrease the agriculture productivity by 0.0160353% and its coefficient is statistically significant at 1%. Definitely, without the awareness of campaign regarding sanitation facilities in rural areas if sanitation facilities like latrines, public and private waste bins, drainage system for sewage removal are provided than beneficiary inhabitants may be hesitant to use sanitation facilities. Due to their habits of using natural places as a wastebasket for their waste and excreta or because people are not properly aware of its utility.

The human development index has significant and positive association with agriculture labour productivity. Result is also consistent with the study of Steve et al. (2014), Sapkota (2014), Harvey (2008), and Nadeem et al. (2011). Result indicates that one unit increase in HDI will cause 4.673976 % increase in agriculture labour productivity and its coefficient is statistically significant at 1%.

The age dependency ratio has inverse relation with agriculture labour productivity as the result of above table showed that against 1% rise in this ratio will lead to fall the agriculture productivity by 0.4082421% and its coefficient is statistically significant at 1%. Accordingly, the greater this ratio means household has non-active members as compared to active members, which results in lower agricultural productivity of household. This result is also consistent with the finding of Kiendrebeogo (2012).

The coefficient of fertilizer consumption is negative which showed that fertilizer consumption has negative impact on agriculture productivity, although it is not statistically significant. Result showed that 1% increase in fertilizer consumption would cause decrease in the agriculture productivity by 0.0153208%, although its coefficient is not statistically significant. Result of our study is not consistent with finding of past studies of Ahmad et al. (2005), Ahmed and Heng (2012). This negative

sign of coefficient of fertilizer consumption is the outcome of extreme use of fertilizer on fields, which may decreased production because of damage caused to yields.

Coefficient of determination of model is 0.7667 explain that 76.67 % variation in agriculture labor productivity is due to independent variables included in our model. Over all the model of fixed effect, estimation is founded to be statistically significant at 1% significance level as F statistic value is very high. Moreover, other diagnostic test are applied and their results are discussed below in subsections.

### 5.4.1 Model Specification Test

As $R^2$ is 0.7667 indicates that 76.67 % of total variation in the agriculture labour productivity is due to explained variables included in the model while remaining 23.33% variation due to other factors that are not incorporated in the model. Ramsey test is used to investigate for probably omitted variables from model and results show that the test is insignificant by accepting the null hypothesis although for single equation model link test is applied. It revealed that estimated hat square of link test is insignificant at 1%. As both the test are insignificant which lead to conclude that the model is correctly specified. Results of both the test are tabulated below.

**Table 6: Ramsey test and Link Test**

| | | | |
|---|---|---|---|
| Model Specification Tests | Ramsey Test **$H_o$:** Model has no omitted variables | F(3, 218) = 1.15 | p-value > F = 0.3303 |
| | link test **(**Single-equation estimation**)** | _hat | p-value =0.426> 0.000 |
| | | _hatsq | p-value = 0.457> 0.000 |

Source: Author's own compilation.

### 5.4.2 Test for Serial Correlation

As we are working with micro panel data where the periods are less than 20, this alleviates the possibility of serial correlation. For the sake of precision, we applied Wooldridge test to investigate the problem of serial correlation. Results illustrated in table 5.6 show that the value of F statistic is 2.755 p-value is above 0.05, which leads to accept the null hypothesis that there is no serial correlation present in data.

**Table 7: Wooldridge Test for Serial Correlation**

| Wooldridge Test. | |
|---|---|
| $H_0$: There is no first order serial correlation present in data. | |
| F(1, 18) | 2.755 |
| p-value> F | 0.1143 |

Source: Author's own compilation.

### 5.4.3. Test for Heteroscedasticity

If heteroscedasticity present in the model this will lead to wrong standard error of the regression coefficients as well as wrong t-values. To investigate the group wise heteroscedasticity we applied Modified Wald test. Results reported in table 5.7 indicates the rejection of null hypothesis as p-value is below 0.05 and it can be easily concluded that errors are heteroscedastic in our analysis.

**Table 8: Modified Wald Test for Group Wise Heteroscedasticity**

| Modified Wald Test | |
|---|---|
| $H_0$: Residuals are homoscedastic | |
| $\chi 2$ (19) | 1157.00 |
| p-value > $\chi 2$ | 0.000 |

Source: Author's own compilation.

### 5.4.4. Test for Cross Sectional Dependence

To check the dependency across the countries we applied Pesaran CD test where the null hypothesis suggest that there is no cross sectional

dependence present. Results of this test are reported in table 5.8, here the minimum value of the probability indicates the refusal of the cross sectional independence and revealed that cross sectional dependence exist between the panel in our analysis.

**Table 9: Pesaran CD Test**

| Pesaran CD Test | |
|---|---|
| $H_0$: Cross sections are independent | |
| Pesaran test of cross sectional dependence = 2.963 | Pr = 0.0030 |
| Average absolute value of the off-diagonal elements | 0.436 |

Source: Author's own compilation

The study applied Driscoll and Kraay standard error with fixed effect estimation as the result of Table 5.7 and 5.8 indicates the presence of group wise heteroscedasticity and cross sectional dependence in our analysis. Result of estimation with Driscoll and Kraay are discussed below in Table 10.

## 5.5 Fixed Effects Estimation with Driscoll and Kraay Standard Errors

The test for group wise heteroscedasticity and Pesaran test for cross sectional dependence advocate that error structure is correlated and heteroscedastic among the countries and call for fixed effect estimation with Driscoll and Kraay (1998) standard error. Results reported in table 5.9 reveals that standard error of coefficients of improved water source, improved sanitation facilities, fertilizer consumption and human development index with Driscoll and Kraay (1998) technique reduced and agriculture land, age dependency ratio standard error increased as compared with fixed effect estimation whereas the estimates of coefficient of fixed effect remain same. Coefficient of Fertilizer consumption is statistically remain insignificant, moreover, improved water source, improved sanitation human development index are statistically significant at 1 % significance level. Age dependency ratio and agriculture land are significant statistically at 5 % significance level. The value of $R^2$ remain

same as 0.7667 as it was in fixed effect estimation while large value of F= 435.07 suggest over all significance of model. From all this, we can conclude that access to improved water source in rural areas positively affect the agriculture labour productivity that is consistent with result of Kiendrebeogo (2012).

**Table: 10: Estimation with Driscoll and Kraay standard errors**

| Dependent Variable is Agriculture Labour Productivity (ALP) | | |
|---|---|---|
| Independent Variables | FE Estimates with Driscoll and Kraay standard errors | |
| | Coefficient | p-value |
| Improved Water Source in Rural Areas (IWSR) | 0.0072*** (0.0017) | 0.002 |
| Improved Sanitation Facilities in Rural Areas(ISFR) | -0.0160*** (0.0019) | 0.000 |
| Agriculture Land (LAND) | 0.3905** (0.1287) | 0.011 |
| Age Dependent Ratio (ADR) | -0.4082** (0.1513) | 0.021 |
| Fertilizer Consumption (FC) | -0.0153 (0.01994) | 0.459 |
| Human Development Index (HDI) | 4.8326*** (0.3125) | 0.000 |
| Constant | 5.3542*** (1.212) | 0.001 |
| $R^2$ | 0.7667 | |
| F(6,11) | 435.07 | |
| p-value > F | 0.000 | |

**Shows 5% level of Significance, *** Shows 1% level of Significance, Parentheses contain standard errors.

## 6. Conclusions and Policy Recommendations

In order to discover the effect of access to safe drinking water on agriculture labor productivity, proxy of five variables as ISFR, LAND, ADR, FC, and HDI have been included in model to control the effect of these variables on labor productivity. We reached at the concluding remarks that access to improved water, human development index are positive whereas age dependency ratio founded to be negative, as the signs of these variables are according to theory and expectation. Improved sanitation facilities is negative and statistically significant It is known that in rural areas of developing countries awareness of sanitation facilities are historically remain very low as compared to developed nation and the habit of people to use open spaces as wastebasket responsible for its negative sign. Agriculture land is positive and significant as most of Asian developing economies are agrarian, people are attached to land, work hard on their land and here mostly land is fertile due to this its sign is positive. In a paradoxical way, fertilizer consumption has negative impact on agriculture labor force, although it is statistically insignificant. From the start of the analysis, we expect that the effect of access to safe water for drinking will be positive, so after applying the econometric techniques we conclude that its sign is positive and significant at 1% based on above results.

These outcomes have significant policy implications. Policies for rural sector progress and to cope with problem of poverty in Asian development countries are needed to stress on providing fundamental social infrastructure like facilitate people with improved water sources in these areas. Provision of safe drinking water can be done by setting up piped water into house, free water taps, tube well, protected dug well and rainwater collection in these areas. Government should encourage development programs regarding provision of improved water sources in rural areas, as it will helps to boost the labor productivity in these areas.

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# Impact of Dividend Policy on Shareholder's Wealth and Performance: A Case Study of Cement Industry

Ammara Sarwar* and Bilal Aziz**

**Abstract:** The objective of present study is to extend the evidence regarding impact of dividend policy on shareholder's wealth and performance. The study analyzes six years data from cement industries listed on the Pakistan Stock Exchange from 2011 to 2016 by applying panel data regression techniques. Financial performance measured through Return on assets and shareholder's wealth are used as dependent variables whereas Dividend policy is incorporated as independent variable. The control variables included in the study are earning per share and size of the firm. The research findings suggest that dividend policy significantly affects the financial performance of the firms while control variables are also positively related to return on assets. It is also suggested that earning per share is positively related to share prices of firms.

**Keywords*:*** Cement industry, Dividend policy, Performance, Shareholder's wealth, financial market, financial policy,
**JEL Classifications:** L11, O16, G32, L61.

## 1. Introduction

A payment that is made by the organization to the common stockholders of the company, and usually distributed from companies' profit is termed as a dividend. General factors that determine the Board's recommendation for giving dividends may include applicable taxes on dividend, the position of cash flow, future plans for capital expenditure and profit earned in a year as discussed by Jerop (2014). According to the discussion of Masum (2014), it is a major financing decision for the organization to formulate their dividend policy. Dividend policy involves the policies related to payment of a certain amount of financial reward to the shareholders when they invest in a firm.

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Every organization and business sector follow a different pattern of paying a dividend, and it obviously acts as firms' financial indicator. Hence, it may be assumed, and have been discussed by some of the studies like Masum (2014) and Ali *et al.,* (2015), that demand of firms' share depends on its dividend policy. Theory of demand and supply determine that more the demand of a product in market more will be its price as discussed by Kalecki (2013). The determinants of dividend policy and the motive of the managers behind giving dividends are still unanswered by the research, although it has been a topic of interest since the inception of Joint Stock Companies. As there is no consensus has been found on the issue of the positive influence of the dividend payout on prices of their stock, the relevant impact of this policy on financial performance is also vague. This research is rare worldwide, however, due to the high volatility of macroeconomic factors in Pakistan, this topic has not engrossed the attention of researchers yet.

The research gap, which has also been established by Ali *et al.,* (2015) suggests that due to the rarity of research on this topic in Pakistan, Pakistani firms have ambiguous dividend policies. There is a need for a study that portrays the impact of effective policy related to dividend on share prices and financial standings, which may help the firms to make better dividend decisions.

## 2. Literature Review

Suwanna (2012) has discussed that dividend payout policy contributes in resolving the conflicts between shareholders and managers. Therefore, the positive experience of shareholders to hold the stock of a company leads to increase in demand of shares, hence resulting in an increase in its prices. A recent study conducted by Akbar and Baig (2010) used a sample of seventy-nine firms for studying the relationship between these two variables. The study has portrayed a positive result with the findings that announcement of both stock dividends and cash dividends lead to increase in stock prices of a particular organization. Other studies, like the research conducted by Hussainey *et al.,* (2011) have also investigated this relationship for firms of UK. The findings of research suggested that there is a significant and positive association between prices of stock and payment of dividend, while there is an observance of a negative

relationship between prices of shares changes and ratio of payout of dividend.

Some researchers have a view that stock price changes are minimally affected by dividend payout ratio of the companies, the major influencing factors include: 1) size of the firm, 2) level of debt, 3) growth rate, and 4) earnings of the firms. However, this study was negated by Khan (2012), which concluded a significant and positive relationship between the variables. All of these authors have concluded contradictory results. The reason behind the difference in their findings is that there are many factors like the political stability of the country, investors' sentiments, the size of organization etc. that may impact prices of shares. For instance, the stock market of Pakistan may be more volatile and hence prices of shares may not react to the dividend policies of the firm as UK or Japanese share prices do due to the stability of their economy. So, the authors like Malla (2009) believed that the theory of the impact of dividend announcements on stock prices is probably the most significant yet puzzling theory in finance that is still unsolved. So, there is a need for a study that may fill this gap by finding out the method of balancing firms' value i.e. financial performance and shareholders' value i.e. offering the dividend to make a well-balanced dividend policy.

There are several studies which concluded that financial performance of the firm has positive and significant relationship with dividend policy as stated by Sifunjo (2015); and Ajanthan (2013). The study of Sifunjo (2015) investigated the data of ten commercial banks listed on NSE, from which some of the banks paid year to year consistent dividend payments and their profits have also increased year by year which shows that the relationship is significant and positive. In addition, Ajanthan (2013) stated that it is very critical to adjust dividend policy for improving the financial performance but there is an affirmative and robust relationship between both variables. As Mutie (2011) also revealed in his study that after paying a dividend, financial performance of the firm improved which means "dividend paid" variable is significantly associated with the "financial performance of the firm" variable.
Naum (2014) also concluded that corporations work for adjusting and developing dividend policy for improving their financial position in the

market and it is a key factor which impacts the organizational performance. Moreover, Chumari (2014) argued that there is an association between liquidity, profitability and organization's performance. Furthermore, Musyoka (2015) mentioned his study's result and assured that both dividend policy and financial performance of all firms which are listed on NSE have impact on each other. Dividend pay-out works as a motivation for the investors after each financial period (Kajola *et al.,* 2015). Their study elaborated that strong dividend policy is a way to attract more investment.

Ndirangu (2014) conducted a study to prove that dividend policy has an impact on the future performance of the firms which are listed on Stock Exchange of Nigerian. The five years' data has been collected for this research work from 2009 to 2013. The correlational analysis resulted in a positive relationship between variables of the study which are "dividend payout" and "earnings growth in the future". The study was conducted in Kenya and selected focus point was listed commercial banks only rather than industries. The study of Chumari (2014) also involved these variables to elaborate the relationship between four financial performance elements such as sales growth, profitability, market to book value, cash flow and dividend payout. Additionally, the data was collected from the secondary sources which are financial statements of the companies. This study supported the dividend theory. Wasike and Ambrose (2015) researched about the determinants of the dividend policy and regression analysis was conducted to analyze the data of 60 companies listed on NSE for the years 2004 to 2014. The conclusion was that there is a significant result between tax, profitability and cash flow while the negative and not significant relationship is between risk, growth, market to book value and dividend policy.

## 3. Methodology

This section of the study aims at discussing the detailed clarification of development of hypothesis, discussion of dependent and independent variables, and theoretical framework of the study. In addition, it will discuss the data collection and analysis techniques used to complete this research.

There are three types of variables included in this study, including dependent variables, independent variables and control variable. For simplifying the relationship between the study's chosen variables as well as measuring the actual impact of independent variable on dependent variable, only one independent and dependent variable are used in the models. However, two control variables are also included, which may have impact on this relationship.

Independent variable utilized for this research is dividend policy of the organization, which is measured through the payments of dividend on yearly basis. Two dependent variables included in the research are financial performance and shareholder's wealth. So, two regression models are used. Financial performance is measured by Return on Assets (ROA) and shareholder's wealth measured through share prices, which is the average of share prices per year.

As far as control variables are concerned, there are two control variables including Earning per share and Size of the firm. Earnings per share is measured by dividing Income after interest and tax to number of shares outstanding while size of firm is measured by taking natural logarithm of total assets.

By concluding the discussion on dependent and independent variables of the study, following models are developed:

$$ROA_{it} = \beta_0 + \beta_1 DivP + \beta_2 Size + B_3 EPS + \mu_{it} \quad (1)$$

$$ShWealth_{it} = \beta_0 + \beta_1 DivP + \beta_2 Size + B_3 EPS + \mu_{it} \quad (2)$$

Where

ROA: Return on assets
Shwealth: Shareholder's wealth
DivP: Dividend policy of firm
Size: Size of firm
EPS: Earnings per share

## 4. Data Collection

The sample chosen for the study is from cement and construction & materials industry of Pakistan. For the purpose of data collection, 10 companies from the sector that were listed on Pakistan Stock Exchange (PSE) were selected for analysis. The selection of the companies was dependent on the availability of data for at least 6 years. Data is collected by the investigator from the official websites of the companies, annual reports, and KSE's official website. In order to analyze the collected data from these resources, panel data analysis methods have been utilized. In addition, for the purpose of finding the relationship between all variables, correlation analysis has also been conducted. The software used for regression and correlation analysis is E-views, which is a statistical package used for conducting all type of empirical data analysis.

## 5. Empirical Results

This particular section of the paper is going to discuss the statistical results concluded from the data analysis of the collected variables. It includes correlation analysis for checking the multi-collinearity issue between independent variables and finding the strength of relationship between dependent and independent variables. After correlation analysis, regression analysis will be done for finding the significant relationships of the models.

Descriptive statistics of variables are given in Table 1 which includes Mean, Median, Minimum values, Maximum values and Standard deviation. The highest mean value is observed for DivP while lowest mean value is for ROA. The deviation of variable value from its mean is measured through standard deviation. Minimum variation is shown for ROA which depicts that lowest

variation in dependent variables caused due to ROA. The highest value of standard deviation is observed for DivP which shows the maximum variation in dependent variables is due to DivP.

**Table 1: Descriptive Statistics**

| | Mean | Median | Max | Min | Std. Dev. |
|---|---|---|---|---|---|
| ROA | 0.1147 | 0.1155 | 0.2438 | -0.05251 | 0.0730 |
| ShWealth | 88.2940 | 54.9875 | 553.1800 | 2.2800 | 104.5867 |
| DivP | 1033.0 | 4853.0 | 6854.0 | 0.0000 | 1419.0 |
| EPS | 11.2620 | 10.8600 | 40.0300 | -3.72 | 10.1676 |
| Size | 7.2571 | 7.4640 | 7.964395 | 6.2993 | 0.4811 |

Correlation analysis can be termed as one of the greatly significant and commonly used statistical analysis in research studies. A correlation value is a number that may describe the positivity or negativity of the association between two variables. Table 2 presents the relationship between the variables of the study.

**Table 2: Correlation Analysis**

| | ROA | DivP | EPS | Size | ShWealth |
|---|---|---|---|---|---|
| ROA | 1.0000 | | | | |
| DivP | 0.4099 | 1.000 | | | |
| EPS | 0.7063 | 0.4767 | 1.0000 | | |
| Size | 0.0542 | 0.5061 | 0.3683 | 1.0000 | |
| ShWealth | 0.5287 | 0.4730 | 0.9241 | 0.3599 | 1.0000 |

The correlation value between two variables is being considered strong if the value is more than 0.3. As it can be seen in the table that dividend paid by the company have a strong positive relationship with its financial performance that was measured by ROA i.e. Return on Assets because its value is 0.409. This concludes that paying more dividends by a company

in Pakistan will lead to increase in their financial performance as well. In addition, the relationship between dividend paid by the company and share prices of the firm that are listed on the above-mentioned stock exchange have stronger and relationship that is positive with the value of 0.528. This implies that with an increase in the dividend paid by the company in a year impacts its stock prices positively, and the price of the stock of a company will rise. The result in the table portrays that both control variables that are Earning Per Share and Size of the companies also have a strong positive relationship with the dividend paid by the firms in that year.

These results imply that when the firm will pay more dividends to its stockholder the size of the companies will also rise and due to more profit the company will have more of the earning against each share held by the shareholders. These results clearly show that all of the firms included as a sample in this study have a positive impact of their dividend giving the policy to their stock holders on their financial performance as well as on their stock prices. So, giving continuous and higher dividend in a year can lead to more EPS earning, ROA; increasing size of the company and prices of shares in stock market.

Table 3 gives the data to analyze the financial performance which is measured through ROA of companies that is a dependent variable and to state that other variables are important to the model of the statistical model. The first value is constant and is 0.405 which shows that when the value of independent variables and mediating variables are zero than ROA is 0.405. For each unit change in independent variables (EPS, Dividend paid and Size of the firm) the dependent variable will change by 0.0000000121, 0.005175 and -0.049836 respectively. From these values, it is analyzed that all variables are significant because all of the values' p-value elaborates the significance level which should be less than 0.05 and in this study that is less than this value.

**Table 3: Regression Analysis Dependent variable, ROA**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.4052 | 0.109509 | 3.7003 | 0.0005*** |
| DivP | 1.21E-08 | 5.59E-09 | 2.1730 | 0.0341** |
| EPS | 0.0051 | 0.000727 | 7.1234 | 0.0000*** |
| Size | -0.0498 | 0.015536 | -3.2078 | 0.0022*** |
| R-squared | 0.5837 | F-statistic | 25.7057 | |
| Adjusted R-squared | 0.5609 | Prob(F-statistic) | 0.0000*** | |
| Durbin-Watson stat | 1.21022 | | | |

*******shows 1 per cent and ** shows 5 per cent level of significance.

The regression analysis of in Table 4 shows that the value of R squared, which is the coefficient of determination, is 0.855 and this value shows the total variations in the model. The value of adjusted R square in the model is 0.847 and this shows that the effect of the independent variables included in the model is 84.7% on the dependent variable as it can be seen in the Table 4 below.

**Table 4: Regression Analysis Dependent variable: Shareholder's wealth**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -31.778 | 92.4663 | -0.3436 | 0.7324 |
| DivP | 2.87E-06 | 4.72E-06 | 0.6091 | 0.5449 |
| EPS | 9.3602 | 0.6134 | 15.2588 | 0.0000*** |
| Size | 1.6737 | 13.1177 | 0.1275 | 0.8989 |
| R-squared | 0.8554 | F-statistic | 108.4581 | |
| Adjusted R-squared | 0.8475 | Prob(F-statistic) | 0.0000*** | |
| Durbin-Watson stat | 0.8652 | | | |

***shows 1 per cent level of significance

The value of constant in the model is -31.77 and this value shows the average value of share price when the values of independent and mediating variables will be zero. The coefficient of dividend paid is 2.87E-06 and this shows that with a 1unit change in the dividend paid will change the share prices by 2.87E-06 and the probability value of dividend paid is 0.544 which shows the insignificant relationship between share price and dividend paid. With a one unit change in EPS and size of the firm there will be a change in the share price by 9.36 and 1.67 respectively, however, the probability value of EPS shows a highly significant and the probability value of the size of the firm shows an insignificant relationship with the share price.

A significant positive relationship has been found between the independent variables (dividend paid, EPS, and size of the firm) and dependent variable ROA from the regression of model 1. This relationship between dividend paid and ROA is consistent with the findings of Khan *et al.,* (2016) and it is considered that when the firms pay dividend their performance increases. The result is also consistent with Ehikioya (2015) which stated that when the firms pay dividends, this phenomenon is observed by the investors and increases the performance of the firm. The results, however, are contrary to the findings of Enekwe *et al.,* (2015). They found a positive and significant relationship among the Earning per Share and ROA and these results are not consistent with the results of Yegon *et al.,* (2014) and Balaputhiran (2014) and both of them found a positive yet insignificant relationship between these two. The reason of this contrary result is because the investors are attracted towards the firms that have high EPS and this thing increases the Firm's performance. There found a positive and a significant relationship among the size of the firm and firm's ROA and these results are according to the results of Ehikioya (2015) and these results can be explained by the words that the larger a firm is the more investments it can take and can increase its performance. The results are contrary to the findings of Khan *et al.,* (2016) which shows insignificance between the size of the firm and its performance. So, here it can be said that the ROA is affected by dividend, EPS, and size of the firm.

A positive yet insignificant result has been found among the dividends paid the share prices of a firm. The results of this regression model are according to the findings of (Hussainey *et al.,* (2011); Dhungel (2013)) and the reason behind these results may be the uncertain conditions of this sector in Pakistan where the share prices are influenced by multiple other factors. These are not consistent with the results of Khan (2012), Masum (2014), and Botchwey (2014). In their studies, they all found that the dividends when paid affect the share prices positively. A significant and positive result has been found among the EPS and the share prices of organizations. The significant results match with the results of Seetharaman and Raj (2011). EPS can affect the share price of any firm because earnings are considered as a determinant of the financial health and prosperity of any firm. Higher the EPS of a firm will increase in the financial health and prosperity of the organization and it will affect the share price positively. The association among the share prices and the size of the firm is found as insignificant and this association can be justified through the findings of Pani (2008) where an insignificant relationship was witnessed between these two variables. So here it can be concluded that only EPS has effects on share prices and remaining two don't have.

## 6. Conclusion and Recommendations

To measure the relationship of financial performance and share prices with the dividend paid is an important issue these days. The effects are recorded as both positive and negative in previous literature and in this study. The study has been started with an aim to investigate the impact of dividend payout on ROA and share prices on the firms. The objective of this study is to find out the impact of dividend payout on shares prices and on the performance of the firms. For the investigation purpose, data of 10 different firms of the construction and material industry listed on KSE for the period of 6 years is being used in this study. Annual reports of the firms of construction and materials industry have been used as a source to obtain data. Following can be concluded from the findings of the results:

The significance between the variables is obtained by regression through OLS technique. A positive and a significant association have been found among dividend paid, EPS, the size of the firm and the firm's

performance. The results found are consistent with the previous literature. A positive correlation has been found between the dividend paid and all the variables through the correlation test.

It is recommended for the organizations that they should focus on making a better dividend policy because the performance is highly affected by it so a better dividend policy will enhance the performance of firms. According to the general point of view, there should be significant association among the dividend paid and ROA but the results of this study are contrary to the general observation. The reason is that the construction and materials sector of Pakistan is not paying the dividends on regular basis. From the many past studies and from general observation, it can be seen that the investors are attracted towards the company that paid the dividend on regular basis and this thing affects their share prices. It is recommended for the companies that they should focus on giving the dividend on a continuous basis if they want to increase their share prices more. In addition, the EPS is having a highly significant relationship with share price, so, it is recommended for future to use it as an independent variable. There are some studies that have already investigated this relationship but still, there is a gap that should be filled in future.

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# Impact of Internal and External Factors on Leverage: A Case from Pakistan

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**Abstract:** Pakistan despite having largest irrigation system in the world, numerous mineral resources in its different geographical areas along with nuclear technology at its hand, is still facing severe energy crisis. Economy as whole is moving through a transitional phase of acquiring advanced machinery, technology for its goods and services which consequently has increased the demand for energy manifolds. A research therefore, is needed to be carried out pertaining to the energy sector of Pakistan to identify how the firms operating in the energy sector manage their capital structure, which factors are more influential in determining the level of their leverage. To achieve this goal, panel data of 19 firms within fuel and energy sector was taken to scrutinize the impact of some internal and external independent variables on leverage of the firm for the period of 1999 - 2012. The statistical facts and figures were obtained from State Bank of Pakistan's financial statement analysis of KSE listed joint stock companies'. The study concluded a negative yet significant relation of leverage with profitability, tangibility, liquidity and forex while it has positive but insignificant relation with size and inflation. Leverage is also negatively related to GDP but results are insignificant. The results suggest that Government should take steps to rescue the economy by keeping prices at a controlled level and should introduce reforms to have foreign exchange rate stable.

**Keywords:** Corporate finance, Inflation, Foreign Exchange, Equity
**JEL Classification:** G33, E31, F31, D63.

## 1. Introduction

The term capital structure explains the approach or the system a corporation backs or supply funds for its assets or operations, with either debt, equity, hybrid securities i.e. a security having characteristics of both debt and equity, or a combination / mix of the three, with an aim to improve its overall worth / value. It is a universal truth that every choice concerning capital structure tool brings along with it a sweet and sour flavor to the menu. Let's say for example choosing more debt results in

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increasing a risk in income flows of the firm and high risks linked with debts decreases stock prices however, increased debt risk also raises expectations of lenders for their return which attracts other investors leading to a stock price rise in the end.

It is due to the very fact that capital structure decisions are said to be the most important and significant decisions done by the financial managers relying on the tradeoff between risk and returns associated. It is therefore, an important objective of a financial manager to maximize wealth of the firm keeping its cost of capital at the lowest level and his decisions be in accordance with debt target ratio.

When we go through literature, we observe that even though there has been profound and plenty of research focusing on the most important determinants of capital structure yet there is still variation and discrepancy regarding which factors considerably and notably have an effect on or able to influence a firm's capital structure.

Most of the researches carried out or prepared on the subject under discussion accomplished that an optimal capital structure is influenced as a result of a mixture / array of internal and external variables. Such variables on the whole differ and vary state to state and even industry to industry inside the same country. Variables of such nature can comprise: managerial factors, macroeconomic indicators, tax rates prevailing within the country, social, legal and financial factors. Studies also recommended that there are a few common and similar factors for the capital structure of different countries but each country also has other factors along coming into play / influencing capital structure decisions therefore, the country, where research is being conducted, should be examined discretely with the purpose of having a better understanding of the exclusive capital structure features in general and of that country in particular. Researchers have studied the topic "capital structure" and a large thread of academic and empirical research is focused and paying attention to it mostly in developed countries. In general adequate work regarding capital structure is done in Pakistan keeping in view of the cement, textile, insurance, banking and energy sector of Pakistan but no extensive work is conducted in terms of external factors in energy sector

of Pakistan. It is therefore, a reason to focus / study energy sector, not just because it acts as the main catalyst to the economy in both, favorable or unfavorable way, but also is a long run capital-intensive sector which needs much larger funds to sustain and develop new firms.

This study intends to augment and enlarge the information, knowledge and a better understanding of capital structure within the energy sector in the light of some specific internal and external factors. Most of the research in Pakistan concerning the topic capital structure spotlighted on specific determinants while overlooked the institutional or macroeconomics variables which ought to influence or affect the capital structure decisions. Hence the findings or conclusions derived from this research will augment the information regarding determinants of capital structure and is ought to help firms to choose efficient and effective decisions as per their requirements. Furthermore, the study is expected to help the financial managers who are responsible to make decisions related to capital structure. This study will enhance and alter them in the direction of adopting, accepting and taking into consideration proficient ways of managing a firm's capital structure.

## 2. Literature Review

Shah and khan (2007) attempted to establish which aspect or variable has important impact on capital structure decision. The data, 1994-2002, was taken from of KSE- listed non-financial firms with leverage as dependent variable and six independent variables which include size, NDTS, tangibility, Earning volatility, growth opportunity and profitability. It was found that Tangibility, growth (-) and profitability (-) variable were significant while the remaining were insignificant.

Mahvish and Qaiser (2012) investigated the influence of profitability, tangibility, size and liquidity on capital structure decisions. The findings of the study results showed that profitability was the only factor that showed an inverse association with leverage, while the other variables, size, tangibility, and liquidity had positive relationship.

Ahmed *et al.,* (2010) investigated the capital structure of life insurance companies of Pakistan. The data was taken from the year 2001 to 2007 with Ordinary least square method while Leverage is taken as dependent variable; at the same time profitability, size, growth, age, risk, tangibility of assets and liquidity are selected as independent variables. The empirical results of OLS regression indicated that the independent variables: size ,risk, growth and tangibility are directly related with leverage but only size and risk is significant whereas profitability and liquidity both are negatively related to leverage. The outcome of the regression also demonstrates that leverage has no significant relations or association with growth of the firm and tangibility.

Shah and Hijazi (2004) envisaged to analyze 16 firms out of 22 firms in cement industry sector of Pakistan and were listed at the KSE. The time span for this study was from 1997 to 2001 with application / model of pooled regression technique to determine capital structure factors of the firms within the cement industry. The study brought into play independent variables i.e. size, tangibility, profitability and growth. They found a contrary association between size and growth. Firm size is -ve with leverage, bigger the firm size, less debt would be used. Profitability also has an inverse relation with leverage which supports the Pecking Order Approach. Asset tangibility is +ve with leverage while Growth also resulted to have a direct association with leverage of the firms operating within the cement industry.

Çekrezi1 (2013) studied the impact of firm specific factor on capital structure. There were sixty five non listed firms in Albania which were selected for the time span of 2008 - 2011. This study used three capital structure measures that is STDA, LTDA and TDTA as dependent variables while Profitability, tangibility, liquidity and size as independent variables. Multiple regression technique was used to determine the results. This study concluded that tangibility, liquidity, profitability and size have a significant impact on leverage. The empirical evidence also divulges a significant yet negative relation of return on assets with leverage and a significant yet positive association of SIZE with leverage.

Zabri (2012) took into consideration 50 award winning small & medium enterprises of Malaysia as sample. Regression analysis was resorted to taking profitability, size, tangibility of assets, growth of firm, age of firm, non-debt tax shield and liquidity as variables for analysis. Out of these seven, only three variables viz. liquidity of the firm, tangibility and NDTS were proven to have significant association with firms' capital structure. In addition, it was also established that these variables were responsible for deviations in capital structure. Additionally, all the three variables of liquidity, tangibility and NDTS were also responsible for capital structure variations.

## 3. Data

This part of study explains criterion for sample selection, data sources, model of study, variables and their explanation in the context of present study. Present study revolves around Pakistan's fuel and energy sector. Current study used panel date of 19 firms within fuel and energy sector to scrutinize the impact of some internal and external independent variables on leverage of the firm for the period of 1999 to 2012. The statistics / information in use for the current study is obtained from State bank of Pakistan's financial statement analysis of KSE listed joint stock companies.

## 4. Estimation of Model

The proposed model is followed:

$$LEV_{it} = \beta_0 + \beta_1 PROF_{it} + \beta_2 LIQ_{it} + \beta_3 TANG_{it} + \beta_4 SizS_{it} + \beta_5 Gro_{it} + \beta_6 GDP_{it} + \beta_7 Infl_{it} + \beta_8 Fx_{it} + w_{it} \quad (11)$$

Where

LEV = Leverage is the amount of debt used finance a firms assets and is measured by total debt / total equity

PROF = stands for profitability is calculated by the proportionate increase or rise in the total value of the firm

LIQ =Liquidity measures cash and securities easy to be converted to cash measured by current assets/current liabilities

TANG =Tangibility is the extent to which debt is backed by physical assets of the company

SIZ =The volume of sales

GRO = Company growth

GDP = Gross domestic product measures the annual production of Goods and Services in the economy

INFL = Sustained increase in the general price level

FX =The price or cost of foreign currency in terms or against the domestic currency

The current study involves profitability, liquidity, size, tangibility, company growth, Inflation, forex , GDP , as independent variables while leverage will be kept as dependent variable. The study use book value of total liabilities divided by total assets to measure leverage because most firms in Pakistan rely on short-term debt to meet their capital requirements as the average firm size is small and banks are more inclined to lend for short-term than for long-term.

Profitability is the difference left off after all operating expenses are deducted from firm's total earnings or revenues. Liquidity is the capability of any business to meet its due, short term, responsibilities. This study will use in this ratio of current assets to current liabilities for measuring this variable. Firm size is the representation of a firm or company’s share in competitive market of products comparing other competitors.

The quality of being perceivable by touch is said to be Tangibility. It is used for measuring the level of guarantee/protection/corroborative a firm can look at its debtor to assure the giver that his or her loan is secure. Tangibility is actually the value derived after deducting all liabilities and intangible assets from total assets of the firm.

Growth opportunity is considered to be an un-collateralized intangible asset, adding worth to a business which not charged under taxable income (Titman & Wessels, 1988). In this study, percentage change in total assets is used. Inflation is a continued, constant or continual raise in the general Price level of goods and services over a period of time within an economy.

Gross Domestic Product (GDP) is one of the most important indicators used to measure or estimate the fitness of a country's economy. Foreign Exchange rate, also acknowledged as the Forex rate, involving two currencies specify or indicates that to what extent currency of a county is worth in terms of the other.

To ascertain the extent of relationship between the above cited variables, panel date has been used. It is often better to use panel data in case a difficult financial situation is confronted. Using panel data is superior in comparison with other types of data such as time serious and cross section etc. The structure wise panel data has further been divided into balanced and unbalanced data. Balanced data has been termed so, when sample set in totality is taken into account while unbalanced data is the one where values are either missing or not available due to any logical restriction. In this study unbalanced data set has been measured as some figures were missing.

This study relied on fixed effect method or least square dummy variables estimator (LSDV) for the sake of analysis of panel data. The aforementioned model encompasses heterogeneity or individuality within cross sections allowing to have its own intercept. The major cause of selecting this method is the problem which had to face due to the missing values which could give rise to suspicion of having correlation with major predictors at group level. But fixed effect can also address such

issue as fixed effect is invariant with respect to time considering all effects that relate to cross section.

### 4.1 Post Estimation Tests

The assumption of OLS model is that independent variables are not vehemently associated which in turn implies the fact that there exists a perfect liner relationship among explanatory variables of a regression model. Multi co-linearity can be termed as the major disease in regression line. In multiple regression line it is relevant but known as a syndrome of fixed variables.

On account of Multi co linearity, VIF reveals the variance of estimator's inflation. Approaching to 1, VIF turns to infinity which shows an increase of co linearity degree. Rule of thumb for VIF values is that once the variance of an estimator takes hike, it becomes infinite.

In classical liner regression model (CLRM), one of the assumptions is that in case of error terms, covariance approaches to zero over time. Residuals are said to be serial correlated if error terms are correlated. So, while taking into account CLRM, one indispensible assumption is that residuals are uncorrelated.

In conformity with CLRM, it is comprehended that error/residual variance is constant and can be in turn titled as one of the assumptions of Homoscedasticity. Neutral coefficient estimates will be the outcome of OLS approximation but will not be BLUE for any longer. It implies that within the class of unbiased estimators coefficients have no minimum variance and in result standard error could be proved erroneous. To verify if Heteroscedasticity exists, the white test for Heteroscedasticity would be performed testing the following hypothesis:

Disorder in panel data models is cross sectional autonomous which holds true for panel data spanning to a larger cross section (N). To identify cross section dependence within panel data model, a simple test was devised in 2004 which considers stationary dynamics and unit root heterogeneous panels with shorter time T and a rather bigger N. The

experiment thus performed, relied mostly on correlation coefficients pertaining to OLS residuals from separate regressions. This test has been resorted to in order to test the following hypothesis:

### 4.2 Generalized Least Square

In order to trace unknown parameters, Generalized least square (GLS) method is commonly used. In event of occurrence of Heteroscedasticity, the above cited method is taken into play. The OLS coefficients in this study are unbiased but at the same time taking departure from being BLUE. It implies that thought OLS estimates are steady statically, yet they prove to be inefficient rather misleading in some cases. Alexander Aitken introduced GLS in 1935. Assumptions of GLS are almost the same as of OLS except for assumption of residuals. In case of Heteroscedasticity, GLS is considered the best to calculate unbiased $\beta$.

One of the assumptions of GLS is that Heterogeneous variance is allowed between residuals. This assumption extended its spectrum to give room for non-zero covariance within residual terms. Empirically, this assumption can be used to provide permission to incorporate different types of correlation. Auto and serial correlation is one of the instances. On the other side of the picture, co-variance matrix does not vary with the passage of time. The major drawback with GLS is that covariance matrix for GLS remains unidentified. This short coming of GLS draws our attention to Feasible Generalized Least Square (FGLS).

### 4.3 Feasible Generalized Least Square (FGLS)

FGLS tag along the similar technique as Generalized Least Square but with the exclusion that an estimated variance covariance matrix for the residuals ($\widehat{\Omega}$) is used in place of unknown $\Omega$. In order to generate $\widehat{\Omega}$, OLS is applied first to the model and it provides consistent estimation of $\beta$.:
The residual values are also consistent and are applied to estimate the variance covariance matrix $\Omega$:

FGLS agrees or permits for the realistic application of GLS and it has been proved to be correspondent to the maximum likelihood estimator in its limit. It is therefore, also possesses the asymptotic properties of the

maximum likelihood. One disadvantage of FGLS is that it works better for huge and hefty sample and awareness with respect to its behavior in undersized restricted sample is less recognized or known. FGLS is preferred over OLS under HAC (Heteroscedasticity and Autocorrelation Consistent). However, in a model where classical assumptions of OLS are met, then least squares shall be more efficient than FGLS.

## 5. Results

This part of current study first explains the descriptive statistics of all variables. Further in next part, the correlation analysis of all variables of the study is reported. Afterword, the findings of regression model is explained and lastly the validity of multivariate regression model is tested.

Descriptive statistics of all variables indicates that data is an unbalanced data with a range of 232 maximum while 214 minimum observations for variables. Further there is high variation especially in liquidity and company growth. The highest variation is in liquidity variable which is 396.42 while the company growth is on second number with variation value of 41.9 GDP , inflation and size variables seem normally distributed as their variation are less as compared to other variables. The lowest standard deviation is in GDP variable with value of 2.07 while inflation is at second lowest position with value of 4.76

Similarly the means value of liquidity variable is at top i.e. 249.8 and forex is at second number with value of 67.9. The mean value of GDP variable is at lowest with value of 4.50. The detail of descriptive statistics of all variables is hereunder:

**Table 2: Description of all variables statistically**

| Variables | Observations | Mean | Std. Dev. | Minimum | Maximum |
|---|---|---|---|---|---|
| leverage | 232 | 54.72177 | 27.2159 | 1.39 | 99.68 |
| roa | 231 | 6.288571 | 13.22609 | -22.4 | 60.4 |
| size | 232 | 21.22668 | 5.378547 | 0 | 26.96 |
| tangibility | 232 | 50.52789 | 25.59903 | 2.93 | 97.65 |
| Company growth | 214 | 12.91701 | 41.90067 | -52.46 | 481.19 |
| liquidity | 232 | 249.8983 | 396.426 | 11.4 | 2713 |
| fx | 232 | 67.91194 | 13.64937 | 51.77 | 96.38 |
| inflation | 232 | 8.274138 | 4.768241 | 2.9 | 20.3 |
| Gdp | 232 | 4.505129 | 2.073651 | 1.72 | 8.96 |

Correlation analysis is carried out to check the degree of association or uniformity between variables. This analysis further helps to determine the level of multi co-linearity between independent variables. Further the correlation analysis is considered as essential part of primary analysis in empirical studies. The correlation matrix of this study is hereunder:

**Table 3: Correlation Matrix**

| | leverage | roa | size | tang | cogwt | Liq | fx | infl | gdp |
|---|---|---|---|---|---|---|---|---|---|
| Leverage | 1.00 | | | | | | | | |
| Roa | -0.26 | 1.00 | | | | | | | |
| Size | 0.34 | 0.32 | 1.00 | | | | | | |
| tang | 0.03 | -0.35 | -0.20 | 1.00 | | | | | |
| Cogwt | 0.08 | 0.08 | -0.11 | -0.29 | 1.00 | | | | |
| Liq | -0.60 | -0.07 | -0.51 | -0.08 | -0.04 | 1.00 | | | |
| Fx | -0.03 | -0.09 | -0.02 | -0.24 | 0.06 | 0.19 | 1.00 | | |
| infl | -0.03 | -0.01 | -0.02 | -0.15 | 0.05 | 0.23 | 0.68 | 1.00 | |
| Gdp | 0.00 | 0.05 | 0.06 | 0.08 | -0.08 | -0.16 | -0.46 | -0.39 | 1.00 |

According to aforementioned correlation matrix it is evident that profitability (roa), liquidity, forex rate, inflation and GDP have negative

association with leverage while size, tangibility, and company growth has positive association. The liquidity variable has the highest negative association with leverage while size is the highest positive correlation variable with leverage. The association of profitability is negative with tangibility, liquidity and inflation while alternatively the same variable has positive relationship with size, company growth and GDP. It is interesting that, size has affirmative relation with Profitability (roa) and GDP while tangibility has negative associations with all other variables except GDP. Moreover, the correlation of liquidity is negative with all variables except forex and inflation while forex has positive relation with Inflation, liquidity and company growth only. The aforesaid correlation will be taken into account during regression analysis and further evaluation will be performed to confirm the degree of association or multi co-linearity.

**Table 4: Summarized results of estimated model**

| Independent variables | OLS | Fixed Effect | FGLS |
|---|---|---|---|
| roa | -.803<br>(0.000)*** | -.573<br>(0.000)*** | -.597<br>(0.000)*** |
| size | .935<br>(0.010)*** | 0.691<br>(0.039)** | .504<br>(0.237) |
| tangibility | -.106<br>(0.099)* | -.375<br>(0.000)*** | -.1888318<br>(0.003)*** |
| cogwt | .046<br>(0.195) | -.069<br>(0.011)** | -.027<br>(0.240) |
| liquidity | -.037<br>(0.000)*** | -.0169<br>(0.000)*** | -.020<br>(0.000)*** |
| Fx | -.164<br>(0.276) | -.248<br>(0.022)** | -.249<br>(0.028)** |
| inflation | .565<br>(0.155) | .307<br>(0.225) | 0.073<br>( 0.736) |
| Gdp | -.907<br>(0.214) | -.692<br>(0.138) | -.468<br>(0.293) |

***, ** and * indicates significance at level 1%, 5% and 10% respectively. p-value in parentheses.

The regression analysis provides a strong linkage to take a decision for any hypothesis and recommend a policy framework for the regulatory authorities. In present study, fixed effect model is sued. The stepwise movement towards OLS to fixed effect regression model and then FGLS is made due to results of post estimation tests that will discuss in next section. Results of regression analysis under OLS, Fixed effect & FGLS method of estimation are here under whereas leverage is dependent variable under all methods of estimation

The results mentioned in Table 4 describe the impact and nature of relation between dependent variable i.e. leverage and independent variables i.e. profitability (roa), size, tangibility, company growth, liquidity , forex , inflation and GDP by using OLS, Fixed effect method and FGLS. The findings displayed that profitability (roa) and liquidity have significant but negative relation with leverage which supports the result found by Çekrezi1 (2013). The results of size showed positive relationship with leverage Mahvish and Qaiser (2012). The nature of relationship for tangibility showed an inverse relation with leverage and is also supported by studies of Amjad and Tufail (2012). The results of forex indicates a negative but significant relationship with leverage.

In a nutshell, it is evident from discussion that the leverage has negative but significant relation with Profitability, tangibility, liquidity and forex while it has positive but insignificant relation with size, inflation. Leverage is also negatively related to GDP but results are insignificant.

This study has applied different post estimation tests to testify the validity of available results. These tests will ensure the status of Multi co-linearity, Autocorrelation, Heteroskedasticity and Cross Section Dependence in available panel data set. Firstly for multi co-llinearity this study used VIF (variance inflation factor). The VIF table shows that all variables are free from multi co-linearity and no independent variable in the model is strongly associated with other independent variables. Further auto / serial correlation has been tested through Wooldridge test. This test indicates the presence of this disease in the data. The result clearly describes that there is existence of auto/serial correlation in the data. In addition to this, white test has been applied to testify the presence

of Heteroscedasticity in panel data. The result of white test endorse that there is presence of Heteroscedasticity in panel data. Hence it is proved that results through OLS way of estimation do not meet major assumptions of OLS as there is existence of auto/serial correlation and Heteroscedasticity in panel data.

In continuation above mentioned findings, this study applied fixed effect method of estimation and also testified results extracted from this method. Firstly, Modified Wald test for group-wise. The result of this test supported that there is existence of Heteroscedasticity. Further this study checked Cross Section Dependence. The results of this test clearly states that Cross sections are not independent CD $\sim$ N (0, 1). Hence the results from fixed effect way of estimation are not consistent as these have problem of Heteroscedasticity and Cross section independence.

In this situation where OLS and fixed effect way of estimation do not meet the basic assumptions and there is doubt on the consistence and reliability of results then this study moved towards FGLS way of estimation wherein no problem of auto / serial correlation exist and panels are homoskedastic. Through FGLS results are certainly capable to predict the relation without any violation.

## 6. Conclusions and Policy Recommendations

It is without doubt accepted from existing fact findings that leverage / the capital structure of the company plays a vital role to ensure the long run stability in Pakistan. This study involves forex inflation, GDP as external factors while profitability, liquidity, size, tangibility and company growth as internal factors to find any relationship with leverage.

This study followed the existing literature which used panel data of 19 firms within fuel and energy sector to scrutinize the impact of some internal and external independent variables on leverage of the firm for the period of 1999 to 2012. The core purpose of this study is to measure the impact of external factors on leverage specifically and internal factors generally. The feasible generalized least square (FGLS) method of estimation is used to measure the nature of relationship and also to

quantify the significance of all independent variables taken into account. The findings/outcomes of this study support certain independent variables have significant effect on leverage. The results such drawn demonstrate that profitability, tangibility, liquidity, company growth and foreign exchange all have inverse relationship with leverage. This negative relationship does not imply that leverage as a whole plays a negative role in the capital structure of the firm. It actually clarifies the fact that increased profitability would suffice the financing needs of the firm allowing it the liberty to take a departure from reliance on leverage. Similarly, relationship with tangibility interprets that a firm with already sufficient assets would not require to take extra debt. Inverse relationship with liquidity implies that the more liquid a firm is, the less debt financing it requires which is but self-evident fact. Likewise, a company with better growth would not have to opt for leverage unlike budding firms which have to reach the growth stage and require debt financing to tap the potential opportunities. Last and most importantly, Foreign exchange which has been taken as external factor and could be considered as the pivot on which the whole study hinges as the other external factors did not have any significant impact on leverage. Negative relationship with foreign exchange means that once the foreign exchange rate increases (Direct quotation whereby the price of Dollar would decrease in terms of Pak Rupee) , leverage of the firm would decrease and vice versa. As energy sector is highly capital intensive one, firms have to import most of the respective machinery for which they have to pay in Dollars. Increase in FX rate would mean that Dollar would depreciate in terms of PKR and vice versa. This in turn would indicate that firms would have to pay less than they borrowed and reverse would be the case if FX rate decreases or USD appreciates.

Pakistan is undergoing a sever energy crises presently and has lost billions on account of sheer dearth of energy in recent past. In such circumstance it becomes highly imperative to revamp the whole structure and energy related infrastructure. Keeping in view the outcomes of this study, research work done previously and the urgency of reviving the energy sector in Pakistan it is but evident that external factors have significant bearing on the capital structure of energy related firms. Even though GDP and inflation were not proven to have any direct impact on

leverage of the firm, they do indirectly affect the overall performance of energy sector and get affected in turn. If only external anomalies could be bridled, energy sector would thrive providing electricity at cheap rates to already inflation ridden Pakistani people. It is high time Government should come to the rescue of economy by keeping prices at a controlled level and should introduce reforms to keep foreign exchange rate stable. This is the only way the deteriorating economy could be bailed out.

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# Intangible Capital Investment & Its Effects on Economic Growth: An Evidence from Asian Nations

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**Abstract:** The research is an attempt to describe the impact of intangible capital and its effects on economic growth using a panel analysis from 1995-2013 in 37 Asian economies. The analysis proves that increasing investment in different forms of intangible capital and its injection to business activities enhances growth pattern of the economy and higher profits in the long run. With the enrichment in human capital with education it helps the countries to absorb new and better technology which flow with FDI easily for value creation and competitiveness in goods and services.

**Keywords:** Capital, FDI, Technology, Investment, Growth, labor
**JEL Classification**: R11, O16, D24, J21.

## 1. Introduction

Following Hall (1992) proposal "intangibles" are considered as "assets" that is, intellectual property rights, trademarks, certain information technology such as data bases, networks, etc., and "skills", i.e., capabilities and competencies, such as the human capital. Approximately, 78% of the world's wealth is attributed to intangible capital (World Bank, 2005). In developing nations, intangible capital is attributed to 59% of the wealth, where as in OECD countries the share is approximately 80%. Economic transformation of the economies to knowledge based and innovative ideas need the incorporation of trained human capital and intangible capital in different activities triggering economic growth of the

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country. The recent economic structure has changed the growth stimulus to the intangible capital investment. Physical or financial resources are no longer keys for competitiveness. These are necessary but not sufficient conditions for a competitive economy (Loureiro & Castelo, 2012).

The key for achieving competitive edge in the word is by investing more in the intangible capital treated i.e. new technology, R&D, education, investment in human capital. Intangible capital basically is an idea putting into an activity for more value creation. Due to globalization and increased competition pressure on companies and economies is increasing and, by targeting successful area and regions. Flexibility can be increased by increasing investment on human capital, which increases the ability to immediately adapt to market developments, are the earmarks of this new era.

Witnessing the current scenario, there is increasing interest in analysis of intangible capital which affects growth. There is profound literature available on human capital, innovation and technology. However, there are some hurdles in the way for the proper analysis of intangible capital and its impact on growth. The factors, process and mechanism which contribute to the creation and development of knowledge i.e. competition and cooperation among firms the role of research and development , universities and global actors, it is identified that they are not connected, which is important to know the process of knowledge creation and its outcome.

The present research explores the injection and importance of intangible capital in the growth of the economy to catch up with more knowledge intensive technologically advanced countries of the world and for maintaining a competitive advantage in goods and services. The main base of the research is tied to the fact that, as in any investment decision, benefits and sacrifices must be compared in order to support a particular action under the economic rationality paradigm. Further public investment in the line of enhancing human capital through injection of more funds and training programs (labor training, organizational structure, education, R&D and public decision of channeling funds as a percentage of GDP for the support of these programs) is also analyzed. Another very important

factor which bring in to the economy new designs, technology, ideas and knowledge is FDI (foreign direct investment) in Asian economies for which the former factors has to have a strong base for better absorption of these factors in market for capturing more benefits for the growth of the economy.

The uniqueness of this research is its emphasis on the role played by intangible capital in the economic growth and development. This study states that the intangibles are already considered to be a significant resource of growth, market segmentation, knowledge creation, value addition, competitiveness in product and services, job opportunities and especially increases labor productivity in the region which On the other hand, the level of productivity is very low as compared to that in the developed countries, which creates a larger space for more development.

Despite the significance of the role of intangible capital in the developing countries; there are only few empirical studies in this regard. Conversely, the more recent restructuring from goods-producing to service-producing activity has not enjoyed the same broad recognition as a contributor to economic growth.

## 2. Literature Review

Ark *et al.,* (2009) discussed measuring intangible capital and its impact on economic growth keeping focus on current international comparison available using data on eleven advanced economies for the measure of intangibles including computerized information, innovative property and economic competencies. The result of intangible investment intensity and intangible capital deepening shows a large impact on growth with a variable growth pattern in EU countries. Suggesting that higher growth rates GDP per capita could be obtained with higher rates of investment in intangible as a share of GDP along with technology transfer and positive technological diffusion.

Bartuseviciene and Sakalyte (2014) tried to assess the patterns of intangible asset investment in OECD and Baltic countries. Concluding that USA, Japan, United Kingdom and other advanced economies' use the approach of computerized information, intellectual property and economic competencies. Accordingly investment in R&D shows slow growth as

share of Gross Domestic Product but it's the only factor affecting the economic growth.

Fukao *et al.,* (2007) found that investment in intangible assets has grown in Japan however, the growth rate declined in 1980 to 1990 but despite of that the contribution of intangible capital to economic growth remained same. The service sector has to be more intangible assets intensive to overcome the slow productivity growth in Japan.

Haskel (2012) explained that there is need to document investment in human and tangible capital, because intangible capital is traded in ideas and not treated typically in the markets. Future, investment will comprise more on intangible and that is important for growth of the economy too. Paper urges to suggest that only the policy should have the flexibility to affect intangible spending as various products and market restrictions might retard the investment in intangibles.

Sokhom (2012) demonstrated the contribution of least understood intangible human capital to assess its impact on economic development of less developing countries studying the case of Cambodia using t-test as a method with a total sample of 272 using psychological methods (self-esteem and political efficiency) finds out that intangible capital have contribution in economic growth.

Gomez and Vargas (2012) focused on manufacturing firms adopting new advanced technology for increasing profit explaining The link between technology adoption and competitive advantage with new diffusion patterns as all the technologies are not related to the firm resource structure. It also explains the idea of firm's movement from epidemic models once the uncertainty in innovation is reduced. It supports the idea that R&D investment increases the chances for adopting new technology with partial provision for human capital and advertisement.

Loureiro and Castelo (2012) gave the relation of three components important for the management of intangible on SME growth (human, structural and relational capital. It also through light on the fact that physical and financial resources are no longer the main keys for

competition rather it the intangible. SMEs are enterprises with limited resource and innovative capabilities which highlights that SMEs are not meeting their required demand of innovation. There is need for increasing he ratio of technology transfer and diffusion d medium terms. This will increases growth in long and medium terms.

Haskel and Wallis (2013) found for UK market sector if publically financed R&D has correlation for private sector productivity role, argues that return has fallen due to trebled in the research budget. Dulal and Foa (2008) explained that social institutions are main components of national wealth and shoes that intangible capital is fundamental for development. Main hurdle for developing countries are the low stock of intangible capital and ability to convert human and social capital into revenue generating and cost savings and other tangible benefits. The cross country differences in stock of the capital are due to social and human capital.

Roth and Elisabeth (2010) using cross-sectional panel analysis for fifteen EU countries found a positive relation between intangible capital in business and its effect on labor productivity. By inclusion of business intangible on the asset side changes the rate of output per worker and it also explains the significant international variance in labor productivity. Country associated with high intangible capital deepening growth has higher labor productivity growth rates.

Chen *et al.,* (2014) using data of 10 EU countries explained that productivity growth was observed in industries which used intensively information and communication technologies, countries with high intangible capital investment which developed countries mostly relies on this source of growth.

Teece (1998) captured the idea of organizational capital important for value creation as knowledge and other intangible capital becomes the key drivers in developed nations. According to author the key drivers of growth and wealth creation are intellectual property, technological know-how, brands and better goods and services and their commercialization. Role of management is quit considerable for business organization for the focus on strategic analysis must change to convert intangibles and knowledge for better product and societal growth.

Amin *et al.,* (2014) examined the intellectual capital impact on pharmaceutical industry of Pakistan using quantitative data from 2009-2013 to measuring financial assets, return on assets, return on equity and earnings per share are used. Partial least square technique is used for the analysis. The results of the estimation shows that path coefficients values (β) reject the null hypothesis supporting $H_1$ reflecting that IC (intellectual capital) has very positive impact on financial performance of the pharmaceutical companies of Pakistan. This makes it fruitful for decision makers of pharmaceutical companies.

Moreno, (2011) gave a summary on intangible asset and its impact on regional economic growth focusing on intangibles for which data was available i.e. knowledge capital, human capital, social capital and entrepreneurship capital. Geographic Macro and Regional approach is applied for regression to measure the impact on GDP of FP6 EU over the period 2003-2007 to analyze the contribution of R&D and intangible assets. The social externality embodied in human relationships facilitates the creation, acquisition and diffusion of useful knowledge. The influence of human capital and R&D efforts on innovation increases with growing levels of social capital. They further argued that an entrepreneurial identity results from an individual's socialization a positive relationship between productivity and entrepreneurship capital, entrepreneurial activity, i.e. the rate of self-employment, and entrepreneurial attitude, and knowledge and productivity.

Kumlu (2014) put an effort to know the intangible capital impact and export performance of Turkish SMEs and ME companies. Sample of 271 was used and analyzed through the SPSS statistical packet program and the proposed relations were tested through regression analyses. Results of the paper show that all forms of the intangible resource and competitive export strategies play an important role in contributing towards perceive export performance. Companies which inject all possible intangible assets and combination of differentiation and cost leadership strategies at the same time reach at the best of export performance.

Malik and Ali (2013) examined that whether the investment in intangible capital is procyclical or not, firms preferences for intangible investment and its response to the transitory and productivity shock. Dynamic general equilibrium model agents work in competitive environment producing output using capital, labor and intangible capital which makes it different from typical business cycle model. Application of the model proves that investment of intangible is procyclical and it produces endogenous movement in productivity. As a result of both transitory and permanent shock there is increase in the investment of intangibles however it reduces the firm's current profit but the investment leads to higher profit in the long run.

Khan and Haider (2015) attempted to highlight the hidden GDP growth drivers (health and education) using time series data from 1972 to 2014 of 43 years for Unit root tests, ADF, Phillip Perron test and ARDL tools. The research proves that education improves abilities, labor market segmentation, reward, profits, youth employment, social class and all of these leads to economic growth and development.

## 3. Theoretical Framework

The main focus on technical change is by increasing the activities of R&D. But this idea was more refined in recent work done by Pavitt (1984), Dosi (1984) and Freeman (1986) in which it is argued that innovation process has more consideration in recombination of existing knowledge than creating new one. Firms usually go through complex learning process where the priority of knowledge through is important along with funding and R&D activities.

Human capital emphasis on skilled human capital considering them asset like financial and physical assets. Human capital act as investors and invest in their training and education. Further the idea of human capital as explained in two points by Mincer (1989), he summarized the role of human capital in economic growth as 1). It's a productive factor which is treated as a stock of education and skill which helps in the production of final good. 2).cause of innovation which is a source of innovation in the form of accumulated knowledge. The concept Of" intangibles" is explained by this human capital theory due to the second reason.

## 4. Data and Sources

Panel data has been used for regression analysis of 34 countries for the time period of 1995 to 2013. Panel data are also known as cross sectional time series data or longitudinal data. Data has been collected from world development indicators 2013.

## 5. Methodology

In order to check the relationship for cross section analysis pooled OLS estimation technique has been used, as it is the most restrictive model which specifies constant coefficients.

$$Y_{it} = a + BX_{it} + U_{it} \qquad (1)$$

Pooled linear regression model estimable by Ordinary Least Squares (OLS) procedure:

$$y = + \sum x + e = 2\ \beta_1\ \beta \qquad (2)$$

Where i = 1,2,….; N; refers to a cross-sectional unit; t = 1,2,….; T; refers to a time period and k = 1,2,….; K; refers to a specific explanatory variable. Thus, it y and it x refers dependent and independent variables. Pooled model differ in the assumption of U. If the regressors are uncorrelated with the error term and model is correctly specified then Pooled OLS can be used for estimation analysis.

## 6. The Model

The econometric technique employed in this study is the POOLED OLS regression analysis. A general linear model for panel data permits intercept and slope coefficients to vary both over time and over individual.

The general empirical model is as follows:

$$Growth_{i,t} = \alpha_{it} + \beta_{1i,t} \text{ foreign direct investment} + \beta_{2i,t} \text{ Govt Exp on Edu} + \beta_{3i,t} \text{ Public Spending on Edu} + \beta_{4i,t} \text{ Gross Capital Formation} + \beta_{5i,t} \text{ Labor} + \varepsilon_{i,t} \quad (3)$$

Dependent variable is Growth which is estimated as GDP per capita as annual percentage. The growth in any economy is estimated with the help of change in the volume of its production or in the real incomes of its inhabitants. It is defined as the sum of value added calculated at constant prices, by governments, industries and the households functioning in that particular economy.

Independent variables are foreign direct investment, government expenditure on education, public spending on education, gross capital formation and labor to see the effect of these variables on growth GDP of the Asian economies.

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## 7. Estimated Results

Table 1 illustrates the summary statistics of per capita GDP, indicators of service sectors like financial and insurance services, computer and communication services, travel services and transport and tourism services as well as governance indicators like political stability, control of corruption, government effectiveness regulatory quality and rule of law. This research uses balanced panel dataset to estimate these statistics.

In order to do the estimation of results in Asian economies, OLS regression models are applied individually for each model in order to explore the nature of relationship between services sector and growth as well as the relationship of growth with institutions. F test has also been applied for each model so as to check the time effects and country effects and the results supports the Pooled OLS as overall there were no time effects as well as country effects

**Table1: Summary Statistics**

| Y | Coefficients | Std. Err. | T-values |
|---|---|---|---|
| FDI | .1790<br>0.000*** | .03015 | 5.94 |
| GEE | .0630<br>0.069* | .05703 | 2.11 |
| PEE | -.1037<br>0.003** | .0347 | -2.98 |
| GCF | .0894<br>0.000*** | .0096 | 9.26 |
| L | 5.04e-09<br>0.000*** | 1.20e-09 | 4.20 |
| Cons | 4.6915<br>0.000*** | .5858 | 8.01 |

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

The results of the Table 1 shows different estimator variables that are associated in intangible capital investment in a regression equation along with the economic growth as a dependent variable for the time period of 1995 to 2013 for the panel of 34 Asian Economies. These results indicate that investment in all form of the intangible capital *expenditure on education and *public spending on education (proxy for training programs, new technology) will increase the value of output in the country. The parameter for α (constant) (4.6915) specifies the association when all explanatory variables are equal to zero. The β parameter illustrates the average change in GDP per capita that is linked with each unit increase in the explanatory variables. The estimation results shows that there is positive relation of FDI with GDP and keeping all other variables constant a 1% increase in the FDI will led to 17 percent raise in the GDP growth. The relation of GEE (government expenditure on Education) with GDP is also positive indicating that keeping other

variables constant if there is 1% increase in the GEE GDP growth increases by 6 percent. GCF (government capital formation) also has a positive relation with GDP and a 1 % increase in the GCF, GDP growth increase by 8 percent. Labor in the research is used trained and educated population in the work force of the economy, which is showing positive sign and the estimation results shows that, 1% increase in the trained and educated labor will increase the GDP growth of the economy. However, the variable PEE (public expenditure on education) showing a negative sign to but the variable is significant.

As all the T-statistic is greater than 2 and the probability value of them is less than 0.1, so it shows that we should reject the null hypothesis of non-significance. Hence all variables are significant.

**Table 2: OLS Results**

| | |
|---|---|
| Number of obs | 627 |
| F( 5, 621) | 35.06 |
| Prob > F | 0.0000 |
| R-squared | 0.2202 |
| Adj R-squared | 0.2139 |
| Root MSE | 4.1326 |

Number of total observation used in the regression analysis of Asian countries are 627. The value of R-squared of .2202 means that only 22 percent of the variation in economic growth (GDP) is explained by all the explanatory variables. To check whether the problem of heteroskedasticity is present or not we test it through Breusch-Pagan / Cook-Weisberg test for heteroskedasticity results are given below:

**Table 3: Breusch-Pagan / Cook-Weisberg test for heteroskedasticity**

| | |
|---|---|
| chi2(1) | 0.23 |
| Prob > chi2 | 0.6351 |

The result in Table 3 shows that there is no problem of heteroscedasticity in estimation of the results of the said model.

**Table 4: Ramsey RESET test**

| | |
|---|---|
| F(3, 618) | 0.76 |
| Prob > F | 0.3567 |

Ramsey has proposed a general test of specification error called RESET (regression specification error test). As the probability value of F is greater than 0.1, so we should not reject our null hypothesis of no omitted variables. Hence the estimated model is a good fit model.

## 8: Conclusion and Policy Recommendations

Using data on intangible capital (government expenditure on education and public spending on education) investment within across-sectional and panel analysis from 1995-2013 in 34 Asian countries, the analysis detects a positive and significant relationship between intangible capital and overall economic growth. The result indicates that a country with a high intangible capital deepening growth rate is associated with a higher labor productivity growth rate along with efficient absorption of technology inflow through FDI. These findings suggest that the Governments should divert their focus on capital expenditure which includes spending on education, health sector and R&D departments for accelerating growth.

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