International Journal of Advanced Multidisciplinary Research and Studies

Short and Long Run Determinants of the Private Investment in Pakistan: A Co-Integrated Analysis

[1] **Babar Bashir,** [2] **Muhammad Rashid,** [3] **Abdul Wajid**
[1] University of Haripur, Haripur, Pakistan
[2, 3] International Islamic University Islamabad, Pakistan

Corresponding Author: **Babar Bashir**

Abstract

The core intention of this study is to analyze the key hurdles by finding the long and short run determinants of private investment in Pakistan. Time Series Data for period 1988 to 2018 of 30 year was used. To check unit root of all data series "Augmented Dickey Fuller test" (ADFT) was implied. Data series were found stationary at first difference I (1) and non-stationary at level I (0). Johansen co-integration test is used to verify long run association. Co-integrating (OLS) was used for demonstration of long run relationship. However, to capture short run dynamics Error Correction Model (ECM) was used. In long run private investment has a positive and significant relationship with GDP and public investment while interest rate has an inverse and significant relationship with private investment; Foreign Direct Investment and Defense expenditure have a positive and significant relationship with Private investment. The co-efficient of dummy shows the increases in investment after the incidence of 9/11. Which reject the hypothesis of this study that 9/11 has negative impact on the local private investment. While in short run, Gross Domestic Product has a direct relationship between private investments while interest rate has an inverse relation with private investment. The ECM factor's value is -0.19 which show that 19 % of the short run error is corrected every year toward the long run equilibrium relationship. This study suggests that Government should increase investment of infrastructure and also create a conducive environment for business.

Introduction

Facts show that in modern era private investment plays a significant role in economic development and stability of any state. The USA has high level of private investment while it has grown with an unprecedented rate and its per capita increases to 59,000 US $. Private investment in Pakistan is in pathetic and it effects the economic growth badly. The private investment level of Pakistan in year 2019 was 2,213.85 billion PKR and economic growth rate was 7.76 percent, (Economic Survey of Pakistan, 2019-20). From a macroeconomic perspective, private investment refers to the acquisition of capital asset that is anticipated to appreciate in value, create income, do both. Capital asset is real estate which is difficult to sell and is typically bought to aid an investor in making decent profit. It does not mean that it will remain same forever. The other can set an autonomous investment level. Induced Investment is that part of total Investment which alters along with the national income and usually it has an increasing relationship with the national income and decreasing relationship with the interest rate (Ajide, K. B., & Lawanson, O. 2012) [5]. Financial Investment is that Investment which is done on the sale and purchase of the already produce capital assets, already issued shares, previously sold bonds and old securities. According to Ali, M. M., & Shaheen, S. (2016) [6] Real Investment is extended to increase the stock of capital in the economy and made in new buildings, Public utilities, railways and roads. Gross Investment The gross investment consists of expenditures on the new investment and all the removing the wear and tear of the old investments in use. $I_g = I_{net} +$ D.A (Depreciation Allowance) Net Investment The investment purely made on the new investment in a period of one year is called Net Investment. Do calculate the net investment the depreciation allowance has to be subtracted from the gross investment. $I_{net} = I_g$ - D.A. Private investment in macroeconomic point of view is the process of the Gross Fixed Capital Formation (GFCF) through the private sector of the economy, whereas GFCF is use for the extension in the fixed capital which comprises the expenditures on the machines, building the new buildings, Constructions of electricity dams, designing the new drainage system, new roads, building shipyards and ports etc (Ali, S. 2013) [7]. The private investment is an act of procurement of machineries and fixed assets that increases the national income in a multiple way. A capital asset is immovable assets e.g., fixed assets comprises factory

buildings, useful land, technical machinery and massive equipment. The inflow of foreign investment in the form of FDI also accelerates the formation of private investment and the GDP growth rate of the underdeveloped countries like Pakistan. Capital formation rate decreased from 19 percent of the GDP to 15 Percent (Maqbool *et al*, 2013) [20]. There are number of factors that explain this variation. Ahmed & Alamdar, (2018) [4] (a) Real interest rate: There are two different views on the effect of interest rate on the investment. An increased interest rate escalates cost of machinery and capital, and hence reduces the private investment. But contrary to this view that an underdeveloped capital market in the developing countries along with a scanty access to foreign exchange market for the private business means that private investment is largely depends on the meager local savings. Karagöz, K. (2010) [18], (b) Inflation rate and effects on Investment: High and variable rate of inflation badly affect the private investment. It increases the risk involved in the projects longer-term, decreased the maturity of bank loans and disturbed the direction guidance conveyed by the market forces and price mechanism (Hussein, J., & Benhin, J. (2015) [16]. This phenomenon will alter the optimal resources allocation and the existence of the pareto optimality and divert the resources towards inefficient uses. Karagöz, K. (2010) [18] (c) Per Capita Income Growth Rate: The economic growth of a country in general has the increasing effect on the per capita income on the country. A high economic growth will ultimately has a direct impact on the private investment. The impact intensity is usually measured through the capital to output ratio. (d) Per Capita Income: Shahbaz *et al* (2014) [26] described Economist claim that per capita income level should be positively related to private investment activities because higher income countries has more savings. Chandio *et al* (2019) [11], (f) External Debt: The external debt has two dimension impact on the private investment as it increase the inflow of foreign exchange and formulate the capital again it increases burden which may have a negative impact on the investment. A higher debt services payment translated into limited resource for domestic society use and private investment and has negative impact on private investment. Chandio *et al* (2019) [11], (g) Non Economic factor: Beside the there are other non-economic factor that are important for the rapid private sector investment growth these includes the political instability, good governance quality of institution and investor confidence that play a significant role in investment behavior. Another factor of is a country's tax and regularity environment which also play a vital role in set up investor's confidence in the administrative structure of the country. Ahmad & Qayyum (2008) [2], until mid of the 20th century the public sector was only involved in only the economic activities like producing army equipment, maintaining and producing hydroelectricity, railway engines and equipment, telephones, wireless phones and telegraphs. The research will investigate the impact of real GDP, real interest rate, Foreign Direct Investment, Defense expenditure, and incidence of nine eleven on the private investment and capital formation in Pakistan. Purpose of research work is to evaluate major determinants of the private investment in long run and short run.

Literature Review
Chapter included a comprehensive review on theme "Determinants of Private Investment in Pakistan" for Pakistan as well as other world. Omorokunwa & Ikponmwosa (2014) [22] in their article "Interest Rate and its Impact on Investment to extent of Pakistan" in regard of Pakistan investigated impact of interest rate on investment; the Time spent for this study was 48 years from 1942 to 2016. They used Johansen Co-integration Test for testing the data, they examined that interest rate had significantly inverse relation with investment. According to them if rate of interest had inverse relation with investment then policy makers can make better policies for Pakistan.

Ismail & Rashid (2013) [17], in their article "Why in Pakistan Private Investment sagged, how it can be reinstated" by time series data year from 1981 to 2002 and applying Augmented Dickey Fuller (ADF) and Philips Pearson Test (PPT) for checking the stationary of data and used Private investment in agriculture (IPA) as a dependent variable in agriculture sector, IPM in manufacturing sector and IPO in service sector while total remittance in real term (RM),Index of stocks of provincial public infrastructure(SPI), Rate of interest(RT), Index of capacity utilization(CU), Export of goods (XG), Price index of imported plant and equipment (RP) and GDP deflator were used as independent variables. The Result show that so many factors like Political instability, security situation, law and order Situation, Public debt etc reduced the Private investment. It further showed that Lake of Confidence among the investors is the main reason of reducing Private investment. And also stated that the policies were adopted in such a way that short run objectives were been achieved. They predict that Non-economic factors are the fundamental hurdle in the way of Private Investment.

Khan & Abbas (2016) [19], In their article "The Determinant of Foreign Direct Investment in Pakistan" empirically identified the handles of growth and FDI on Pakistan. The main objective of study is that how different handles reflect Trade, Fiscal and financial Liberalization attracts FDI in Pakistan. From year 1972 to 2012 Time series data is taken Co-Integration and Error Correction Technique (ECT) to link variables in explaining FDI with regard to Pakistan. The study considered the import tax, currency rate, taxes, private credit and index of price as important variable. To evaluate the relative demand for labour and the market size hypothesis, they also incorporated GDP wages and per capita income. With the exception of the wage rate and share price index, all variables had the correct sign and were statistically significant. The outcome demonstrated that Pakistan's FDI reforms had made a good and considerable contribution.

Muhammad *et al*. (2013) [21] enlightened determinant of private investment in agriculture R&D in developing countries. According to them new technology is critical to enhance agriculture output and illuminating poverty in poor countries while Government investment in R&D has improves technological changes in agriculture. They further assessed that the Public sector's role cannot improve agriculture. They were confident about the Private sector' to develop new technology even though current Level of private Investment in developing countries reaming low.

They recommended that new technologies can develop the technology strived agriculture yield and output.

Shahbaz & Rahman (2012) [25], in their article "What are determines Private investment? A case from Pakistan" analyzed the factors effecting Private investment in Pakistan. They used time Series data year from 1972 to 2005. Co-integration Approach and Auto Regressive Distributed Lag (ARDL) were implied to find factors have no impact or little on Private Investment while non-conventional factors like institution governance quantity, entrepreneur skills etc. are compulsory in regard to Private investment.

Afzal et.al (2012) [1], in their article "Determinants of private investment and relationship between public and private investment in Pakistan" examined the relationship between private and public investment, and used time series data year from 1982 to 2012 and Ordinary Least Square (OLS) method to test regression. Equation and recursive model were used to check the relationship between public and Private sector, negative and positive effect on private investment in Pakistan while Recursive model revealed that their exist positive effect which mean that most of the Resources were utilized by public sector so there exist negative relationship between Public and private sector. They reckoned that lower the economic rate of interest to encourage investment, provision of advanced technology, country's stable environment. They also suggested that local investment be encouraged to increase the private investment.

Farooq *et al* (2013) [15], in their article "Determinant of Foreign Direct investment in India, Indonesia and Pakistan" they investigated that several economic factors effected the FDI inflow into Pakistan, India and Indonesia. They chose three countries Pakistan, India and Indonesia and used time series data from year 1980 to 2014. Used Long Linear Regression Model and the method of Least Square to estimate the several handles that effects on FDI inflow and used FDI as a dependent variable while market size, Inflation rate, Government consumption, Infrastructure, Domestic saving and trade openness were used as independent variables. Empirically result showed that market volume, dolor debt, Goods Trade and technical infrastructure were the significant economic Determinant of FDI. They estimated that the result of economic handles of India matched with of Pakistan while the result of Indonesia didn't match with the result of Pakistan. They further suggested that to enhance more FDI in Pakistan, Indonesia and India, the govt need to ensure economic, political stability, fast infrastructure, security, and boost domestic saving.

Ahmad, K., & Mahmood, H. (2013) [3] described in their article "Inter linkages of Public Investment & Economic growth in Pakistan". He investigated the influence of Pakistan's economic growth on public investment. He applied secondary annual data for the years 1969 through 2011. Data were gathered from the Pakistan Economic Survey and global financial statistics. For studies, a linear regression model and the two-stage least squares (2SLS) method were employed. According to the study, increasing productivity and reserves had a positive effect on public investment. Results also indicated that long-term government investment strategies, both private and public, might provide stronger economic growth, which would then lead to increased public investment, more job opportunities, and the eradication of poverty.

Cheema & Atta (2014) [13] in their article "Determinants of Private and Public Investment an Empirical Study in Pakistan" by investigated elements of private and public investment in Pakistan by using 30 years from 1985 to 2016 time series data. Error correction and Co-integration techniques were applied to indicate relationship between dependent variable i.e., private investment and independent variable i.e., Real Interest Rate, AID and Government investment. Outcomes demonstrated that governmental investment had a significant impact on private investment. investments by governments has had a considerable and favorable short-term lag. Although good, the impact of aid on government spending is short-term and negligible. Government investment is significantly and favorably impacted by private investment.

Babar *et al* (2013) in their article "Determinant of Investment in Pakistan" examined that perfect Mobility of capital increase the saving in one country will increase investment in many other countries. They used time series data from year 1969 to 2013 to identify the long run relationship between Investments and saving and used Co-Integration technique. In this study they used Real Capital Formation as a dependent variable while Domestic Saving, Trade and export were used as independent. The result showed that long run relationship between domestic investment and saving does not exist In Pakistan because trade in saving significantly affect the investment while is negatively affect the domestic saving.

Shah et.al (2016) [24] in their article "Impact of Foreign Direct Investment on economic growth" analyzed effect of FDI on economic development. They used time series year from 1991 to 2015 and used Multiple Regression Model to measure the GDP, FDI and Inflation. GDP in this model used as a dependent and FDI and Inflation were taken as an independent variable. The result showed that model had a negative but significant relationship was found between Inflation and GDP while a positive and significant relationship between FDI and GDP. They further suggested that FDI was absolutely inevitable factor of economic growth in the developing countries.

Chaudhry *et al* (2014) [12], in their article "Investment's Impact activities on economic growth of Pakistan" they investigated influence and impact on economic development of Pakistan. Time series data were used by them from 1991 to 2014 and used Multiple Regression Technique (MRT) to study relationship between dependent variable i.e., Gross Domestic Product and Independent variable i.e. Public Investment and Foreign Direct Investment. They suggested that in the short-term Pakistan should make serious steps to gain maximum numbers of FDI's to aid foreign exchange sector. Satisfactory law and order position, Political instability and different situation are also serious indicators to attract FDI.

Rahman *et al* (2016) [23], in their article "Determinant of Private Investment in Pakistan" investigated that the impact of various factors on investment regarding Pakistan. She used a time series data year from 1989 to 2011. Data was checked for unit root by applying Augmented Dickey Fuller test (ADF) and found all data series stationary at First Difference (I). She used Co-integration (OLS) to find the long run relationship with independent variables (GDP, Rate of Interest, Political instability, External Debt, Grass public investment, Exchange rate) and dependent variable (private investment). The result showed that the rate of interest GDP

and External Debt had a positive but insignificant relation with Private investment. It further showed that the value of ECM was 0.32 which showed 32 % short run error is corrected every year.

Bint-e-Ajaz & Ellahi (2012) [10] described in their article "Economic determinant of domestic investment a case of Pakistan". They investigated the determinants of gross domestic investment and data was used annual time series year from 1981 to 2009 data derived from State Bank of Pakistan. Regression and co-relation technique were used to estimate the dependent variable (Gross Domestic Product) and independent variables (Growth Rate, Foreign Direct Investment, financial and intermediate product and export of goods). The result indicated that there was a positive and significant relationship between Gross Domestic Investment with respect to Foreign Direct Investment, Gross Domestic Saving and money supply, whereas export has a positive relationship with domestic investment which suggested that the expansion of export increases domestic production.

Hypothesis of the Study

H1: H_{01} Real GDP has no positive and significance impact on the PI.

H2: H_{02} Defense expenditure has no positive and significance impact on the PI.

H3: H_{03} FDI has no positive and significance impact on the PI.

H4: H_{04} Real Interest rate has no significance and positive impact on the PI.

H5: H_{05} The incidence of 9/11 in USA has no significance impact on the PI.

Theoretical Framework

Interest rate fluctuation and expected yield are the main cause of bringing changes in the private investment was the idea was presented by Keynes and his followers. People thing that if interest rate increase will decrease the private profit and private investment, (Keynes, 1936). Again, a political situation disturbed either in a positive or negative manner, inventions, innovation expected to start or stopped as the incidence of 9/11 has started the flight of capital from Pakistan as a consequence of the of changes in expectation regarding sale and profit changes. Another important component that accelerates the private investment and business is the defense expenditures in Pakistan. According to economic survey the defense expenditure of Pakistan for the year 2013 stands at 600 billion PKR. The defense expenditure attracts the private investment as well. The FDI has also has significant positive impact on the domestic private investment, (Fida U (2014). Gross Domestic Product also effect the domestic private investment in Pakistan as GDP effects aggregate demand and it in turn effect local private investment.

Variable of the Study

Different variables are used in this study discussed as below.

Domestic Private Investment

Private investment is something in which money invested by investor, companies, or other financial institution rather than by the Government. This study used Private investment as

dependent variable and measure in term of million rupees.

Real GDP

In a specified year, money value of all the goods and services produce within the national boundary, expressed in the base year price. Real GDP here taken as a independent variable denoted by GDP and measure in term of million rupees. According to ministry of finance the latest value of total GDP is 25177.68 million rupees.

Real GDP= Nominal GDP/Deflator:

Real Interest Rate

The amount that lender charge from the borrower when he uses the assets as a percentage of its amount. The borrowing assets comprise consumer good, cash, vehicles or building. When interest rate increases people save more of their revenues and income while consume less to earn more return. This is negative influences in money demand the measure in parentage. According to ministry of finance the value of May 2018 is 11 percent.

Defense Expenditure

Expenditure used by any country for his defense purposes i.e., expenditure on police, Military, or any other defense department. Defense expenditure in here is taken has an independent variable and it measure in term of million rupees. According to ministry of finance the defense expenditure in 2019 $11.30B, 8.76% increase from 2018.

Foreign Direct Investment

Diabate, N. (2016) [14] described "FDI is the sum of reinvestment of earnings, other long & short run capital and equity capital," (World Bank, IMF). Pakistan is making many reforms to attract investment flows. it has significant and positive effect for money demand. Foreign Direct Investment here is taken as a independent variable. It is measure in term of million rupees. According to ministry of finance the latest value of foreign direct investment is in 2019 $2.06B, a 7.92% decline from 2018.

Dummy Variable as a Proxy of 9/11 Incident

Dummy variable one in which take the value (0 or 1) to indicate the presence or absence of some other effect that may be the cause of different outcome than expected. In this study dummy show effects of nine eleven on private investment.

Table 1: Study Variable

S. No	Variable	Dependent/Independent	Code	Measure in RS
1	Private investment	Dependent	Prinvit	Million RS
2	REAL Interest Rate	Independent	intrate	Percentage
3	Gross Domestic Investment	Independent	GDP	Million RS
4	Defence Expenditure	Independent	Defexpd	Million RS
5	Dummy Variable	Independent	DD	0,1
6	foreign direct investment	Independent	Fdi	Million RS

Research Method
Data Set:
In this study data is used mainly taken from the PIDE Federal Bureau of Statistic and State SBP's sites and from their libraries and other required data is acquired from the Board of Investment (BOI). Study covers 30 financial years' data from 1988 to 2018.

Study Sample:
Sample consist of the data from the year 1988 to 2018.

Variables:
Dependent Variable: Private investment, Independent Variable: Real interest rate, Defense expenditure, Gross Domestic Product, Foreign Direct Investment.

Test Hypothesis:
H01: FDI has insignificant positive impact on PI.
H02: GDP has positive insignificant impact on PI.
H03: Defense expenditure has positive insignificant impact on PI.
H04: Interest rate has negative insignificant impact on PI.
H05: Incident of 9/11 has negative insignificant impact on PI.

Financial Model:

$$PRI = f(FDI, GDP, Defexped, IRATE, DD, \mu),$$

Where:

PRI: Private Investment,
FDI: Foreign Direct Investment,
GDP: Gross Domestic Product
DEFEXPED: Defense Expenditure,
IRATE: Interest rate,
DD: Dummy Variable,
μ: Error term.
Private Investment (PRI); dependent variable in the model. Remaining variables are considered as independents or determinants of PI.

Model Specification:
$$PRI = \beta_0 + \beta_1 FDI + \beta_2 GDP + \beta_3 Defexped + \beta_4 IRATE + \beta_5 D + \mu$$

Where:
PRI: Private investment.
FDI: Foreign Direct Investment.
GDP: Gross Domestic Product.
DEFEXPED: Defense Expenditure.
IRATE: Interest rate.
DD: Dummy Variable.
μ: Error term.

Initially before applying any econometric technique we check the data for stationary or non-stationary we use AUGMENTAG DICKEY FULLER (ADF) approach to check stationary of data and to infer that data is non-stationary at level I (O). Therefore, first we transform data and find data become stationary at 1st difference I (1). To observe existence of long run relationship between variables, JOHANSON CO-INTEGRATION Technique is applied. Similarly short run relationship between variables has been checked through ERROR CORRECTION MODEL (ECM).

Stationary v/s Non-Stationary:
Stationary is a process in which variance and mean of the data series remain constant over period of time. It means that the parameters mean and variance do not follow any trend. Stationary use in time series analysis whereas the non-stationary data is converted into stationary data. There are three situation are stationary. Let suppose Xt is stochastic random error
$E(Xt)=\mu$, VAR $(Xt)=\sigma^2 Xt$, COV $(Xt, Xt+s)=Cov (Xt, Xt-s)$. Three methods to check the stationary: Graphical method, Correlogram or auto correlation function (ACF), Augmented Dickey Fuller Test

Non-Stationary:
Non stationary is a process in which variance and mean of data changed over the period of time. It mean that the parameter mean and variance follow tend non stationary data is uncertain and the result obtained using non stationary data is spurious, as it establish a relationship between two variable when in fact they are not related so in order to obtain credible result non stationary data require to convert into stationary data first. Non-stationary data type.
Pure random walk: $(Xt = Xt-1+\mu t)$, Deterministic trend, Random Walk with drift: $(Xt = \alpha+Xt-1+\mu t)$

Augmented Dickey Fuller Test (ADFT):
To assess stationary in time series data Augmented Dickey Fuller Test (ADF) is used. ADF is a complicated set and enormous part in time series model. ADFT is used to test whether the strong rejection of the more negative Hypothesis has a unit root at the confidence level. ADF states that; When $\rho=1$ it is a worrisome situation mean Yt is only determined by its past value Yt-1, When $\rho>1$ it is explosive series which is not feasible for testing, When $\rho<1$ it is the situation that prevail for stationary.

Johansen Co-Integration Test:
If data is stationary at first difference then we apply the Johansen Co-integration or other technique. Johansen Co-integration technique related to the existence of long run relationship between two variables. Although the economic variables are non-stationary but they have long run common trend. e.g., MV=PV (where v and t remain constant) We infer according to Quantity theory money (QTM). When we double the supply of money (M) price (P) also double; There are two basic conditions for the existence of long run co integration relationship 1) All the date series must be non-stationary at level I(o) but stationary at first difference I(I). 2). Linear combination of data series must be integrated at level I(o) mean that residual must be stationary at level.

Error Correction Method (ECM):
ECM is used to find short run relation. ECM is a multiple time series model that estimates expedite at which dependent variable return to equilibrium after changing independent variable.

Data Analysis and Interpretation:
All the results and finding regarding analysis of the

variables discussed in this chapter and the used econometrics techniques have been covered in this chapter. First, stationery of all variables is checked by using ADFT and we come to know that all the variables are non-stationary at level but stationary at first difference (1). In next phase this study applies Johansen Co-integration technique to verify existence of long-run relationship between variables (dependent and Independent), findings are mentioned below.

Checking the Stationary of All Variables:
ADFT and unit root test shows that all data series of GDP, INTRATE, DEFEXPD were found non stationary at level both with intercept and trend. Differencing technique technique is used to transform entire data series from non-stationary to stationary. Again, ADFT is applied to the first difference and all the data series are found to be stationary at first difference that means "order integrated data series is I(1)". This result showed fundamental role in establishing long-run relationship among variables and is called "CO-

integration relationship". Computational results are summarized in table which shows that the ADFT data are stationary at first difference.

Augmented Dickey Fuller Test:
ADFT is "unit root test to estimate whether series is stationary or not". All mentioned variable in model is stationary at I (I). The null Hypothesis HO is rejected as ADF statistic are less than their critical value. From table and series are stationary. All series are integrated of order one, so co-integration between these series is checked. To solve the model Johansen test of Co-integration is used.

Data:
The time span of this study is 30 year from 1988 to 2018. Population taken from this study is 30 from 1988 to 2018. Sample selected from population for this study is 30 year from 1988 to 2018. Data is collected from State Bank of Pakistan (SBP)from the following website. www.sbp.org.pk.

Table 2: Checking the stationarity of all variables using ADF test

S. No	Variables	Unit Root Tests	Include in Equation	ADFT statistics	ADF Critical Values	Results
1	**Private investment**	Level	Constant, Linear Trend	-3.4235	1% -4.273225 5% -3.557753 10% -3.212326	*I (1)*
		1st difference	Constant, Linear Trend	-2.4526	1% -2.639216 5% -1.951635 10% -1.610526	
2	**Gross Domestic Investment**	Level	Constant, Linear Trend	-2.0889	1% -4.262735 5% -3.552973 10% -3.209642	*I (1)*
		1st difference	Constant, Linear Trend	-5.6685	1% -4.273277 5% -3.557759 10% -3.212361	
3	**REAL Interest Rate**	Level	Constant, Linear Trend	-1.8132	1%-4.262735 5%-3.552973 10%-3.209642	*I (1)*
		1st difference	Constant	-4.1280	1%-4.273277 5%-3.557759 10%-3.212361	
4	**Defense Expenditure**	Level	None	1.6124	1% -2.636901 5% -1.951332 10% -1.610747	*I (1)*
		1st difference	None	-4.3875	1%-2.639210 5%-1.951687 10%-1.610579	
5	**Foreign Direct Investment**	Level	Constant	-1.3875	1% -4.262735 5% -3.552973 10% -3.209642	*I (1)*
		1st difference	constant & linear trend	-2.7980	1% -2.639210 5% -1.951687 10% -1.610579	

Johansen Co-Integration:

Table 3: Johansen Co-integration Test Results

Series: Prinvit Intrate GDP FDI Defexpd Dummy				
Hypthszd		Trace	0.05	
No. of CE(s)	Eigen value	Statistic	Crit: Values	Prob.**
None *	0.791207	133.6118	83.93713	0.0000
At most 01 *	0.713855	83.48657	60.06241	0.0002
At most 02 *	0.494414	43.44634	40.17483	0.0226
At most 03	0.357731	21.62112	24.27696	0.1042
At most 04	0.206636	7.453179	12.31090	0.2823
At most 05	0.001438	0.046052	4.128906	0.8605
Hypthszd		Max - Eigen	0.05	

No. of CE(s)	Eigen value	Statistics	Crit: Values	Prb **
None *	0.791207	50.12521	36.63119	0.0008
At most 01 *	0.713855	40.04023	30.44962	0.0024
At most 02	0.494414	21.82522	24.15922	0.1003
At most 03	0.357731	14.16794	17.79631	0.1620
At most 04	0.206636	7.407128	11.23471	0.2162
At most 05	0.001438	0.046052	4.128906	0.8605

Johannes test is used to observe Long run relationship existence. Johansen test Null Hypothesis is H_0 is that elaborates no co-integration. For checking rejection or acceptance of Null Hypothesis two tests/statistics are used Max-Eigen and Trace statistics. It's vibrant if P-value is greater than 0.05 (i.e., P>0.05) Ho will be accepted and if P-value is less than 0.05 (i.e., P<0.05) Ho is rejected. In phase second we examine the T statistics with respect to critical values and we know that if T test/statistics is less than Critical value, Ho will accept and T test/statistics is > than Critical value, will reject Ho. In this study result shows that as both Rank test (Maximum EIGEN value) and Rank (TRACE) test statistics is > critical value i.e., 133.6118 > 83.93712 (TRACE) and 50.12521 >36.63019 (MAX EIGEN value) test Ho is rejected. This indicates to accept that alternative Hypothesis which accepts the existence of Co-integration between both variables (dependent and independent). Now we are attention to measure the long run co-integrating relationship so we use ordinary least square estimate (OLS).

Co-Integration Relationship Finding:
VECM and OLS are applied for evaluation Co-integrating co-efficient indicating equilibrium long run relationship, as because of the simplicity and its BLUE properties, we prefer OLS technique.

$$PRI= \beta_0 + \beta_1 FDI + \beta_2 GDP + \beta_3 Defexped + \beta_4 IRATE + \beta_5 D + \mu$$

Here in the above model β is the intercept, PRI is taken as dependent variable and rest of variables (FDI, GDP, DEFEXPED, IRATE and Dummy) are independent variables. Below stated result obtained by using OLS technique of Co-integration for assessing long run co-integration relationship among variables

Co-Intrgrating OLS:

Table 4: Results of CO Intrgrating OLS

Dependent Variables: PRINVIT				
Variable	Coefficient	Std.Error	t- Statistic	Prob
INTRATE	-55117.00	23247.62	-2.370867	0.0249
GDP	0.082803	0.030038	2.756582	0.0102
FDI	174.5222	40.48903	4.310357	0.0 002
DUMMY	150234.7	285357.7	0.526478	0.6027
DEFEXPD	237.0266	87.79898	2.699651	0.0116
C	30544.53	345224.2	0.088477	0.9301
R-squared	0.850677	Mean dependent vari		512748.4
Adjusted R-squared	0.824012	S.D. dependent vari		599256.5
S.E. regression	251393.6	Akaike info criterion		27.86621
Sum squared resid	1.77E+12	Schwarz criterion		28.13557
Log likelihood	-467.7256	Hannan-Quinn criter.		27.95807
F- statistic	31.90258	Durbin-Watson stat		0.419564
Prob (F-statistic)	0.000000			

$$PRI= \beta_0 + \beta_1 FDI + \beta_2 GDP + \beta_3 Defexpd + \beta_4 IRATE + \beta_5 D + \mu$$

PRI= 30544.53 + 174.522FDI + 0.08280GDP + 237.0266Defexpd - 55117.0IRATE + 150234.7D + μ

Interpretation of Result
Foreign Direct Investment (β_1)
FDI long run co-efficient that is (β_1) having positive value indicates positive and significant relationship for private investment. Above result shows that 1 million rupees growth in foreign direct investment (FDI) will boost or increase private investment by 174.5222 million rupees. Here we conclude one thing that the independent variable (FDI) is significance at 5% significance level as its t-test/statistic is >2 i.e., 4.3104.

Gross Domestic Product (β_2)
Gross domestic product long run co-efficient that is (β_2)

has positive value which indicates significant and positive relationship with private investment. Above result explains that 1 million rupees increase in gross domestic product (GDP) will boost or increase private investment by 0.082803 million rupees. In here (GDP) is significance at 5% level of significance as its t-statistic is >2 i.e., 2.7566.

Defense Expenditure (β_3)
Co-efficient of defense expenditure (β_3) shows a positive and significance relationship with private investment we interpret such result according to the value which is 237.026 showing the positive impact on private investment as one million increase in defense expenditure will increase private investment by 237.026 million rupees. And result also show that independent variable (DEFEXPD) is significance at 5% level of significance as its t-statistic is >2 i.e., 2.6997.

Interest rate (β_4)
Long run co-efficient (β_4) shows inverse and significance

relationship with private investment the value which is -55117.00 showing negative impact on private investment. As 1% increase in interest rate will decrease the private investment by -55177.00 million rupees. Secondly, we find that it shows significant relation with (PRI) because of the reason that its t- statistic is >2 i.e., 2.3706 and p value is 0.0249.

Dummy ($\beta 5$)

The long run co-efficient of β has a positive value i.e., 150234.7. Positive value of $\beta 5$ indicate the positive and insignificance relationship with private investment.

Goodness of Fit of Model (R^2)

As it is obvious that R^2 explain change occurs in the model independent variable. When R^2 =1 meaning all variation occur due to independent variable in model, here in model value R^2 = 0.850677 indicates 85% of total variation is described in model. However, value of adjusted R^2 and R^2 both confirms good fit of model.

Model Overall Significance

F-test is used to assess overall significance of model. F-test criteria was set that if value of F^* >4 H0 will be rejected, and model will significance. In case of reverse situation H0 will be accepted and model will insignificant. By following this criteria on study it is observed that value of F^* >4 i.e. 31.90258 indicates that H0 has rejected (which states that there no co-integration among variable) and alternative one was accepted (stating co-integration existence among variables) so model shows overall significance.

Error Correction Model (ECM)

To predict or expect short run relations ECM is used. ECM factor shows speed of adjustment. Earlier we establish long run co-integration relationship among variables (dependent and independent). To in order short run disequilibrium prevail investment ECM technique was used.

Error Correction Model Findings

Table 5: Results of Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	47499.45	14932.55	3.180933	0.0038
D(INTRATE)	7624.076	10785.16	0.706904	0.4859
D(GDP)	-0.012588	0.023627	-0.532791	0.5987
D(FDI)	55.96347	22.67302	2.468285	0.0205
D(DUMMY)	-7207.785	58675.37	-0.122842	0.9032
D(DEFEXPD)	19.76798	65.93028	0.299832	0.7667
ECM(-1)	-0.190734	0.074176	-2.571370	0.0322
R-squared	0.450925	Mean dependent var		49276.94
Adjusted R-squared	0.324216	S.D. dependent var		81805.06
S.E. of regression	67248.76	Akaike info criterion		25.25602
Sum squared resid	1.18E+11	Schwarz criterion		25.57346
Log likelihood	-409.7243	Hannan-Quinn criter.		25.36283
F-statistic	3.558730	Durbin-Watson stat		1.167308
Prob(F-statistic)	0.010458			

ECM factor express adjustment speed. Value if ECM factor (-0.190734) that express short run disequilibrium in private investment (PRI) is corrected with (19%) in 01 year to long run equilibrium path of co-integration. Almost after 5 year it is completed 100%.

ECM Interpretation Results

Independent variables absence means all independent variables taken as zero (0). Intercept (β) shows dependent variable average value which is private investment (PRI). Results indicate where absence of all independent variables occurred dependent variable (PRI) is 47499.45 million rupees. Here in Intercept is significant level 5% because T-statistic > 2 i.e., 3.180933.

Foreign Direct Investment ($\beta 1$)

Co-efficient of foreign direct investment ($\beta 1$) has positive value with positive in-significant relationship with PI. Results show 01 million rupees rise foreign direct investment will grow private investment by 55.96347 million rupees. Here we mentioned one thing more that the independent variable (FDI) is at 5% significance level as T-statistic is > 2.

Gross Domestic Product ($\beta 2$)

The co-efficient of gross domestic product has a negative and insignificance value i.e., -0.012588 shows a negative relationship with private investment in short run. Result show that a 1 million rupees increase in gross domestic product (GDP) will decrease private investment by -0.012588 million rupees in short run. We also come to know that the independent variable (GDP) is insignificant at 5% level of significance as it T-statistic is <2.i.e -0.532791.

Defense Expenditure ($\beta 3$):

A positive value of co-efficient of defense expenditure vindicate that there is positive relationship between defense expenditure and private investment whereas the greater value of T-statistic show that ($\beta 3$) is highly significant at 5% level of significance. Her we interpret that a 1 million rupees increase in defense expenditure will boost the private investment by 19.76798 million rupees.

Interest Rate ($\beta 4$)

The co-efficient of interest rate indicate that there is a positive but insignificant relationship between interest rate and private investment. Result show that 1 million rupees increase in interest rate will increase private investment by 7624.076 million rupees in short run. Whereas the value of T-statistic show that ($\beta 4$) is insignificant at 5% level of significance as it T-statistic is<2.ie 0.7069.

Dummy($\beta 5$)

The co-efficient of $\beta 5$ shows a negative and insignificant relationship between the private investment and incidence of nine eleven. Goodness of fit of the model R^2: R^2 Explain the change occur in the model due to independent variables. When R^2= 1 meanings all variation occurred due to independent variables in model, value of R^2=0.450925 indicate that 45% of total variation is explained in short run.

Cusum Test for Stability of Model

Cusum test is applied for estimated error correction function stability. Results indicate all change movement is in critical lines have no movement outside critical lines. Graph and Cusum Test approves stability of estimated co-efficient and no any chance of instability in model.
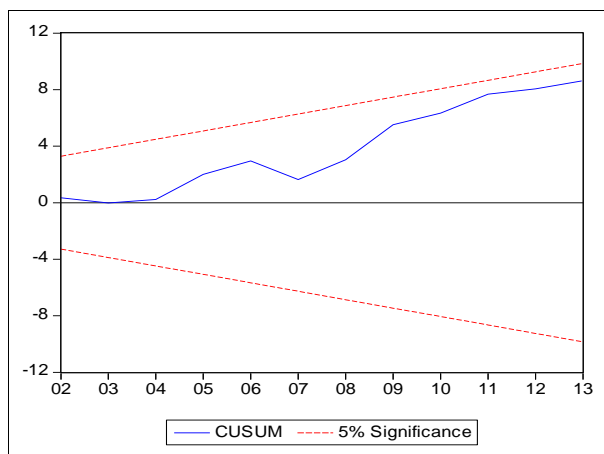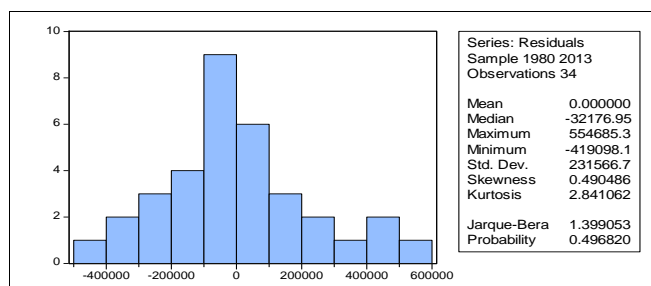
Fig 1: Cusum Test to Check Stability of Model

Jarque–Bera Test to Check Normality

To normality of model Jarque-bera test is used. Value of Jarque-Bera is1.399053 and Kurtosis is 2.841062 indicating model normality. P-value is greater than 0.05 that indicate acceptance normality of Null hypothesis normality.

Heteroskedasticity Test: Breusch-Pagan-Godfrey Test

Table 6: Results of Hetroskdasticy Test: Breusch-Pagn-Godfry Test

Heteroskdasticity Test: Breusch-Pagn-Godfry			
F-statstic	11.418822	Prob F(5, 25)	0.2518
Obs* R-squred	16.852266	Prob Chi-Squr (5)	0.2319
Scald explain S.S	10.25852	Prb Chi-Squre (5)	0.1682

The results show that there occur no hetroscedasticity as p-value is greater than significance level which does not provide sufficient evidence of rejection of Null hypothesis of no-hetroscedasticity.

Table 7: Results of Brusch-Godfry Serial Correlation LM Test

Brusch-Godfry Serial Correlation LM Test:			
F-statstic	14.430788	Prob. F(2,23)	0.0236
Obs*R-squred	18.621948	Prob. Chi-Square(2)	0.0134

Results show that there occur no Autocorrelation as p-value is greater than level of significance which does not provide sufficient evidence to reject the Null hypothesis of no Autocorrelation.

Conclusion

Research work intends to analyze main handles of private investment. From 1988 to 2018 data for period of 30 years' Time Series Data was used. The intention of the studies was to find the short run as well as long run determinants of private investment. Augmented Dickey Fuller test was implied to check unit root of data series. All data series were found non stationary at level I (0) but stationary at first difference I (1). The long run association was verified by using Johansen co-integration test. Co-integrating (OLS) was used for demonstration of long run relationship and ECM was applied to show short run dynamics. In long run the private investment has a positive and significant relationship with GDP and public investment while interest rate has an inverse and significant relationship with private investment; Foreign Direct Investment and Defense expenditure have a positive and significant relationship with Private investment. The co-efficient of dummy show the increases in investment also after the incidence of 9/11. Which reject the hypothesis of this study that 9/11 has negative impact on local private investment. In short run, Gross Domestic Product has a direct relationship between private investments while interest rate and private investment has inverse relation. The ECM factor's value is -0.19 which show that 19 % of the short run error is corrected every year toward the long run equilibrium relationship.

Recommendations

1. Interest rate has significantly negative impact on the domestic private investment. A deep analysis of key investment determinants which is real interest rate to bring investment in Pakistan institutions has to retain control rate of interest. High cost reduces discourage investment because of low profit tendency. Moreover they also create disincentives for firm to formalize with a resultant loss or benefits to the economy. So, Government should reduce lending and borrowing charges.
2. A reduction in government spending on infrastructure as a matter of policy will deter local private investment and possibly slow growth; slower economic growth will therefore result in less private investment. It follows that the government should provide adequate physical, technological, and financial infrastructure. Additionally, financing or cost of capital is in order to encourage private investment, interest rates must be low in developing nations.
3. It is meant to help the government develop a climate that would draw both domestic and foreign businesses. Expanding relationships with foreign investors and enhancing local businesses' capacity to respond to new investment opportunities would both be advantageous.
4. The results suggest that FDI is the major determinant of the domestic investment and FDI driven by different factors in resource intensive relative to non-resource-intensive countries. In particular, infrastructure is critical for attracting FDI in non-resource rich countries but not in those with resources. This suggests that non-resource rich countries have to work harder to entice foreign investors. At same time, it also implies that there are substitutes to resource endowments as a means of attracting FDI.

References

1. Afzal M, Malik ME, Begum I, Sarwar K, Fatima H. Relationship among education, poverty and economic growth in Pakistan: An econometric analysis. Journal of Elementary Education. 2012; 22(1):23-45.
2. Ahmad I, Qayyum A. Effect of government spending and macro-economic uncertainty on private investment in services sector: Evidence from Pakistan, 2008.

3. Ahmad K, Mahmood H. Macroeconomic determinants of national savings revisited: A small open economy of Pakistan. World Applied Sciences Journal. 2013; 21(1):49-57.

4. Ahmed M, Alamdar A. Effects of corruption and budget deficit on private investment: Evidences from Pakistan. International Journal of Development and Sustainability. 2018; 7(6):1898-1913.

5. Ajide KB, Lawanson O. Modelling the long run determinants of domestic private investment in Nigeria. Asian Social Science. 2012; 8(13):p139.

6. Ali MM, Shaheen S. An analysis of determinants of private investment in Pakistan. International Interdisciplinary Journal of Scholarly Research (IIJSR). 2016; 2(2):18-25.

7. Ali S. A Cointegration Approach to Estimate Private Investment Demand Function of Pakistan. Ali, S. A Co Integration Approach to Estimate Private Investment Demand Function of Pakistan. Asian Journal of Research in Business Economics & Management. 2013; 3(9):1-13.

8. Awan RU, Anjum A, Rahim S. An econometric analysis of determinants of external debt in Pakistan. British Journal of Economics, Management & Trade. 2015; 5(4):382-391.

9. Badar M, Javid AY, Zulfiquar S. Impact of macroeconomic forces on nonperforming loans: An empirical study of commercial banks in Pakistan. Wseas Transactions on Business and Economics. 2013; 10(1):40-48.

10. Bint-e-Ajaz M, Ellahi N. Public-private investment and economic growth in Pakistan: An empirical analysis. The Pakistan Development Review, 2012, 61-77.

11. Chandio AA, Jiang Y, Rehman A. Energy consumption and agricultural economic growth in Pakistan: Is there a nexus? International Journal of Energy Sector Management. 2019; 13(3):597-609.

12. Chaudhry IS, Riaz U, Farooq F, Zulfiqar S. The monetary and fiscal determinants of national savings in Pakistan: Empirical evidence from ARDL approach to co-integration. Pakistan Journal of Commerce and Social Sciences (PJCSS). 2014; 8(2):521-539.

13. Cheema AR, Atta A. Economic determinants of unemployment in Pakistan: Co-integration analysis. International Journal of Business and Social Science. 2014; 5(3).

14. Diabate N. An analysis of long run determinants of domestic private investment in Cote d'Ivoire. European Scientific Journal. 2016; 12(28):240-251.

15. Farooq A, Shahbaz M, Arouri M, Teulon F. Does corruption impede economic growth in Pakistan? Economic Modelling. 2013; 35:622-633.

16. Hussein J, Benhin J. Public and Private Investment and Economic Development in Iraq (19702010). International Journal of Social Science and Humanity. 2015; 5(9):p743

17. Ismail A, Rashid K. Determinants of household saving: Cointegrated evidence from Pakistan (1975-2011). Economic Modelling. 2013; 32:524-531.

18. Karagöz K. Determining factors of private investments: An empirical analysis for Turkey. Sosyoekonomi. 2010; 11(11).

19. Khan MA, Abbas F. The dynamics of electricity demand in Pakistan: A panel cointegration analysis. Renewable and Sustainable Energy Reviews. 2016; 65:1159-1178.

20. Maqbool MS, Mahmood T, Sattar A, Bhalli MN. Determinants of unemployment: Empirical evidences from Pakistan. Pakistan Economic and Social Review, 2013, 191-208.

21. Muhammad SD, Lakhan GR, Zafar S, Noman M. Rate of Interest and its Impact on Investment to the Extent of Pakistan. Pakistan Journal of Commerce and Social Sciences (PJCSS). 2013; 7(1):91-99.

22. Omorokunwa OG, Ikponmwosa N. Exchange rate volatility and foreign private investment in Nigeria. Asian Journal of Business Management. 2014; 6(4):146-154.

23. Rahman M, Islam AM, Banerjee PK. Public versus private investment in economic growth of Bangladesh: An econometric analysis. International Journal of Trade and Global Markets. 2016; 9(3):228-248.

24. Shah SH, Hasnat H, Ahmad MH. The effects of the human cost of terror on national income, private consumption and investment in Pakistan: An empirical analysis. South Asia Economic Journal. 2016; 17(2):216-235.

25. Shahbaz M, Rahman MM. The dynamic of financial development, imports, foreign direct investment and economic growth: Cointegration and causality analysis in Pakistan. Global Business Review. 2012; 13(2):201-219.

26. Shahbaz M, Arouri M, Teulon F. Short-and long-run relationships between natural gas consumption and economic growth: Evidence from Pakistan. Economic Modelling. 2014; 41:219-226.