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Factors Affecting Domestic Investment in Pakistan: An Empirical Analysis

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Abstract

Basic objective of the study is to develop an insight into the factors affecting total domestic investment in Pakistan, consisting of private investment, public investment and changes in investment stocks. The role of each type of investment is imperative for economic growth and consequently vital for employment generation and poverty alleviation. Hence, it becomes desirable to determine the relationship among variables like economic growth, domestic savings and total domestic investment among others. The study finds a robust relationship across these variables both in short run as well as the long run. The variables like real GDP, domestic savings, rates of return, government spending, exports and imports appear to have a positively significant impact on total domestic investment while the public debt and interest rates surface with a negatively significant effect on total domestic investment in Pakistan.

Keywords: Domestic Investment; Domestic Saving; Domestic Debt; ARDL; Pakistan

I. Introduction

Capital accumulation is an important factor to enhance the levels of investment which, in turn, can increase economic growth in economies of the world (UN, 1981). An economy cannot move along the trajectory of economic growth both in short run and the long run without a substantial growth in investment levels. It stands as the most important variable not only for developed but for the developing countries to speed up economic growth. Investment is the expenditure used for wear and tear of capital goods and is used for increasing capital stock of the economy.

The living standard of people is largely determined by economic growth of the country as well as growth in capital accumulation. It leads towards financial resource abundance and mitigates dependence on foreign resources. Investments have played an important role to boost up growth rates, stabilize inflation rates, generate new goods for the society, enhance productivity levels, and create new techniques of production. Simultaneously, investment stands as the most volatile component of aggregate expenditure in the economy because of its dependence upon various macroeconomic factors. In periods of recession, the aggregate expenditure on goods and services decreases, leading to a decline in investment expenditures.

The government has played an important role in stimulating investment and GDP growth rates but the performance has been lower than expected. Government spending, taking the form of subsidies and loans, burdens the public sector with budget deficit making the private sector more productive than the public one. A variety of factors tend to influence the levels of investment in an economy such as GDP growth rate, lending rates, federal government debt levels and exchange rates etc. The effect of variables e.g. interest rate lag, public loans, domestic savings and bond yield appear to have a positive and significant impact on investment while the effect of wholesale price index on investment was negative and significant [Nasir and Khalid, 2004].

In context of flexible accelerator model framework, variables like domestic savings, economic growth, real rate of interest, rates of return on investment projects, government spending, federal government debt, exports, imports etc. might be seen as determinants of investment. Jorgenson (1971) and the later researchers did formulate the approach of neoclassicals, which is a description of the flexible accelerator model. Another neoliberal approach by Galbis, (1979) along with Shaw (1973) and McKinnon (1973) emphasizes the significance of high rates of interest and financial deepening.

Agrawal (2000) using a panel data for five South Asian countries depicted that the impact of GDP growth, credit availability and net total foreign borrowings on investment was positive while the effect of real lending rates on investment was negative. Similarly, Nasir and Khalid (2004) explored that the impact of interest rates, yield on bonds, foreign savings, public loans and domestic saving on investment was positive but negative in the case of wholesale prices. The impact of factors like gross domestic product, Share of credit of the private sector in total credit to public and private sectors, reforms and exchange rate was positive on growth of foreign direct investment (FDI) while foreign direct investment was found to be adversely affected by index, devaluation, import tariff, tax and wages in a study by Aqeel and Nishat (2004).

Following the life cycle hypothesis theory and applying a multiple regression technique, the impact of income, farming experience, family size, loan repayment and amount of funds borrowed on investment was seen as positive by Adeyemo and Bamire (2005). By the same token, Aqeel and Nishat (2005) also discovered the impact of growth rate, credit share, exchange rate on foreign direct investment as positive and significant while the impact of wages, import tariff and price index share on foreign direct investment was negative. Mahmood and Shabir (1992) also analyzed the relationship between economic growth and investment and found the impact of disbursements of grants, external loans and private investment on growth rate was positive.

A great deal of literature has discussed the investment determinants and its relationship with economic growth. Different studies have been conducted in a Pakistani context like those by Majeed and Khan (2008), Ahmad and Qayyum (2007), Khan and Khan (2007), Ghani and Din (2006), Khan and Sasaki (2001), Naqvi (2003), Loony *et al*. (1997), Looney & Frederiken (1995) and Khan (1988). Obamuyi (2009) analyzed the effect of interest rates on economic growth and found that in the short run, the impact of variables like real lending rates, financial deepening, inflation rate, gross domestic savings and policy shift dummy variables was negative while positive between economic growth and real deposit rates. On the other hand, Mishra *et al.* (2010) found that gross domestic capital formation enhanced gross domestic savings which, in turn, augmented gross domestic capital formation in India. Similarly, Husnain *et al. (2011)* explored the impact of foreign direct investment on economic growth as positive and significant while the effect of public spending on economic growth and population growth as negative and significant.

Ellahi and Kiani (2011) also found that the effect of private investment on real GDP was positive and significant while the impact of public investment and government consumption on real GDP was negatively significant. Bibi *et al.* (2012) discovered that there was no long run relationship between saving and investment and trade openness affected the investment negatively. Likewise, Khan and Saghir (2012) found that the effect of government revenue, foreign aid, private investment and gross national product on public investment was positive and significant while the impact of real rate of interest on private investment was negatively significant.

The remainder of the discussion is organized as follows. Section 2 describes the data and methodology employed for research. Section 3 presents major findings of the study. The final part concludes with policy implications.

II. Materials and Methods

Present part of the study consists of data and methodology that has been used to estimate the impact of domestic savings, exports, imports, government spending, and foreign government debt, GDP, real rate of interest and rate of return on total investment in Pakistan. In order to analyze relationships among variables, annual time series data for the year 1972-2015 has been used while an auto regressive distributed lag (ARDL) model has been applied.

The data was collected from official publications of Ministry of Finance (MoF), State Bank of Pakistan (SBP) and Board of Investment (BOI). The study uses total domestic investment (TI) as the dependent variable while gross domestic product (GDP) at market prices, domestic savings (DS), exports (EX), imports (IM), government current spending (GCE), foreign government debt (FGD), real rate of interest (LND) and the rate of return on investment (ROR) have been used as independent variables. All of the variables are used as a percentage of GDP except the lending rate and the rate of return. The data is tested for stationarity to ascertain the use of appropriate technique for estimation.

The present study makes use of the ARDL approach on a single equation to estimate parameters of variables in the short run as well as in long run simultaneously.

The estimated parameters are expected to be efficient and unbiased. The ARDL approach to co-integration is advantageous since all of the variables in the model do not need to be in the same order. The ARDL approach can be applied in spite of variables may be at I(0) or I(1) or mix up of both I (1) and I (0). However, the ARDL approach will not be applicable if variables in the model tend to be stationary of order I (2) or higher. Table 1 provides details of Augmented Dickey-Fuller (ADF) test statistics for variables used in the analysis. The outcome of the ADF test statistics indicates that some of the variables tend to be stationary at first difference while others are stationary at level. These results offer a justification for the use of ARDL technique.

Table 1: ADF tests of Stationarity of dependent and explanatory variables

Variables	Parameters	ADF Calculated	At 5%	Lag Values	Trend/Intercept	Conclusions
TI	-0.37	-3.68	-2.94	1	Trend	I(0)
DS	-1.40	-5.68	-3.53	1	Trend/Intercept	I(1)
RGDP	-0.08	-4.03	-1.94	1	None	I(0)
FGD	-0.62	-2.96	-1.94	1	Intercept	I(1)
GCE	-1.007	-4.72	-2.94	1	Intercept	I(1)
ROR	-0.25	-3.01	-2.93	1	Intercept	I(0)
LND	-0.99	-4.61	-2.93	1	Intercept	I(1)
X	-1.09	-4.11	-3.53	1	Trend/Intercept	I(1)
M	-0.42	-3.25	-2.94	1	Intercept	I(0)

III. Model Specification

There are two steps involved in the ARDL technique for estimating relationship among variables in the long-run. The first step is to observe the presence of long-run relationship among variables under consideration. Conditional upon verification of co-integration, the long-run and the short-run coefficients are estimated using the error correction model (ECM) and ARDL approach in the second stage. For testing the co-integration in model (1) by the bounds test, the unrestricted error correction model is constructed as follows;

$$\Delta TI_t = \alpha_0 + \sum_{i=0}^{a}\alpha_{1i}\Delta(TI)_{t-i} + \sum_{i=0}^{b}\alpha_{2i}\Delta(DS)_{t-i} + \sum_{i=0}^{c}\alpha_{3i}\Delta(RGDP)_{t-i} + \sum_{i=0}^{d}\alpha_{4i}\Delta(GCE)_{t-i} + \sum_{i=0}^{e}\alpha_{5i}\Delta(FGD)_{t-i}$$
$$+ \sum_{i=0}^{f}\alpha_{6i}\Delta(ROR)_{t-i} + \sum_{i=0}^{g}\alpha_{7i}\Delta(LND)_{t-i} + \sum_{i=0}^{h}\alpha_{8i}\Delta(X)_{t-i} + \sum_{i=0}^{j}\alpha_{9i}\Delta(M)_{t-i} + \beta_0(TI)_{t-1} + \beta_1(DS)_{t-1}$$
$$+ \beta_2(RGDP)_{t-1} + \beta_3(GCE)_{t-1} + \beta_4(FGD)_{t-1} + \beta_5(ROR)_{t-1} + \beta_6(LND)_{t-1} + \beta_7(X)_{t-1} + \beta_8(M)_{t-1} + \varphi_t \text{......(1)}$$

$$TI_t = \nu_0 + \sum_{i=1}^{p}\nu_{1i}(TI)_{t-i} + \sum_{i=0}^{p_1}\nu_{2i}(DS)_{t-i} + \sum_{i=0}^{p_2}\nu_{3i}(RGDP)_{t-i} + \sum_{i=0}^{p_3}\nu_{4i}(GCE)_{t-i} + \sum_{i=0}^{p_4}\nu_{5i}(FGD)_{t-i}$$
$$+ \sum_{i=0}^{p_5}\nu_{6i}(ROR)_{t-i} + \sum_{i=0}^{p_6}\nu_{7i}(LND)_{t-i} + \sum_{i=0}^{p_7}\nu_{8i}(X)_{t-i} + \sum_{i=0}^{p_8}\nu_{9i}(M)_{t-i} + \varepsilon_t \quad \text{............} \quad (2)$$

$$\Delta TI_t = \omega_0 + \sum_{i=1}^{q}\omega_{1i}\Delta(TI)_{t-i} + \sum_{i=0}^{q_1}\omega_{2i}\Delta(DS)_{t-i} + \sum_{i=0}^{q_2}\omega_{3i}\Delta(RGDP)_{t-i} +$$
$$\sum_{i=0}^{q_3}\omega_{4i}\Delta(GCE)_{t-i} + \sum_{i=0}^{q_4}\omega_{5i}\Delta(FGD)_{t-i} + \sum_{i=0}^{q_5}\omega_{6i}\Delta(ROR)_{t-i}$$
$$+ \sum_{i=0}^{q_6}\omega_{7i}\Delta(LND)_{t-i} + \sum_{i=0}^{q_7}\omega_{8i}\Delta(X)_{t-i} + \sum_{i=0}^{q_8}\omega_{9i}\Delta(M)_{t-i} + \lambda(ECM)_{t-1} + \sigma_t \quad \text{....} \quad (3)$$

The symbol Δ is the first-difference operator and (φ_t) is a white-noise disturbance term in the model. The model (1) can also be viewed as an ARDL technique of order (*a, b, c, d, e, f, g, h, j*). The model indicates that the total domestic investment tends to be influenced and explained by its lag values. The construction of structural lags is established by using the minimum Schwarz criteria. The model makes use of lagged value of first difference dependent variable and explanatory variables for short run and the lagged value of dependent and explanatory variables for the long run. Thus, the model consists of both the long run and short run coefficients of variables. The parameters $(\alpha_{1,}\alpha_{2,}\alpha_{3,}\alpha_{4,}\alpha_{5,}\alpha_{6,}\alpha_{7,}\alpha_{8,}\alpha_{9})$ are coefficients of variables in the short run and parameters $(\beta_{0,}\beta_{1,}\beta_{2,}\beta_{3,}\beta_{4,}\beta_{5,}\beta_{6,}\beta_{7,}\beta_{8})$ are coefficients of variables in the long run while the sign (α_0) is an intercept in the model.

Having estimated the regression equation (1) above, the Wald test (*F*-statistic) is computed to differentiate between long-run relationships among variables. The Wald test can be computed by imposing restrictions on estimated long-run coefficients on total domestic investment, domestic savings, government current spending, federal government debt, lending rate, rate of return on investment, real gross domestic product, exports and imports, for equation 1 based on the null hypothesis as follows;

$$H_0: \beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8$$

No long run-relationship exists among variables against the alternative hypothesis of $H_1: \beta_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq \beta_8$

Where a long-run relationship exists among the variables.

In case the calculated value of F-statistics does not exceed the lower bound value, the Null Hypothesis will not be rejected and it is concluded that there is no existence of long run relationship between total domestic investment and explanatory variables. In contrast, if the calculated value of F-statistics is greater than the value of upper bound, the co-integration exists between total domestic investment and explanatory variables.

To observe the impact of explanatory variables on the total domestic investment for Pakistan, we have to estimate the equation 1 with OLS technique (Bound test approach to co-integration) and then normalize the resulting values. The ARDL model for the long run coefficients of Equation 1 is to determine the long run effects of investment determinants on total domestic investment in Pakistan.

With the use of error correction term[1], short coefficients of the variables are calculated. The coefficient on error correction term is expected to be significant and negative. The short run error correction model is used to determine the effects of investment determinants on total domestic investment in time adjusting framework for attaining the long run equilibrium.

[1] The error correction term is defined as the term showing the time required in the short run to move towards equilibrium in the long run.

The term ECM_{t-1} is a lagged error correction term where λ is coefficient value of the ECM and shows the speed of adjustment from short run to long run equilibrium. The highly significant value of the error correction term is an evidence on the existence of stable long run relationship among variables in the model as concluded by Bannerjee *et al*. (1998). The negative sign of error correction term also reveals a uni-directional impact of variables in the equation.

IV. Results and Discussion

Table 2 presents results of the Wald-test (F-Statistics) among dependent and explanatory variables in the long-run. It can be concluded from the results that there exists a co-integration among variables. Values in the table below indicate that the F-statistics is higher than the upper bound value which supports the presence of long run relationship among variables. The value of *F-statistics,* based on Wald test, is presented in the second column while the lower and upper bound values are presented in the third column.

Table 2: Bound testing results of Co-integration

Model	F-statistics Calculated	Critical Bound		Conclusion
		Lower Bound Value	Upper Bound Value	
TI/DS,RGDP,GCE,FGD, ROR,LND,X,M	7.11 (0.0003)	3.15 (99%)	4.43 (99%)	Co-integration exists

Note: The calculated value of F-statistic is 7.11 (Significant at 1% level). Critical value at k =9-1=8 is coded from Pesaran *et al*. (1999). The parenthesis value is the probability of F-statistics.

A. Long run and Short run Estimates of Investment Determinants and Total Domestic Investment

Results of the estimates reveal that the coefficient values of domestic savings and real GDP are 0.65 and 0.10 respectively, which indicate that a1% increase in domestic savings and real GDP will enhance the total domestic investment by 65% and 10% respectively in the long run. This reveals the existence of positive and significant impact of domestic savings and real GDP on total domestic investment. These results are consistent with those by Agrawal (2000), Ahmad (2010) and Kaya (2008) while opposite to those by Bibi *et al.* (2012). The impact of federal government debt and lending rate on investment is negatively significant. These findings are in line with those by Agrawal (2000), Khan (2011) and Obamuyi (2009). Similarly, the effect of government current expenditures and rate of return on domestic investment is positive but insignificant as discovered by the study of Nasir & Khalid (2004) and Ahmad & Qayyum (2008). The coefficients on exports and imports do also reveal their impact on total domestic investment as positive and significant. This reinforces the findings by Al Khatib *et al.* (2011).

The regression coefficients on variables in short run are presented in Table 4 which discloses the effects of domestic savings and real GDP on total domestic investment as positive and significant. These results do match with those of Ellahi & Kiani (2011). The total domestic investment will increase 40% and 82% with an increase of 1% in domestic saving and real GDP respectively in short run. It further reveals that the impact of real GDP is higher than that of domestic savings in the short run and inverse in the long run. On the other hand, signs and significant impact of lending rates and federal government debt on total domestic investment stay same both in the short run as well as long run. The coefficients on lending rates and federal government debt surface as 0.23 and 0.13 respectively with a negative sign, confirming that a percentage increase in these variables will decrease the total domestic investment around 23% and 13% respectively. These results are supported by Nasir & Khalid (2004) and Khan & Saghir (2012).

Table 3: Long run results of Total Domestic Investment and its Determinants

Explanatory Variables	Coefficients	Standard Error	T-Ratio	Probability
DS	0.65293	0.076422	8.5438	0.000
RGDP	0.10333	0.45324	2.2793	0.033
GCE	0.086494	0.072233	1.1974	0.244
FGD	-0.13161	0.048468	-2.7153	0.013
ROR	0.11954	0.16958	0.70492	0.489
LND	-0.23509	0.092643	-2.5376	0.019
X	0.82722	0.11457	7.2203	0.000
M	0.63191	0.059503	10.6197	0.000
C	8.0780	1.8928	4.2678	0.000
T	0.095545	0.085641	1.1156	0.277

Table 4: Short run Effects of Investment Determinants on Total Domestic Investment

Explanatory Variables	Coefficients	Standard Error	T-Ratio	Probability
∆DS	0 .40597	0.078013	5.2039	0.000
∆RGDP	0.81764	0.27314	2.9935	0.006
∆GCE	0.16217	0.087698	1.8492	0.076
∆FGD	-0.13161	0.048468	-2.7153	0.012
∆ROR	0.55191	0.15896	3.4720	0.002
∆LND	-0.23509	0.092643	-2.5376	0.017
∆X	0.40044	0.13165	3.0417	0.005
∆M	0.49273	0.065385	7.5358	0.000
∆T	0.095545	0.085641	1.1156	0.275
ECM (-1)	-0.895	0.10135	-5.002	0.000
R-Squared	0.94362	**R-Bar-Squared**	0.89799	
DW-Statistic	2.1464	**F-Stat. F (12, 26)**	29.2914	

The impact of rates of return on total investment is positive and significant in the short run while the impact of government spending is positive but insignificant as confirmed by Nasir & Khalid (2004) and Obamuyi (2009). The export and import variables also tend to have a positively significant relationship with the total domestic investment in the short run. The coefficients on exports and imports are 0.40 and 0.49 respectively which indicate that a percentage increase in exports and imports will boost up the total domestic investment by almost 40% and 49% respectively in the short run.

B. The Diagnostic Tests for the Model

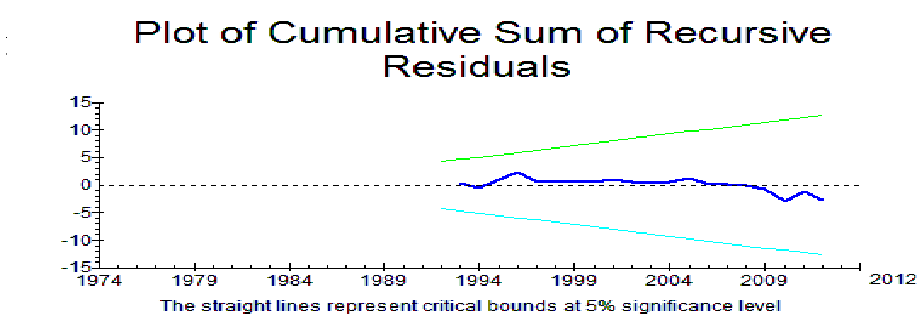
In a dynamic time series analysis, the selection of dependent and explanatory variables is critical. Approximately, all of the individual time series variables, which represent trend, are considered to have the issues of specification and serial correlation. This requires to conduct some diagnostic tests of unrestricted and unconstrained error correction model. Table 5, presents the specified unrestricted error correction model (UECM) which covers all the diagnostic tests. The serial correlation is tested by the Lagrange multiplier which shows that there is no serial correlation in the model. The test of functional form is conducted by Ramsey's reset test which shows that functional form of the model is correctly specified. The test of normality is performed through skewness and kurtosis of residuals showing that variables are normally distributed.

The stability of the estimated dependent and explanatory variables in the error correction model also needs to be graphically investigated according to Pesaran and Shin (1999). Thus, to test for stability of the variables, cumulative sum of recursive residuals (CUSCUM) and cumulative sum of recursive residuals squares (CUSUMS) are plotted above in figure 1 above. The results are stable as values of the coefficients fall in the critical bounds. Due to the absence of divergence, the graphs of CUSUM and CUSUMS verify that the short run and long run parameters are stable.

Table 5: Results of the diagnostic tests

Diagnosis	Test	Values	
		LM Version	F Version
Test of Serial Correlation	Lagrange multiplier	CHSQ(1)=2.4693[.116]	F(1,20)= 1.3519[.259]
Test of Functional Form	Ramsey's Reset	CHSQ(1)=0.28293[.595]	F(1,20)= .14615[.706]
Test of Normality	Skewness and Kurtosis of Residuals	CHSQ(2)=1.0004[.606]	-

Figure 1: CUSUM Test



V. Conclusions and Policy Implications

Having applied the ARDL model, it appears from the results that the variables are stable and have robust relationships both in short run as well as in long run. Results of the study lead to some useful policy implications for policy makers in Pakistan.

The impact of domestic savings on total domestic investment is positive which reflects that the government can improve the level of investment by developing policies and projects which can escalate savings in Pakistan. Similarly, the effect of real GDP on total domestic investment is also seen as positive which suggests that the levels of investment can also be augmented by enhancing GDP in the economy. The relationship between government spending and total domestic investment is positive. This leads to the implication that the government can stimulate level of investment by promoting development expenditure and controlling the non-development one. In contrast, the impact of federal government debt and rate of interest on total domestic investment is negative which signify their undesirable impact on the dependent variable. This might be for the reason that the government might be directing a major portion of GDP towards interest payments to foreign countries and international financial institutions. These payments can alternatively be channeled towards promotion of domestic investment through an easy access to credit by private sector at low rates of interest. The relationship between rate of return and total domestic investment is seen as positive which supports the notion that profitability of firms helps to augment the level of investment. Lastly, variables like exports and imports tend to have a positive effect on domestic investment with a larger impact by exports than imports in long run. This leads to the implication that the government needs to develop its level of export-orientation to the level that promotes domestic investment in Pakistan.

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