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Contributing Factors of Inland Investment

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Contributing Factors of Inland Investment

Malik Shahzad Shabbir

Abstract- Investment is a catalyst for the economic growth, and the efforts to explore the factors catalyzing investment, whether domestic or foreign, public or private, are unstoppable. The present study attempts to investigate empirically, the factors responsible for shaping up domestic investment in the middle income Asian countries. We use a sample of twelve countries and the data extends over a period of 31 years ending at 2010. We employ empirical Bayesian approach for analysis, after undergoing the preliminary testing of data through panel unit root test, redundancy test and panel co-integration. The results suggests that domestic investment is positively determined by lagged investment, real GDP per capita growth, domestic credit to private sector, domestic saving, trade and government expenditures whereas a negative relationship of domestic investment is observed with inflation and interest rate. Findings of the study provide a torch to the policy makers who intend to boost domestic investment for attaining higher growth rates.

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I. Introduction

Investment is an important component of aggregate demand in the economy and variations in investment have considerable long term effects on the economic strength of a country. Investment not only enhances the economic growth, but also promotes employment and provides livelihood to masses. The association of investment and long run economic growth is not only emphasized in the era of classical economists, but subsequently a number of studies are conducted to empirically test the importance of investment in experiencing higher growth rates (Kuznets (1973), McKinnon (1973), Shaw (1973); Barro and Lee (1994); Collier and Gunning (1999); Ndikumana (2000). All of these studies end up with a conclusion that investment is a strongly associated with economic growth. The investment-growth relationship in general and the Asian financial crises of late 1990's in particular have led to a mob of studies investigating the factors that bring about variations in the rate of investment in developing countries.

Investment, however, can be categorized into two major classes, i.e. foreign direct investment (FDI) and domestic investment (further divided into its public and private parts). There is a flood of studies that attempt to investigate the determinants of foreign direct investment in poor and middle income countries [see for example Juncki and Wunnava (2004); James and Jiangyan (2010); Blonigen and Piger (2011)] However, to explore the factors explaining domestic investment in such countries is relatively less explored area. Although a variety of variables are suggested by various studies conducted elsewhere in the world to be the causing factors of investment in countries. In our study we endeavor to find the determining factors of domestic investment focusing a sample of middle income Asian countries.

Work on investment can be viewed in two distinct dimensions; one set of studies concentrate on analyzing the determinants of Foreign Direct investment (FDI) and another group of studies focused on the determinants of domestic investment. As far determinants of FDI are concerned, lots of studies are available ending up with different covariates of FDI (like Juncki and Wunnava (2004); Blonigen and Piger (2011), For the domestic investment, some other studies that focus on identifying the macroeconomic and financial factor are either narrower in their scope because of considering time series data only (Shahbaz et al. (2010); Shah et al. (2012) in Pakistan; Tan and Lean (2010), Tan et al. (2011) in Malaysia; Seruvatu and Jayaraman (2001) in Fiji or directed towards other geographical zones (Salahuddin et al. (2009) in Muslim developing countries). However, the area of middle income countries from Asia is generally ignored and demands attention of the researchers.

In order to fill this gap the present study is an attempt to add in literature a comprehensive work focusing on determining factors of domestic investment covering the horizons of financial and macroeconomic indicators by taking into account latest data and employing Empirical Bayesian approach on a sample of middle income Asian countries.

II. Literature Review

We are examining the existing empirical literature focusing the investment and its determining factors. The researchers study the role of a variety of factors including macroeconomic variables and financial market factors, in explaining the investment behavior. The studies not only differ from each other on the basis of factors included in the model and the estimation techniques applied but results arrived at also depict a spectrum of conclusions. The empirical literature on investment behavior in the developing countries seems to have focused on macroeconomic variables and financial variables. The findings of different studies on determinants of investment behavior are discussed hereunder in detail.

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a) Studies focusing on Macroeconomic Variables

Investment practice in the preceding year gives an indication to the investors regarding economic climate in the country and thus, has a potential to affect investment positively. A similar relationship is observed in earlier studies based on empirics. Mileva (2008) finds a positive relationship between the two variables, in his study conducted on 22 transition economies. Salahuddin et al. (2009) reports a positive and significant effect of lagged investment, in their study on 21 developing countries from the Muslim regions. The results of the studies by Donwa and Agbontaen (2010) on Nigeria and Janice et al. (2011) are also consistent with the above-mentioned proposition. Taghavi (2011) while carrying out a study on a panel of India, China, Pakistan, Iran, Turkey, Indonesia and United Arab Emirates also concludes that lagged investment is a strong determinant of domestic investment.

An increase in the aggregate demand motivates firms to increase supply and this may require an increase in the installed capacity and thus stimulate investment. Wolf (2002) examines that GDP per capita significantly explains domestic investment, in a positive way, in South African developing countries. The studies of Tan and Lean (2010) in Malaysia, Salahuddin et al. (2009) on Muslim developing countries also find a positive impact of the variable on domestic investment.

Similarly studies by Oshikoya (1994) on African countries, Ghura and Goodwin (2000) on countries from Asia, Latin America and Sub Saharan Africa, Seruvatu and Jayaraman (2001) in Fiji. Acosta and Loza (2005) in Argentina, Mileva (2008) on 22 transition economies, Peltonen et al. (2009) on emerging markets of Asia, Latin America and Europe, Frimpong and Marbuah (2010) in Ghana and Tan et al. (2011) in Malaysia find positive relationship between investment and GDP or GDP growth.

Many studies report that investment is positively determined by saving. Salahuddin et al. (2009) find in their study that domestic investment is positively related with domestic saving for the case of 21 Muslim developing economies. The work of Baker (2011) also finds the similar results in relation with private investment for Nigeria. The study of Feldstein and Horioka (1980) suggest that cross section saving-investment correlation is high in OECD countries which implies that there is low capital mobility among these countries, this is known as F-H puzzle. Some studies find small regression coefficient of saving in the developing countries like Wong (1990) and Dooley et al. (1987) in the developing counties which implies that high capital mobility is present among the countries. Saving- investment relationship is observed by Shahbaz et al. (2010) in Pakistan with the finding of a weak correlation. The study suggests that the underlying reason for this weak relationship is the insufficient capital mobility within the country which induces domestic investors to borrow from the international markets with higher capital mobility, in order to finance their projects.

Wahid et al (2008) find positive but low correlation between saving and investment in the south Asian countries which is conflict with the FH puzzle. While the study of Salma et al (2012) observes that there is no long-run relationship between domestic saving and investment in Pakistan. There can be various reasons for it, but capital mobility is the major cause for such relationship.

Mixed results are observed in literature regarding the role of interest rate in determining investment. Some studies find negative relation with private investment like Frimpong and Marbuah (2010) for Ghana in both short and long run.Ghura and Goodwin (2000) also find similar results in the developing countries of Asia, Latin America and Sub Saharan Africa. While, Seruvatu and Jayaraman (2001) find no significant impact of real lending rate on private investment, in Fiji. The study of Salahuddinet al. (2009), in 21 Muslim developing economies are reinforces the results of Seruvatu and Jayaraman (2001).

Trade represents the volume of trade in the economy. Investment increases with expansion in the quantum of exports and imports. Hence a positive relationship of trade and investment is believed to exist generally. According to the study of Salahuddin et al. (2009) domestic investment is positively explained by trade openness. Frimpong and Marbuah (2010) also find similar results for private investment in case of Ghana, both in short run and long run. But the studies of Acosta and Loza (2005) and Seruvatu and Jayaraman (2001) depict that private investment is determined by term of trade during the study of 48 emerging countries and Fiji respectively, rather than the volume of trade. Mileva (2008) in a study on 22 transition economies, however, reports an insignificant impact of trade in the long run.

A mixed role of inflation is observed, in existing literature, as determinant of domestic investment. Li (2006) finds a negative impact of inflation on domestic investment for a sample of 117 countries from the list of developing as well as developed countries stating that high rate of inflation is an obstacle to achieve higher rates of domestic investment.

Shahbaz et al. (2010) reports a positive impact of inflation on investment reinforcing the theory of Phillips curve. The study of Oshikoya (1994) find in African countries that impact of inflation is like a flip of coin for the two groups; where it negatively affects investment in the low income countries, it has a positive impact for the countries belonging to middle income group.

A group of studies also end up with a conclusion that inflation has no effect on domestic

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investment. Examples include; the studies of Jaramillo (2010) on 48 emerging economies and Salahuddin et al. (2009) on 21 Muslim developing economies.

Increase in government expenditures may either encourage or discourage investment. High government borrowing may increase the interest rate and contract the size of available funds in the financial market for private sector, leading to crowd out private investment. The studies reporting results in favour of this hypothesis include Ghura and Goodwin (2000) whose sample comprises developing countries from Asia, Latin America and Sub Saharan Africa; Karago and Kerim (2006) conducting study on Turkey.

On the other side, government expenditures on basic infrastructure are found to create an environment conducive for investment and persuade private investors to enhance investment. This relationship is observed by Asante (2000) in Ghana and Baker (2011) in Nigeria. Many of the developing countries are debt-strapped and therefore, carry large amounts of external debt to their credit. This leads to an environment of macroeconomic uncertainty and in this way it may affect domestic investment negatively. An adverse effect of external debt is observed by Oshikoya (1994) on private investment in African countries, by Salahuddin et al. (2009) on domestic investment in 21 Muslim developing economies and also by Frimpong and Marbuah (2010) on long run private investment in Ghana. The studies that find an insignificant relationship between the two variables include Fitz Gerald et al (1994), Ghura and Goodwin (2000) and Nabende and Salater (2005).

III. Methodology and Data Description

The present study attempts to explore the determinants of domestic investment in the frame of financial development and macroeconomic factors. Our sample is, however, confined to the middle income Asian countries[1], the countries for which data is available (A list of sample countries used in our study is provided in Appendix A). The model employed in our study and a brief description of the variables used is given hereunder.

a) Econometric Model

In order to find the role of financial and macroeconomic variable on the domestic investment we use an investment model which is a variant of the model earlier used by Ndikumana (2000). The model in its general form is presented below;

$$INVit = \alpha + \beta\, INV_{it-1} + \delta\, X_{it} + u_{it} \qquad (a)$$

Where INV_{it} is the investment (as a percentage of GDP) of country *i*at time *t*. X indicates the set of all possible variables.

As the main objective of our study is to search for the factor explaining domestic investment, therefore we are compelled to include all the possible relevant variables in the model to get unbiased estimators of potential variables of domestic investment. A general model, developed on the basis of existing studies for domestic investment is presented as follows;

$$INV_{it} = \beta_0 INV_{it-1} + \beta_1 Y_{it} + \beta_2 Y_{it-1} + \beta_3 PRIVT_{it} + \beta_4 PRVT_{it-1} + \beta_5 R_{it} + \beta_6 R_{it-1} + \beta_7 S_{it} + \beta_8 S_{it-1} + \beta_9 TRAD_{it} + \beta_{10} TRAD_{it-1} + \beta_{11} GE_{it} + \beta_{12} GE_{it-1} + \beta_{13} D_{it} + \beta_{14} D_{it-1} + \epsilon_{it} \qquad (b)$$

The results of redundancy test mentioned in table 5.1 exclude the redundant (unimportant) variables in the above-mentioned model (Equation 4.2) and leave us with the following investment model for estimation.

$$INV_{it} = \beta_0 INV_{it-1} + \beta_1 Y_{it} + \beta_2 Y_{it-1} + \beta_3 PRIVT_{it} + \beta_5 R_{it} + \beta_6 R_{it-1} + \beta_7 S_{it} + \beta_8 S_{it-1} + \beta_9 TRAD_{it} + \beta_{10} TRAD_{it-1} + \beta_{11} GE_{it} + \beta_{12} GE_{it-1} + \beta_{13} D_{it} + \epsilon_{it}$$

Where;

INV_{it} = "Gross Fixed Capital Formation as a percentage of GDP".

$PRVT_{it}$= "Domestic credit to private sector as a percentage of GDP"

Y_{it} = GDP per capita growth (Annual %)

R_{it} = Lending interest rate (%)

S_{it} = Gross domestic savings (% of GDP)

$TRAD_{it}$ = Trade (% of GDP)

INF_{it} = Inflation, GDP deflator (annual %)

GE_{it}= "General government final consumption expenditure (% of GDP)"

D_{it} = External Debt (% of GNI)

[1] The classification is based on the World Bank 2011.

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b) Gross Fixed Capital Formation (% of GDP)

Gross fixed capital formation (a proxy for gross domestic investment) represents dependant variable in our model and includes land improvements (fences, drains, ditches, and so on); plant, equipment purchases, machinery; and the construction of railways, roads, and the like, including offices, schools, hospitals, commercial and industrial buildings and private residential dwellings. The same variable is used by Manuel et.al (2000), Mileva (2008) and Arazmuradov (2011).

c) GDP Per Capita Growth (Annual %)

GDP per capita growth is the annual growth rate of GDP per capita (the ratio of gross domestic product and the midyear population). The neo classical theory states that, real GDP growth is positively related with the domestic investment through the accelerator effect. It is expected that our results will follow the theory of neo classical.

d) Domestic Credit to Private Sector (% of GDP)

Domestic credit to private sector, a variable of financial development, designates the role of banks in the provision of finance to private corporations. It is normally believed that credit to private sector yields greater returns as compared to credit allocated to public sector (Rousseau, and Vuthipadadorn (2005).

e) Lending Interest Rate (%)

Lending interest rate is the rate of interest charged by banks on loans from the lender.

f) Gross Domestic Savings (% of GDP)

Gross domestic saving is calculated by taking the difference between GDP and final consumption expenditures.

g) Trade (% of GDP)

Trade is the sum of imports and exports of the goods and services as a percentage of GDP.

h) Inflation, GDP Deflator (Annual %)

Inflation is measured by the GDP deflator which indicates the rate of change in price as a whole in the economy.

i) General Government Final Consumption Expenditure (% of GDP)

General government final consumption expenditure indicates current expenditures of the government for goods and services and expenditure on security and national defense, although the expenditures on the government military are excluded from it.

j) External Debt (% of GNI)

External debt means the ratio of total external debt to gross national income and means debt payable to nonresidents in foreign currency, or goods and services. It is the sum of public, publicly guaranteed, private nonguaranteed long-term debt, short-term debt and use of IMF credit. Short-term debt includes all debt having an original maturity of one year or less and interest in amount outstanding on long-term debt.

k) Data and Variables

Keeping in view the objectives of our study and our specific model, we have obtained data for the middle income Asian countries over the period 1980 to 2010. Non-availability of data on some of the variables induced us to drop some countries from the study and finally we have 12 cross sectional units in our sample. The data is taken from WDI 2011 online data base. Before we move on to the regression analysis, an appropriate methodology followed in this study is explained hereunder.

l) Methodology

Classical econometrics is valid only for stationary series and since panel data includes both components, time series as well as cross sections, thus the time series dimension makes it necessary to apply Unit Root test in order to ensure that the results are reliable. Nelson and Plassor (1982) explain that most of the economic series are Unit Root, and as suggested by Engel and Granger (1982), the regression of unit root series is valid only if they are co-integrated. Thus as a first step of estimation process, we have employed unit root test with a view to find whether the series are stationary or not. Series of I (0) are believed to be ideal which mean that there is no unit root, thus signifying that a particular series is stationary at its level. However, if two or more series are found to be non-stationary then the estimated regression yields spurious results [Granger and Newbold (1974)], than co-integration between variables is necessary to be tested.

m) Panel Unit Root Test

Before we proceed to identify the long run relationship we need to investigate the order of integration in order to verify whether the series is stationary or unit root. A Stationery series is characterized by the constant variance, constant mean and constant covariance of each given lag. For the identification of the order of integration we have used a modern technique of panel unit root developed by Im, Pesaran, Shin (2003) (hereafter referred to as IPS). It specifies a separate ADF regression for every cross section by individual effect and no time trend.

n) Panel Co-integration

Finding more than one variable non-stationary urges us to test whether the series are co-integrated. So in the second step of estimation we apply penal co-integration test introduced by Kao (1999) which is Engel-Granger (1987) two step residual based test to measure the long run relationship among the selected variables.

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o) Redundancy Test

For the purpose of obtaining meaningful results, econometric model should be parsimonious and unimportant variables must be excluded from the model. Where inclusion of insignificant variable enlarges the variability of estimators on one hand, the exclusion of any important variable from the model yields biased estimator on the other. Thus, the process of dropping some variable from the equation is not a hit and trial method but this ought to be done in a systematic manner. Therefore, we have applied coefficient test of redundant variable to obtain a parsimonious model. Test of redundant variables is basically the comparison of the original model and model with redundant variables, in order to decide which variables are to be excluded from the initial equation.

p) Empirical Bayesian Estimator

Although classical techniques are frequently used in econometrics, Empirical Bayesian is an alternative to such techniques and getting popular due to its advantages as compared with the classical methods. Classical approach ignores the prior knowledge about the parameters and the variability of the parameters. The fact that Bayesian approach incorporates the prior information in the model enhances the power and flexibility of the model and provides results in natural form. It also deals with the complexities inherent in the classical approach. Keeping in view the merits of Bayesian technique we have used Empirical Bayesian approach to estimate the investment model in our study.

q) Bayesian Estimation Procedure

It is believed that Empirical Bayesian procedure is efficient over the class of others estimators especially in case of small samples. Bayesian approach has various advantages over the other estimators that lead to more precise and reliable coefficients. It assumes that prior information about unknown must be incorporated in the density function.

$$\hat{\beta}_i \,/\, \beta_i \sim N(\beta_i, \Lambda_i) \qquad \text{(d)}$$

$\hat{\beta}_i$ Indicates the estimated elasticities and β_i is true values of elasticity. It shows that 'estimated values' of parameters is normally distributed with mean β_i and variance Λ_i given the true values of parameters. The empirical Bayesian estimators are attained by assuming that β_i is normal prior distribution of the form;

$$[\beta_i \,|\, \mu, \Omega] \sim N(\mu, \Omega) \qquad \text{(e)}$$

Equation 4.5 implies that β_i is normal distribution with μ and Ω. Where, Ω indicates the variance of the prior density which has been calculated from the Ordinary Least Squares results that is:

$$\Omega = \left[\sum_{i=1}^{n} \Lambda_i^{-1}\right]^{-1} \qquad \text{(f)}$$

Ω is the variance of prior density which is simply the weighted average of the variance covariance matrices of the OLS estimates. We follow the procedure of Corrington and Zaman (1994) to calculate the variance covariance matrices of parameters by using the standard errors of OLS estimates obtained in the first stage. μ in equation 4.5 is the mean of prior density which is given below:

$$\mu = \Omega^{-1}\left[\sum_{i=1}^{n} \Lambda_i^{-1}\, \hat{\beta}_i\right] \qquad \text{(g)}$$

Finally the Empirical Bayesian estimator obtained from the posterior density is given as follows:

$$\hat{\beta}^{EB} = V_i\,(\Lambda_i^{-1}\,\hat{\beta}_i + \Omega^{-1}\mu) \qquad \text{(h)}$$

Formula of Empirical Bayesian is given in equation 4.8. $\hat{\beta}^{EB}$, means the parameter estimates of the Empirical Bayesian and standard error of the estimates are obtained from 'Vi' which is the variance of the posterior density.

$$V_i = (\Lambda_i^{-1} + \Omega^{-1})^{-1} \qquad \text{(i)}$$

Estimates of the Bayesian methods are more precise as compared to the classical estimates. Standard errors of the Bayesian are smaller than those of classical which helps in getting more reliable conclusions (Berger (1985)). Some other authors also recommend Empirical Bayesian for the panel data analysis including Koop (1999) and Peseran (2005) whereas a number of researchers have employed Empirical Bayesian approach in their studies Efron and Morris (1972), (Rubin (1981), Hsiao, pesaran and Tahmiscioglu (1999)).

IV. Empirical Results

In this study we empirically test the role of financial and macroeconomic variables in the determination of domestic investment, with a view to conclude the debates on the subject.

a) Redundancy Test

We estimate equation (b), as a first step of formal estimation process, which include lagged investment[2] and all the variables of financial and macroeconomic nature, in their level and lag forms, which can potentially affect the domestic investment. The model in equation (b) is a general model and to get a parsimonious model from model (b) we apply the redundancy test to all variables in the model. The findings of this test are given in Table 3.1 below;

[2] Lagged investment is included to control the economic condition in the last year (Li, 2006)

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Table 3.1 : Results of Exclusive Restriction (Redundancy Test)

Variables	F-statistics	Prob
I_{it-1}	25.34	0.000***
Y_{it}	9.21	0.000***
Y_{it-1}	3.69	0.000***
$PRIVT_{it}$	3.47	0.000***
$PRIVT_{it-1}$	1.45	0.147
S_{it}	15.56	0.000***
S_{it-1}	3.51	0.000***
$TRADE_{it}$	2.81	0.002***
$TRADE_{it-1}$	2.83	0.002**
INF_{it}	2.13	0.018**
INF_{it-1}	4.22	0.000***
R_{it}	3.34	0.000***
R_{it-1}	2.56	0.004**
GE_{it}	2.99	0.001**
GE_{it-1}	2.03	0.025**
D_{it}	2.64	0.003**
D_{it-1}	1.32	0.210

Significance at 1% level (***), Significant at 5% level (**)

According to the results of redundancy test, as shown in Table 3.1, we reject the null of redundancy for all the variables except lag of private credit and external debt. The corresponding p-values for rest of the variables indicate the variable is not redundant and hence cannot be excluded from the model.

b) Testing Panel Unit Root

Before switching to the formal estimation process we first test unit root of the series of candidate variables in our econometric model. We employ Im, Pesaran and Shin (2003) test for the purpose of finding unit root. The results of the test are given below.

Table 3.2 : Test results of Panel Unit Root (Im, Pesaran and Shin (2003))

	Levels		First Difference	
Series	t-statistics	p-value	t-statistics	p-value
INV_{it} (Gross Capital Formation (%GDP))	-0.252	0.401	-10.209	0.000***
Y_{it}(GDP per capita growth (annual %))	-6.206	0.000***		
$PRIVT_{it}$ (Domestic credit to private sector %GDP)	3.546	1.000	-4.90934	0.000***
D_{it} (External Debt (%GNI))	-0.216	0.415	-5.80144	0.000***
GE_{it} (Govt Expenditure %GDP)	0.461	0.678	-10.209	0.000***

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INF_{it} (Inflation, GDP deflator (Annual %))	-4.787	0.000***		
R_{it} (Lending interest rate (%))	1.268	0.898	-12.7066	0.000***
S_{it} (Gross Domestic Saving (%GDP))	-0.110	0.456	-10.9317	0.000***
$TRADE_{it}$ (Trade as % of GDP)	2.195	0.986	-8.78945	0.000***

*Note: *** denote level of significant at 1%*

Table 3.2 shows results of the test for the variables at level form, and the series which are not stationery at level, the test is further extended to the variables in their first difference form. The null of the test specifically states that the series is a Unit root (signifying that the series is not stationary), whereas under the alternative hypothesis the series is not a unit root (that the series is stationary). The t-stats and the corresponding p-values for each of the variables show that only two variables (Yit, INFit) are stationary at level or integrated order zero I(0). Other series are non-stationary at level, however, these are integrated order one I(1), that is the series become stationary at first difference.

Since more than one variable are non-stationary, we cannot proceed further for the analysis unless we find a long run relationship between the investment and the financial and macroeconomic variables, that is we are satisfied that there is cointegration between the variables.

c) Penal Cointegration

A panel cointegration test introduced by Kao (1999)[3] is employed to examine the long run relationship between the variables. Table 3.3 below, yields the output of the test.

Table 3.3 : Test results of Penal Cointegration

Series	ADF	
	t-statistics	Prob
INV_{it} ,Y_{it} ,$PRIVT_{it}$, S_{it} ,$TRADE_{it}$,INF_{it} ,R_{it} ,GE_{it}, D_{it}	-4.239	0.000***

The results presented in Table 3.3 provide sufficient evidence to reject the null hypothesis of no co-integration, at 1% level. This reveals the existence of a long run relationship between the investment, financial and macroeconomic variables. The fact that the variables are co-integrated allows us to proceed to the estimation process.

d) Findings of the Empirical Bayes

For reasons discussed earlier we employ Empirical Bayesian technique in our final stage of estimation process. Table 3.4 below shows the estimates of the empirical Bayes of the investment model (c). As compared with OLS estimates, under the empirical Bayesian analysis, the estimates become more precise because of incorporation of the prior information, with the data information.

[3] Kao (1999) test is based on the (Engel Granger (1987) two step residuals.

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Table 3.4 : Results of Empirical Bayesian Estimation

Countries		I_{it-1}	Y_{it}	Y_{it-1}	P_{it}	S_{it}	S_{it-1}	T_{it}	T_{it-1}	INF_{it}	INF_{it-1}	R_{it}	R_{it-1}	GE_{it}	GE_{it-1}	D_{it}
Bhutan	Coefficient	0.63	0.20	0.10	0.04	0.20	-0.06	0.01	-0.04	-0.02	-0.05	0.02	-0.15	0.13	-0.03	0.00
	t-value	23.32***	9.80***	4.56***	4.61***	8.66***	-2.72***	1.36	-4.73***	-1.35	-3.55***	0.48	-3.84***	2.31**	-0.40	-0.31
China	Coefficient	0.59	0.22	0.11	0.05	0.24	-0.06	0.01	-0.04	-0.01	-0.04	-0.02	-0.18	0.12	-0.02	0.00
	t -value	22.71***	10.70***	5.27***	5.82***	10.14***	-2.59***	0.83	-4.69***	-0.86	-2.84***	-0.53	-4.88***	2.15**	-0.24	-0.22
Fiji	Coefficient	0.62	0.20	0.09	0.04	0.24	-0.07	0.02	-0.04	-0.01	-0.04	0.00	-0.16	0.14	-0.06	0.00
	t -value	22.96***	9.57***	4.05***	4.45***	10.05***	-2.99***	1.63	-4.56***	-0.82	-3.09***	0.05	-4.22***	2.43**	-0.83	-0.37
Indonesia	Coefficient	0.63	0.20	0.09	0.05	0.20	-0.06	0.02	-0.05	-0.01	-0.02	-0.06	-0.16	0.19	-0.07	0.00
	t -value	23.77***	9.94***	4.23***	5.38***	8.40***	-2.55***	1.55	-5.16***	-0.99	-1.74*	-1.72*	-4.70***	3.18***	-0.98	0.56
India	Coefficient	0.61	0.19	0.07	0.04	0.27	-0.04	0.02	-0.05	-0.02	-0.07	0.06	-0.16	0.19	-0.11	0.00
	t -value	22.99***	10.23***	3.56***	4.30***	12.63***	-1.91*	1.98*	-5.04***	-1.75*	-4.94***	1.69*	-4.42***	3.47***	-1.71*	-0.09
Sri Lanka	Coefficient	0.62	0.21	0.11	0.04	0.21	-0.06	0.02	-0.05	-0.02	-0.05	0.01	-0.12	0.13	-0.06	-0.01
	t -value	22.81***	10.15***	4.84***	4.55***	8.65***	-2.61***	1.71*	-4.79***	-1.25	-3.32***	0.28	-3.35***	2.23**	-0.89	-0.68

Significant at 1 % (***), Significant at 5% (**), Significant at 10%(*)

Table 3.5 : Results of Empirical Bayesian Estimation (Continued)

Countries		I_{it-1}	Y_{it}	Y_{it-1}	P_{it}	S_{it}	S_{it-1}	T_{it}	T_{it-1}	INF_{it}	INF_{it-1}	R_{it}	R_{it-1}	GE_{it}	GE_{it-1}	D_{it}
Malaysia	Coefficient	0.66	0.29	0.13	0.04	0.18	-0.05	0.02	-0.03	-0.02	-0.06	0.01	-0.14	0.10	-0.04	0.00
	t -value	26.66***	14.72***	5.96***	4.61***	7.29***	-2.08**	2.17**	-3.73***	-1.61	-4.58***	0.19	-3.61***	1.64*	-0.54	-0.49
Pakistan	Coefficient	0.63	0.19	0.11	0.04	0.22	-0.06	0.02	-0.04	0.00	-0.05	0.03	-0.17	0.12	-0.05	0.00
	t -value	23.29***	9.50***	5.18***	4.59***	9.35***	-2.86***	1.64*	-4.58***	-0.36	-3.87***	0.76	-4.40***	2.23**	-0.78	-0.25
Philippine	Coefficient	0.63	0.20	0.09	0.04	0.23	-0.06	0.02	-0.04	-0.03	-0.07	0.05	-0.13	0.15	-0.03	-0.01
	t -value	23.02***	9.59***	4.28***	4.71***	9.40***	-2.42**	1.68*	-4.36***	-2.33**	-5.23***	1.29	-3.62***	2.46**	-0.51	-1.32
Papua New Guinea	Coefficient	0.65	0.17	0.09	0.04	0.21	-0.08	0.02	-0.04	-0.02	-0.06	0.02	-0.11	0.15	-0.05	-0.02
	t -value	24.17***	8.51***	4.18***	4.63***	9.31***	-3.38***	1.71*	-4.71***	-1.13	-4.43***	0.42	-2.92***	2.63***	-0.73	-1.88
Thailand	Coefficient	0.64	0.23	0.11	0.03	0.19	-0.03	0.01	-0.03	-0.02	-0.05	0.05	-0.17	0.16	-0.04	0.00
	t -value	24.10***	11.53***	5.09***	3.20***	8.04***	-1.47	0.74	-3.80***	-1.30	-3.49***	1.34	-4.41***	2.65***	-0.63	-0.03
Vanuatu	Coefficient	0.61	0.22	0.11	0.05	0.19	-0.06	0.01	-0.05	-0.02	-0.05	0.02	-0.15	0.15	0.05	0.00
	t -value	22.93***	10.43***	4.93***	5.11***	8.01***	-2.40**	0.98	-4.92***	-1.08	-3.53***	0.38	-4.01***	2.65***	0.71	-0.15

Significant at 1 % (***), Significant at 5% (**), Significant at 10% (*)

Variables for most of the countries in the table bear expected sign of the estimators are statistically significant. The coefficient of one period lagged investment (hereafter referred to as lagged investment), ranging from 0.59 to 0.66 across countries, shows its positive impact on current investment at 1% level for all cross sectional units. The positive coefficient of lagged investment divulges that investment practice in the previous year acts as an indicator of the economic condition in a particular country, thereby stimulating investment in the following year. Our results are consistent with the findings of Ndikumana (2000) and Salahuddin et al (2009).

The coefficient of GDP per capita growth bears a positive sign and is statistically significant at 1% level for all the countries, with a value ranging from 0.17 to

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0.29. It implies that 1% increase in GDP per capita growth has a potential to expand domestic investment by 0.17% to 0.29% in the sample countries. This provides evidence in support of the endogenous growth theory (Locas (1988) and Romer (1986)). The philosophy of neo classical theory of investment, that output growth is positively related with the investment due to the accelerator effect[4], also sustains by this relationship. In terms of quantitative importance, the variable is least important for Papua New Guinea where one percent increases in GDP per capita growth stimulates investment by about 0.17percent. On the other extreme, one percent change in GDP per capita growth changes domestic investment by 0.29 percent for Malaysia. The results are consistent with the findings of Levine and Rental (1992), Barro and Lee (1994), Ghura and Hadjimicheal (1996), Ndikumana (2000), Hernadez-Cata (2000), Wai and Wong (1982), Fielding (1997), Wolf S. (2002), Mbanga (2002), Akpalu (2002), Greene and Villanueva (1991). Furthermore, it is not only the current level of per capita income that affects domestic investment but its lagged value (one year lag) also determines investment positively (although its quantitative importance is lesser than the variable at level). The variable is significant at 1% and its value stands between 0.07 and 0.11, for the middle income Asian countries.

The estimated coefficient of domestic credit to private sector, which is also considered a measure of financial development, is found to have a positive impact on domestic investment. The fact that availability of funds in the credit market promotes investment cannot be undermined despite a small range of the coefficient between 0.03% and 0.05%. Our results are similar to the studies of Stiglitz and Weiss (1981), Greenwald et al. (1984), Islam and Wetzel (1991), Ronge and Kimuyu (1997) and Ghura and Goodwin (2000).

The coefficient of saving is also found to affect the domestic investment positively, for the entire sample and the results are significant at 1% level. India has a coefficient of 0.27, which is highest in the sample whereas Malaysia is on the tail with a value of 0.18. A positive relationship of gross domestic saving with domestic investment implies that the two variables are complimentary; however, a relatively smaller coefficient indicates the higher mobility of capital from these countries. These results are consistent with the findings of Dooley et al. (1987), Wong (1990), Salahuddin and Islam (2008) and Arazmuradov, A. 2011.

We find the coefficient of trade (current level) positive and significant at 5% for Malaysia while for India, Pakistan, Philippine, Sri Lanka and Papua New Guinea, it is significant at 10% level. Its role, however, is not of worth mentioning for rest of the countries in the sample. Positive relationship implies that domestic investment is affected by both exports and imports. Increase in Exports increases the foreign exchange which is necessary for purchase of imported capital goods that is helpful to increase in domestic products. While, the greater access to investment good due to high imports helps to stimulates domestic investment. These results follow the findings of Ghura and Goodwin (2000) and Mileva (2008).

On the other, the estimated coefficient of first lag of trade is negative and significant at 1% level for all the countries ranging between -0.05 and -0.03. This is consistent with the study of Demir (2005) and Ouattara (2005). Because of the increase in risk after the trade liberalizations risk adverse investors desire to invest in financial sector rather than real sector. The current inflation level does not seem to affect investment significantly, with the exception of India and Philippine where it is significant at 10% and 5% level of significance respectively, and has negatively sign. These findings encompass the studies of Mehrara and Karsalari (2011) and Ghura and Goodwin (2000).

However, the lagged inflation is found to discourage investment (coefficient ranges between 0.02 and 0.07) and the results are significant at one percent level, for all the countries except Indonesia for which the significance stands at 10% level. These results provide evidence in favour of the Fisher's (1993) stand point that inflation curbs investment by raising the risk associated with long-term projects. The results support the findings of Oshikoya (1994), Asante (2002) and Salahuddin M. et al (2009).

The negative sign of estimated coefficients of interest rate advocates the Neo-classical theory of investment that the cost of capital escalates as the interest rate increases, resulting in cuts in the capital expenditures at firms level. For India and Indonesia for which current interest rate is negatively related with investment (at 10% level), the estimator becomes significant in its lag form, at 1% level for all the cross sections. These findings are in line with the results of Green and Villanueva (1991), Serven, and Solimano (1992), Ghura and Goodwin (2000) and Peltonen et al. (2009).

Government expenditures bear a positive coefficient and significant at 1% level for India, Indonesia, Papua New Guinea, Thailand and Vanuatu, at 5% for Bhutan, China, Fiji, Sri Lanka, Pakistan, Philippine and at 10% for Malaysia. With respect to the quantitative important Indonesia and India lead with 0.19% leaving Malaysia farthest behind at 0.10%. The

[4] The accelerator effect theory states Gross Domestic Product (GDP) stimulates investment. In response to a rise in GDP, firms increase their investments and thus the profits go up. Consequently the fixed investments of firms explode, in the form of increased capital stock. This further leads to economic growth by raising consumer expenditure through the multiplier effect.`

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government spending, in our study reveals crowed in effect in contradiction with the study of Ghura and Goodwin (2000). This may be due to the fact that government expenditures in infrastructure (communication, transport and irrigation) and government spending on national defense and security creates a climate favorable for investment as also suggested by Greene and Villanueva (1991).

Although, external debt is believed to be an indicator of macroeconomic uncertainty, it does not constrain domestic investment in the middle income Asian countries and the coefficient is insignificant for the entire sample. One of the reasons behind irrelevance of external debt with that of domestic investment could be the fact that most of the developing countries depend on the loans from official sources at concessional terms rather than from the private sector as suggested by Fitz Gerald et al (1994). Earlier studies of Ghura and Goodwin (2000) and Nabende and Salater (2005) also arrive at the similar findings.

In nutshell, the results suggest that lagged investment, real GDP per capita growth, domestic credit to private sector, domestic saving, government expenditures, lagged of trade, inflation, interest rate are the key determinants of domestic investment in the middle income Asian countries and for the period under study.

V. Conclusions

In this study we attempted to explore the role of various factors in the determination of domestic investment. Our sample consisted of twelve middle income Asian countries and the sample period extended over 31 years ending up to 2010. Empirical Bayesian approach was used for estimation purpose, after undertaking preliminary data testing through the unit root and panel cointegration. We started with a general model of investment incorporating a variety of variables having their candidature on ground of various theoretical considerations. The parsimonious model, however, was arrived at by undergoing the redundancy test. The model finally used for analysis included lagged investment, real GDP per capita growth, domestic saving, domestic credit to private sector, interest rate, Inflation, trade, government expenditures and external debt (with lagged for all variables except GDP and Debt) as explanatory variables.

The results of this study are found in line with findings of most of the studies in the existing literature. We found that past outcomes of domestic investment strongly influence the possibility for the investors to reinvest. A positive relationship between growth and investment was also observed implying that increased output is assumed to be an indication of better performance of the economy thereby attracting further investment. Our study also provides evidence in favor of the classical positive relationship between investment and savings. A positive impact of 'availability of domestic credit to private sector' on domestic investment signifies that higher the availability of funds in the credit market, higher would be the rate of investment. It also acknowledges the proposition that financial development results in higher rates of investment and, in turn, accelerates the rate of economic growth. Inflation, being an indicator of macroeconomic uncertainty, exhibits cuts in the rate of investment and thus bears a negative relationship with domestic investment. Interest rate is found to affect the inland investment negatively speaking in favor of the neoclassical approach that the interest rate hurts investment by raising the cost of capital. Furthermore, government expenditures in infrastructure are also found helpful in stimulating domestic investment. The results of this study, thus, highlight the importance of macroeconomic factors and indicators of financial development in determining domestic investment and consequently achieving higher rates of economic growth.

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