INTERNATIONAL CAPITAL MOBILITY AND SAVING - INVESTMENT NEXUS IN SAARC COUNTRIES

BY

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International finance.
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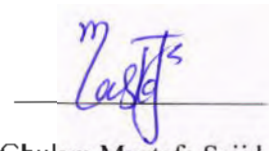
Savings.
Direction of causality.
Business cycle shocks.

In the Name of Allah the Most Gracious and the Most Merciful

CERTIFICATE

The thesis entitled **"International Capital Mobility and Saving-Investment Nexus in SAARC Countries"** submitted by **Ms. Nazia BiBi** in partial fulfillment of MS degree in Economics has been completed under my guidance and Supervision. It is certified that the student has incorporated the necessary changes suggested by the Examiners during viva voce exam on September 07, 2016. Now the thesis is ready for further process.

Signature: 

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Declaration

I hereby declare that this thesis, neither as a whole nor as a part thereof, has been copied out from any source. It is further declared that I have carried out this research by myself and have completed this thesis on the basis of my personal efforts under the guidance and help of my supervisor. If any part of this thesis is proven to be copied out or earlier submitted, I shall stand by the consequences. No portion of work presented in this thesis has been submitted in support of any application for any other degree or qualification in International Islamic University or any other university or institute of learning.

Nazia BiBi

DEDICATION

To My Great Parents

With Deepest gratitude whose love and prayers have always been a source of strength for me.

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First has been the enduring sustenance of ALLAH the Almighty who gave me strength and resilience to complete my thesis despite of many difficulties. My humblest gratitude from the core of my heart is to our beloved Prophet HAZRAT MUHAMMAD (S.A.W.W), who is the eternal fountain of knowledge and guidance for the whole mankind.

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Abstract

This study investigates the co-integration and direction of causality between savings and investment in time-series settings over the period of 1980-2013 for the South Asian Association for Regional Cooperation (SAARC) by using auto regressive distributed lag (ARDL hereafter) bounds test of co-integration which is proposed by Pesaran et al. (2001) and the Granger causality test proposed by Granger (1969). We also test the significance of the business cycle shocks such as productivity, fiscal and terms of trade shocks. All data is compiled from the International Financial Statistic (IFS) and World Development Indicators (WDI). Result shows that savings and investment are correlated only in Bangladesh and India and in these countries all the increase in savings not flow out of these countries, but it induce investment. For rest of the countries, the domestic savings and investment are not correlated. The result of Granger causality shows that causality running from savings to investment in Bangladesh and India. The results of business cycle shocks explain the high saving-investment (S-I hereafter) correlation. Even after controlling all three shocks, the saving-retention coefficient remains well above zero.

Keywords: Investment, Savings, Co-integration, Direction of Causality, Business cycle shocks

CHAPTER

1

INTRODUCTION

Savings and investment are key factors in the growth and development of any economy, however, lack of savings and investment are common in developing countries. To overcome the lack of adequate domestic savings, foreign savings via unrestricted capital flows are encouraged. The issue of low level of savings is a major problem of small developing countries because there is low level of wages, high rate of unemployment and poor performance of the economy. Foreign through unrestricted capital mobility are promoted to overcome the lack of adequate savings. The S-I association has long been an object of interest for analysts. It is well known that one of the important aspects of achieving sustainable development is to preserve macroeconomic stability, which is closely related to the extent of capital mobility. The matter is also significant for policy makers because (i) the effectiveness of macroeconomic policies is highly associated with the level of international capital mobility; this study examine the impact of savings and investment correlation on international capital mobility (ii) Higher capital mobility assist to allocate the available resources more efficiently and achieve risk diversification (iii) High capital mobility also give raise to volatility that may result in unstable financial condition. Although there is strong positive S-I relationship in a closed economy and existence of international capital flows makes it more complex to analyze. The debate on savings and investment traditionally have two major disputes, one is whether domestic

investment leads to domestic saving, second is through which channels domestic investment moves domestic saving. A huge literature has been developed theoretically as well as empirically, trying to answer these questions [Keho and Esso (2010)]. Saving and investment nexus is important as it matters for policies that affect capital mobility. The causal relationship between savings and investment also has important implication for fiscal policy.

The degree of international capital mobility has an influence on the effects of global resource allocation, economic policy and responses to external shocks. Various tests on capital mobility have been identified in the literature; one of the test which is proposed by Feldstein and Horioka (1980) (F-H hereafter) examined the S-I nexus in an open economy. F-H (1980) hypothesized that, "a low correlation coefficient between savings and investment indicates capital mobility while a higher correlation coefficient suggests capital immobility". However, contrary to their presumption, the empirical results, for sixteen OECD economies over the period of 1960 to 1974, supported that investment and national savings was highly associated under perfect capital mobility. They claimed that this was the evidence of the existence of imperfect capital mobility across countries and thus resulting in the term "F-H puzzle". The conclusion of F-H of low level of capital flows, modeled an uncomfortable puzzle, the reason being that many open macroeconomic simulations usually assumed high capital flows since 1970s [Coakley et al. (1996)]. Feldstein (1982) extended the work of F-H (1980) and addressed many econometric problems that are used in their previous papers and they also updated the set of data. The results show that high capital mobility is not present in the OECD countries

in the long-run.

F-H's results reveal that there is large-country bias instead of low capital movement [Harberger (1980) and Murphy (1984)]. Bayoumi (1989) argues that the relationship between saving and investment reveal that to achieve the current account, the government practices the monetary policies as well as fiscal policies. Many other theoretical justifications have been recommended to determine the greater and significant coefficient when investment is regressed on saving rates. For illustration, Obstfeld (1986) recommends that this shows low capital mobility as a consequence of information restraints and nonexistence of enforceability of agreements at international level. Obstfeld (1986, 1995) also mentions that S-I correlation may be due to these common results or may be due to any other factor for example "productivity shocks". Cardia (1991), Baxter and Crucini (1993) constructed the models by adding productivity shocks in the models which patch up the raise in foreign capital flows with a close S-I relationship. All these studies analyze the S-I relationship on capital mobility across multiple countries however, individual countries, especially the SAARC countries which are socially, politically and economically similar in nature, have mostly been ignored. To the best of our information, this is the first study do so far on SAARC countries which examine the S-I correlation and analyze its impact on degree of capital mobility and direction of causality between these two variables for individual countries. An attempt is also made to investigate the effect of business cycle shocks such as productivity, fiscal and TOT shocks on S-I correlation. Our study place the contribution in the literature regarding degree of capital mobility and business cycle shocks in SAARC countries using

the S-I correlation approach proposed by F-H (1980).

1.1 Objectives of the study

Main objective is to examine the impact of S-I correlation on international capital mobility for SAARC countries. Specifically the study intends to:

i. Find co-integration between savings and investment.

ii. Find the direction of causality between savings and investment.

iii. Investigate an effect of S-I correlation on the degree of capital mobility for SAARC countries before and after controlling business cycle shocks.

1.2 Research Questions

The research questions, which are going to be investigated in this study, are:

i. Whether savings and investment are co-integrated?

ii. What is the direction of the causality between these two variables if they are co-integrated?

iii. Does the S-I relationship correctly reflect the degree of capital mobility in SAARC countries before and after controlling business cycle shocks?

Rests of the chapters are structured as: Chapter 2 provides a brief review of the existing literature. Chapter 3 discusses the theoretical review of the study. Chapter 4 is related to the estimation procedure and empirical technique employed for the analysis of data. Chapter 5 covers the sources of data and variables description. Chapter 6 provides the

results and their discussion and finally chapter 7 presents the summary conclusions and policy recommendations for SAARC countries[1] in the light of findings of the study.

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[1] I exclude Afghanistan and Maldives due to the lack of the data.

CHAPTER

2

LITERATURE REVIEW

A huge volume of literature concerning the F-H hypothesis is available and has been taking the responsiveness of economists from all over the world. It is clear from the huge body of literature on this subject. There are basically two main aspects of literature that compact with this hypothesis. The first aspect that tries to create the validity of F-H hypothesis, and claims that high S-I correlation implies that there is greater international capital immobility. Feldstein (1983), Penati and Dooley (1984), Dooley et al. (1987) and Vos (1988) submit that domestic savings and investment are closely related to each other when they use cross-sectional frame. When time series framework is used, the literature shows that there is dynamic relationship between savings and investment over the time and through different exchange rates and capital control systems (Miller, 1988; De Vita and Abbott, 2002; Ozman and Parmaksiz, 2003; Narayan, 2005).

Another aspect of the literature deals alternate hypothesis to clarify high S-I relationship. It claims that high level S-I relationship has no effect on the degree of capital mobility but there are some other factors i.e. productivity shocks [Obstfeld (1986), current account [Summers (1988), Artis and Bayoumi (1992)], size of country [Baxter and Crucini (1993)], current account solvency [Coakley et al. (1996)] and financial crisis [Kasuga,(2004)]. The impact of free capital mobility on domestic S-I relationship has been matter of a significant debate. From a theoretical perspective, if perfect capital

mobility is present within the nations, national savings respond to worldwide investment opportunities and national investment should be financed depicting on the worldwide pool of capital. Likewise, there should not be national S-I relationship. However Feldstein-Horioka (1980) found high association between saving and investment, as the assessed coefficients of the regression of the proportion of saving to output on the investment -output ratio was generally not significantly different from one. Furthermore, no decrease in these coefficients was detected; leading F-H to infer that at level of global capital flows was low and, also, had not expanded in current time period.

F-H (1980) use average cross-sectional sample of sixteen OECD economies during the time of 1960-1974 and their result shows significant association between the saving and output ratio as well as between investment and output ratio. The empirical results show that almost ninety percent of domestic saving stays within a nation that funding the domestic investment which implies low capital mobility across countries. The existing literature comprises of cross sectional and time series research. Cross sectional studies (Feldstein, 1983; Penati and Dooley, 1984; Obstfeld 1986; Golub, 1990; Feldstein and Bachetta, 1991; Tesar, 1991; Artis and Bayoumi, 1992 and Coakley et al., 1995) find that saving and investment are positively correlated.

By using time-series data (Obstfeld, 1986; Miller, 1988 and Mamingi, 1997) obtain mixed results. There are few studies in which techniques related to panel data are used for estimation of S-I correlation including Krol, 1996; Kim, 2001 and Coakley et al., 2004. Obstfeld –Taylor (2005) states that saving and investment are those variables which can be determine jointly and the common basic shocks might be induce high S-I correlation

even with perfectly mobile capital. The overall assumption that can be depicted from above mentioned studies is that panel estimations are mostly similar to the cross-country estimations. For OECD countries their estimates are near to unity but for the developing countries they are lower. Literature review is separated into different sections. Section (2.1) appraises studies related to the perfect capital mobility when saving and investment are not correlated. Section (2.2), discussed those studies that related to low capital mobility when saving and investment are correlated. Section (2.3) reviews those studies, related to S-I correlation that have nothing to do with capital mobility.

2.1. Review of studies which observe perfect capital mobility when there is no correlation between savings and investment

Gulley (1992) investigates the co-integration between saving and investment. He concludes that S-I relationship does not exists in the United States. Yamori (1995) apply ordinary least squares (OLS) as well as two-stage least squares (2SLS) method to estimates the S-I correlation in Japan by using time series data set. The results show that saving and investment are not correlated with each other which suggest perfect capital mobility. Palley (1996) find the direction of causality by using the granger causality test and find the casual relationship between saving and investment for United States by using the time period of 1973:4 and 1995:2. His result indicates that investment adversely affect individual saving and it is free from government saving and individual saving adversely affect government saving. It also contradicts to the F-H puzzle. The interpretation established by the researcher Vamvakidis and Wackziang (1998) is that, F-H hypothesis only applies for OECD economies not for other countries. The researchers

analyze that this situation is due to the reason of risk diversification. The results propose that chances of diversification are higher in developing economies than industrialized economies. Thus, S-I relationship can be partial. Furthermore, Vamvakidis and Wackziang (1998) investigate the fact that capital flows are the main factor for investment only in the non-OECD economies and this capital mobility is due to the financial aid and foreign borrowing.

Blanchard and Giavazzi (2002) explain the co-integration of domestic saving and domestic investment which decreases over time that suggest higher integration in the capital market. Kasuga (2004) find the saving retention coefficient for the developing countries and for the industrialized countries as well. After estimating the coefficients for both type of countries he concludes that developing countries have low coefficient while the industrialized countries obtain high coefficient. However it is also remarkable that in the sample of developing countries the capital is more mobile in the countries of middle income than the countries having low income.

Cooray and Sinha (2005) examine S-I correlation after selecting the 20 Sub Saharan African (SSA) states. They shows that there is no evidence of S-I co-integration. De and Eyden (2005) select the panel data set of 36 selected Sub Saharan African (SSA) states and find that capital is highly mobile in selected Sub Saharan African (SSA) states. The researchers also conclude that investment rate is determined by foreign direct investment (FDI) flows and foreign aid in Sub Saharan African (SSA) countries and not by domestic saving. It is also found that the studies related to the developed countries had high saving retention coefficient. While, in developing countries the coefficient of saving-retention

was low, this implies that these countries have high capital mobility. Payne and Kumazawa (2005) investigate the impact of foreign aid, domestic savings and openness on the domestic investment. They used 29 countries of Sub Saharan African over the period of 1980-2001. Their result indicates that the flow of capital eventually rises with the passage of time and openness significantly affects the rate of investment. They argue that if the factor of foreign assistance is an essential element and it is excluded, then the relationship between saving and investment will decreases that implies perfect capital mobility.

Amirkhalkhali and Dar (2006) examine the correlation between capital mobility and the openness for G-7 countries. Their result shows that trade openness and capital flow are not co-integrated in these seven countries. When Amirkhalkhali and Dar (2006) study the S-I relationship, and also examine the influence of openness on the S-I relationship for 23 OECD economies their results do not show that trade openness is linked with higher capital mobility in these countries.

Kim *et al.* (2005) used the panel co-integration technique to investigates the saving-investment correlation. The result gives the illustration of high level of capital mobility in Asian countries in decade of 80s and 90s. Adedeji and Thornton (2006) test the hypothesis of F-H for six African countries and conclude that the capital is fairly moveable in the selected African nations. Afzal (2007) investigates the evidence of S-I relationship for developing countries by using the econometrics techniques for time-series data and also investigates the causality between savings and investment. His result

indicates that no indication of long-run S-I relationship exist in 4 countries out of 7 countries of the sample; which implies that there is high capital mobility in these countries and bidirectional causality exists which means that saving cause investment and investment also cause savings in South Africa while in Pakistan and Sri Lanka unidirectional causality exist which states that only saving cause investment. No evidence of causality found in case of Iran, Philippines, Malaysia and India. He concludes that this situation is due to the different policies of the countries and high S-I relationship does not make impossible to capital mobility all around these countries.

Tang and Lean (2008) explore S-I relationship in case of Malaysia for the period of 1960 to 2007. There results specify that no evidence of co-integration is found in Malaysia, which implies perfect capital mobility in this country.

Narayan and Narayan (2010) tried to find the capital flows through the panel of G-7 countries for the period of 1971-2002. The results determined that there is free capital mobility in these countries and this perfect capital mobility also provides the indication of non-existence of saving and investment relationship among G-7 countries. Gebreyehu (2010) investigates the direction of causal relationship of savings and investment for Ethiopia. His result shows that no causal relationship exists between savings and investment.

Saeed and Khan (2012a) test the rationality of F-H hypothesis by using the bounds test by taking the time period of 1976 to 2010. They investigate the hypothesis for Pakistan in the presence of current account deficit and budget deficit. Their findings show positive relationship exists between both deficits in the short-run as well as in the long-run.

This positive relationship between the variables implies that there is twin deficits problem in Pakistan. There is adverse association between investment and current account deficit both in short-run and in the long-run.

Saeed and Khan (2012b) investigate the evidence of Feldstein-Horioka (F-H) puzzle by taking the annual time series data set over the year 1972 to 2008. The result shows that F-H hypothesis does not hold in Pakistan and capital is highly mobile in case of Pakistan. Although Pakistan is not includes in those countries that are highly integrated in the world economy. From both studies it is found that, the level of worldwide capital flows has never been perfect.

All the above mentioned studies, panel as well as time series show that saving and investment are not correlated which suggests perfect capital mobility. This also gives evidence that savings and investment are not move together and the strategies that design to raise the rate of investment by saving are not successful.

2.2. Review of studies which observe low capital mobility when there is correlation between saving and investment

Jansen (1996) tested the saving and investment co-integration for twenty-three OECD economies for the year of 1951 to 1991 by estimating error correction model (ECM). He found the confirmation of co-integration between these two variables. Hussein (1998) tested the F-H hypothesis for twenty three OECD countries for the period of 1960-1993. He uses the dynamic ordinary least square (DOLS) technique. His findings showed that eighteen countries out of twenty three countries give the evidence that international capital mobility was very low. Wacziarg (1998) recommend that the co-integration

between saving and investment is low or even close to zero in an illustration of developing economies and low S-I correlation does not implies high level capital mobility.

Corbin (2001) considers a cross-sectional study of saving and investment relationship by using the panel set of data and he also determines the significance of adjusting for the heterogeneity of economies. He concludes country specific effect plays a significant role for high S-I association.

Isaksson (2001) investigates the relation of savings and investment over the time period of 1975-1995. In the study countries are categories according to their geographical entities i.e. Middle East, Asia, Latin America and Tunisia are used in a cross section frame and Sub-Saharan Africa. They conclude that there is low capital mobility in all countries except in Middle East. Agbetsiafa (2002) examine the F-H hypothesis and also find the direction of causality within the time series framework by taking six emerging countries. He employs Johansen co-integration techniques and also apply the causality tests which is based on an error correction model to check the causal relation. The results suggest that there is one way causal relation that goes from saving to investment in some countries i.e. Ghana, Ivory Coast, Kenya, Nigeria and Zambia and two way causal relationships in South Africa. The S-I relationship exists in all countries. Thus, they conclude that in the long run capital is not perfectly mobile at international level.

Sinha (2002) states that the evidence of long-run correlation exists between savings and investment for two countries i.e. Thailand and Myanmar, Similarly saving rate cause investment rate for some countries i.e. Sri Lanka, Singapore Malaysia and Thailand.

But unidirectional causality runs from investment rates to saving rate in four countries Myanmar, Hong-Kong, Singapore and Malaysia. Athukorala and Sen (2002) provide the S-I association. According to them results can be bias if cross-sectional analysis for S-I association is modeled. Thus they accomplishes country-specific study by using time series analysis to find the S-I association. The individual country analysis can help in making an applicable macroeconomic policy for a particular country.

Rubio (1998), Pelagidis and Mastroyiannis (2003) analyze S-I association and researchers used the error correction model to determine the extent of capital mobility. Ozmen and Parmaksiz (2003) tested the F-H hypothesis for UK economy. They found the evidence of co-integration between savings and investment. Pelgrin and Schich (2004) observe the presence of saving and investment correlation and capital mobility in India from the period 1970 to 2010. They find that S-I are co-integrated, but the error correction model shows structural imbalance in the beginning of BOP crisis in the 1990s and currency devaluation after the period of 2000.

Chakrabarti (2006) select the panel of 126 countries to find the correlation of saving and investment by taking the duration of 1960-2000. He establishes a view that saving and investment positively and significantly related to each other. Papaetrou (2006) examined the co-integration between saving and investment in Greece. The findings suggested that S-I is weakened during structural changes periods.

Telatar *et al.* (2007) examined the S-I correlation for ten European countries for the period of 1970-2002. They used high and low capital mobility states in the analysis. They found that saving and investment were not highly correlated for Denmark, Belgium,

Finland, Sweden, Italy and France whereas, no changes is reported to measure the capital flows of national S-I correlation for the remaining countries. Kim (2007) used the technique of generalized least square (GSL) by using 11 countries and categories these countries into three portions: big three, ASEAN and the greater china by taking the time period of 1980-2002. The results show that in the East Asia, association between saving and investment decrease with the passage of time. Kollias *et al.* (2008) investigate the F-H hypothesis for EU fifteen member countries for the period of 1962-2002. They apply bounds test and panel techniques. Their results show high, as well as average to low degree of capital mobility. Pelgrin and Schich (2008) measure the degree of capital mobility after selecting twenty one OECD economies by using the model of fixed effect their result shows that in 1990s there is rise in the degree of capital mobility.

Parker and Parker (2008) determine the co-integration of saving and investment and also its impact on the capital flows for Thailand and Malaysia. The results illustrate that no evidence of co-integration exists which implies perfect capital mobility within the selected countries. To determine the relationship between savings and investment Payne (2005) used the model of error correction as well as Engle-Granger. While [Narayan (2005), Ang (2007) and Singh (2008)] applied the test of causality and use ARDL model for countries i.e. Mexico, Malaysia, Japan and India respectively. They found that savings and investment were co-integrated which showed that there was a low capital mobility. Fouquau *et al.* (2008) study the effect of demography, economic growth,

country size, current account balance and the trade openness on the correlation of saving and investment in 24 OECD countries for the period of 1960-2000. They used the panel threshold regression technique and conclude that only three variables i.e. current account, country size and degree of openness affect the relationship of saving and investment.

Wahid *et al.* (2009) examined the S-I correlation by using the panel of five South Asian countries and found that saving and investment were related to each other. They established the view that the F-H hypothesis not present in the region of South Asia. Georgepoulos and Hejazi (2009) argue that, if the degree of capital mobility is neglected then the correlation could be biased upward between national saving and domestic investment.

Rao *et al.* (2010) estimated the saving retention ratio for thirteen OECD economies by selecting the time period of 1960 to 2007. They use the GMM approach and found that capital flow rises in decade of 90s. Mishra *et al.* (2010) considered dynamic relationship between S-I in case of India. They select the time period 1950-51 to 2008-09 by retaining the technique of Johansen co-integration and the Granger causality test by vector autoregressive frame. The result of this study shows that long-run correlation exists between saving and investment the result of causality shows that India reveals bidirectional relation between the mention variables. Mishra, Das and Mishra (2010), observe the co-integration relationship between savings and investment by taking Johansen co-integration technique and to check the causal relationship of these two variables apply the causality test within the duration of 1950-51 and 2008-09. The results provide the evidence of existence of the long term relationship between savings and

investment in case of India.

Seth (2011) applies different techniques to investigate the correlation between saving and investment. The researcher used the corporate saving and the corporate investment in his study and the technique used to find the relation between selected variables are error correction model and Engle-Granger for the time period of 1980 to 2008. The findings of the study relates to the existence of corporate S-I relation. Onafowara *et al.* (2011) select eight countries from the European Union and provide the evidence of existence of S-I co-integration relationship in selected countries. Their results show that statistically there is evidence S-I nexus for six countries out of eight countries. Similarly, Sanjib and Joice (2012) investigate the same relation but they select countries China, United Kingdom and United State and also compared their result with India. They shows that there is evidence of S-I association.

Adebola and Dahalan (2012) investigate the relationship between saving and investment in case of Tunisia for the time period of 1970 to 2009 and they find that if the variables show correlation between saving and investment than these variables must cause other variables. The researcher use two tests for this purpose, the causality test and autoregressive distributed lag model as well. They establish long term correlation between selected variables. They find two-way correlation through which the F-H hypothesis which suggests low level of capital mobility. Shahbaz *et al.* (2010) and Nasiru and Usman (2013) also used the same technique to explore the long run and short run S-I association for Nigeria and Pakistan. The strong evidence found for S-I relationship in Nigeria and weak correlation in Pakistan.

That implies low capital mobility. The review of the literature made above proposes that saving and investment are co-integrated. This also support F-H hypothesis of low capital mobility.

2.3. Review of studies which suggest saving and investment correlation has no impact on capital mobility

All the studies reviewed in this section are those which concluded that the S-I correlation had no effect on capital mobility. Obstfeld and Rogoff (1986) indicated the possible instruments to clarify the co-movement of saving and investment. Both saving and investment are significant elements of the business cycle, there is a reason to trust that real shocks, for example "total productivity shocks" that adequately persistent, can bring about a high relation within the saving and investment.

Baxter and Crucini (1993) built a theoretical structure to clarify the relation between saving and investment. The investigation was completed inside two countries (Home country and the foreign country). They found that higher S-I relationship occurred normally with "persistent productivity shocks" and small developing economies display higher level of capital mobility than developed economies. Mamingi (1997) tries to test the S-I relationship by using the ordinary least squares method and fully modified least squares. He takes 58 developing countries for time period of 1970 to1990. The results demonstrated that developing countries are financially integrated over the long run and S-I relationship is higher in low-wage countries than middle-income countries.

Kasuga (2004) analyzes the relationship between S-I by taking seventy-nine non-OECD and twenty-three OECD economies for time period of 1980-1995 by utilizing the method of ordinary least square and instrumental variables techniques. He concludes that it is domestic saving that increases net worth opposed to domestic investment. The study proposes that the effect of domestic saving on investment depends upon the stage of development and financial system. Bahmani *et al.* (2004) examine S-I correlation for 106 countries during the period of 1960-2000 and examine whether the relationship is delicate to the level of openness and the country size. They detect a critical positive relationship between the proportion of gross domestic investment to GDP and the proportion of gross domestic savings to GDP.

Cyrille (2010), investigates the association between savings and investment and also investigate the association between capital flows for fifteen African countries. He draws the conclusion that S-I nexus is low and relationship between capital inflow and capital outflow is insignificant. Ketenci (2012) quantify the long run correlation between saving and investment by selecting the twenty-three nations of European Union for period of 1995-2009 by applying the Johansen approach of co-integration. His results demonstrated the evidence of validity of co-integration in all countries except for Portugal and Estonia. He disputes the F-H hypothesis. Low level of saving-retention coefficient measured high capital flows in most of the countries.

Literature review made above reveals that most of the existing studies estimate F-H hypothesis for cross country mostly for OECD countries but no study has been conducted

for SAARC countries, especially for country-by-country analysis although these countries are socially, politically and economically similar in nature.

Most of the previous empirical studies depend on panel or cross country regressions and might be criticized on the ground of imposition of cross-sectional homogeneity on coefficients that as a general rule might fluctuate across countries because different countries have different structure. The general result got from the cross-sectional analysis or from the panel analysis represents just an average relationship that might not be applicable for individual countries [Esso and Keho (2010)].

To improve our knowledge related to the causal relationship between saving and investment it is necessary to perform study on individual countries by using time series data. Our study tries to fill this gap by evaluating the S-I nexus for SAARC countries and use the time-series data for the period of 1980-2013. Afghanistan and Maldives both are excluded from the sample due to non-accessibility of data. In contrast to most empirical studies, this study apply the bounds testing approach to co-integration[2] proposed by Pesaran et *al.* (2001) and Granger causality test[3] proposed by Granger (1969). These tests are relatively more efficient for a finite sample (Narayan and Narayan, 2005 and Narayan and Smyth, 2006). In particular, prevailing work on co-integration and for test of causality uses standard Engle and Granger (1987), Johansen (1988) co-integration tests, and the Granger-causality-type tests to explore the long-run relationship as well as direction of causality.

[2] Used by De Vita, G. and Abbott, A. (2002), Shahbaz *et al.* (2010), Adebole and Dahalan (2012),Nasiru and Usman (2013)

[3] Keho and Esso (2010)

2.4. Research Gap

- Most of the existing studies estimate the F-H hypothesis for cross country but there are very few studies that consider country by country analysis.
- Most of the studies are for OECD countries but no study has been conducted for SAARC countries, especially for a country-by-country analysis.
- Specifically for SAARC countries no study has been conducted on the direction of causality between savings and investment.

CHAPTER

3

THEORETICAL REVIEW

3.1. Investment Theories

Economic theory proposes that savings and investment are important factors for growth in any economy. The most substantial economic relationship between past, present and future of every economy is reported by its savings and investment. If the savings rate remains low for a long time period, it may bring the economy into a vicious circle of low economic progress, low profitability and low per capita income and low rate of investment etc. Therefore if high savings rate is the prior condition to get rid from low investment and low growth in any country then high saving rate is a requirement in any country to move out from low saving and low growth equilibrium. (Ahmed & Asghar, 2004).

Economic theory states that savings is that part of income which is in surplus of current expenditure and kept sets aside for future use. Usually savings are kept in the form deposits or in the form of cash or in other financial assets. All those assets which are held in the form of financial assets, inventories, equipment or in the form of land are also includes in savings [Rehman, Faridi and Bashir (2010)].

Different theories of investment come forth with Keynes (1936) publication. The general theory of interest, money and employment but the idea of Keynes (cited in paper of

Galbraith, 1987) considerably advance. Gould (1969) mentioned that the theories that are related to the capital and investment have also long been associated. The approaches related to investment can be considered in five wide theories i.e. the accelerator theory, cash flow theory, neoclassical theory, modified neoclassical theory and the Tobin's q theory.

3.1.1 The Accelerator Theory

According to the Anderton (2007) accelerator theory of Samuelson recommends that investment is an element of past changes in income. It takes after the Keynesian view that adjustments in investor's anticipations about future economic conditions determine the levels of investment. The desired investment stock relies upon planned output. Neoclassical consider that investment is extremely delicate to the interest rate while Keynes and his supporters took the position that changes in anticipations of investor about future economic conditions are far vital in clarifying in adjustments in levels of investment. Both groups decided that balance investment takes place when the expected rate of return in investment measures up to the rate of interest (Byrns and Stone, 1981). On government spending, it is proposed that declines in government spending directly shrink the demand for goods and services. As indicated by Keynesian perspective direct this leads toward diminished the activities of investment (Bodie, Alex and Marcus, 2009).

3.1.2. Cash Flow Theory

Present and past benefits or cash flows have been considered as great intermediary for future benefit desires which in turn decide investment (Bischoff, 1971). Furthermore,

cash flow is considered as a source of funds so the expense of funds to the firm increases when internal funds are useless given imperfect economic situation. As indicated by Cherian (1996) that managerial and information theoretic methodologies to deal with investment were the most recent. Both methodologies underline the part of internal finance as the major determinants of investment and can be viewed as the modern types of liquidity hypothesis. In the managerial perspective, internal finance is ideal as it encourages discretionary behavior by managers on the other hand according to the information theoretic perspective, because of information asymmetries amongst insiders and outsiders.

3.1.3. Neoclassical Theory

The Neo- classical theory contends that the rate of premium is the essential determinant of investment. Conversely with the accelerator model demonstrate, the neoclassical model expect that the preferred stock depends only on planned output as well as on the proportion of output cost to the implicit rental cost of the services of capital merchandise (Bischoff, 1971). Primarily it is gets from a profit maximization process directed for preferred capital given a Cobb-Douglas production function. Bodie, Alex and Marcus (2009) notice that Keynesian investigates the impacts of taxes on the demand of consumption while Neoclassical oppose that decline in tax rate will increase the investment and enhance the incentive to work. Similarly, monetary policy works to a great extent through its effect on interest rates. Increment in money supply decrease interest rate ultimately stimulates the demand of investment.

3.1.4. Modified Neoclassical Theory

Modified Neoclassical model is an adaptation of Neoclassical model in which the distributed lag is adjusted to suit the exact perception that capital-output proportion are encapsulated in new capital and structures instead of the existing capital (Clark, 1979). Since component proportions are settled at that time when the equipment is designed, changes in variable intensities directed by changes in the cost of capital occur just as the old capital replaced by new capital. Bischoff recommended that in order to determine the investment expenditure output as well as expense on capital ought to have distinct lag structures (Hall, 1977).

3.1.5. Tobin's Q Theory

In contrast to the prior output-based models the Q hypothesis clarifies the investment in terms of portfolio balance. This depends on the q-proportion proposed by James Tobin, of the market value of capital to its substitution cost (Clark, 1979). If it is observed that marginal addition to the market value of the firm more than the replacement cost of the capital stock then to expand the market value of the firm capital stock will be added (Cherian, 1996). The early scholars of the subject of investment focus on the accelerator approach. The development of liquidity hypothesis in the late 1950's and mid 1960's monitored that investment is seen as an element of cash flows. In 1960's came along the neoclassical model by Jorgenson and in the late 1960's the Q hypothesis of investment (Cherian, 1996).

Yaw (2000) has categorized the variables of private investment into Keynesian, Neoclassical and Uncertainty variables. The Keynesian factors include GDP growth rate, internal funds and capacity utilization. In the neoclassical category is Tobin's Q, real interest rate, user cost of capital and public investment ratio. The uncertainty values are three: variability in the user cost of capital, real exchange rate, inflation rate, distortions in the foreign exchange market and real GDP; debt/GDP ratio and debt service as a ratio of exports of goods and services. Investment is also affected by Terms of trade (TOT hereafter) with improvements in the TOT stimulating investment demand. Because of adjustment costs for changing the stock of capital, investment demand will respond mainly to long-lasting shifts in the TOT, Barro (1993). As Bodie, Alex and Marcus (2009) notes, appreciation of the home currency creates a problem for the country's producers that must compete with other international producers. Therefore, on exchange rates, the appreciation of home currency would be expected to discourage investment.

The standard investment theories have been considered as not fully applicable to developing countries becoming the subject of further hypotheses and studies in this area. Such studies include Fry (1998), Greene and Villanueva (1991), Bledjer and Khan (1984) and Sundararajan and Thakur (1980). Developing countries have been associated with several inherent problems mainly relating to analytical and data problems and general imperfections in financial and labor markets (Bledjer and Khan, 1984) such as financial repression (Kimuyu, 1997).

The concepts of investment date back to before Keynes and it have been studied ever

since. There are many studies related to investment and the topic of domestic investment might not be examined by avoid extensive available literature review. Empirical characteristics have also been of main focus and may have several implications to any undertaking in the area of research. Investment play key role for the growth in every economy. It puts greater impact on output and income. Furthermost, the economists believe that high level of investment is closely associated with the economic growth. Several economists have attempted to study the theoretical and empirical relationship between investment and saving. Investment has been defined in different ways by different researchers. Reilly and Keith, (2009) defined investment as the money for the future payment that will pay to investors for the period of time. Such as the Accelerator theory state that the expectations of the investors regarding economics condition of the economy in future influence the investment level, the specific or focal channel or factors to affect is the question of argument between neo-classical and keynesians (Anderton, 2007).

In conclusion Case and Fair (2007) summarize that numerous other hard-to-measure and hard-to-predict variables additionally influence the level of investment spending. These might incorporate government policy changes and worldwide issues. Investment thoughts have additionally been created further in finance. For illustration Bodie, Kane and Marcus (2009) observes the possibility of expansion is age-old, however it was not until 1952 that Harry Markowitz distributed a formal model of portfolio determination representing diversification principles; termed the distinguishing proof of the effective frontier of risky assets

3.2. Savings Theories

The traditional theory of Lewis's (1955) states that if savings increase in turn economic growth also increase, As the Domar-Harrod (1939) models determined investment as the fundamental to encouraging economic growth. While neoclassical Solow (1970) approach indicates that when there is rise in saving rate it will highly promote the steady state output as compared to investment because increase in income also raise savings, that contribute to promote higher investment. Bacha, (1990); Jappelli and Pagano, (1994) also strongly affirm that in the short-run savings promotes the higher investment and higher economic growth. Furthermore, the Carroll-Weil (1994) theory tells that savings is promoted by the contribution of economic growth but not vice versa. While the new theories of growth developed by Romer (1986, 1990); Lucas, (1988) and Barro, (1990) also confirm that the capital accumulation are helpful for the long-run economic growth.

3.2.1 Classical Theory

According to the classical theory when savings increase, it will decrease the interest rates, promotes the investors demand from the available stocks and this in turn increase investments.

3.2.2. Keynesian Theory

Contrarily to the classical theory, Keynes argues that when investment increases it will also increase the output and income that in turn, increase the savings. He also argues that investment is not only generated by the stock of capital but also through the aggregate demand and through many other economics activities.

It is a common view that savings is an important factor to promote investment and also for economic growth. Low level of investment and economic growth is due to the low level of domestic savings. All empirical studies do not support this conventional view because different studies have different empirical findings and disputed by cross countries. These disputes are due to the differences in institutional, economic and social system. The traditional view about the savings and investment is that domestic investment; cost of investment and interest rate is determined by the domestic saving. In turn, these variables determine the requirement of new capital. In general, if the rate of saving is low then in return there is low rate of investment.

The high S-I correlation is also associated with government action. Governments of every country avoid the current account deficits because this leads to an increase in the foreign debt and debt servicing. However to achieve a current account target expansionary fiscal policy will be adopted. Government budget targeting would minimize the resource gap and will bring equality between savings and investment and in the current account. If government sustains a current account targeting policy, then the current account would not change to the optimal level. Therefore, saving and investment would be highly correlated even in the presence of perfect capital mobility. The S-I relationship might give indirect evidence of a government's stance on the current account policy, whether governments focus the current account balance as their policy goal or simply allow for the current account as a residual of economic activity.

3.3. Saving and investment Relationship

Savings and investment are also important to attain the price stability, economic growth, for employment prospects and also for the development of the country. It is important to understand the association between saving and investment because it plays effective role in economic growth and economic growth depends on capital accumulation and that steady addition of capital base on investment, and investment rely upon domestic capital as well as on foreign capital. Subsequently, increment in saving will lead to an increase in economic growth through capital formation. Ho (2003) argues that it is important to understand the link between saving and investment, since it might bring about positive relationship between economic growth and saving. If capital accumulation is significant for economic growth, then this relationship is essential to measure the validity of the perspective that increasing savings surly increase economic growth.

To explore the link between savings and investment and their long-run relationship, different empirical and theoretical analyses are needed to measure them. Theoretically, S-I correlation put a significant effect on the process of economic advancement and on the level of worldwide capital mobility (Feldstein and Horioka, 1980). However, in developing countries there is lack of savings and investment. Unrestricted capital inflows can play a significant role to remove the problem of domestic saving in the developing countries. Therefore the capital mobility should be encouraged. Developing countries have low rate of domestic savings because of the high rate of unemployment, low level of

wages, and involvement of the large number of people in the informal sector and low performance of the country. There are two fundamental issues that are still under consideration, the first is whether domestic investment is influence domestic savings or it is influenced by domestic savings. The second is how domestic investment influence savings.

3.4. International capital mobility

It is a fact that the large developing countries impose some legal restrictions on the capital inflows and out flows. However, the studies on the level of capital mobility in developing countries, presently received greater attention. The level of capital mobility among nations has essential implications.

The investigations related to the worldwide capital mobility are as under: The first one is to decide an ideal savings strategy. In the closed economy, the profit on additional savings is the marginal product of capital. The point is that whether to promote the saving rate's policies is equal to consider that whether the marginal product of capital. Provide the adequately high compensation for postponing consumption. In spite of the fact that the net profit that individual investor receive is decreases because there imposition of taxes on capital. In every country both tax yield and tax revenue affect marginal product of capital and this affect the savings policies of individual countries. If capital is free mobile between countries and if the country is exporter of capital then a large portion of extra savings will not remain in home country and if the country is importer of capital then they will interchanged by the capital of different countries and put resources into

the home country. In these situations, advantage goes to home country in the shape of net tax that is obtained by the investor. If the extra savings is invested into any other country, then a foreign government accumulates the taxes. If due to the additional saving there is reduction in the imports of capital into the home country then tax revenue not change but rather the national income increase by the after-tax return to investors.

3.5. Business Cyclical Shocks

Business cyclical shocks i.e. productivity shock, fiscal shock and terms of trade (TOT) shock put greater impact on capital mobility hence to find the exact measure of capital mobility there is need to control the business cyclical shocks, because these shocks affect savings and investment.

3.5.1. Productivity Shocks

Most of the studies have exhibited that a high association between saving and investment can be due to persistent productivity shocks. If any country face positive productivity shocks, then consumption of that country will not raise more than the rise in output, as a result the additional output save by the households. Due to this positive productivity shocks investment arises when marginal product of capital arises and this brings about a positive S-I relationship.

3.5.2. Fiscal Shocks

Turnovsky and Sen (1991) analyzed the permanent and temporary effect of change in government expenditure on different variable related to macroeconomic. A permanent

increase in government spending coordinated towards a domestic good rise employment and output both in the short run and after some time. In spite of the transitional increase in the domestic real interest rate, investment is induced by the expansion in Tobin's q, prompting a higher equilibrium capital stock. Along the transitional change way, consumption and recreation are both underneath their respective beginning levels which implies a high relationship between saving and investment. In any case, the results highly rely upon the nature of shocks.

3.5.3. Terms of Trade Shocks

The impact of TOT on saving and investment has been an issue following the 1950s in Harberger, Laursen, and Metzler (HLM). HLM proposes that real income and saving decline with a decrease in TOT. However this controversy relies upon a static theory and has been reevaluated by numerous papers taking into account the inter-temporal approach with forward looking savings behaviors.

By assuming Uzawa-type utility function, Obstfeld (1982) analyzes that the decrease of the TOT can expand savings. In his model, the decline of the TOT brings down the target level of real wealth. To hold the target level, the economy should collect foreign wealth and subsequently save. Svensson and Razin (1983) investigate the impacts of the TOT of final and intermediate products on save and investment. A temporary decrease in the TOT of final products also lowers the discount factor. The lower discount factors thus increases investment but significantly affects consumption. The decrease in TOT also

decreases the real value of domestic output in term of consumption and in the end bring down consumption. Consequently, savings can be positively related with investment.

CHAPTER 4

DATA AND VARIABLES DESCRIPTION

4.1. The Data

Adequate and reliable data is very important for an empirical analysis. So the data must be thoroughly checked to ensure its adequacy and consistency before performing the intended analysis. Committing any mistake in the collection of data would end us with misguiding and unreliable results. We make an utmost effort for the collection of reliable and consistent data set for the analysis. The main objective of the study is to see the impact of S-I relationship on capital mobility in SAARC countries for the period of 1980-2013. The variables used in the study are, savings and investment, share of labor, labor output (Industrial Production), labor input (Employment), GDP growth rate, net government debt, growth rate of government spending, export price (unit values of exports) and import price (unit values of imports). This study mainly uses two data sources. For the most of the variables, we have consulted the International Financial Statistics (IFS), published by International Monetary Fund (IMF). On some variables, we have taken the data from the second source i.e. World Development Indicators (WDI).

4.2. Construction of Variables

4.2.1. Savings

The savings represents gross domestic saving as a share of GDP. The data on this variable is extracted from World Development Indicators (WDI) of World Bank.

4.2.2. Investment

The investment stands for gross capital formation as a share of GDP. The data on this measure of investment is also taken from World Development Indicators (WDI) of World Bank.

4.2.3. Productivity Shocks

Productivity shocks are defined as annual percentage changes[4] in productivity. For productivity measure, we use Solow residuals derived from the Cobb-Douglas production function. If we assume fixed stock of capital, the Solow residual can be represented as follows:

$$A_t = Y_t/L_t^{\alpha}$$

- A is Solow residuals
- α is share of labor (assumed 0.6)
- Y is Industrial value added as a share of GDP.
- L is Labor input (Employment), Employment in industry (% of total employment).

[4] In order to correctly compare the coefficients of different shocks in the regression, we control the differences in units by defining shocks as percentage changes instead of first differences

- t is time period

4.2.4. Fiscal Shocks

Fiscal shocks are defined as percentage changes in unexpected government spending. We run the country-by-country OLS regression of the growth rate of real government spending at time *t* on the real GDP growth rates and the total debt. We use the residuals of these regressions for the unexpected government spending data. The data on all these variables are extracted from World Development Indicators (WDI).

4.2.5. Terms of Trade (TOT) Shocks

Terms of trade (TOT) shocks are defined as the percentage changes in the TOT. ' Export price to Import price ratio (P_x/P_m). Export price is the unit values of exports (Index Number) and import price is the unit values of imports (Index Number) and data is extracted from International Financial Statistics (IFS) by International Monetary Fund (IMF).

CHAPTER

5

ESTIMATION PROCEDURE AND EMPIRICAL TECHNIQUE

As stated earlier, the main objective of this study is to analyze the impact of savings-investment relationship on capital mobility of SAARC countries and the main focus is on the long–run and short-run relationship. This chapter is divided into two sections; Section-1 considers the unit root, co-integration and causality tests and Section-2 discusses the ARDL approach in detail.

5.1. Unit Root Tests

In co-integration and causality analysis, our purpose is to determine the nature of long-run relationship between a set of various time series variables and to analyze the patterns of effect of one variable on another. But before starting the co-integration and causality tests, it is essential to check each time series for stationary because if time series is non-stationary then the regression analysis done in a conventional way will produce spurious results[5]. In time series data realization is also used to draw inference about the underlying stochastic process. So the unit tests are conducted first to examine the property of the time series.

[5] Shrestha(2005)

5.1.1. Testing Stationary and Non- Stationary of Variables

A time series variable is assumed to be stationary if its mean and variance are not limited and autonomous of time, while the covariance is limited and free of time[6]. Furthermore, the time series information will be non-stationary if its mean and variance are varying over time, in other words this variable has a unit root issue. So by concluding the unit root test, we can analyze the stationary for different time series. To make the clear idea about stationary, let we assume the following equation;

$$x_t = \rho x_{t-1} + \varepsilon_t \qquad (5.1)$$

By adding x_{t-1} on both side of Eq (5.1), we get

$$x_t - x_{t-1} = \rho x_{t-1} - x_{t-1} + \varepsilon_t$$

$$\Delta x_t = (1-\rho) x_{t-1} + \varepsilon_t \qquad (5.2)$$

$$\Delta x_t = \delta x_{t-1} + \varepsilon_t \qquad (5.3)$$

Where, $\delta = 1 - \rho$

ε_t specify the error term

We estimate equation (5.3) instead of equation (5.1) we also test for the null hypothesis that $\delta = 0$. Whenever $\delta = 0$ then $\rho = 1$ this shows unit root (or x_t is not stationary). If

[6] It does not vary systematically over time.

$\delta = 0$ the equation (5.2) becomes as $\Delta x_t = \varepsilon_t$ this ε_t specify the error term, it shows stationary, which implies that the 1st difference of a random walk is stationary as well.

It means that if time series become stationary at 1st difference with respect to time then this series is said to be integrated of order one which can be denoted as I(1). Similarly, if time series become stationary at 2nd difference then this series is said to be integrated of order two and can be denoted by I(2). Commonly, if a non-stationary time series become stationary at difference 'd' it implies that the series is integrated of order at 'd'. If series x_t is integrated of order 'd' is indicated as $x_t \sim$ I(d). Therefore, any variable which is integrated of order one or more than one then this series is called non-stationary at level. By rule if d=0, then the order of stationary time series is indicated as I (0).

5.1.2. Methods to Test Unit Root

To draw implication from the analysis of time series, it is necessary to apply the stationary test. Different test are used to check the properties of time series unit root, the tests are as follows Dickey-Fuller test (Dickey and Fuller 1976); augmented Dickey-Fuller (ADF) test (Dickey and Fuller 1979); Phillips-Perron test (Phillips-Perron 1988). This study uses augmented dickey-fuller (ADF) test.

5.1.2.1. Augmented Dickey-Fuller (ADF) test

A model developed by Dickey and Fuller (1976), is known as Dickey-Fuller test[7] and it is

[7] The difference among these tests is that the DF test assumes that the error term ε is independently and identically distributed, the ADF test care of the possible serial correlation in the error term by adding the lagged difference terms of the regrassand.

based on simple auto regression:

$$y_t = \mu + \alpha y_{t-1} + \varepsilon_t \quad (5.4)$$

- y_t is the dependent variable
- μ shows the intercept
- ε_t indicate the error term

If the error term ε_t in equation (5.4) is consecutively correlated then this can be removed by changing the Dickey-Fuller as the augmented Dickey-Fuller (ADF) test which can be specified as:

$$\Delta y_t = \mu + \delta y_{t-1} + \sum_{i=1}^{k} \beta \, \Delta y_{t-1} + \varepsilon_t \quad (5.5)$$

Where $\delta = \alpha - 1$

k is chosen such that ε_t is white noise error term

H_0: $\delta \geq 0$ Unit Root

H_1: $\delta < 0$ Stationary

If the null hypothesis is rejected it means that time series is stationary but If the null hypothesis is not rejected it implies that the series is unit root.

5.2. Co-Integration and Auto Regressive Distributed Lag Approach

Over the last decades, significant consideration has been paid in empirical aspects to test the presence of correlation between variables.

Several methods are available in the literature to check the prevalence of co integration among variables. Literature provides the lot of alternative econometric techniques that deal with non-stationary data, like the Box-Jenkins ARIMA (Box and Jenkins, 1970) approach, vector auto regressive (Sims, 1980) approach. Along with them, the most generally the strategies used for testing the null hypothesis of co integration have the two steps residual based Engle-Granger (1987) test, fully modified OLS approach (Phillips and Hansen's, 1990), Johansen-Juselius (1990) and maximum likelihood-based Johansen (1988; 1991; 1995) approach in a fully specified error correction model [Shrestha (2005)].

The Engle-Granger co-integration test comprises of a two-stage method. In the initial step, the stationary of the residual error is tested. Variables Y and X may individually be non- stationary (means non- stationary at levels and must be of some positive order) but if the residuals of Y and X are stationary then it means that Y and X are co integrated. It infers that Y and X have a long- run relationship and the regression do not have spurious results. Engle and Granger (1987) demonstrated that any co integrated series has an error correction illustration. Hence, the error correction model can be evaluated only if the residual error is stationary at level. First, stationary of the residual are evaluated then in the second step error correction model is estimated. Error correction model shows the

short-run dynamics. This two-stage procedure covers both long-run as well as short-run adjustment procedure [Shrestha (2005)].

For once in a while, the process of Engle-Granger had been assuming the best technique for the test of causality in economic models where everyone variable is tested as an endogenous variable. In any case, residual based co integration tests are incompetent and can lead to contrary results, particularly when the variables under consideration are more than two [Pesaran and Pesaran (1997)]. In this way, Johansen (1988; 1991) and Johansen-Juselius (1992) tests are used as a part of multivariate case. So because of better statistical properties the Johansen-Juselius maximum likelihood error correction model got more extensive acknowledgment in empirical applications. One point of preference of this test is that, contradictory to Engle and Granger (1987), it yields same error correction terms regardless of the decision of the variable to be standardized. In any case, this procedure additionally requires certain pre-testing for unit roots and the fundamental variables must be integrated of order one.

Different methodology, for example, the variable addition methodology of Park (1990), residual based strategy which is used to test the null of co integration proposed by Shin (1994), finally the stochastic common trend (framework) methodology by Stock and Wastson (1998) have been considered. In any case, every one of these techniques focus on that cases in which basic variables are integrated of order one which unavoidably involves a specific level of pre-testing, in this manner presenting a further level of variability into the analysis of level relationships. Thus, the strength of these procedures is addressed after years of development of "unit root" econometrics as well as co-

integration study. According to new type of time series study states that one can continue with the standard practice if the pattern variables are deterministic and not stochastic.

Presently, to check the relationship between two series one need to apply normal unit root tests which mostly experience a serious issue of power specifically (low power) when sample is small. So the Engle-Granger (1987), Johansen (1988), residual based test and Johansen's multivariate test (Johansen and Juselius, 1992), Maximum likelihood based Johansen (1991; 1995), Pittichis (1999) and Moh (2000) methods are not preferable now because they are not robust and reliable for small sample size studies (do not have good small sample properties). There also exists uncertainty regarding the choice of appropriate lag of a unit root test (Sarkar, 2005).

Due to these problems, recently Pasaran and Shin (1999) and Pesaran et al. (2001) developed a new technique to test for the existence of a long-run relationship between different variables irrespective of whether they are stationary or stochastic. This is known as ARDL approach to co integration, which got popularity in recent years. This approach has various advantages. The main advantage lies in the fact that there is no need of pre-testing of the variables to determine the order of their integration (how many times the data is to be differenced to achieved stationary property of the data) in the sample, so can be applied regardless of whether the variables are I(1), I(0) or fractionally integrated, i.e. whether the results are all unit root or all stationary or, indeed, even if mixed results are obtained. But it still allows for inferences on long-run estimates, which is not possible under alternative co integration procedures.

This means that it avoids the pre-testing problems associated with standard co integration, which require that variables are already classified I(1) or I(0). In other words we can say that this methodology is relieved of the burden of establishing the order of integration amongst the variables and of pre-testing for the unit root tests. But still it performed the test of unit root to ensure that whether the variables have mixed order of integration or not? In addition, it is also discussed that a minor change in the assumptions or specifications might extremely influence the after effects of the unit root test and in turn the results which shows stationary time series might be observed to be a non-stationary and vice versa (Shrestha, 2005). So even the stationary of the data is determined by the unit root test and it found that all the variables considered in the study to be non-stationary, there is even remain certain possibility of misspecification. However, ARDL is the most appropriate approach in such manner on the grounds that, as stationary of the variables rely on upon the particular unit root test used. Different test could leads to conflicting outcomes that will influence the robustness of outcomes. Similarly, as indicated by Pesaran *et al.* (2001) that the order of integration of dependent variable must be one but the order of integration of regressors can be zero or one. Another point of Pasaran and Shin (1999), which indicates that this methodology gives strong results for the small sample sizes and the long-run coefficients of estimation results, are stable in small sample sizes. On the other hand the procedures of Johansen co integration even require huge information for the purpose of validity. Similarly, the problem of endogenity as well as the inability to test the hypothesis on the long-run

coefficient (as proof in some different methodologies) is also determined. Moreover, Banerjee *et al.* (1993) state that a dynamic error correction model can be resulting from ARDL through a simple linear transformation, which incorporates the short-run changes with the long-run equilibrium without missing long-run data. Therefore the long-run and short-run parameters of the model can be evaluated at the same time. It is also argued that using ARDL approach avoids problems resulting from non- stationary time series data [Lauraenceson and Chai (2003), quoted by Shrestha, 2005)].

In this approach the model takes sufficient number of lags to captures the data generating process in a general to specific modeling framework (Lauraenceson and chai 2003, quoted by Shrestha, 2005). Similarly, all the variables are assumed to be endogenous.

Finally, with the ARDL, it is also possible that variables have different optimal number of lags which is not possible to handle in other approaches of co integration. So, in view of the above advantages to test for the existence of any long-run relationship we use the bounds test approach to co integration within an ARDL framework[8] and the Granger causality test. These tests are relatively more efficient for finite sample [(Narayan and Narayan (2005), Narayan and Smyth (2006)].

In this study ARDL technique is applied to examine the effect of S-I relationship on capital mobility. To derive our preferred model, we follow the assumptions made by Pesaran *et al.* (2001) in case III (unrestricted intercept and no trend), ARDL representations of the respective function can be stated as follows.

[8] Such models are also named as *dynamic linear regressian models.*

5.2.1. ARDL Representation

To examine the long run relationship between savings and investment, we estimate the following ARDL model:

$$\Delta lnI_t = \alpha + \varphi lnI_{t-1} + \gamma lnS_{t-1} + \sum_{i=1}^{p} \delta_i \, \Delta lnI_{t-i} + \sum_{i=0}^{p} \beta_i \, \Delta lnS_{t-i} + e_t \qquad (5.6)$$

Where Δ is the first difference operator, *ln* is the log of the variables. I_t and S_t denote investment and savings as a share of GDP at time t, α is drift component and e_t are white noise errors. The first part of the equation with φ and γ represents the long-run dynamics of model. The second part of the equation represents the short-run dynamics of the model. The optimal lag length is determined by using minimum Akaike's information criteria (AIC).There are two steps involved in this procedure. The first step involves conducting F-test for co-integration, while the second step involves estimating the relationship.

5.2.1.1. Hypothesis for Testing Long-run Relationship

The bounds test for co-integration is based on F-test of the following null hypothesis.

H_o: $\varphi = \gamma = 0$ there is no co-integration between the variables.

H_1: $\varphi \neq \gamma \neq 0$ there is co-integration between the variables.

To depict the presence of co-integration we use bounds testing approach. The bounds testing approach to co-integration was introduced originally by Pesaran and Shin (1999) and further extended by Pesaran *et al* (2001).

The ARDL bounds test is based on the Wald-test (F-statistics). The asymptotic distribution of the Wald-test is non-standard under the null hypothesis of no co-integration among the variables. Pesaran *et al* (2001) give two critical values for the co-integration test. The lower critical bounds assume that all the regressors are I (0), while the upper critical value assumes that they are I (1). Therefore, if the computed F-statistics is greater than the upper bounds critical value, then H_0 will be rejected and we conclude that savings and investment have long-run relationship. If the F-statistics is below the lower bounds critical value, then H_0 not be rejected regardless of the orders of integration of the variables and we conclude that savings and investment do not have a long-run relationship. The presence of co-integration suggests that capital is at least internationally immobile, while the lack of co-integration suggests perfect capital mobility [Miller (1988)]. When computed F-statistics fall between the lower and upper bounds, then the results are inconclusive unless we know the order of integration of the underlying variables.

The second step in the analysis is to estimate the coefficients of the long-run relationship. Once an evidence of co integration is found between the variables, a long-run model of the following form is estimated:

$$lnI_t = \alpha + \sum_{i=1}^{p} \eta_i ln\, I_{t-i} + \sum_{i=0}^{p} \beta_i\, lnS_{t-i} + e_t \qquad (5.7)$$

We choose the optimal lags according to least values of the Akaike information criteria (AIC). This criterion is more preferable to others due to their tendency to define more

parsimonious specifications [Pesaran and Shin (1998)]. The specified model is then estimated by ordinary least squares technique.

5.2.2. A General (Short- Run) Error Correction Representation

After estimating the long-run model, the short run coefficients are estimated by error correction. The short run dynamics are examined using the Error Correction Model (ECM). It explains changes in the dependent variable in term of changes in the explanatory variables as well as deviations from the long run relationship between the variables and its determinants. The short-run model is of the following form:

$$\Delta lnI_t = \alpha + \sum_{i=1}^{m} \gamma_i \Delta lnI_{t-i} + \sum_{i=0}^{n} \delta_i \Delta lnS_{t-i} + \lambda ECM_{t-1} + \varepsilon_t \qquad (5.8)$$

Here, λ is speed adjustment parameter and it measure how fast equilibrium in investment is restored following shocks to equilibrium. The expected sign of λ is negative and its statistical significance is interpreted as further evidence of co-integration. The error correction term indicate the speed of adjustment back to the long-run equilibrium after a short-run shock in dynamic model. The λ shows how quickly variables return to equilibrium and it should have a statistically significant coefficient which must be less than one with negative sign. If it is so, then there is stability in the long-run equilibrium for dependent variable. Similarly, it is also said that a highly significant error correction term is another proof of the existence of a stable long-run relationship.

5.3. Granger Causality Test

To determine the direction of causality we employ bi-variate Granger causality test. The bounds test assumes that the dependent variable to be I (1) and the regressors to be either I (0) or I (1). The procedure cannot be applied if the dependent variable of interest is I (0) and would crash in the presence of I(2) variable. To complement the bounds test approach and derive inference regarding the direction of causality between savings and investment, we use Granger causality test proposed by Granger (1969).

$$\ln I_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} \ln I_{t-i} + \sum_{i=1}^{k} \beta_{1i} \ln S_{t-i} + e_{1t} \quad (5.9)$$

$$\ln S_t = \emptyset_0 + \sum_{i=1}^{k} \emptyset_{1i} \ln S_{t-i} + \sum_{i=1}^{k} \delta_{1i} \ln I_{t-i} + e_{2t} \quad (5.10)$$

Where lnI_t and lnS_t shows the log of investment and savings at time t respectively and k represents the number of lags.

5.3.1. Hypothesis for Granger Causality Test

There are two set of hypothesis. The first null hypothesis shows that savings does not cause investment and its alternative is that savings cause investment. The second null hypothesis shows that investment does not cause savings and its alternative is that investment cause savings. These hypothesis are formulated as follows:

H_o: $\beta_1=\beta_2=\ldots\ldots=\beta_k=0$, against H_A: $\beta_1\neq\beta_2\neq\ldots\ldots\neq\beta_k\neq0$

H_o: $\delta_1=\delta_2=\ldots\ldots=\delta_k=0$, against H_A: $\delta_1\neq\delta_2\neq\ldots\ldots\neq\delta_k\neq0$

In both cases, a rejection of the null hypothesis implies that there is Granger causality. Equation (5.9) and (5.10) is estimated and a Wald test is carried out to test the hypothesis.

5.4. Business Cycle Shocks

In order to control the effect of business cycle shocks, we run the separate regressions for ΔS and ΔI on each shock and use the residuals from these regressions to estimate the S-I correlation. We use the residuals from the following time-series regression for savings and investment for all countries:

$$\Delta S_{it}\,(\Delta I_{it}) = \alpha_i + \beta_o shocks_{it} + \beta_1 shocks_{it-1} + \beta_2 shocks_{it-2} + residuals_{it} \qquad (5.11)$$

Three shocks are considered in the regression: productivity, fiscal and TOT shock; we set the lag length up to 2 for shocks because the coefficients from the lag length 3 and above are insignificant in most cases (Soyoung *et al.* (2007)).

CHAPTER

6

RESULTS AND INTERPRETATIONS

The capital mobility can be measured through S-I relationship. Therefore, in order to analyze the impact of S-I relationship on capital mobility, an ARDL model is constructed. This chapter is divided into four sections. Section-I discusses the order of integration of variables for countries used in this study, Section-II applies the bounds test for co integration. The results of direction of causality are discussed in Section-III. Section-IV represents the results of error correction model.

6.1. Results of Unit Root Test

In time series data, there is possibility that the regression may be spurious if the series are unit root. Therefore if we want to ensure that the regression is not spurious, we have to test for unit root and co integration. Augmented Dickey-Fuller (1979) unit-root test (ADF) is applied to determine the order of integration of each variable. This is to ensure that none of the variables is I (2) so as to avoid spurious results.

The results of the ADF test are reported in Tables 6.1.1. The results show that savings are stationary at levels for Bangladesh, Bhutan and Nepal but non-stationary for India, Pakistan and Sri Lanka. The savings for India, Pakistan and Sri Lanka; and investment for all countries become stationary at their first difference and they may exhibit some long run linear combination.

Table 6.1.1: Results of Unit Root Tests

Countries	Augmented Dickey-Fuller (ADF) test			
	At Level		At First difference	
	S	I	ΔS	ΔI
Bangladesh	-3.106*(2)	-0.090 (0)	-5.537**(1)	-4.426** (0)
Bhutan	-3.462*(0)	-2.328 (1)	-5.627**(0)	-5.557**(1)
India	-1.492 (3)	-1.077 (1)	-7.487**(0)	-7.345**(1)
Nepal	-3.181*(0)	-0.936(0)	-5.429**(1)	-6.528**(0)
Pakistan	-1.895 (0)	-1.131(0)	-6.070**(0)	-5.457**(0)
Sri Lanka	-1.056 (2)	-2.488(1)	-6.444** (1)	-4.799**(1)

*Note: Savings and investment are in the form of log. The null hypothesis is that the series is non-stationary, or contains a unit root. The rejection of the null hypothesis is bosed on MacKinnon (1996) critical values that are reported in appendix. The lag lengths (figures in parenthesis) are selected based on AIC criteria, this ranges from lag zero to lag three. *and ** indicate the rejection of the null hypothesis of non-stationary at 1% and 5% significant level, respectively.*

It means that savings for Bangladesh, Bhutan and Nepal is I (0), whereas it is I(1) for remaining three countries. Investment is I(1) for all countries. Johansen co integration test is not applicable to the variables which do not have same order of integration.

6.2. Bounds Test

We apply the bounds test to examine the presence of long-run relationships between savings and investment. Akaike Information Criterion (AIC) is used to determine the appropriate lag structure. Table 6.2.1 reports the F-statistics of bounds test. The presence

of long run relationship between the savings and investment is checked by the significance of the coefficient of the lagged levels variables with the help of F-statistics.

Table 6.2.1: Results of Bounds Test

Dependent Variable (I_t)		
Countries	**F-Statistics**	**Co- integration**
Bangladesh	8.323*	Yes
Bhutan	4.324	No
India	5.851*	Yes
Nepal	1.305	No
Pakistan	0.767	No
Sri Lanka	2.437	No

*Note: * denotes the rejection of null hypothesis at 5% significance level. Critical values for F-statistics are taken from Pesaran et al (2001,p.300) and reported in appendix.*

It is clear from the table 6.2.1 that the computed F-statistics appear to be greater than the upper bounds critical values at 5% level of significance for only Bangladesh and India. So the null hypothesis of no co-integration is rejected for these two countries. Hence we can conclude that for Bangladesh and India there is evidence of co-integration. It implies low capital mobility in Bangladesh and India which supports F-H hypothesis. The result suggests that a large proportion of domestic saving remains in the economy of Bangladesh and India to fund domestic investment. Our results of these two countries are consistent with the findings of Seth (2011).

We cannot reject the null hypothesis of no co-integration for Bhutan, Nepal, Pakistan and Sri Lanka because the computed F-values are less than the lower bounds critical value at 5% level of significance for these countries. It implies that there is perfect capital mobility in Bhutan, Nepal, Pakistan and Sri Lanka. The results of these countries are consistent with the results of Narayan and Narayan (2010).

The non-existence of co-integration between savings and investment in these four countries is may be due to the deficit in current account of balance of payments. The continuous and unsustainable current account deficits which are closely related to the decline in savings can be the major reason for the absence of long -run co movement between savings and investment [Ramakrishna & Rao (2012)]. If savings causes investment in all countries then to promote savings should be a greater priority to boost investment but if investment causes savings then to promote savings policies will not be successful and it create in efficiency.

The overall findings of the bounds test are that the computed F-statistics appear to be lower than the upper critical values at 5% level of significance for all countries except for Bangladesh and India. Co integration exists in Bangladesh and India, so we find the long-run coefficients only for these two countries.

Table 6.2.2: Estimated Long-run Coefficient for Bangladesh

Dependent Variable: I, Method: Least Square				
Variables	**Coefficient**	**Std. Error**	**t-Statistics**	**Prob.**
I(-1)	0.9447	0.1213	7.79	0.0000
I(-2)	-0.0851	0.1046	-0.814	0.4225
Constant	0.2008	0.1106	1.82	0.0799
S(-1)	0.0911	0.0314	2.90	0.0072
R-Squared	0.9860	**Mean Dependent Var**		3.0378
Log- likelihood	75.329	**Durbin-Watson Stat**		2.15
F-statistics	660.8	**Prob (F-statistics)**		0.000

Note: Savings and investment are in the form of log.

Table 6.2.3: Estimated Long-run Coefficient for India

Dependent Variable: I, Method: Least Square				
Variables	**Coefficient**	**Std. Error**	**t-Statistics**	**Prob.**
I(-1)	0.1419	0.3550	0.400	0.6923
I(-2)	0.3103	0.1658	1.87	0.0717
Constant	0.0046	0.2878	0.0160	0.9873
S(-1)	0.5651	0.3506	1.61	0.0182
R-Squared	0.8531	**Mean Dependent Var**		3.2855
Log- likelihood	37.515	**Durbin-Watson Stat**		2.12
F-statistics	54.21	**Prob(F-statistics)**		0.000

The long-run coefficients of savings for Bangladesh (0.09) and India (0.56) not only have expected sign but also significant at 1% level of significance It means that a 1% increase in savings results in 0.09% and 0.56% increase in investment in the long run in Bangladesh and India respectively. The overall robustness of the model represented by F-values is good.

The findings of a long-run co-integrated relationship between domestic saving and investment suggest that any change in domestic saving will be closely associated with a change in investment. Hence, financial sector policies targeting at mobilizing domestic saving are critical for capital accumulation. However, it should also be highlighted that over reliance on domestic saving may limit the growth opportunity of an economy. As such, policy makers should also focus on attracting foreign capital as part of the development policy while mobilizing resources in the domestic economy.

6.3. Results of Granger Causality Test

On the bases of the findings of the co-integration test we proceed to causality test. From the above findings we can see that there is long-run relationship between savings and investment only for Bangladesh and India but for cross checking we find the granger causality for all countries. P-value of the Wald test is used to check the direction of causality between savings and investment. Results of the causality test are presented in Table 6.3.1.

Table 6.3.1: Result of Granger Causality Test

Countries	Lag Length (k)	S_t causes I_t		I_t causes S_t		Direction of Causality
		Wald stat	p-value	Wald stat	p-value	
Bangladesh	1	3.808*	0.042	0.017	0.796	$S \rightarrow I$
Bhutan	1	0.361	0.594	0.833	0.803	No
India	1	5.727*	0.022	0.583	0.651	$S \rightarrow I$
Nepal	1	0.226	0.939	0.703	0.494	No
Pakistan	1	1.148	0.219	1.351	0.678	No
Sri Lanka	1	1.339	0.973	1.108	0.210	No

*Note: * denotes the rejection of null hypothesis at 5% significance level.*

The p-values of Wald statistics show that null hypothesis of savings does not cause investment is rejected for Bangladesh and India. Hence there is evidence of unidirectional causality running from savings to investment for these two countries. It means that the savings should be given a greater priority to boost investment. For the rest of the countries, no evidence of causality is found between savings and investment.

The overall findings of the study suggest that Bangladesh and India are characterized by a degree of capital immobility. Therefore increase in domestic savings does not flow out of these countries but induces domestic investment. This highlights the importance of saving-promoting policies in Bangladesh and India. The results also reveal that domestic savings does not play a significant role in financing domestic investment in the rest of the

countries considered for analysis. This shows that domestic investment being financed by foreign rather than domestic savings.

6.4. Result of Error Correction Model:

The error correction model (ECM) explains the short run dynamics of the model. It finds that change in the dependent variable due to the change in independent variable. It also explains the deviation from the long run relationship between the variables. ECM incorporates the short-run as well as the long run relationship between the variables in one regression [Engle and Granger (1987)].

The error correction term specifies the speed of adjustment that returns stability in dynamic model. The measurement of ECT_{t-1} shows how rapidly variables go back to equilibrium. The value of ECT_{t-1} should be statistically significant and must have negative sign. Before proceeding to error correction model we must check stationary of the residuals from the regressions of investment on savings. If it is stationary at level then we can proceed for ECM.

Table 6.4.1: Result of Residuals of Error Correction Model

Augmented Dickey-Fuller (ADF) test on residuals	
Countries	**At Level**
Bangladesh	-4.833**
India	-5.729**

*Note: ** denotes the rejection of null hypothesis of non- stationary at 5% significance level The lag length one is used.*

The null hypothesis of unit root in residuals obtained from S-I regression is rejected at 5% significant level for all countries. This shows that co-integration exist between the residual of savings and investment for two countries. We can proceed to make the ECM.

Table 6.4.2: Estimated Short-Run Coefficient for Bangladesh

Dependent Variable: ΔI				
Variables	**Coefficient**	**Std. Error**	**t-Statistics**	**Prob.**
ΔI(-1)	1.1338	0.3453	3.28	0.0029
ΔI(-2)	-0.3676	0.1068	-3.44	0.0020
Constant	0.0108	0.0059	1.84	0.0775
ΔS(-1)	-0.2324	0.0827	-2.81	0.0093
ECT(-1)	-0.0402	0.0198	-2.02	0.0253

Note: Savings and investment are in the form of log.

Table 6.4.3: Estimated Short-Run Coefficient for India

Dependent Variable: ΔI				
Variables	**Coefficient**	**Std. Error**	**t-Statistics**	**Prob.**
ΔI(-1)	0.4024	0.9369	0.430	0.6711
ΔI(-2)	-0.0804	0.1818	-0.443	0.6617
Constant	0.0195	0.0156	1.25	0.2236
ΔS(-1)	-0.7365	0.9752	-0.755	0.4569
ECT(-1)	-0.0686	0.0391	-1.75	0.0313

The ECT measures the speed with which the endogenous variable converges to equilibrium to changes in the explanatory variables. If error correction term is negative

and significant it implies that the adjustment process to returns to equilibrium is very efficient and a moderately high value of error correction implies a faster adjustment. The sign of error correction term is not only expected but also statistically significant for both countries. It means that the adjustment process restores to equilibrium over time in these countries is efficient.

The estimated coefficient of lagged ECT is significant and ECT≠0 in Bangladesh and India which implies that there is long-run relationship between savings and investment in these countries. It also shows that 4% and 6% of the errors from the lags are absorbed in the next period of Bangladesh and India respectively. The speed of adjustment is very slow in both countries. The coefficient of lagged error term for Bangladesh and India is significant at 5% level.

If the short-run estimated coefficient of λ is not significantly different from 0, it implies that capital mobility. If it is not significantly different from 1, it implies that capital is immobile. if λ is significantly different from zero and one, there is some degree of capital mobility. Hence λ is significantly different from 0 and 1; we can say that there is some degree of capital mobility. Furthermore, a lower value of coefficient estimate λ can be obtained if capital is sufficiently mobile [Rocha, (2009)].

The estimated value of savings is also negative for Bangladesh but it is statistically significant at the 1% level. The negative coefficient estimate indicates the capital mobility in Bangladesh in the short-run. The estimated value of savings is also negative but it is statistically insignificant in case of India. The negative coefficient indicates that

there is foreign capital flows from India. But the results are not statistically strong because the value of t-statistics is insignificant.

6.5. Business Cycles Shocks

We also test the role of business cycle shocks for correlation between savings and investment. To find the relationship between savings and investment we run the regression of investment on savings, the coefficients we get from this regression are named as savings retention coefficients[9]. After that we again run the regression after controlling business shocks and use the residuals of savings and investment on each shock i.e. Productivity shocks, fiscal shocks and terms of trade (TOT) shocks[10]. If the values of the coefficients decline after controlling the shocks, it means that the shocks are able to justify the presences of positive relationship between savings and investment.

Table 6.5.1. Saving-Retention Coefficients

The table 6.5.1 shows that the savings retention coefficients. Model 0 shows the saving retention coefficients before controlling shocks. Model 1, 2 and 3 shows the saving-retention coefficients after controlling the productivity, fiscal and TOT shocks respectively. Model 4 shows the saving-retention coefficients after controlling all these three shocks at a time.

[9] This regression coefficient measures the fraction of an exogenous increase in saving that remains at home Feldstein and Bacchetta (1991) and Obstfeld (1995) used the same measure

[10] For the use of these shocks in a model, see, for example, Obstfeld (1982), Svensson and Razin (1983)

It is clear from the table that saving retention coefficients are different for all the countries but statistically significant for three countries. All the countries' savings retention coefficients decrease after controlling the shocks except for Pakistan and Nepal. Specifically after controlling all three shocks the savings retention coefficients decrease in four countries out of six countries. The saving-retention coefficients for four countries are lower than that of model 0 except for and Pakistan and Nepal. It implies that there is high positive correlation between savings and investment for Bangladesh, Bhutan, Sri Lanka and India after controlling all shocks.

Countries	Model 0	Model 1 (Productivity Shocks)	Model 2 (Fiscal Shocks)	Model 3 (TOT Shocks)	Model 4 (All Three Shocks)
Bangladesh	0.42** (0.01)	0.01* (0.05)	0.01* (0.05)	0.06 (0.05)	0.37** (0.05)
Bhutan	0.13 (0.04)	-0.18 (0.09)	0.09 (0.09)	0.16 (0.27)	0.01* (0.09)
India	0.95** (0.06)	0.23 (0.28)	0.16 (0.27)	0.49 (0.33)	0.18** (0.41)
Nepal	0.31* (0.07)	0.25 (0.08)	0.20 (0.08)	0.16 (0.09)	1.49** (0.09)
Pakistan	0.19 (0.05)	0.15 (0.08)	0.10 (0.08)	0.10 (0.09)	0.23 (0.10)
Sri Lanka	0.01 (0.09)	0.31 (0.12)	0.03 (0.15)	0.02 (0.15)	0.007* (0.14)

*Note: Saving retention coefficients are obtained from the regressions of ΔI on ΔS. The number of lags in shocks is set at 2. * and ** Shows 1 percent and 5 percent level of Significant respectively.*

Table 6.5.2. Effects of Shocks on ΔI and ΔS

Table 6.5.2 reports the estimates of ΔI and ΔS and saving retention coefficient at different lags after controlling the business cycle shocks. We control all these shocks from savings and investment by using the residuals of the regression of savings and investment on each shock to get the saving-retention coefficients. These saving-retention coefficients are derived from the regression of the residuals of ΔI on the residuals of ΔS. The residuals are obtained from the regressions of ΔI and ΔS on each shock at 0, 1 and 2 lags.

Countries	ΔZ	Coefficient	Productivity Shocks	Fiscal shocks	TOT shocks
Bangladesh	ΔI	βo	0.17*	0.06	0.07
		β1	0.06*	-0.1	0.02
		β2	-0.01*	0.01	0.06**
	ΔS	βo	0.78*	-0.95	1.06
		β1	0.11**	-0.66	-0.22
		β2	-0.15*	-0.18	0.41
Bhutan	ΔI	βo	0.11*	0.10**	0.006
		β1	0.03*	-0.1	-0.08
		β2	0.12*	-0.09	-0.04
	ΔS	βo	0.09*	0.6	0.18
		β1	0.01**	0.41	0.04
		β2	0.02**	0.64	-0.02
India	ΔI	βo	0.95	1.04	1.1
		β1	0.25	-0.35	0.09
		β2	0.37	0.02	-0.64
	ΔS	βo	0.84	0.82	0.81*
		β1	-0.04	-0.03	0.38
		β2	0.3	0.5	0.49

Countries	ΔZ	Coefficient	Productivity Shocks	Fiscal shocks	TOT shocks
Nepal	ΔI	βo	0.28*	0.13	-0.06
		β1	0.01	0.05	-0.01
		β2	-0.25*	-0.2	-0.05
	ΔS	βo	1.34**	1.55	-0.09
		β1	-0.05	0.23	-0.13
		β2	0.06	0.12	0.02
Pakistan	ΔI	βo	0.01	-0.04	-0.07*
		β1	-0.02	0.04	0.006
		β2	-0.08	0.04	0.07**
	ΔS	βo	-0.13	0.35	-0.09
		β1	-0.12	0.24	0.08
		β2	-0.02	0.52	0.37
Sri Lanka	ΔI	βo	0.22**	0.16	-0.17
		β1	0.17*	-0.40*	0.28
		β2	0.31	-0.03	-0.02
	ΔS	βo	1.23**	0.02	0.4
		β1	-0.85	0.26	0.21
		β2	0.06	0.08	0.13

Note: We avoid the spurious regression problem by using the first differenced data We name β saving retention coefficient. We report the coefficients of current and lagged shocks and ** Shows 1 percent and 5 percent level of Significant respectively.*

From the above table we can see that the signs of the saving-retention coefficients are as expected in many countries. The value of βs in first column shows that productivity shocks affect positively to savings and investment. Increases in productivity have positive and significant effect on savings and investment but these effects decline over time. A decline in the saving-retention coefficient after controlling a certain shock indicates that this shock is adept to explain the positive relationship between saving and investment. After controlling the productivity shocks from the data of savings and investment, the saving-retention coefficient decrease in Bangladesh and India. The saving-retention

coefficient of investment increases in Bhutan and Sri Lanka but coefficient of savings decreases. The investment decreases in Pakistan and Nepal, while the savings increases in case of Pakistan but decreases in case of Nepal.

The result of Bangladesh and India is similar with the conclusion of Baxter and Crucini (1993, 1995), Backus, et al. (1992) and Kim (1997) that shows positive S-I correlation with the persistent productivity shocks but the results of Bhutan and Sri Lanka contradict to all these studies for investment and the results of Nepal and Pakistan is also contradict to all these studies in case of savings. The persistent productivity shocks can bring high S-I correlation. All the countries except Bhutan and Sri Lanka face, the positive productivity shocks which means that in these countries consumption is high but it is not as much as the increase in productivity and the households save remaining output. Due to the positive productivity shocks the marginal product of capital increases which increases the investment in countries.

The estimated values of β's indicate that productivity shocks positively affect savings and investment. A rise in productivity shocks initially has positive and significant effect on investment and savings but these effects diminish over time. However, these effects are not strong enough to reduce the saving retention coefficient significantly.

Fiscal shocks have less significant effect on the investment as compared to the productivity shocks. Fiscal shocks have initially negative effect on savings; it may be due to the increase in government spending. Investment initially increases but rapidly decreases over time. Theoretically the effects of fiscal shocks on savings and investment are ambiguous since the effects depend on the specification of the shocks. The empirical

results in the table also indicate ambiguous effects of fiscal shocks. An improvement in TOT decreases both savings and investment. Savings and investment initially increases but then decreases over time.

Some points that are noticeable, first, productivity shocks have the largest impact on both variables among the three shocks, which is consistent with the fact that productivity shocks are the most important source of business cycles in the economy. Second, the effects of lagged shocks are quite weak in the case of productivity shocks, while fiscal and TOT shocks have prolonged effects.

CHAPTER

7

CONCLUSIONS AND POLICY RECOMMENDATIONS

The objective of the study is to empirically investigate the relationship between savings and investment for SAARC countries. An attempt is also made to find the direction of causality between savings and investment in these countries for the period of 1980–2013. The ARDL model and error correction model are employed to accomplish the objectives. Before applying ARDL model, unit root properties of the variables used in the study are checked. The results of unit root test reveal that savings and investment are non-stationary at level for India, Pakistan and Sri Lanka. However at first difference they become stationary. The results of co-integration show that savings and investment are co-integrated for only two countries i.e. Bangladesh and India. It suggests that investment responses proportionately to changes in savings. It implies low capital mobility in these two countries. In these countries capital mobility can be affected by other factors. It has been empirically proved that the size of non-traded sector (Wong, 1990), economic size (Baxter and Crucini, 1993), poor fiscal policy (Mammingi, 1994). Foreign aid (Isaksson, 2001), country specific effect (Corbin 2001) and differences in financial structure (Kasuga, 2003) also affect the degree of capital mobility.

The results confirm non-existence of co-integration for Pakistan, Bhutan, Nepal and Sri Lanka. It means that domestic savings does not perform effective part to support investment. It indicates perfect capital mobility, so domestic investment is supported

through foreign investment instead of domestic savings. Causality test show that there is unidirectional causality from savings to investment for Bangladesh and India. Based on these empirics, we conclude that savings drives investment in Bangladesh and India, so the policies that encourage savings in these countries can be helpful to increase domestic investment which can be important for growth and development. The results of error correction represents that the relationship between savings and investment not only holds in the short run but it is also statistically significant. In sum we can say that domestic investment is positively related to domestic savings in only two countries i.e. Bangladesh and India out of six countries. Bulk of the investment in other four countries is not being financed by domestic savings but by foreign savings.

We also incorporated business cycle shocks and analyzed how each shock explains the S-I correlation. The major findings of the study are as follows: The First one is, business cycle shocks describe the high correlation between saving and investment. Even after controlling all three shocks, the coefficient of saving-retention remains well above zero. This result is similar to the former studies which claim that "business cycle shocks", particularly "productivity shocks" cause high S-I correlation.

Policy Recommendations

On the basis of empirical findings of the study, we can make following policy recommendations:

Understanding the causal relationship between saving and investment is relevant for its policy implications, specifically for countries of a common monetary area. Indeed,

budget deficits reduction within monetary unions is commonly based on the belief that deficits affect negatively domestic savings, and therefore domestic investment. Behind this interpretation there is the idea that domestic saving systematically causes domestic investment. If this saving causes investment in all countries, then promoting domestic savings should be a high priority to boost investment and economic growth. In this case, the deficit target in Bangladesh and India is absolutely relevant. In Bangladesh and India there is long-run relationship between saving and investment and in both countries savings cause investment so the efficient use of external aid and finance to promote growth and savings is the immediate priority in these countries. However, Bangladesh and India are characterized by low capital mobility. The low capital mobility or integration of financial markets indicates the fact that in economies of Bangladesh, and India monetary policy may be effectively used for macroeconomic stability. The implication of these findings suggests that a large proportion of domestic saving remains in the economy of Bangladesh, and India to fund domestic investment.

Economic policies may be focused on the incitation of investment and the reduction of capital outflows in Bhutan, Nepal, Pakistan and Sri Lanka. In all these countries saving does not cause investment so policy emphasis should be shifted away from saving and concentrated in removing the impediments to investment. For this purpose a combined fiscal and monetary policy initiatives are needed to ensure the equilibrium between domestic resources and financing in the economy. Government budget targeting would minimize the resource gap and will bring equality between savings and investment. The basic reason for the absence of long run equilibrium between savings and investment in

these countries is the decline in savings in the economy. To address this, the pattern of investment should be changed with an objective of promoting employment and reducing inflation. Promoting savings through various incentives such as income tax relief, higher deposit rates should be implemented. In Bhutan, Nepal, Pakistan and Sri Lanka savings and investments are not correlated so the government of these countries should maintain a current account targeting policy then the current account would not fluctuate to the optimal level and in turn, saving and investment would be highly correlated even in the presence of perfect capital mobility.

The overall conclusion is that Bangladesh and India are characterized by a degree of low capital mobility so that all the increase in savings not flow out of these countries to other countries, but it induces investment which suggests that policy maker should make saving-promoting policies in Bangladesh and India. In all other four countries the domestic investment has never depended on domestic savings. Foreign aid or loan has always played a vital role to finance the national programs related to development. Thus the relationship between domestic savings and investment is very poor in Bhutan, Nepal, Pakistan and Sri Lanka.

Limitations of the study

Our study signifies a worthy contribution to existing literature on savings and investment nexus, which can be proceeded in future by considering role of trade, role of country differences and economy size. Future research can covers a number of research questions. For the future research, comprehensive analysis the impact of S-I relationship can be

estimated for other SAARC countries. Therefore, the analysis will be done in better way. For the enhanced and accurate results, one can extend the sample size of the study. By performing this, policy judgments will be made more definitely. By using several advance econometric procedures better and strong output can also be measured.

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APPENDIX A.

Unrestricted Intercept and No Trend

Critical Value	Lower Bounds value	Upper Bounds value
1%	6.84	7.84
5%	4.94	5.73
10%	4.04	4.78

Note: Critical values are cited from Pesaran et al. (2001), Table CI (iii), Case III, unrestricted intercept and no Trend.

APPENDIX B.

Type	%	At Level	At First difference
Constant, No Trend	1	-3.66	-3.69
	5	-2.96	-2.97

MacKinnon (1996) critical values.

APPENDIX C.

Variables Definitions, Construction and Sources

Variables	Definition and Construction[11]	Source
Savings[12] measures		
Savings	Savings as a percentage of GDP	World Development Indicators (WDI)
Investment measures		
Investment	Investment percentage of GDP	World Development Indicators (WDI)
Shocks measures		

[11]. All the variables are constructed by the method used in Kim, S. Kim, S.H., and Wang, Y (2007)

[12]. Savings are considered as domestic savings for each country.

Productivity shocks	Productivity shocks are defined as annual percentage changes in productivity. For productivity measure, we use solow residuals derived from the Cobb-Douglas production ($A_t = Y_t/L_t^{\alpha}$) assuming fixed capital stocks.	
Share of labor	The share of labor (α) in manufacturing output will be assumed.	World Development Indicators (WDI)
Labor output (Industrial Production)	Industrial value added (Constant 2000 LCU).	
Labor input (Employment)	Employment in industry (% of total employment).	
Fiscal shocks	Fiscal shocks are defined as percentage changes in unexpected government spending.	
GDP growth rate	Annual GDP growth rate	World Development Indicators (WDI)
Net government debt	Central government debt, total (Constant 2000 LCU).	
Growth rate of government spending	General government final consumption expenditure (Constant 2000 LCU).	
Terms of trade (TOT) shock	Terms of trade (TOT) shocks are defined as the percentage changes in the TOT. ` Export price to Import price ratio.	
Export price	Unit values of exports (Index Number)	International Financial Statistic (IFS)
Import price	Unit values of imports (Index Number)