An Empirical Investigation of the Determinants of Savings and Investment Relationship: Evidence from South Asia

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Abstract

This study examines the possible determinants of savings and investment (S-I) relationship in case of South Asia. The study adopted a unified framework to investigate relative significance of possible factors of S-I relationship. Firstly; saving retention coefficients has been estimated for each of six countries included in the analysis for the period of 1980-2015. Secondly, the dependent variable of saving retention coefficient has been regressed on the potential factors- country size, productivity shocks, interest rate differentials and openness-for the S-I association. The results reveal that S-I form a stable long run relationship for each country except Pakistan. Further, regression analysis indicates that country size, interest rate parity and productivity shock have positive and significant role in explaining the FH puzzle, while openness of the economy has no influence on the S-I interaction. Few important policy implications have been drawn from the results of the study; (i) ineffectiveness of financial openness in explaining the FH puzzle may indicate that these countries are unable to attract the investors, as investment do not merely depends upon the normal returns (iii) these countries need to bring consistency in economic policies so that openness could pay the desire role and (iv) our study also suggests that interest rates or country risk premium influenced the degree of financial integration. The central banks of South Asia countries should maintain interest rate parity with the rest of the world.

Keywords: FH puzzle, Savings, Investment, Openness, South Asia
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1. Introduction

A fundamental difference between open and closed economies is that the former can borrow and lend resources from rest of the world. This signifies a mutually advantageous arrangement in which financial integration can seen to be an important adjunct for both the 'developed' and 'developing' economies; as high capital mobility implies that saving and investment gaps do not undermine economic growth. In an empirical finding Feldstein and Horioka (1980), (FH)

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proposed the saving-investment correlation technique to assess the degree of capital mobility or financial market integration. FH determined that national saving rates affect domestic investment rates with unit coefficients that appeared to provide a strong evidence against the assumption that capital is internationally mobile which most of the models of international finance assume. According to FH, the low correlation coefficient between domestic savings and investment refers to the movement of capital, while a higher correlation coefficient indicates capital immobility, means domestic investment is financed by domestic savings. The justification underlying this domestic savings and investment (S-I) relationship is not only simple to follow but also theoretically persuasive. Domestic investment is financed only from domestic savings in a closed economy, it logically follows therefore, that the S-I relationship is fundamentally expected to be tied to a large extent in closed economies. However, capital can flow in and out of an open economy depending upon the relative revenue, whereby domestic investment can be financed by both international and domestic savings.

Generally accepted assertion about saving retention coefficient is that its value decreases over time with the opening of international capital markets. However, FH analysis of the corresponding relationship across sixteen OECD countries, for the periods 1960 to 1974, found that contrary to the prediction, domestic investment and savings were tied to a large extent. This conclusion suggested that there is an incomplete movement of capital across these relatively open and industrialized economies. This surprising result is known as the FH puzzle in the literature (Obstfeld *et al.,* 2000). This mystery has enthused growing interest on the degree of movement of international capital in the literature, raising concerns and criticism about the FH on several counts. Many researchers attempted to reconcile the theory and data by introducing additional features into the model such as the size of the country, productivity shocks, real interest rate parity, and degree of openness to explain why S-I relationship can be closely tied under the perfect capital movement (Gur *et al.,* 2011). One line of studies has presented productivity shocks to elucidate how the existence of a high correlation between S-I relationship can be compatible in the world of an exceedingly integrated international capital markets (Glick & Rogoff 1995; Gregory & Head 1999; Mendoza 1991; Miniane 2004; Obstfeld 1986). Second, the size of the country can also be a reason for the high saving retention coefficient under capital mobility (Harberger 1980; Ho 2002; Obstfeld 1986; Ozkan 2009). In general, the theoretical studies associated with the country size conclude that, with the increase in size of the country the saving retention coefficient become close to one. Furthermore, real interest rate differential is also considered as a determinant to explain the FH puzzle under the perfect international capital mobility. Real interest rate differential offers endogenous mechanism through which monetary and fiscal policy influence the changes in

both domestic investment and savings (Cardia, 1992; Gur *et al.,* 2011). Finally, the degree of openness to international financial markets may be a motive for the S-I correlation (Bahmani-Oskooee & Chakrabarti 2005; Gur *et al.,* 2011).

Although FH Puzzle rigorously tested in the literature, however, very few empirical studies have tried to give explanation of the potential reasons for the existence of FH puzzle in context of South Asia. Motivated by these deliberations, this study takes another look at this issue and empirically investigate the effects of different factors such as the size of the country, productivity shocks, and interest rate differentials and openness measure on S-I relationship. The main focus of this study is to draw on fresh judgments and build on looking into new avenues and dimensions for understanding of the FH puzzle. This paper adopts a unified framework and examines the relative significance of all the factors in context of the South Asian region. The present empirical study consists of a two-step approach. The first step of the analysis includes the description of the dynamics of co-integration test of the link between the S-I relationship and then the estimation of the saving retention coefficients for each of six countries in south Asian region from 1980 to 2015. Co-integration tests verify the meaningful and stable relationship of S-I while the saving retention coefficient shows the direction and the magnitude of the S-I interaction. In the second step, we model the regression equation having saving retention coefficient as the dependent variable and the potential explanations for the S-I association as independent variables.

2. Literature Review

First documented in 1980 and now spanning over forty years, the pioneering work of Feldstein and Horioka (1980) has brought forth an extensive and growing body of literature that has generated competing views and differing interpretations of the FH puzzle. By using the cross-sectional data, empirical estimates of S-I correlation have tended to remain 'very high' - which from a generally accepted standpoint of standard economic theory, signifies 'capital immobility'. Most of the cross-sectional and panel studies suggest a strong association between the saving and investment (Bai & Zhangy 2009; Bebczuk & Hebbel 2006; Bordoloi & John 2011; Feldstein & Horioka 1980; Kim *et al.,* 2006; Jain & Sami 2011; Murphy1984; Petreska & Mojsoska-Blazevski 2013; Wong 1990).

Furthermore, time series analysis has disclosed hybrid results with regards to the relationship between savings and investment (Bayoumi 1990; Byrne *et al.,* 2005; Frankel 1986; Nasiru & Usman 2013; Sinn 1992; Shahbaz *et al.*, 2010; Obstfeld 1986; Venkata 2012; Verma & Salman 2011; Yamori 1995). A notable study conducted by Wahid *et. al*., (2010) on five South Asian countries and found that FH puzzle does not hold for the region. The said study suggested that future research need to explore the possible factors that might potentially

explain the savings-investment correlation in the region which our work did. Petreska and Mojsoska-Blazevski (2013) examine the existence of the FH puzzle in three groups of transition countries including South-East Europe, Central & Eastern Europe and the Commonwealth of Independent States. Using annual data for the period 1991 to 2010 and applied panel cointegration econometric technique, the study confirm the existence of FH puzzle in all three panels. Nasiru and Usman (2013) explore the S-I relationship in Nigeria. The sample span covers the period from 1980 to 2011. By employing Autoregressive Distributed Lag (ARDL) Bounds testing approach to test for long run relationship and Error Correction Model (ECM) for the short-run dynamics the study confirms the existence of long run S-I relationship. The results also provide evidence in support of FH hypothesis that claims low capital mobility internationally. FH hypothesis is also identified as one of the six major puzzles in international economics (Obstfeld & Rogoff, 2000)[1]. The literature has advanced several credible explanations to solve this puzzle in relatively open economies. These potential explanations includes exogenous factors such as population growth and productivity shocks as well as endogenous factors including country size, real interest rate differential, exchange rate regimes and degree of openness (Gur et al., 2010; Lutfi *et al,.* 2009; Kim 1999; Miniane 2004; Obstfeld 1986; Rocha 2000).

Productivity shocks have been identified as an important source to explain the FH puzzle. In the past two decades, some of the theoretical work that has focused on productivity shocks to explain the FH puzzle includes (Helmut Herwartz & Fang Xu 2007; Glick & Rogoff 1993; Gregory & Head 1996; Obstfeld 1986). All of these studies point to similar results indicating that productivity shocks are found to affect the S-I relationship significantly in the long run irrespective of the nature and type of productivity shock[2]. Gregory and Head (1996) used the dynamic factors analysis and Kalman filtering to build a common economic activity for G7 countries. These common economic activities are important in productivity. The study proves that for all the selected countries, country specific productivity movement has little effect on the S-I relationship. Miniane (2004) studied the implications of productivity shocks subject to the agents observes the amassed level of productivity not its permanent and transitory components. The model's predictions are lined up with numerous empirical findings: (i) investment response to a shock that is permanent is slothful and peaks with delay; and (ii) permanent shocks generate positive

[1] Rest of the five puzzles in the field of open economy macroeconomics includes, the equity home bias puzzle, some bias in trade puzzle the purchasing power, exchange rate disconnect puzzle, the consumption correlation puzzle, and the Baxter-Stockman neutrality of exchange rate regime puzzle {Obstfeld, M., Rogoff , K., (2000)}.

[2] Productivity shocks might be global or country specific, persistent or feeble and temporary or permanent

impacts on savings. In contrast to other standard explanations of the FH puzzle, learning persuades high correlations irrespective of the assumed persistence of shocks. A few studies in literature have also tried to empirically test the effects of productivity shocks as a latent explanation for the FH puzzle. These studies include (Kim 1999; Kim 2001; Kim & Wang 2004; Razin 1993). Kim (1999) empirically tested the implication of productivity, cyclical, fiscal and terms of trade shocks to explain the high S-I correlation by using the panel annual data from 1960 to 1992 for the OECD countries. The estimation results demonstrate that even after controlling all three shocks, the saving retention coefficient remains high. This result contradicts with the preceding studies that have shown the productivity shocks as a reason for the high S-I correlation. Furthermore, this study confirms the significant role of global shocks in explaining the FH puzzle. The study conducted by Gur et al. (2011) specifies that the size of the economy and productivity shocks have almost no role in explaining the saving investment behavior. This finding belongs to the cross section of 86 countries over the periods of 1970 to 2008. Erden et al. (2009) scrutinize the importance of productivity shocks in explaining a high saving-investment correlation, using data from a panel of twenty one OECD countries over the period 970 to 2003. The study examines whether the productivity shocks can relate saving to investment. Employing the Fuzzy-c-means (FCM) clustering technique, the results provide support to the productivity shock argument, signifying that the saving retention coefficients are greater for the countries with the larger productivity shocks.

Size of the country can also be considered a major reason for the high saving retention coefficient (Harberger 1980; Ho 2003; Mamingi 1994; Murphy 1984; Summers (1988); Ozkan et al., 2009). By dividing the seventeen OECD countries into two small and the large groups based on their GDPs, Murphy (1984) finds a higher S-I correlation for large countries. Ho (2003) contributed to the empirical literature by groping the threshold effect of country-size on the saving-retention coefficient. Evidence from panel of 23 OECD countries supports the country-size argument that the saving-retention coefficient get larger with the increase in the relative GNP share. Georgopoulos and Hejazi (2005) argued that the FH result basically imitate the fact that a large country is more dependent on internal sources of funding. Herwartz and Xu (2007) tested the possible determinants of the S-I relationship by using the annual data 1971-2002 for the world economy including developing countries, the OECD, the EU and the Euro area. The results found the supporting evidence for the large country effect on the S-I relation. Small countries are likely to have a lower S-I correlation in comparison with larger economies. By employing the Fuzzy-c means clustering technique Erden et al. (2009) divided the countries into three clusters of small, medium and large country size. They find the supporting evidence for the country-size argument.

Real interest rate differential is also considered as a determinant to explain the FH puzzle under the perfect international capital mobility (Cardia, 1992).Frankel (1992) reveal that variables like interest rate premium could be a reason to influence the S-I relationship. Prior to 1980s, the saving retention coefficient was found to have a higher value for USA. But in the 1980s, USA began borrowing internationally on such a large scale that the traditional saving retention coefficient of near-unit collapsed. Hence, it emerged, that interest rates or country risk premium influenced the degree of financial integration. Cardia (1992) proves theoretically that failure of interest rate parity could be a reason to explain high positive S-I correlation. Gur *et al.* (2011) by using the combination of cointegration technique and cross section regression analysis to investigate the impact of real interest rate differentials on the S-I co-movement over the periods of 1970 to 2008 for 86 countries in the sample. The results specify that the interest rate differentials have no role to explain the high S-I association.

Finally, the degree of openness to international financial markets may be a motive for the S-I correlation Gur *et al.* (2011). Chan and Baharumshah (2003) examine the capital mobility by focusing on Asia Pacific nations by taking into account their different level of economic development and financial openness, over the past three decades. The results demonstrate that, regardless of building up strong economic fundamentals, developing Asian countries need to strengthen their domestic financial system before opening their financial markets internationally. To uncover the determinants of the S-I relationship Herwartz and Xu (2007) used the annual data 1971 to 2002 for the world economy including developing countries, the OECD, and EU. From functional coefficient models, variable degree of openness is identified to have a drastically negative influence on the S-I relation in the long run. Cyrille (2010) analyzed the FH puzzle for 15 African countries by applying cross section; panel data, and even time series analyses. Results show that the downward movement in the saving retention coefficient is due to the lapse in foreign aid and openness variables which are pertinent for the FH analysis in context of developing countries. Further results are more probable to reflect the poor financial structure of the countries. Shahbaz *et al.* (2010) made an attempt to explore the S-I relationship in the context of financial openness and flexible exchange rate regime in Pakistan. Time series data utilized cover the period 1976–2006. Using ARDL bounds testing and Error Correction Model (ECM) approach, empirical findings specify a weak S-I correlation in the case of Pakistan.

3. Methodology

Data and variables

The data consist of annual observations from 1980 to 2015. Annual data were used in this study to avoid the seasonal biases. Sample consists of South Asian countries including Bangladesh, Bhutan, India, Nepal, Pakistan, and Sri

Lanka. Lack of complete and consistent annual data, limit the sample to only these six countries. The time series data were collected from World Bank, (WDI) database and Penn World Table Version 7.1 (PWT7.1).The data on the saving rate, investment rate, real interest rate and productivity are obtained from WDI database while data for openness obtained from PWT7.1.

Definitions of variables

The precise description of the variables used in this work is given below:

1. Gross domestic savings (as a % of GDP) is the Gross Domestic Product less final consumption expenditure. Gross Domestic Investment (as a % of GDP) is proxy by Gross capital formation.
2. Country size is proxy by GDP of the j^{th} country relative to the total GDPs of all the countries included in the sample.
3. Interest rate parity is the difference of the domestic real interest rate of each country from the USA's real interest rate (Gur *et al.,* 2011).
4. Productivity shock is proxy by 1^{st} difference of the GDP growth data (Fouquau *et al*., 2007).
5. Finally, openness is measured by a country's degree of international capital account openness.

This work consists of two steps. In the first phase; we applied the dynamics of cointegration test of the link between the S-I relationship and then the estimation of the saving retention coefficients for each country. Cointegration tests verify the meaningful and stable relationship of S-I while saving retention coefficient shows the direction and the magnitude of the S-I interaction. In the second phase, we used cross sectional regression having saving retention coefficient as the dependent variable and the potential explanations for the S-I association as independent variables.

Cointegration analysis

In this section we check the cointegration relation between saving and investment. The estimation of the long run relationship between the variables, time series properties of the individual variables are examined, then the short run dynamic and long run cointegration relationship are investigated by using the multivariate Johansen's cointegration test.

Regression analysis

The second step is based on performing the regression analysis.

$$I_{it} = \alpha + \beta S_{it} + \varepsilon_{it} \qquad (1)$$

To estimate the saving retention coefficient "β" gross domestic investment (as % of GDP) is regressed on the gross domestic savings (as % of GDP) based on (Feldstein & Horioka, 1980) for each country included in the sample. After that to check out the saving retention coefficient is influenced by what factors, a second regression equation has been formed. For this regression equation explanatory variables such as size, productivity shock, interest rate differentials and the degree of international financial openness has been taken, while the dependent variable is based on the saving retention coefficients for each country. The deviation of saving retention coefficient from "one" implies that the S-I are limply related or not indicating a higher international capital mobility. With reference to all above, the overall shape of the second regression model can be identified as follows;

$$Y_i = \alpha + \beta_1 PRO_i + \beta_2 SIZE_i + \beta_3 IRD_i + \beta_4 FO_i + \varepsilon_i \quad (2)$$

Where;
PRO =Productivity
Size = Size of country
IRD= Interest rate differential
FO= Financial openness.

OLS is used to estimate the above cross section regression equation. First, in the cross section regression equation all of explanatory variables are the average values during the period 1980-2015. Conversely via mean values of explanatory variables is too restraining because it presses on the differences in variables, and consequently may limit their ability to explain the S-I association. As a result, we utilize 10 year averages of all explanatory variables. Secondly, we have only six countries for analysis, hence produce six values for saving retention coefficient that will be insufficient to get appropriate results from cross section regression. In order to resolve the econometric problem, we take the observer status SAARC countries into the analysis that are nine (9). They include countries like USA and EU that can compress the size variable of the analysis. To avoid this problem, we estimated saving retention coefficients for observer countries separately and utilize them for estimating final cross section equations. The results of the observer countries are not presented in the study to save the space of work.

4. Result and discussion

Unit-root test result

Initially the unit roots are checked using ADF. Table 1 show that all the series are stationary at 1st difference process.

Table 1: Results of unit root tests

Countries	Variables	ADF		Order of integration
		Level	1st difference	
Bangladesh	Y	-3.57	-6.80*	I(1)
	X	-2.53	-8.55*	I(1)
Bhutan	Y	-4.07	-5.33*	I(1)
	X	-2.87	-5.65*	I(1)
India	Y	-2.23	-7.61*	I(1)
	X	-2.85	-7.47*	I(1)
Nepal	Y	-2.65	-7.36*	I(1)
	X	-3.08	-6.89*	I(1)
Pakistan	Y	-3.87	-3.56*	I(1)
	X	-0.33	-6.02*	I(1)
Sri-lanka	Y	-2.03	-3.56*	I(1)
	X	-3.87	-7.10*	I(1)

Y (investment) and X (savings)

The unit root test results illustrate that the both series are stationary at their first differences for each country to reject the null hypothesis of the unit root. As a result, it can be concluded that all the series are I (1) process, hence suitable for cointegration tests.

Cointegration test result

In order to decide about the cointegration relationship for testing the existence of lasting relationship between investments and savings Johansen procedure has been used (Johansen, 1988; Johansen and Juselius, 1990). For this purpose, the study employs trace statistics test (trace of matrix Eigen value). As the results of cointegration can be very receptive to the lag length selected, so this study used the traditional methods to evaluate the optimal lag length including (AIC, SIC, HQ, LR, FPE) attained from the empirical VAR in first difference. All these traditional criteria of lag length in the differenced VAR recommend an optimal lag of one. Table 2 illustrates the results of Johansen co-integration test.

Table 2: Results of cointegration trace statistics test

Countries	Hypothesized No. of CE(s)	Test statistics	5% Critical value
Bangladesh	None	16.32*	15.49
	At most 1	2.88	3.84
Bhutan	None	13.20	15.49
	At most 1	4.72*	3.84
India	None	16.49*	15.49
	At most 1	1.49	3.84
Nepal	None	17.25*	15.49
	At most 1	0.02	3.84
Sri-lanka	None	12.81	15.49
	At most 1	4.07*	3.84
Pakistan	None	9.59	15.49
	At most 1	1.29	3.84

Note; (*) denotes rejection of the null hypothesis of no cointegration at the 0.05 level.

The results show that λ_{trace} statistics is greater than the 5% critical value for all the countries in the sample except Pakistan. This implies that we reject the null hypothesis of no cointegration. Under the significance of 5%, the results from Table 2 indicate the existence of long run co integration. Hence it can be concluded that there is a long-term equilibrium relationship between the gross domestic investment and gross domestic saving (% of GDP).

Estimation of the saving retention coefficient

After performing the cointegration test next step is to perform the regression analysis for estimating the saving retention coefficient for each country in the sample. Table 3 shows the estimated values of saving retention coefficient.

Table 3 saving retention coefficients values

Countries	Coefficient (β)	Std. Error	t-statistic
Bangladesh	0.72*	0.05	12.32
Bhutan	0.34*	0.14	2.35
India	0.98*	0.06	15.08
Nepal	0.76*	0.16	4.57
Pakistan	0.05	0.09	0.52
Sri Lanka	0.003	0.16	0.2

The results illustrate that the saving retention coefficient is almost one in the case of India (0.98), for Bangladesh (0.72), and for Nepal (0.76) and is statistically significant. But for Pakistan and Sri Lanka the saving retention coefficient is insignificant and very low. These results are in line with other studies conducted in context of South Asia in regard to FH puzzle; for example, (Dooley *et al*., 1987); (Coakley *et al.*, 1999); (Payne and Kumazawa , 2005) and (Younas , 2007). This implies higher degree of integration i.e., domestically capital immobility and high international mobility of capital (Shahbaz *et al.,* 2010).

Regression analysis

As Table 3 shows the saving retention coefficients, the next step is to perform cross sectional regression to investigate the determinants of empirical S-I relationship. For this purpose the explanatory variables are the country size, productivity shock, interest rate differentials and the degree of international financial openness, while the dependent variable is the deviation of the saving retention coefficient from one. OLS technique is used for the analysis of data.

OLS method does require the variables to be of the same order, so Augmented Dickey Fuller (ADF) and Phillip Perron (PP) unit root tests have been conducted to identify the order of integration and to determine that the

estimation results not represent spurious regression problem. From Table 4, it is clear that all the variables are stationary at level I (0) at 1 and 5% level of significance. As the test gives an indication that the order of integration is same i.e. I (0) for all the variables, it is preferred to use OLS technique for the estimation.

Table 4: Unit-root tests of independent variables

Variables	ADF		PP		Order of integration
	Level	First Difference	Level	First Difference	
Size	-4.17*	-5.89*	-4.18*	-8.03*	I(0)
Parity	-3.86**	-0.68	-3.62	-10.1*	I(0)
Openness	-2.88	-4.58	-3.24**	-5.80*	I(0)
Productivity	-4.56*	-3.08	-5.60*	-11.4*	I(0)
Saving Retention coefficient	-4.99*	-4.22*	-2.21	-2.95	I(0)

(*) & (**) indicates the rejection of null hypothesis at 1% & 5% significance level. For the levels, intercept and trend have been integrated while for their first differences; stationary has been checked at intercept only.

Following the ADF and PP unit root tests the next step is to estimate the coefficients of the potential factors that might explain the FH puzzle or S-I relationship. Table 5 presents the relationship between saving retention coefficient and explanatory variables-country size, interest rate differential, productivity shock and financial openness.

Table 5: Modeling prospective determinants of saving retention coefficient

Dependent variable : Saving retention coefficient				
Variable	Coefficient	Standard error	t-statistics	Probability
Constant	-0.32	0.13	-1.53	0.16
Size	1.041**	0.46	2.26	0.05
Parity	0.115*	0.02	3.97	0.005
Openness	0.002	0.002	0.83	0.43
Productivity	0.689*	0.20	3.36	0.007
Model Criteria / Goodness of Fit:				
Adjusted R^2	0.53			
R^2	0.72			
D-W statistics	1.81			
Model (p-value)	0.05			
Diagnostic Tests:				
		F- statistics	p-value	
Breush-Pagan-Godfrey Hetroskedasticity Test		0.58	(0.68)	
ARCH Hetroskedasticity Test		1.69	(0.21)	
Breusch Godfrey Serial Correlation LM test		1.49	(0.28)	
Ramsey RESET test		0.00153	(0.99)	

Note; (*) & (**) indicate the 1% and 5% significance levels respectively.

The coefficients of all variables including size, parity, openness and productivity shocks have positive sign. Country size, parity and productivity shocks are significant while, openness of the economy is found statistically insignificant. The results reveal that country size is positive and significant. The probable underlying mechanism as discussed (Murphy, 1984 and Ho, 2002) that size as measured by their GDPs may affect the world interest rate, an increase in national savings will reduce the world interest rate and hence domestic investment increases in turn a higher correlation between the S-I for large countries. The estimated result related to the country size is consistent with the other theoretical studies that with the increase in size of the country the saving retention coefficient become close to one (Harberger, 1980 and Erden & Ozkan, 2009).

Positive and significant impact of the real interest rate differential on the S-I relationship for South Asian region is found in our analysis. Any increase in money supply by the country's respective central bank boost up the consumption which results in lowering the savings. Consequently, relative price of the foreign goods decline to equilibrate the domestic goods market. This in turn increases the domestic real interest rate relative to the world interest rate. This increases domestic interest rate and lowers the investment as interest rate and investment are inversely related. Hence, interest rate differential plays a significant role in explaining the close tie of S-I relationship.

Financial openness is statistically insignificant in explaining the FH puzzle consistent with Gur *et al.* (2011). One possible reason for this result may be the poor law & order conditions of South Asian region. South Asia is facing serious security threats due to increased extremism and terrorist activities within its countries. Policy of violence and extremist trends in South Asia can be linked to the contradictions arising from the flawed national policies. Developing countries of the South Asian region included in the sample are all internally disturbed countries so these countries are not able to attract the investors as the investment do not depend upon the normal returns. All this reflects the rejection of financial openness as insignificant.

Further, results explain that the saving retention coefficient is very responsive to productivity shocks. Further exclusively, the coefficient varies depending on the productivity shocks. This can be taken as proof that productivity shocks may be one of the main factors that connects domestic savings to investment. Thus productivity shocks provided an explanation for the FH puzzle. Overall, it appears that productivity shocks that provide an important channel leading to savings and investment hanging closely together shed some light on the FH puzzle.

The estimated coefficient values described above in Table 5 came from the estimation of average values of all of explanatory variables during the period 1980-2015. Conversely via mean values of explanatory variables is too

restraining because it presses on the differences in variables, and consequently may limit their ability to explain the S-I association. As a result, we utilize 10 year averages of all explanatory variables. Table 6 shows the time varying impact of possible factors including size, productivity shock, interest rate differential and the financial openness. The results demonstrate that the time varying impact of real interest rate differential is statistically significant at 1% during 1980s, 1990s and 2000s and productivity shocks are significant at 1 and 5% respectively during 1980s and 2000s only and both the coefficients carries positive sign (consistent result with the overall impact of interest rate differential reported in table 5). While the country size carries negative sign and is found to be only significant during period of 1990 and 2000s at 1% significance level. By dropping the saving retention coefficient from unit, size of the country appears to encompass a time varying impact on the S-I association. This implies that smaller countries having a larger share of public consumption in GDP are also more open economies Alesina and Wacziarg (1998). Surprisingly, coefficients of the financial openness during period 2000s carry a positive sign and are statistically significant at 1% significance level.

Table 6: Time varying impacts of determinants on saving retention coefficient

Dependent variable : Saving retention coefficient				
Variable	Coefficient	Standard error	t-statistics	Probability
Constant	-1.71**	0.49	-3.42	0.005
Size 1980's	0.04	0.33	0.13	0.897
Size 1990's	-9.19*	2.4	3.77	0.003
Size 2000's	-7.11*	2.37	-2.99	0.012
Parity 1980's	0.06*	0.02	-2.79	0.017
Parity 1990's	0.11*	0.03	-3.13	0.009
Parity 2000's	0.29*	0.07	4.12	0.001
Openness 1980's	-0.003	0.002	-1.15	0.274
Openness 1990's	-0.009	0.006	-1.54	0.15
Openness 2000's	0.03*	0.01	3.52	0.0048
Productivity 1980's	0.58*	0.12	4.86	0.0005
Productivity 1990's	0.03	0.11	0.34	0.73
Productivity 2000's	0.30**	0.12	2.56	0.02
Model Criteria / Goodness of Fit:				
Adjusted R^2	0.42			
R^2	0.73			
D-W statistics	1.82			
Model (p-value)	0.06			
Diagnostic Tests:				
		F- statistics	p-value	
Breush-Pagan-Godfrey Hetroskedasticity Test		0.56	(0.77)	
ARCH Hetroskedasticity Test		1.69	(0.21)	
Breusch Godfrey Serial Correlation LM test		0.48	(0.63)	
Ramsey RESET test		0.06	(0.80)	

Note; (*) & (**) indicate the 1% and 5% significance levels respectively.

Further; the empirical results appear to be very good in terms of the usual diagnostic statistics. The adjusted R^2 value specifies that 73% variation in dependent variable i.e. saving retention coefficient has been explained by variations in potential determinants. As a result, model robustness is empirically acceptable. The Durbin Watson statistics proves no problem of autocorrelation, as its value is around 2.

5. Conclusion

This paper examines the relationship between domestic investment and savings for six cross sections of South Asian region covering the sample period of 1980 to 2015. This study followed unified framework based on the combination of cointegration and regression analysis to empirically investigate the effects of different factors including size of the country, productivity shocks, interest rate differentials and openness measure on saving-Investment (S-I) co-movement all at once. Our empirical study consists of two steps. The first phase of analysis includes the description of the dynamics of cointegration test of the link between the S-I relationship and then the estimation of the saving retention coefficients for each of 06 countries in south Asian region. In the second phase, we regressed dependent variable on the potential factors for the S-I association. The results confirm that the saving and investment form a stable long run relationship for each of the South Asian countries except Pakistan. Further in the longer term economic factors are found to effect the S-I relationship. Regression analysis indicates that country size, interest rate parity and productivity have positive and significant role in explaining the FH puzzle, while openness of the economy is statistically insignificant and have no influence on the S-I interaction. The results of our study are in compliance with the Feldstein and Horioka (1980), Ozkan (2009) Cardia (1992) Gur *et al.* (2011).

Our research has important policy implications for policy makers and researchers. The study suggest that financial openness is ineffective in explaining the FH puzzle in case of South Asia which means that these countries are unable to attract the investors as the investment do not depends upon the normal returns. These countries need to improve law and order and consistency in economic policy so that openness pays the desired results. Furthermore, as suggested by the time varying results interest rate differential has consistent impact on saving retention coefficient which means that interest rates or country risk premium influence the degree of financial integration. The central banks of South Asia should maintain interest rate parity with the rest of the world.

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