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This study explores the relationship between savings and investment in Nigeria during the period 1980-2011. Unlike previous studies, this study employed Autoregressive Distributed Lag (ARDL) Bounds testing approach to test for long run relationship. The short-run dynamics are also captured from error correction model (ECM).The results of the Bounds test suggest that there is a long run relationship between savings and investment. This result is consistent with a number ofearlier studies reviewed in the literature that found saving and investment to be cointegrated in thelong run. The results also support the Feldstein-Horioka (1980) hypothesis that postulates low capital mobility internationally.

KEYWORDS: Savings, Investment, Capital Mobility, ARDL

JEL Classification: O3.

1.0 Introduction

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 most robust tests for capital mobility is to compare interest rates across countries. An alternative test proposed by Feldstein and Horioka (1980) examined the savings-investment nexus in an open economy. Feldstein and Horioka (1980) hypothesized that, "a low correlation coefficient between savings and investment indicates capital mobility while a higher correlation coefficient suggests capital immobility".

Advances in time series econometrics during the last three decades have opened up possibilities of examining the relationship between saving and investment in a new way. This study attempts to investigate the degree of international capital mobility in the case of Nigeria by employing the Bounds testing approach to cointegration. The rest of the paper is organized as follows. Section 2 presents a brief review of the relevant literature on the saving–investment nexus. Section 3 presents data and methodology. Section 4

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reports the empirical results and analysis. And finally, section 5 concludes the paper.

2.0 Literature Review

Many studies have attempted to solve the Feldstein-Horioka puzzle by examining its feasibility, either theoretically or empirically, or both in different countries. On the basis of time series data, Yamori (1995) estimated savings and investment correlations for Japan for the period 1970-1985 using ordinary least squares (OLS) and two-stage least squares (2SLS). The results revealed that there is no correlation between savings and investment suggesting perfect capital mobility.

Moreover, the results earlier obtained by Yamori (1995) using instrumental variable technique from the period 1975-1988, Delke (1996) reported results consistent with the hypothesis of Feldstein-Horioka for Japanese data. Similarly, Palley (1996) tested the causal relationship between saving and investment over the sample period 1973:4-1995:2 using Granger causality test for United State. The results showed that investment has a negative effect on personal saving and independent of government saving. Also, personal saving negatively affects government saving, thereby concurring with the Keynesian paradox of thrift thereby disputing F-H puzzle.

Ozmen and Parmaksiz (2003) used Johansen cointegration technique and Engle and Granger two-step residual-based approach to cointegration to test for the Feldstein-Horioka puzzle for UK economy in the period 1948-1998. The authors concluded that there exist a long run relationship between saving and investment, thereby lending support to the Feldstein-Horioka puzzle.

Payne (2005) employed Engle-Granger and error correction model (ECM) to study the relationship between saving and investment in Mexico over the period 1960-2002. The results showed that savings and investment are cointegrated, thereby indicating low capital mobility in accordance with F-H hypothesis. However, the coefficient of error correction model is positive and statistically significant with a binding intertemporal budget constraint and an adjustment parameter of 0.242. Also, Narayan (2005) studied the relationship between investment and saving for the period 1960-1999 by applying Autoregressive Distributed Lag (ARDL) Model and Granger causality test for Japan. The author found long run relationship between saving and investment

which suggest that there must be granger causality in at least one direction. Therefore, the Granger causality test results suggest bidirectional causality relationship between saving and investment. Thus, lending support to Feldstein and Horioka (1980) hypothesis.

Recent study by Singh (2008) examined the long run relationship between saving and investment to determine the degree of capital mobility using Two-step Residual-based test, Autoregressive Distributed Lag (ARDL) Model and Granger causality test from the period 1950-51 to 2001-02. The results revealed long run relationship between saving and investment in India, supporting the Feldstein-Horioka hypothesis. The Granger causality test revealed unidirectional causality running from saving to investment.

Mishra *et al*. (2010) studied the dynamic relationship between savings and investment in India for the period 1950-51 to 2008-09 by employing Johansen cointegration technique and Granger causality test via Vector Autoregressive framework. The authors found the presence of long run equilibrium relationship between saving and investment in India. The Granger causality test revealed directional causal relationship between the variables under study.

A more recent study by Seth (2011) applied Engle-Granger and Error Correction Model (ECM) to investigate the long run relationship between saving and investment for India from the period 1980-2008. The results showed long run relationship between savings and investment. The results also revealed long run equilibrium relationship between corporate savings and corporate investment. The former supports low capital mobility into India, whereas the latter revealed that corporate sector's dependency on their fund for investment.

Furthermore, Tang and Lean (2008) applied Rolling Windows Bounds test to empirically investigate the relationship between savings and investment over the period 1960-2007 for Malaysia. The study showed that savings and investment are not cointegrated implying that capital is internationally mobile over the same period. Shahbaz *et al*. (2010) analyzed savings and investment correlation through the application of Autoregressive Distributed Lag (ARDL) bounds testing for cointegration through Error Correction Model (ECM) for Pakistan from period1976-2006. The authors reported long run relationships among savings, domestic investment, inflation, real exchange rate, and financial development which invariably indicate inadequate capital mobility in the country. Similarly, Adebola and Dahalan (2012) investigated the

relationship between savings and investment nexus for Tunisia from the period 1970-2009 by employing Autoregressive Distributed Lag (ARDL) Model and Granger causality test. The authors found the existence of long run relationship when investment is taken as dependent variable. The results of Granger causality test revealed two-way relationship justifying the low capital mobility as suggested by FH hypothesis.

Empirical studies also emerged from a panel of OECD countries, for example, Krol (1996) examined the relationship between saving and investment using data for 21 OECD countries covering the period 1962-1990 by employing fixed effects estimates. The results reject the idea that capital is highly mobile internationally. Jansen (1996) also re-examined the relationship between savings and investment for 23 OECD countries spanning the period 1951-1991 using Error Correction Model (ECM). The author revealed evidence of cointegration between saving and investment which invariably indicating an in capital mobility within the OECD. Another study by Hussein (1998) for 23 OECD countries over the period 1960-1993 to test the Feldstein-Horioka hypothesis by applying Dynamic Ordinary Least Square (DOLS). The results revealed that international capital mobility in 18 out 23 is very low, while the results suggest a moderate change in Canada, Denmark, Finland, Greece and Sweden.

In addition, Kasuga (2004) investigated the relationship between savings-investment nexus for 23 OECD and 79 non-OECD countries spanning 1980-1995. The author employed Ordinary Least Square (OLS) and instrumental variables. The results revealed that if domestic saving increases net worth, it increases domestic investment. Therefore, the study suggests that the impact of domestic saving depends on financial system and their development. Recent study by Pelgrin and Schich (2008) applied a panel Error Correction Model (ECM) to analyze the long run relationship distinctly from the short run adjustment via the Autoregressive Distributed Lag (ARDL) Model in addition to Dynamic Fixed-Effects Estimator (DFE), Pooled Mean Group (PMG) estimator and Mean Group Estimator (MGE) for 20 OECD countries from 1960-1999. The authors found that saving and investment have long run cointegration relationship that is consistent with the interpretation that a long run solvency constraint is binding for each country.

Similarly, Ozkan *et al*. (2009) applied Fuzzy C-Mean (FCM) Clustering Algorithm using panel data from 21 OECD countries covering the period

1970-2003, their results revealed that saving retention coefficient are greater for larger countries except for the cluster which contains the largest countries. A more recent study by Rao *et al*. (2010) applied the Bludell and Bound systems GMM method and Structural Breaks tests of Mancini-Griffoli and Pauwels to test the Feldstein-Horioka from the period 1960-2007 for a panel of 13 OECD countries. The results evidenced that the Feldstein-Horioka hypothesis is valid in the pre-Bretton Woods period and international capital mobility was negligible even though there has been a significant improvement in international capital mobility in the OECD countries.

Last but not least, another group of studies examine if the puzzle also holds in country groups other than the OECD countries. Mamingi (1997) tested the savings and investment correlation by employing Ordinary Least Squares and Fully Modified Least Squares for 58 developing countries over the period 1970-1990. The author revealed that many developing countries are financially integrated in the long run. The results further showed that saving and investment correlation for low-income countries is higher than those for middle-income countries. Using Japan and 10 other Asian countries data by employing Johansen framework covering the period 1950-1999.

Sinha (2002) revealed long run relationship between savings and investment for Myanmar and Thailand. The study also showed that the growth of the saving rates granger causes the growth rate of investment rates for Malaysia, Singapore, Sri Lanka and Thailand. However, causality runs from investment rates to saving rate for Hong-Kong, Malaysia, Myanmar and Singapore. Similarly, on the basis of panel data from 11 Asian countries using the recently developed 'between-group' Fully Modified Ordinary Least Square (FMOLS) and Dynamic Ordinary Least Square (DOLS) panel cointegration technique over the period 1960-1998. Kim *et al*. (2005) revealed that the coefficients using FMOLS and DOLS are 0.39 and 0.42. These small coefficients suggest that capital mobility increased in Asian countries in the 1980s and 1990s.

Furthermore, Chakrabarti (2006) re-examined the relationship between saving and investment by employing Multivariate Heterogeneous panel cointegration for the panel of 126 countries spanning 1960-2000. The author found a significant positive association between the ratio of gross domestic investment to GDP and the ratio of gross domestic saving to GDP ranging from 0.58 to 0.81. The evidence of cointegration and a significant positive correlation

between saving and investment may indicate a low degree of financial integration in the world capital markets, which is the basis for the FH hypothesis. Also, Telatar *et al.* (2007) studied the relationship between savings and investment for 10 European countries over the period 1970-2002 by applying a Markov-Switching Model which allowed data to be drawn from two different states- high capital mobility and low capital mobility- and extent it to allow variances to change among different regimes. The authors found a low correlation between savings and investment for Belgium, Denmark, Finland, France, Italy and Sweden. While, no single switching point in the regime of capital mobility measuring the degree of correlation between national savings and national investment was reported for the remaining countries.

Kim *et al*. (2007) applied Generalized Least Square (GSL) estimation by iterating the Seemingly Unrelated Regression (SUR) system using the newly computed covariances and system equation estimates for Big three (China, Malaysia, and Korea), ASEAN countries and Greater China (Hong Kong, Taiwan, and China) covering the period 1980-2002. The authors concluded that the saving-investment correlation in East Asia steadily decreases over time but is still higher than that of the OECD countries.

Recent study by Narayan and Narayan (2010) employed Gregory and Hansen Residual-Based structural break test for cointegration for G7 countries over the period 1971-2002. The results revealed that capital is highly mobile in these countries since no evidence of cointegration exists between savings and investment. More recent study also by Ketenci (2012) used Gregory and Hansen and Johansen approach to cointegration to measure long run relationship between savings and investment for 23 EU countries for the period 1995-2009. The author showed that there is evidence of cointegration in all cases except for Estonia and Portugal. The low level saving-retention coefficient estimated in the presence of structural breaks revealed high capital mobility in most of the countries under study disputing the Feldstein-Horioka hypothesis.

3.0 Methodology

The study used the reduced-form bi-variate model of Feldstein and Horioka (1980) to examine the long-run relationship between domestic saving and

investment and measure the degree of international capital mobility. The model is specified as:

$$IG_t = \beta_0 + \beta_1 SG_t + \mu_t \quad (1)$$

where IG_t is gross national investment as a proportion of gross domestic product (GDP), and SG_t is the gross national saving as a proportion of GDP, β_0 and β_1 are parameters to be estimated, and $\mu_t$is the disturbance term. The choice of gross national investment as a share of GDP and gross national saving as a share of GDP is justified following the work of Feldstein and Horioka (1980).

Before proceeding to cointegration test, the stationarity of employed variables has to be examined. In order to test the order of integration of the variables, the ADF unit root test will be applied. Following the stationarity test, the Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration proposed by Pesaran et al. (2001) will be used to analyse long-run relationships between the variables. This procedure is adopted because it has better small sample properties than alternative methods. Moreover, it can be used irrespective of the order of integration of the regressors. The bounds testing procedure consists of estimating an unrestricted error correction model with the following generic form in which each variable comes in turn as a dependent variable:

$$\Delta \ln(IG_t) = \alpha_0 + \alpha_1 \ln(IG_{t-1}) + \alpha_2 \ln(SG_{t-1}) + \sum_{i=1}^{q} \alpha_{1i} \Delta \ln(IG_{t-i}) + \sum_{i=1}^{p} \alpha_{2i} \Delta \ln(SG_{t-i}) + \mu_{1t} \quad (2)$$

$$\Delta \ln(SG_t) = \beta_0 + \beta_1 \ln(SG_{t-1}) + \beta_2 \ln(IG_{t-1}) + \sum_{i=1}^{q} \beta_{1i} \Delta \ln(SG_{t-i}) + \sum_{i=1}^{p} \beta_{2i} \Delta \ln(IG_{t-i}) + \mu_{2t} \quad (3)$$

The bounds test is mainly based on the joint F-statistic whose asymptotic distribution is nonstandard under the null hypothesis of no cointegration. The first step in the ARDL bounds test approach is to estimate equations (2) and (3) by OLS, which tests for the existence of a long-run relationship among the variables by conducting an F-test for the joint significance of the coefficient of

the lagged level of the variables. Thus, the null hypotheses of no cointegration for equations (2) and (3) are stated as follows:

H_0: $\alpha_1 = \alpha_2 = 0$ against H_1: $\alpha_1 \neq \alpha_2 \neq 0$

H_0: $\beta_1 = \beta_2 = 0$ against H_1: $\beta_1 \neq \beta_2 \neq 0$

We denote the F-statistic of the test which normalizes on $IG$and $SG$by $F_{IG}(IG\backslash SG)$ and $F_{SG}(SG\backslash IG)$, respectively. Two sets of critical values for a given significance level can be determined (Pesaran *et al*., 2001). The first critical value is obtained on the assumption that all variables included in the ARDL specification are stationary, while the second level is obtained on the assumption that the variables are I(1). We reject the null hypothesis of no cointegration when the F-value exceeds the upper critical bounds value. We do not reject the null hypothesis if the F-value is lower than the lower bounds. Finally, the decision about cointegration is inconclusive, if the calculated F-statistic falls between the lower and upper-bound critical values.

4.0 Data Analysis and Results

The data set analyzed in this paper contains annual observations for Nigeria over the period from 1980 to 2011 and is taken from the World Watch (2012) database. From Equations (2)–(3), the F-test can be used to examine whether along-run equilibrium relationship exists between the variables, by testing the significance of the lagged level variable. The computed F-statistics for cointegration are denoted as $F_{IG}(IG\backslash SG)$ and $F_{SG}(SG\backslash IG)$for each equation, respectively. Pesaran *et al*. (2001) tabulated the lower-bounds and upper bounds critical values of the F-test.

The unit root test has to be performed to test the stationarity of IG and SG. For this purpose, an Augmented Dickey- Fuller (ADF) unit roots test is carried out on the time series in levels. Table 1 which presents the results of the test on the variables at level revealed that the two variables are stationary at level at 5% level of significance.

Table 1: Unit Root Test

Variable	ADF test at Level	Order of integration
IG	-4.8195**	I(0)
SG	-5.1225**	I(1)

Source: Authors' calculation, **indicates level of significance at 5%

The long-run relationship between IG and SG is examined using the ARDL bounds testing procedure. The results of the bounds test are reported in Table 2.

Table 2: Bounds Test Results

F-Statistic Critical Values at 5%	Lower bound	Upper bound
$F_{IG}(IG\backslash SG)$ =15.1289	5.3958	6.3533
$F_{SG}(SG\backslash IG)$=2.9709	5.3958	6.3533

Source: Authors' calculation.

Based on Table 2 above, the results suggest the existence of cointegration, when investment is the dependent variable as the computed F_{IG} = 15.1289 is greater than the upper bound critical value at 5% level. However, there is no evidence of cointegration when saving is taken as dependent variable as the computed F_{SG}= 2.9709 is lower than the lower bound critical value at 5% level. In other words, these results suggest long run relationship between the variables when investment is taken as dependent variable which invariably implies low capital mobility in Nigeria, in accordance with the Feldstein-Horioka hypothesis. These results is consistent with the findings of Christos *et al*. (2008), Naraya and Naraya (2010), Esso and Keho (2010) and Seth (2011).

Table 3: Estimated Long-run Coefficients Based on ARDL(2, 1)

Dependent Variable: LNIG

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.173142	0.245638	-4.775899	0.0001
LNIG(-1)	0.586832	0.155976	3.762329	0.0009
LNIG(-2)	-0.499873	0.154061	-3.24465	0.0032
LNSG(-1)	0.115198	0.049288	2.337232	0.0274
R-squared	0.495549	Mean dependent var		-1.48228
Adjusted R-squared	0.437343	S.D. dependent var		0.169545
S.E. of regression	0.127176	Akaike info criterion		-1.16292
Sum squared resid	0.420519	Schwarz criterion		-0.97609
Log likelihood	21.44381	Hannan-Quinn criter.		-1.10315
F-statistic	8.513727	Durbin-Watson stat		2.101801
Prob(F-statistic)	0.000418			

Source: Authors calculation

Having determined the existence of a long run equilibrium when investment serves as dependent variable, the long run coefficients and short run coefficients are estimated using the associated ARDL and ECM. The ARDL model is estimated by setting the maximum lag length to 2 and using Akaike information criteria in selecting the optimum lag order for the model. The specification finally selected is ARDL(2,1), the derived long run elasticities are presented in Table 3.

Based on Table 3, the long-run elasticities on investment in Nigeria are generally positive as expected. The long-run impact of saving on investment is around 0.12 and statistically significant at 5% level, meaning that a 1% increase in saving will result in a 0.12% increase in investment.

Table 4: Estimated Short-run Coefficients Based on ARDL(2,1)

Dependent Variable: D(LNIG)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.002105	0.024386	-0.086305	0.9319
D(LNIG(-1))	0.630164	0.182577	3.451493	0.0021
D(LNIG(-2))	-0.486587	0.136831	-3.556119	0.0016
D(LNSG(-1))	0.086974	0.061521	1.413724	0.1703
ECM(-1)	-1.107699	0.270371	-4.096958	0.0004
S.E. of regression	0.130215	Akaike info criterion		-1.08368
Sum squared resid	0.406942	Schwarz criterion		-0.84793
Log likelihood	20.71328	Hannan-Quinn criter.		-1.00984
Durbin-Watson stat	1.940616			

The short-run dynamics of the equilibrium relationship are obtained via the relevant error correction model and the results are presented in Table 4. The error correction term (denoted as ECM(-1)) is found to be negative as expected and statistically significant. This term measures the speed at which the endogenous variable adjusts to changes in the explanatory variables before converging to its equilibrium level. A negative and significant error correction term implies that the adjustment process to restore equilibrium is very effective. A relatively high error correction coefficient implies a faster adjustment process. The coefficient is -1.11 and is significant at 1% level, which suggests that the convergence to equilibrium after a shock in investment in Nigeria takes slightly over 1 year.

The results of diagnostics test indicate no sign of autocorrelation of the error terms in the ARDL estimators, and the error terms are normally distributed. Moreover, hetrosecdasticity tests evidenced that errors are homoskedastic and independent of the regressors.

5.0 Conclusion

This paper examined the empirical analysis of dynamic relationship between saving and investment for Nigeria over the period 1980–2011 by employing the Autoregressive Distributed Lag (ARDL) Model and Error Correction Model (ECM). The results revealed the evidence of a long-run relationship between saving and investment. This result is consistent with a number of earlier studies in the literature that found saving and investment to be cointegrated in the long run. The results also support the Feldstein-Horioka (1980) hypothesis that there is low capital mobility internationally. The implication of these findings suggests that a large proportion of domestic saving remains in the Nigerian economy to fund domestic investment. Also, the study showed a negative and significant error correction term which implies the adjustment process to restore equilibrium is very effective.

It is widely acknowledged in the literature that international capital mobility is paramount in the allocation of resources to their best use. However, there are issues related to capital inflows and outflows. Capital inflows serves as a stimulant to investment as a well as economic growth in the recipient country, allow intertemporal smoothing in consumption, and thus raise welfare of the people in the country. At the same time, they also increase the vulnerability of the recipients to a sudden reversal of capital inflows. Therefore, this study recommends that adequate supply of savings should be maintained as a central policy objective for economic stability. A national savings rate that is broadly in line with investment needs reduces the economy's vulnerability to unexpected shifts in international capital flows.

References

Adebole, S.S. and Dahalan, J. (2012): "Capital Mobility: Application of Saving-Investment Link for Tunisia." *International Journal of Economics and Financial Issues*, Vol. 2(1), pp.1-11.

Chakrabarti, A. (2006): "The Saving-Investment Relationship Revisited: New Evidence from Multivariate Heterogeneous Panel Cointegration Analyses." *Journal of Comparative Economics*, Vol. 34, pp.402-429.

Christos, K., Mylonidis, N., and Paleologou, S. (2008): "The Feldstein-Horioka Puzzle Across EU Members: Evidence from the ARDL Bounds Approach and Panel data." I*nternational Review of Economics and Finance,* Vol. 17, pp.380-387.

Delke, R. (1996): "Savings-Investment Associations and Capital Mobility on the Evidence from Japanese Regional Data." *Journal of International Economics*, Vol. 41, pp.53-72.

Economy Watch (2012): The Economic Statistics and Indicator Database." www.economywatch.com/economic-statistics/countries/Nigeria.

Esso, L.J and Keho, Y. (2010): "The Saving-Investment Relationship: Cointegration and Causality Evidence from UEMOA Countries." *International Journal of Economics and Finance,* Vol. 2(1), pp.174-181

Feldstein, M. and Horioka, C. (1980): "Domestic Saving and International Capital Flow." *Economic Journal,* Vol. 90, pp.314-329.

Hussein, K.A. (1998): "International Capital Mobility in OECD Countries: The Feldstein-Horioka 'Puzzle' Revisited." *Economic Letters*, Vol. 59, pp.237-242.

Jansen, W.J. (1996): "Estimating Saving-Investment Correlation: Evidence for OECD Countries Based on an Error Correction Model." *Journal of International Money and Finance,* Vol. 15(3), pp.749-781.

Kasuga, H.(2004): "Savings-Investment Correlations in Developing Countries." *Economic Letters,* Vol. 83, pp.371-376.

Ketenci, N. (2012): "The Feldstein-Horioka Puzzle and Structural Breaks: Evidence from EU Members. *Economic Modeling*, Vol. 29, pp.262-270.

Kim, S., Kim, S.H., and Wang, Y. (2007): "Saving, Investment and International Capital Mobility in East Asia." *Japan and World Economy*, Vol. 19, pp.279-291.

Kim, H., Oh, K. and Jeong, C. (2005): "Panel Cointegration Results on International Capital Mobility in Asian Economies." *Journal of International Money and Finance*, Vol. 24, pp.71-82.

Krol, R. (1996): "International Capital Mobility: Evidence from Panel Data." *Journal of International Money and Finance*, Vol. 15(3), pp.467-474.

Mishra, P.K., Das, J.R., and Mishra, S.K. (2010): "The Dynamics of Savings and Investment Relationship in India." *European Journal of Economics, Finance, and Administration Sciences*, Vol. 18, pp.164-172.

Mamingi, N. (1997): "Saving-Investment Correlations and Capital Mobility: The Experience of Developing Countries." *Journal of Policy Modeling*, Vol. 19(6), pp.605-625.

Narayan, P.K. (2005): "The Relationship Between Saving and Investment for Japan." *Japan and World Economy*, Vol. 17, pp.239-309.

Narayan, P.K. and Narayan, S. (2010): "Testing for Capital Mobility: New Evidence from a Panel of G7 Countries." *Research in International Business and Finance*, Vol. 24, pp.15-23.

Ozkan, I., Erden, L., and Turksen, I.B. (2009): "A Fuzzy Analysis of Country-Size Argument for the Feldstein-Horioka Puzzle." *Information Sciences*, Vol. 179, pp.2754-2761.

Ozman, E. and Parmaksiz, K. (2003): "Policy Regime Change and the Feldstein-Horioka Puzzle: The UK Evidence." *Journal of Policy Modeling*, Vol. 25, pp.137-149.

Palley, T.I. (1996): "The Saving-Investment Nexus: Why it Matters and How it works." *Center for Economic Policy Analysis*, Working Paper Series II, No 1.

Payne, J.E. (2005): "Savings-Investment Dynamics in Mexico." *Journal of Policy Modeling*, Vol. 27, pp.525-534.

Pelgrin, F. and Schich, S. (2008): "International Capital Mobility: What do National Saving-Investment Dynamics Tell us?." *Journal of International Money and Finance,* Vol. 27, pp.331-344.

Pesaran, M.H., Shin, Y.C., and Smith, R., (2001):"Bound testing approaches to the analysis of levelrelationships"*Journal of Applied Econometrics,*Vol. 16, pp.289–326.

Rao, B.B., Tamazian, A., and Kumar, S. (2010): "System GMM Estimates of the Feldstein-Horioka Puzzle for the OECD Countries and Test for Structural Breaks." *Economic Modeling,* Vol. 27, pp.1269-1273.

Shahbaz, M., Ahmad, N. and Walid, A.N.M. (2010): "Savings-Investment Correlation and Capital Outflow: The Case of Pakistan." *Transit Studies Review*, Vol. 17, pp.80-97.

Singha, D. (2002): "Saving-Investment Relationships Japan and Other Asian Countries." *Japan and World Economy*, Vol. 14, pp.1-23.

Singh, T. (2008): "Testing the Saving-Investment Correlations in India: An Evidence from Single-Equation and System Estimators." *Economic Modeling,* Vol. 25, pp.1064-1094.

Seth, B. (2011): "Long Run and Short Run Saving-Investment Relationship in India." RBI Working Paper Series, Department of Economics and Policy Research No. 13.

Tang, C.F. and Lean, H.H. (2008): "The Savings and Investment Nexus: Evidence from Rolling Windows Bounds Test." Asian Business and Economics Research Unit, Discussion Paper 66.

Telatar, E., Telatar, F., and Bolatoglu (2007): "A Regime Switching Approach to the Feldstein-Horioka Puzzle: Evidence from Some European Countries." *Journal of Policy Modeling*, Vol. 29, pp.523-533.

Yamori, N. (1995): "The Relationship Between Domestic Savings and Investment: The Feldstein-Horioka test Using Japanese Data." Economics Letters, Vol. 48, pp.361-366.