

REVISITING FELDSTEIN-HORIOKA PUZZLE Econometric Evidences from Common Coefficient Mean Group Model

NAZIA BIBI AND ABDUL JALIL*

Abstract. The Feldstein-Horioka (1980) puzzle (FHP) is revisited by using Common Correlated Effect Mean Group (CCEMG) for a large group of countries over the period of 1980 to 2015. CCEMG methodology incorporates the issues of structural breaks and cross sectional dependence. Furthermore, we also investigate the role of several other macroeconomic factors, like judicial environment, governance and business environment, to improve the international capital mobility. There are two main findings of the paper. First, we confirm FHP. More exactly, there is a lack of international capital mobility among a larger group of countries. Second, this capital immobility can be declined through the improvement of globalization, judicial environment, governance and financial sector development.

Keywords: Feldstein-Horioka puzzle, Judicial environment, Governance, Business environment

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I. INTRODUCTION

There is near to consensus that financial markets of the world are highly integrated. This view gets more strength in the presence of easily accessible

*The authors are, respectively, Lecturer in Economics at Pakistan Institute of Development Economics, Islamabad (Presently she is Ph.D. scholar at Quaid-i-Azam University, Islamabad); and Associate Professor of Economics at Quaid-i-Azam University, Islamabad (Pakistan).

Corresponding author e-mail: abdul.jalil@qau.edu.pk

information through the development of new communication technologies. Therefore, the financial economists have a common view that the capital mobility should be very high in the presence of integrated financial markets. Therefore, they test the degree of capital mobility through various indicators, methodologies and samples. However, the present study focuses on the measures and methodology of Feldstein and Horioka (1980) that is labeled as *the mother of all puzzles* by Obstfeld and Rogoff (2000).

Feldstein and Horioka (1980) consider a relationship between domestic savings and domestic investment in open economy framework and document that if there is a high mobility of savings across the nations then the correlation between these two variables should be zero. This implies that domestic investment will be financed by foreign savings. On the other hand, the empirical analysis by Feldstein and Horioka (1980) shows a high correlation between domestic savings and domestic investment of OECD countries. This implies that most of the domestic investment is financed by the domestic saving. The high correlations between domestic savings and domestic investment can be termed as home bias instead of mobility.

The seminal study of Feldstein and Horioka (1980) was revisited by Feldstein (1983) by extending the data for the OECD countries and confirmed the earlier findings. The FHP gets more strength. This strength of puzzle motivates a number of researchers to further test the correlations of savings and investments. Many of these researchers provide the support for FHP. However, some of the studies have a stance that the studies on the saving-investment relationship may not be informative in the context of mobility and financial market integrations. For example, the definition of capital mobility of Feldstein and Horioka (1980) is challenged by Sachs *et al.* (1981) and Ghosh (1995). Sachs *et al.* (1981) and Ghosh (1995) note that that current account volatility should be used as a proxy for capital mobility instead of savings and investment. Therefore, many of the empirical studies show that even if capital are mobile, saving and investment may be correlated because of the presence other macroeconomic factors. For example, the big economy effect, exchange rate regime, cost of investment, common causes and endogenous shocks (*see*, Murphy, 1984; Bayoumi, 1990; Coakley *et al.*, 2004; Obstfeld and Rogoff, 2000; De Vita and Abbott, 2002; Corbin, 2004; Georgopoulos and Hejazi, 2009; Herwartz and Xu, 2010).

Indeed, keeping this backdrop in view, the revisiting of FHP is not a unique idea. A plethora of research is available on the topic with different measures, samples, estimation methodologies and time span. Importantly, the

more recent studies are augmenting FHP with various macroeconomic variables like size of economy, exchange rate regime, globalization, price of investment among many others. However, none of the studies incorporate the several issues of recent times. For example, the quality of institutions, the governance, the business environment and the impact of terrorism is almost completely ignored by almost all of the studies. The present study attempts to fill this gap.

We accept the claim of Feldstein and Horioka (1980) and their followers that there exist home bias in the allocations of domestic saving due to various reasons that are mentioned in the literature. However, there arises an important and interesting question that whether the saving retention coefficient can be declined by including any variable in the Feldstein and Horioka (1980) regression. This article is an attempt to answer this question. Specifically, we investigate the question whether the saving retention coefficient can be declined over time by improving the situation of governance, doing business, quality of institutions and terrorism or not. If the saving retention coefficient declines by incorporating the mentioned factor then this will imply that these factors will play their role in the increasing of capital mobility across the world.

Furthermore, most of the studies test FHP by using panel methods for the different sample from world. However, the researchers have not yet seriously explored the panel studies relating to FHP. Almost all of the studies are based on the single homogenous slope assumption. This implies that there is almost every country in the sample has the same saving retention coefficient. Obviously, this assumption is not very attractive. Furthermore, these studies do not take the structural break into account even taking a larger time span of data. Indeed, the empirical researchers should expect a number of structural breaks in the data of domestic saving and domestic investment due to various reforms in the financial sectors over the last two decades. Furthermore, the traditional panel data methods like fixed effects models and Generalized Method of Moments (GMM) models are based on the assumptions of cross sectional dependence. Importantly, the possibility of cross sectional independence cannot be denied in the presence of financial market integration. Keeping all these argument in view, FHP should be re-investigated by incorporating the slope heterogeneity and structural breaks assumptions robust to cross sectional dependence. This article is an attempt in this way.

Therefore, the present study has the several contributions in the literature. First, this study reinvestigates FHP for a larger group of countries

by using a long time series data. Second, we shall test the long run relationship between saving-investment by incorporating the structure breaks in a longer time series data. Finally, the article uses the second generation of the econometrics methodologies by incorporating the assumption of cross sectional dependence.

The rest of the article is organized as follows. Section II will review the existing literature. Section III will explain the econometric specification and estimation Algorithms. The construction of the variables and data sources will be explained in Section IV. The details of empirical findings will be presented in Section V. Section VI will conclude the article.

II. LITERATURE REVIEW

There is a plethora of research on FHP. However, even after discussion of last three decades, there is no consensus has been built. More specifically, the story is initiated by the seminal of paper of Feldstein and Horioka (1980). The paper finds that saving retention coefficient is greater than zero that is interpreted as lack of capital mobility. Whereas this coefficient should be zero in the presence of financial market integrations and capital mobility. The difference between theory and empirical findings started a huge discussion in the financial literature. The researchers attempt to find the saving retention coefficient by using different measures, methodology and samples of the countries but find inconclusive results in this regard.

Generally, the literature on the FHP can be divided into three strands of opinion. First, the saving retention coefficient is close to zero that implies that there exists perfect mobility of capital. Second, the saving retention coefficient is greater than zero that implies the lack of capital mobility. Third, the saving retention coefficient can be declined to zero through some policy intervention. Only the third strand is an infant in the literature while the first two strands have good standing in the literature of finance.

For example, Ketenci (2012) generally believe that there is no high correlation exist between the variables of domestic saving and domestic investment. This implies that the capital is highly mobile across nations. Similarly, Chu (2012) also shows through the experiment of Monte Carlo simulation that the FHP is upward biased and showing a spurious correlation between saving and investment. Ozdemir and Olgun (2009) also documents that FHP has very limited validity in the case of panel of country. Furthermore, the more recent studies like Singh (2013), Holmes and Otero (2014), Johnson and Lamdin (2014) and Kumar *et al.* (2014) note that the capital mobility is increasing in the recent times. On the other hand, the

equally important studies like Penati and Dooley (1984) and Coakley *et al.* (2004) still confirm the findings of Feldstein and Horioka (1980) that the saving retention coefficient is much higher than zero. Similarly, Kumar *et al.* (2014), Chang and Smith (2014), Barros and Gil-Alana (2015), Chen and Shen (2015), and Konya (2015) also believe that the puzzle holds despite the many methodological and specification issues.

The third strand postulates that there exist a high correlation between domestic saving and domestic investment. However, this is not because of the lack of capital mobility but it is attributes to some other macro-economic factors like the size of economy, exchange rate regime, governments spending, quality of institutions and globalizations (Dooley *et al.*, 1987; Sinha and Sinha, 2004; Chakrabarti, 2006). Therefore, the international capital mobility can be increased through the intervention in the macroeconomic environment.

Recently, Singh (2016) presents a classic survey of the literature on saving-investment correlation and international capital mobility. The study attempts to cover the theoretical issues of FHP as well as the empirical findings from at least 100 articles. Singh (2016) concludes that the researchers have a strong controversy on the issue and provide inconclusive results on the puzzle by using various methodologies and sample. This controversy motivates us to further investigate the issue. However, we shall concentrate on the empirical side of the issue because our study has a contribution on the empirical side of the literature.

The empirical studies on FHP can be divided into three parts, that is, cross sectional studies, time series studies and panel data studies. It is interesting to note that the initial studies were based on the cross sectional data and were estimated through Ordinary Least Square estimators. Feldstein (1983), Murphy (1984), Dooley *et al.* (1987), and Sinn (1992) find a high correlation and low international capital mobility in their findings. On the other hand, Vos (1988), Golub (1990), Obstfeld and Rogoff (2000), Bayoumi *et al.* (1999), Katsimi and Moutos (2009), and Chu (2012) contradict the previous mentioned studies and find a low or no correlation between domestic savings and domestic investment that implies lack of international capital mobility.

This controversy motivates the researchers to further investigate the puzzle by using the more efficient cointegration estimators and error correction models by using time series data. However, this stream of studies also provides contradictory findings. For example, Penati and Dooley (1984), de Haan and Siermann (1994), Levy (2000), Coakley *et al.* (2004), Moreno

(1997), Levy (2000), De Vita and Abbott (2002), Pelagidis and Mastroiannis (2003), and Caporale *et al.* (2005) find the high correlations between domestic savings and domestic investment that reinforces the conclusion of Feldstein-Horioka (1980) that there is lack of international capital mobility among the nations. However, this finding is not free of ambiguity and controversy. The other side of the discussion is provided by Corbin (2004), Hoffmann (2004), and Barros and Gil-Alana (2015). These studies have a stance that there is no or very low long run relationship between saving and investment that implies a high international capital mobility.

The third line of empirical research is based on the estimation of panel data methods. It is commonly known that in the applied econometrics literature that the panel methods have some extended advantages over cross sectional and time series data. For example, panel methods have more power to explain the variations due to increased sample. Therefore, the studies based on panel methods (*see* for example, Ho, 2002; Kollias *et al.*, 2008; Byrne *et al.*, 2009; Georgopoulos and Hejazi, 2009; Guillaumin, 2009; Herwartz and Xu, 2010; Bangake and Eggoh, 2012) provide an ample evidence that there is a considerable degree of international capital mobility among the nations. More Rao *et al.* (2010), Holmes and Otero (2014), Johnson and Lamdin (2014), and Kumar *et al.* (2014) post the saving retention coefficient has set a momentum to decrease over time. However, the coefficient and speed of decrease varies across country to country (Bangake and Eggoh, 2012).

However, all these studies are based on the linear panel methods. One of the major flaws of the linear panel methods is that they do not incorporate the structural breaks in the data series. The structural breaks may arise mainly due to changes in policy regime and liberalization of capital controls. This issue is tackled by a number of studies like Rao *et al.* (2010), Kumar and Rao (2011), Kumar *et al.* (2014), and Chen and Shen (2015). The general conclusion of studies is that the capital mobility may increase after incorporating the structural breaks in the data series.

However, the panel data model can be more useful with larger time series data. However, the above mentioned studies, most of the time, use the shorter span of the data. Furthermore, the above mentioned studies on the panel methods are based on the first generation of the econometric which implicitly assume that the panel units are homogeneous. Ironically, this is a strong assumption and may produce the invalid finding if it does not hold. Interestingly, it cannot be hold in a longer time series data. Furthermore, the

methodology also relies on the assumption of cross sectional independence. But, in the present circumstances the panel unit can't be cross sectional independent. Because, supply-side productivity, technology shocks and global economic shocks may affect the investment and savings of the nations. Therefore, Singh (2013, 2016) and Holmes and Otero (2014) note that the finding of the panel method may be dubious in the presence of slope heterogeneity and cross sectional dependence assumption. Therefore, the present study will contribute in the literature by relaxing the assumption of homogeneity of panel units and cross sectional independence.

III. ECONOMETRIC SPECIFICATION

As mentioned earlier, the discussion on the puzzle was initiated by Feldstein and Horioka (1980) when they estimate international capital mobility by using domestic saving and domestic investment in a reduced form model for 21 OECD countries over period of 1960-74. They specify the model as follows:

$$\left(\frac{I}{Y}\right) = \alpha + \beta \left(\frac{S}{Y}\right) + u \quad (1)$$

where $\frac{I}{Y}$ is the ratio of investment to GDP, $\frac{S}{Y}$ is the ratio of saving to GDP, and u is a well-behaved residual term. In the above equation, the slope parameter β posts the retention of proportion of the saving to finance the domestic investment. According to Feldstein and Horioka (1980) the coefficient may vary from zero to one, that is, $0 \leq \beta \leq 1$. Therefore, there may exist three situations in economy. First, if the saving retention coefficient is close to zero then all the saving will be lent to finance the international investment and domestic investment will be financed by the international saving. The implication of the statement is that there exists a complete international mobility of the capital across the nations. Second, $\beta = 1$ shows that the complete financial autarky which implies that the all domestic investment will be financed by the domestic saving and there is the absence of international capital mobility. Third, $0 < \beta < 1$ implies that lower the value higher the international capital mobility and *vice versa*.

As mentioned earlier, that the recent studies are showing that high correlation among the saving and investment is not because of capital immobility but is attributed to some other macro-economic factors like the size of economy, exchange rate regime, governments spending, quality of institutions and globalizations (Dooley *et al.*, 1987; Sinha and Sinha, 2004;

Chakrabarti, 2006). Therefore, the international capital mobility can be increased through the intervention in the macroeconomic environment. To test the level of effect of the macroeconomic and socioeconomic variables the researchers augment the Feldstein and Horioka (1980) equation with different macroeconomic variables.

For example, Razin and Rubinstein (2006) postulate that saving retention coefficient is high when economies are experiencing fixed exchange rate regimes because the environment for investor is less risky or more likely to invest. Furthermore, Younas and Chakraborty (2011) openness and financial integration may reduce the saving retention coefficient. This implies that openness is one of the factors which may increase the international capital mobility. Choudhry *et al.* (2014) notes the importance of finance and financial crisis while speciation the international mobility equation. Gunji (2003) documents that the legal protection and regulations for investors may also explain the relationship between saving and investment. Furthermore, Raheem *et al.* (2015) incorporates the role of governance. Financial development or deepness is also an important argument in mobility of capital as Guisso *et al.* (2004) show that disparities in financial development matter for capital mobility. However, none of the studies took regulation, governance and business environment.

Considering all the above arguments we are going to estimate the following equation:

$$\begin{aligned} \left(\frac{I}{Y}\right)_{it} = & \alpha + \beta_1\left(\frac{S}{Y}\right)_{it} + \beta_2\left[T \times \left(\frac{S}{Y}\right)\right]_{it} + \beta_3\left[GLO \times \left(\frac{S}{Y}\right)\right]_{it} + \\ & \beta_4\left[REG \times \left(\frac{S}{Y}\right)\right]_{it} + \beta_5\left[GOV \times \left(\frac{S}{Y}\right)\right]_{it} + \\ & \beta_6\left[BUS \times \left(\frac{S}{Y}\right)\right]_{it} + \beta_7\left[FIN \times \left(\frac{S}{Y}\right)\right]_{it} + U_{it} \end{aligned} \quad (2)$$

where $\left(\frac{I}{Y}\right)$ is domestic investment to GDP ratio, $\left(\frac{S}{Y}\right)$ is domestic saving to GDP ratio, T is time GLO is index of globalization, REG is regulations index, GOV is governance index, BUS is business regulations index, FIN is financial deepening index and U is Gaussian error term.

This article introduces some control variable as interactive terms to evaluate the impact of different macroeconomic variable in the context of FHP. If the coefficient of the interactive term appears negative then this

implies that the saving retention coefficient may decrease over time. The partial effect of savings on investment $\beta_1 + \beta_2 T$, $\beta_1 + \beta_3 GLO$, $\beta_1 + \beta_4 REG$, $\beta_1 + \beta_5 GOV$, $\beta_1 + \beta_6 BUS$ and $\beta_1 + \beta_7 FIN$ will be evaluated. It is expected that $\beta_1 > 0$, while $\beta_2 < 0$, $\beta_3 < 0$, $\beta_4 < 0$, $\beta_5 < 0$, $\beta_6 < 0$ and $\beta_7 < 0$.

As mentioned earlier that Singh (2016) and Holmes and Otero (2014) note that the finding of the panel method may be dubious in the presence of slope heterogeneity and cross sectional independence assumption. Therefore, the traditional panel methodologies like Fixed Effect Model, Random Effect Model and Generalized Method of Moments (GMM) will not be the good choice to estimate the equation 2. Therefore, we shall estimate equation 2 keeping slope homogeneity assumptions and cointegration under the assumptions of cross sectional dependence and structural breaks in view.

The assumption of cross sectional dependence can be test thorough the cross-section dependence (CD) that is proposed by Persaran (2004).

The test is defined as:

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij} \right) \rightarrow N(0,1) \quad (3)$$

where $\hat{\rho}_{ij}$ is the sample estimate of correlation the residuals. More clearly:

$$\hat{\rho}_{ij} = \hat{\rho}_{ji} = \frac{\sum_{t=1}^T \hat{u}_{it} \hat{u}_{jt}}{\left(\sum_{t=1}^T \hat{u}_{it}^2 \right)^{1/2} \left(\sum_{t=1}^T \hat{u}_{jt}^2 \right)^{1/2}}$$

Three types of panel unit roots are implied in the paper to test the properties of panel series of the data. First, Maddala and Wu (1999) panel unit root test without considering the cross sectional dependence and structural breaks. Second, Pesaran (2007) panel unit root test that is based on the on the assumption of cross section dependence among units. Finally, Bai and Carrion-i-Silvestre (2009) panel unit root test which take into account the problem of structural breaks and cross section dependence simultaneously.

Next task is to test the long run relationship between domestic investment and domestic saving. For this purpose, we shall use Westerlund (2007) cointegration test. However, the panel cointegration test of Westerlund (2007) does not provide evidences robust for structural breaks. For this purpose we shall use Westerlund and Edgertton (2008) panel

cointegration test that provide evidences of heterogeneous panel robust for the cross sectional dependence and the structural breaks simultaneously.

Final step is to estimate the long run and short run coefficients using Mean Group (MG), Pooled Mean Group (PMG) and Common correlated effect mean group (CCEMG) estimator. Mean Group and Pooled Mean Group allow finding long run and short run coefficients in dynamic panel data but they do not take into account the presence of structural breaks. In this respect CCEMG is applicable as this method considers structural breaks and also assume cross sectional dependence. CCEMG provide consistent and robust results even when structural breaks prevail in the data (Kapetanios *et al.*, 2011).¹ This study uses CCEMG methodology to estimate equation 2.

IV. DATA AND VARIABLES CONSTRUCTION

Our empirical analysis is based on a large sample of 88 countries over the period of 1980 to 2015 (List of countries is given in Appendix I). In literature different measures of savings and investment are being used as Feldstein and Horioka (1980), Kaya-Bahçe and Özmen (2008), Evans *et al.* (2008), Younas (2015), and Kollias *et al.* (2008) use gross fixed capital formation to measure the investment while Jiang (2014) decompose the investment in private and government investment. We also employ gross fixed capital formation to GDP ratio to check the presence of the puzzle. On same grounds domestic savings are measures as difference between gross domestic income and consumption plus net transfers. Feldstein and Horioka (1980), Evans *et al.* (2008), Kaya-Bahçe and Özmen (2008), and Younas (2015) also use gross savings for their analysis. In this study we are considering gross domestic savings as it is a better measure of domestic savings. The data are taken from *World Development Indicators*.

One of the major shortcomings of the previous literature is that they do not include role of governance and institutions explicitly in their analysis. Hence, we employ such variables to consider the impact on savings-investment puzzle. In this regard, we develop an index of regulations which depicts the judicial environment in the country through principal component analysis (PCA). To construct the regulation index, we use different indices of regulations as judicial independence, legal information of contracts, legal system and property rights, protection of property rights, military interference and reliability of police. On the same grounds, we develop the

¹The details of panel unit root tests and the cointegration tests are well mentioned in the literature. Therefore, we are not mentioning here keeping brevity in view.

index of governance, which consist on index of government stability, democratic accountability, corruption, law and order and bureaucratic quality. Business regulations index is also developed through PCA through various business related variables. The related data are taken from Heritage Foundation and International Country Risk Guide.² Furthermore, Bonser-Neal and Dewentre (1999) and Guise *et al.* (2004) stress the importance of financial development in risk sharing among regions as well settled financial environment is important to enhance the mobility of savings. Financial development can be measured by a number of factors such as depth, size, access and soundness of financial system (Jalil *et al.*, 2010). One of the measures of financial development is Broad money to GDP ratio, that is M_2/GDP . The data are taken from *World Development Indicators*.

V. ESTIMATION RESULTS

It is evident from Table 1 that the almost all variable contains unit roots whether structural breaks are taken into account or not. Same is true for the assumption of cross sectional dependence (see the column of Pesaran (2007) in Table 1).

TABLE 1
Panel Unit Root Test

	without structural breaks		with structural breaks		
	MW Test	Pesaran (2007)	Constant and trend	Mean shift	Trend shift
Saving	0.541	0.205	0.870	0.612	0.378
Investment	0.397	0.018	0.035	0.971	0.561
Globalization	0.792	0.833	0.112	0.018	0.463
Finance	0.637	0.958	0.501	0.916	0.672
Regulation	0.749	0.919	0.302	0.411	0.649
Governance	0.843	0.182	0.38	0.343	0.32
Business	0.236	0.01	0.852	0.673	0.075
Corruption	0.834	0.692	0.279	0.932	0.359

p-values are given without null hypothesis that series is I(1).

²<http://www.heritage.org/index/>

<http://epub.prsgroup.com/products/international-country-risk-guide-icrg>

The next step is to test the long run relationship among variables through panel cointegration test. To accomplish this task we use Westerlund (2007) technique which allows finding long run relationship among variables in presence of cross sectional dependence. The results reported in Table 2 clearly indicate the presence of long run relationship among variables. This confirms the results of Guillamin (2009), Kim *et al.* (2005), Bangake and Eggoh (2012), Jansen (1998) and Murthy (2005). But this test is not applicable when structural breaks are present in data. Therefore, Westerlund and Edgerton (2008) test is applied and presence of long run relationship among variables is confirmed.

TABLE 2

Panel Cointegration Test (Null Hypothesis: No Cointegration)

Without structural breaks assuming cross sectional dependence				With structural breaks assuming cross sectional dependence				
Statistic	value	p-value	Robust	Model	$z\phi(N)$	p-value	$z\tau(N)$	p-value
Gt	-3.5767	0.0877	0.0004	No break	8.3893	0.0083	3.7314	0.0126
Ga	-5.1147	0.0067	0.0007	Mean Shift	3.6540	0.0689	2.0280	0.0572
Pt	-7.9784	0.0973	0.0090	Regime Shift	4.0731	0.0314	1.9631	0.0538
Pa	-10.7937	0.0602	0.0005	NA	NA	NA	NA	NA

The long-run estimates are reported in Table 3. Model 1 confirms the existence of FHP with a considerable magnitude of saving retention coefficient, that is, 0.585. This implies that 59 per cent of the domestic investment is financed by the domestic saving and rest 41 per cent is financed by the international capital mobility. This magnitude confirms the one side of controversy. The high magnitude of the saving retention coefficient can be expected in the presence of low level of quality of institution, financial development, legal protections and prudential regulation. Therefore, the international capital mobility can be enhanced through the improvement in the mentioned factor over time.

The significant negative entry of time variable confirms the assertion that saving retention coefficient can be declined overtime (*see* Model 2). However, the magnitude of time variable is very low. This implies that the capital mobility will be increased only 0.9 per cent per year. This finding is in line with Georgopoulos and Hejazi (2005). The further implication of this magnitude is that it almost takes more than one century to become perfectly

capital mobile world. However, the process can be catalyzed by the inclusion of different policy instruments. For example, the economic globalization further can increase the process of capital mobility by 0.7 per cent (*see* Model 3). Specifically, the measure of globalization enters significantly negative in the base line regression that implies that the home biasness may reduce with the increase of economic globalization over time. This finding is consistent with Younas and Chakraborty (2011).

TABLE 3

Long-Run Estimates from Common Correlated Effect Mean Group

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Constant	0.128** (0.057)	0.171*** (0.073)	-0.171 (0.138)	0.200 (0.176)	0.013 (0.087)	-0.065*** (0.006)	0.112 (0.167)	-0.149 (0.138)
Savings	0.585*** (0.175)	0.478*** (0.192)	0.294** (0.141)	0.356** (0.156)	0.612** (0.294)	0.671*** (0.198)	0.375*** (0.104)	0.350** (0.158)
	Interaction Terms							
Time	NA	-0.009** (0.004)	NA	NA	NA	NA	NA	-0.005** (0.002)
Globalization	NA	NA	-0.007*** (0.001)	NA	NA	NA	NA	-0.041*** (0.009)
Regulation	NA	NA	NA	-0.084*** (0.010)	NA	NA	NA	-0.037 (0.078)
Governance	NA	NA	NA	NA	-0.071*** (0.008)	NA	NA	-0.053 (0.046)
Business	NA	NA	NA	NA	NA	-0.007 (0.005)	NA	-0.062*** (0.008)
Finance	NA	NA	NA	NA	NA	NA	-0.007*** (0.001)	-0.097*** (0.008)

NOTE: The standard errors are presented in parentheses.

*** 1% level of significance, ** 5% level of significance, *10% level of significance.

Gunji (2003) posts the importance of law and regulation in determining the level of international capital mobility. However, Gunji (2003) contributes in the literature only by examining the role of general legal framework. We consider the role of regulations that is based on the judicial system of the country. The indices of regulation are constructed through the judicial independence, legal system and property rights, protection of property rights,

legal information of contracts and military interference and reliability of police. This variable basically explains the judicial situation of a country. We argue that better judiciary provides protection to investor's hence home biasness may decrease through the internal flows of investments. This variable is again used as interactive term which is interpreted that how better judicial system will decrease saving retention coefficient. The index enters in the regression significantly negative that implies the saving retention coefficient will be declined as compare to the base model. Then we consider the role of governance in the guideline of Raheem *et al.* (2015). We observe that the interactive term of governance is negative and significant which show that the governance helps to decrease the home biasness of savings. The magnitude of the coefficient of governance is larger as compare to regulations and globalization. Similarly, the business environment and financial development on saving retention coefficient. Better business situation increases the risk sharing significant. On the other hand financial development also helps to increase risk sharing as explained by Jalil *et al.* (2010).

Robustness Check

We move from specific to general model to test the robustness of our finding. In this regard, we consider all the variables simultaneously to control the misspecification of biasness. The result of Model 8 indicates that saving retention coefficient is low in all samples as compare to the base model. However, the measures of governance and regulation become insignificant in the case of full model. The interactive terms of other variables as of financial depth and globalization show that improved situation of globalization and financial development will increase risk sharing.

VI. CONCLUSION

This article aims to study to revisit the FHP for a group of 88 countries over the period of 1980 to 2015. Indeed, this is not a new area. However, the controversy among the researchers and inconclusive findings of the empirical findings motivates the researcher to investigate it further despite a plethora of research. The main reason of the mixed findings is the selection of different methodologies, country samples and data samples. All three types, cross sectional, time series and panel data, are utilized by the researchers in their studies. Our study is based on the panel data methods.

This study contributes in the empirical research by incorporating the assumptions of cross sectional dependence and structural breaks. Specifically, the present study revisits Feldstein-Horioka (1980) puzzle by

using Common Correlated Effect Mean Group (CCEMG) for a large group of countries over the period of 1980 to 2015. CCEMG methodology incorporates the issues of structural breaks and cross sectional dependence. These issues can be arisen in a longer time series data. Therefore, the traditional estimation methodologies may produce the inconsistency and bias findings. Furthermore, we also investigate the role of several other macroeconomic factors that are not taken into the consideration like judicial environment, governance and business environment. There are two main findings of the recent paper. First, we confirm the Feldstein-Horioka (1980) puzzle that there is a lack of international capital mobility. Second, this capital mobility may be increased through the improvement of globalization, judicial environment, governance and financial sector development. That is foreign investors feel comfortable in investing in countries with better governance, business environment and judicial system. Hence it is clear indication for the policy makers that if they want to enhance the capital mobility in form of foreign savings in their country, they can attract it by improving institutions and by better governance.

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APPENDIX I

List of Countries

Albania	Iraq	Paraguay
Algeria	Israel	Philippines
Argentina	Italy	Poland
Australia	Japan	Portugal
Austria	Jordan	Qatar
Bahrain	Kazakhstan	Saudi-Arabia
Bangladesh	Kenya	Senegal
Belgium	Korea	Sierra Leone
Bolivia	Kuwait	Singapore
Brazil	Lao PDR	South Africa
Brunei Darussalam	Libya	Spain
Cambodia	Madagascar	Sri Lanka
Canada	Malaysia	Sudan
Chile	Maldives	Sweden
China	Mauritania	Syria
Colombia	Mauritius	Taiwan
Czech	Mexico	Thailand
Denmark	Morocco	Turkey
Egypt	Myanmar	Turkmenistan
Estonia	Namibia	United Kingdom
Fiji	Nepal	United States
Finland	Netherlands	Uruguay
France	New Zealand	Uzbekistan
Germany	Niger	Vietnam
Greece	Nigeria	Venezuela
Hong Kong	Norway	Yemen
Hungary	Oman	Zambia
India	Pakistan	Zimbabwe
Indonesia	Palestine	
Iran	Panama	