

Feldstein Horioka Puzzle in Jordan: Real or Fancy

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Abstract

This study aims at testing the validity of Feldstein and Horioka puzzle (F-H) in Jordan. For this purpose, the study will test the unit root for the variables and applies the cointegration test and the Granger Causality test besides the Error Correction Model (ECM). The study employs a considerable quarterly data set for Jordan covering the period (2000-2016).

Results reveal that there is a stable long run relationship between saving ratio to GDP and investment ratio to GDP in Jordan as well as in the short run. As a result, the study confirms the correlation between saving and investment where the coefficient equals (0.83). In other words, Feldstein Horioka puzzle is hold in Jordan. On the other hand, results reveal that (69%) of disequilibrium in investment produced by saving will be corrected annually.

The study recommends that government and institutions of civil community should enhance and commitment to build a cultural move toward less consumption and more saving. Besides, there is a real need to shift consumer behavior from borrowing to saving and supplied them with sufficient knowledge and capability to take significant decisions about controlling their money and saving for the future. Increase savings programs that targeting expatriate Jordanians such as promoting Islamic government savings instruments and certificates of deposits in Jordanian banks bonds.

Keywords Feldstein Horioka Puzzle, capital mobility, saving, investment, Jordan.

JEL Classification E21, E22, F21

1. Introduction

International macroeconomics and finance is rich in puzzles that are conflicting with theories. The Feldstein Horioka puzzle is one of the six major puzzles that attract the researchers' attention (Obstfeld and Rogoff, 2000). It has been argued that in a world with perfect capital mobility, it is not necessary to find a connection between savings and investments because savings can globally look up the highest return. But since 1980, Feldstein and Horioka (1980) conclude that a rise in investments in an economy could be funded by a perfectly elastic supply of universal capital. In contrast, if capital mobility is very restricted, then this shows a one to one relationship among savings and investments because savings have to be invested locally.

The relationship between saving and investment has received a significant international attention. It has become a universal assumption that capital flows freely between countries to keep the return to capital equal in all countries. Thus, with perfect capital mobility there should be no relation between a country's domestic saving and its domestic investment. Instead, a sustained increase in saving in any one country should add funds to the world capital market. Solow (1956) provides some explanation about capital marginal productivity evenness among countries. He argues that if saving rates increase in one country and the extra reinvested domestically, the marginal productivity will reduce and enhance investing abroad. In fact, such assumption of perfect capital mobility is highly argumentative one.

However, Feldstein and Horioka (1980) found that this is not the case and that most incremental saving is in fact invested in the country in which it occurs. The puzzle is to try to understand why this should be the case. Given the large empirical researches that were trying to examine the capital mobility degree in different countries, this paper is going to briefly review the literature into the saving-investment correlation and testing both the long run and short run relationship to examines the validity of Feldstein and Horioka puzzle (F-H) in Jordan as a small country in the middle east surrounded by many political and economic crises. For this purpose, the study will apply the cointegration test and the Granger Causality test besides the Error Correction Model (ECM). The study employs a considerable quarterly data set for Jordan covering the period (2000-2016).

2. Trends of Saving and Investment in Jordan

Before going to econometrics analysis, it is important to review a set of facts relating to both investment and savings in the Jordanian economy. Table (1) reports data about evolution of saving and investment during the period of (2000 – 2015).

The general trend of investment-real GDP ratio (I/Y) was increasing along the period. This is due to that the growth rate of investment is greater than the growth rate of real GDP over the study period. After the third gulf war Iraq-USA in 2003, many groups of Iraqis move to Jordan leading to an increase in investment growth rate from 10% in 2003 to about 47% in 2004.

On 2008, financial crisis hit American economy, which effects extended to reach all countries, especially those who mainly linked with USA including Jordan. As a result, investment growth rate decreased from 30% in 2008 to only 6% in 2009. The highest value of investment-real GDP ratio was 1.03 and took place in the year 2015.

On the other hand, one can noticed that the general trend of saving's ratio to real GDP (S/Y) was increasing along the period of the study simultaneously with the growth rate of real GDP. After the third gulf war between Iraq and USA, saving declined in 2004 and 2005 by 12.1% and 59% respectively. This caused the ratio of saving to real GDP to decrease from 0.257 to 0.208 on 2004 and the decrease continued to reach 0.08 in the year 2005.

Besides, and after the last global economic crisis of 2008, saving growth rate declined from 24% in 2008 to 16.7% in 2009. Although, the ratio of saving to real GDP increased from 0.213 to 0.235, as a result of the decrease in real GDP growth rate from 7.2% in 2008 to 5.5% in 2009.

On the beginnings of the Arabic Spring, saving growth rate goes down from 69% in 2011 to reach 21% on 2012 and about 20% on 2013. The highest value of saving-real GDP reached 0.98 in the year 2015.

Table 1: The Trends of Saving and Investment in Jordan (2000-2015)

Year	Real GDP	Investment	Saving	I/Y	S/Y	Growth of Investment %	Growth of saving %
2000	5418.7	1341.4	736.2	0.25	0.14		
2001	5704.2	1340	666.8	0.23	0.12	0.00	-0.09
2002	6034.2	1365.3	1054	0.23	0.18	0.02	0.58
2003	6285.2	1506.5	1618	0.24	0.26	0.10	0.53
2004	6823.7	2215.6	1422	0.32	0.21	0.47	-0.12
2005	7379.6	3047.9	589.1	0.41	0.08	0.38	-0.59
2006	7976.9	3025.4	1223	0.38	0.15	-0.01	1.08
2007	8629	3671.9	1586	0.43	0.18	0.21	0.30
2008	9253.3	4761.9	1967	0.51	0.21	0.30	0.24
2009	9760	5056	2294	0.52	0.24	0.06	0.17
2010	9985.4	5680.5	2896	0.57	0.29	0.12	0.26
2011	10244	6429.4	4884	0.63	0.48	0.13	0.69
2012	10515.3	7434.2	5927	0.71	0.56	0.16	0.21
2013	10812.8	8712.1	7103	0.81	0.66	0.17	0.20
2014	11147.6	10113.8	8755	0.91	0.79	0.16	0.23
2015	11413	11706.6	11139	1.03	0.98	0.16	0.27

Source: Central Bank of Jordan

One can notice that the trends of both saving and investment are almost similar along the period of the study which may suggest a correlation between both variables and that the Feldstein-Horioka puzzle exists. Econometrics results will confirm or refuse such early judge.

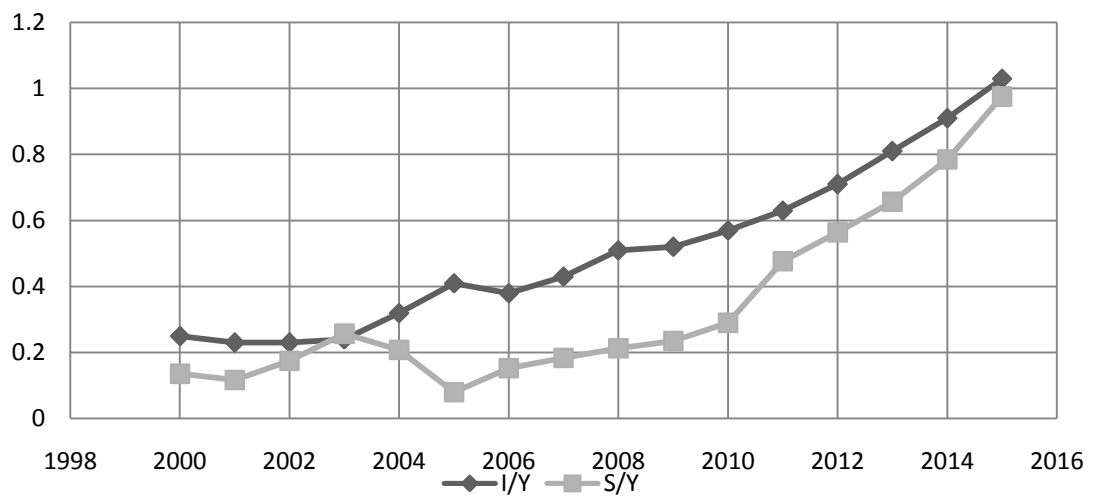


Figure 1: Evolution of Saving and Investment to Real GDP

3. Literature Review

The Feldstein-Horioka puzzle anxiety is about the causes that make investment and saving are correlated across countries. Since financial markets can quickly move capital among countries, then there is no significant cause leads investment opportunities to be located in a saver's home country. Various theoretical and empirical researches have been carried out related to the Feldstein Horioka puzzle and capital mobility, reflecting the importance of this component in the functioning of the economies. Here are the most important.

Feldstein and Horioka (1980) tested the relationship among saving and investment and found results against perfect capital mobility which indicates a strong correlation between saving and investment. Petreska and Mojsoska-Blazevski (2013) used panel data for the period 1991 to 2010 to examine the Feldstein-Horioka hypothesis in three groups of countries: South-East Europe (SEE), Central and Eastern Europe (CEE), and the Commonwealth of Independent States (CIS). Results confirm the validity of Feldstein Horioka in the three groups with a higher correlation of saving-investment as we move towards the panel included bigger and richer countries. This means that larger and richer countries are characterized by lower capital mobility.

Using annual data for the period (1994-2010), Josic and Josic (2012) tested the Feldstein Horioka puzzle in Croatia. They employed Johansen cointegration test besides Granger causality test and VAR methodology and reveals a high correlation between saving and investment which confirms the existing of Feldstein Horioka in Croatia.

Kumar et al. (2012) examine the existing of Feldstein Horioka puzzle in Australia for the period 1960 to 2007. Findings confirm the validity of Feldstein Horioka puzzle but in a weak form on showed a low saving retention coefficient. Granger Causality results reveals that the effect move from savings to investment both in the short and long runs which suggest that Australia could significantly enhance investment through expanding domestic savings.

Giannone and Lenza (2008) prove that general equilibrium impacts can partially justify the high correlation among saving and investment ratios noticed in OECD countries. Findings suggest that the saving-store coefficient stays high in the 70's which confirms the validity of F-H hypothesis but reduced frequently since the

80's, accompanied with the raised capital mobility in OECD countries. Ang (2007) also test the correlation between investment and savings in Malaysia for the period (1965-2003) and found a strong long run relationship among domestic saving and investment.

Coakley et al. (1998) present previous works and researches on the Feldstein Horioka puzzle. The interpretations which suggest support for the Feldstein Horioka hypothesis of capital mobility includes sectoral gap models, the Barro et al. (1995) modified neoclassical growth model in which human capital is not mobile, and Sarno and Taylor's (1996) of low capital mobility. The debate over whether saving-investment movements are informative about capital mobility is still unresolved although the sceptics appear to be in the ascendancy.

On the other hand, many studies found results against Feldstein Horioka hypothesis. For example Bineau (2014) examines correlation between regional savings and investment over the period (1999-2009) in Bulgaria as a small open economy. Results reveal a low correlation among regional savings and investment ratios. In fact, regional capital mobility has increased over time and openness has a significant impact on regional investment.

Varga and Plajner (2012) used a time varying parameter model to analyze Feldstein Horioka puzzle on a large dataset including 126 countries and fifty one years of data. The findings suggest that the worldwide savings-store coefficient has decreased which indicates that countries' capital markets are opened up more and more as a proof of a weak F-H hypothesis.

Saeed and Khan (2012) tried to catch any proof of a strong correlation between domestic rates of investment and saving in Pakistan over the period (1972-2008). Empirical results refuse the validity of Feldstein Horioka puzzle in Pakistan although no evidence refer to a high integration with international capital market.

Younas and Chakraborty (2011) employ the Feldstein Horioka hypothesis to test the effect of economic globalization on the degree of capital mobility in ninety nine countries for the period (1970-2005). Results confirm that both economic openness and financial market integration improve capital mobility in the chosen countries in the sample and weaken the F-H puzzle.

Murthy (2008) tests the Feldstein Horioka puzzle by developing panel unit root and the Pedroni cointegration tests in fourteen Latin American and five Caribbean countries for the period 1960 to 2002. Results show that solvency condition in long term is hold. Besides, there is a prevalence of a moderate degree of capital mobility and thus refuse the validity of Feldstein Horioka.

Serletis and Gogas (2007) examine Feldstein Horioka puzzle in fifteen European countries, in addition to USA and Japan. Using annual data for the period (1960- 2002), results were negative toward F-H hypothesis. In contrast, findings are convenient with the neoclassical growth theory that with high capital mobility no need to expect a high correlation between saving and investment.

Huang and Guo (2006) test the correlations between saving and investment and the covered interest parity conditions to measure the degree of capital mobility in 8 East Asia emerging markets. Results confirm a fair mobile capital markets in Hong Kong and Singapore. Besides, financial integration has been broadly improved which contrast the Feldstein Horioka hypothesis.

Using quarterly data for a seven industrialized economies, Tsoukis and Alyousha (2001) examine the Feldstein Horioka hypothesis by the correlation degree between saving and investment. They noticed that such methodology brings various problems thus, they used the Granger causality tests for the post-war period, the 1980s and 1990s. Results show that causality goes from saving ratio to investment ratio in the whole sample. On the other hand, causality goes from investment ratio to saving ratio in the single (German) cointegrated pair of the 1980s and 1990s, indicating that capital mobility increased post-1980 as a result of more integration in the international financial market.

4. Methodology

This study investigates the existence of a significant statistical connection between savings and investment in Jordan. It is needless to say that the availability of proper and credible data is very important for diagnosis analysis. The study will use a quarterly data set for Jordan for the period (2000-2016) that is retrieved from Central Bank of Jordan (CBJ) data base.

The study will test the long run relationship between saving ratio (S/Y) and investment ratio (I/Y) in Jordan. For this purpose, this study will use the Augmented Dickey-Fuller Test to check unit root, Johansen co-integration technique, Granger Causality test and the Error Correction Model (ECM) to attain its objectives.

5. Analysis Results

As widely known, the main aim of cointegration analysis is to clarify the nature of the long-run connection among a set of time series variables. Yet, it is important to check each time series for stationarity first and then run the cointegration test if the given time series is not stationary at level. The results show that variables are stationary at first difference, which implies that variables are integrated of order one, I(1). Based on these results, one can test for the existence of a long-run relationship between the variables, that is, cointegration.

Table 2: The Augmented Dickey-Fuller Test

Mackinnon Critical Values for Rejection of Hypothesis of a Unit Root						
Variables	Level	First Difference	1%	5%	Decision	Order of Integration
S/Y	2.72	-4.35	-4.18	-3.51	Stationary at first difference	I (1)
I/Y	2.18	-4.82	-4.18	-3.51	Stationary at first difference	I (1)

Source: calculated values using Eviews 7

Cointegration implies that in spite of being individually not stationary, a linear set of two or more time series could be stationary. Results of Trace Statistic and Max-Eigen Statistic tests confirm the existence of long run relationship between the variables (one cointegrating vector), which give the green light to apply the Error Correction Model (ECM). The cointegration results permits to test and estimate short and long run relationship between variables using the ECM approach which also helps to solve the spurious correlation problem among economic variables.

Table 3: Johansen Cointegration Test

Johansen Tests	Computed Value	Critical Value (5%)	Prob.	Decision
Trace Statistic	33.89	25.87	0.004	there is a long run relationship between saving and investment
Max-Eigen Statistic	25.18	19.39	0.006	

Source: calculated values using Eviews 7

The study proceed with the estimation of the Error Correction Model which was developed by Engle and Granger to reconcile the short-run behavior of an economic variable with its long-run behavior and to investigate the adjustment mechanisms towards the long-run equilibrium represented by the cointegration relationship. Hence, ECM shows the dynamics of short run adjustments towards the long run equilibrium.

$$D(I) = - 0.69*(D(-1) - 0.83 *D(S(-1)) - 0.01) - 0.16 *D(-1) - 0.14 *D(S(-1)) + 0.003 \dots (1)$$

The results show that there is a stable long run relationship between investment ratio to GDP and saving ratio to GDP in Jordan as well as in the short run because the t-statistics of these variables are significant. This relationship explains that the effect comes from saving to investment in the long run. This effect was estimated to be 0.83 and the negative sign indicate that there is adjustment toward long-run equilibrium. The coefficient equals 0.83 is near 1 which confirms the validity of Feldstein-Horioka in Jordan. As a result, the study confirms the correlation between saving and investment in the long run. On the other hand, results reveal that 69% of disequilibrium in investment produced by saving will be corrected annually.

It is very likely that an increase in savings will have supported effect on investment which enhance economic growth and contributes to economic development.

By employing Granger-causality test for the two variables, results show that there is statistical bidirectional dependence between them in the short-run. Therefore, the Feldstein-Horioka Puzzle is supported by Jordanian data over the time period of our analysis. (See table 4)

Table 4: Granger Causality Test

Null Hypothesis	F-Statistics	Probability	Decision
(S/Y) does not granger cause	6.51	0.0145	Reject H_0
(I/Y) does not granger cause	6.55	0.0142	Reject H_0

Source: calculated values using Eviews 7

6. Conclusions

One of the common constraints to the Jordanian economy is the lack of domestic savings to finance the investments which participate in economic growth limitation. The relationship between saving and investment has received a significant international attention. With perfect capital mobility there should be no relation between a country's domestic saving and its domestic investment. Instead, a sustained increase in saving in any one country should add funds to the world capital market. However, Feldstein and Horioka (1980) found that this is not the case and that most incremental saving is in fact invested in the country in which it occurs. The puzzle is to try to understand why this should be the case. Given the large empirical researches that were trying to examine the capital mobility degree in different countries, this paper is going to briefly review the literature into the saving-investment correlation.

This study aims mainly at testing the validity of Feldstein and Horioka puzzle (F-H) in Jordan. For this purpose, the study will test the unit root for the variables using Augmented Dickey-Fuller Test (ADF) and applies the cointegration test and the Granger Causality test besides the Error Correction Model (ECM). The study employs a considerable annual data set for Jordan covering the period (1970-2015).

The results show that there is a stable long run relationship between investment to real GDP ratio and saving to real GDP ratio in Jordan as well as in the short run because the t-statistics of these variables are significant. This relationship explains that the effect comes from (S/Y) to (I/Y) in the long run. This effect was estimated to be 0.83 and the negative sign indicate that there is adjustment toward long-run equilibrium. As a result, the study confirms the correlation between saving

and investment in the long run and confirms the validity of Feldstein-Horioka in Jordan. In other words, savings contribute to investment in Jordan. On the other hand, results reveal that 69% of disequilibrium in investment produced by saving will be corrected annually.

The study recommends that government and institutions of civil community should enhance and commitment to build a cultural move toward less consumption and more saving. Besides, there is a real need to shift consumer behavior from borrowing to saving and supplied them with sufficient knowledge and capability to take significant decisions about controlling their money and saving for the future. Increase savings programs that targeting expatriate Jordanians such as promoting Islamic government savings instruments and certificates of deposits in Jordanian banks bonds.

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