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THE FELDSTEIN – HORIOKA PARADOX, A CASE STUDY OF TURKEY

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ABSTRACT

The Feldstein and Horioka (1980) is one of the globally reviewed issues in international finance and macroeconomics. The theory juxtapose relationships between saving rates and investment rates in a dynamic way, that capital mobility across nations, would act to match up incremental product of capital. It was argued that, savings (especially in unregulated international markets) would flow to countries that show a tendency of high investment opportunities. Thus, indigenous saving and investment rate would be uncorrelated. The main objective of this study is to evaluate saving - investment relationships in case of Turkey, using a Time Series (co-integration and Granger causality) analysis between the periods of 1960 – 2014. From the findings, we discovered that a short and the long – run relationship exist between the series, with a major structural break in 1993. The co-integration regression revealed presence of high capital mobility in Turkey. Thus, the Feldstein-Horioka paradox is a puzzle in Turkey.

Keywords: Saving rate, Investment rate, Capital mobility, Co-integration, Granger causality, International finance.
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Contribution/ Originality

The paper's primary contribution is finding that Feldstein - Horioka puzzle hold for Turkey. To the best of authors' knowledge, it is first of its kind to investigate empirically, the Feldstein – Horioka puzzle for emerging economy like Turkey.

1. INTRODUCTION

One of the positive economic impacts of globalization is the recent development and rapid integration of the international financial markets. Consequently, the capital mobility across the nations has geared the attention of the policy makers, business owners, individual or government to a mushrooming study for decades, for basis that seems justified. Actually, the unrestricted international mobility of capital has numerous of crucial policy related and theoretical consequences. For the record, it aids highly lucrative investment opportunities globally to be shouldered and thus influence comparatively growth rates and pushes such economy towards equilibrium. By making savings

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more available, it enhances welfare and leads to an efficient turnaround of consumption instability. Moreover, it invades on the burden of taxation and on the capability of macroeconomics policies to influence indigenous economy. Furthermore, the extent of international capital flow involvement is a vital precondition, that would help in validating inter-temporal perspective in macroeconomics and our perception, in particular, of the current account (see Obstfeld (1986)). According to the inter-temporal theory of the current account had failed to justify the general equilibrium impact, which had been argued over the years, could put more light on the FH paradox. If the whole world could be viewed as a closed economy, then the world investment and saving must be equal, though this seems conflicting with the inter-temporal theory.

In the Feldstein – Horioka seminar paper put together in 1980 the empirical study was carried out using cross–sectional regression analysis of the form below:

$$(I/Y)_t = \alpha + \beta(S/Y)_t + u_t$$

Where the ratios depicted the period averages, and the countries were indexed by i. Their findings of β equal 1 (and statistically significant) denote total absence of mobility while β equal 0 denote presence of perfect capital mobility. This FH finding has been justified by several empirical studies through the tools of cross – sectional regression analysis. In his analysis employed the historical series. Obstfeld (1986) investigated direct correlations between OECD countries (Feldstein and Bachetta, 1991)

The past empirical work on the FH puzzle can be categorized into two based on their methodology. The first being the group employed cross sectional regression analysis. Feldstein and Horioka (1980) being the protagonist of the theory and other researchers in the field, employed simple cross sectional regression analysis to investigate the relationship or correlation between investment/GDP and saving/GDP ratio.

Some of these researchers among others include Feldstein (1983); Murphy (1984); Dooley and Penati (1984); Dooley *et al.* (1987) etc. All these earliest researchers confirm the FH puzzle. Panel regression analysis was also recently employed to evaluate the saving – investment relationship. Krol (1996) employed pooled panel data for 21 OECD countries, where the estimated coefficient was found to be 0.2, significantly smaller than the estimated coefficient gotten from the cross sectional analysis recorded in the earliest studies. Though, Jansen (2000) criticized the atypical findings of Krol. He argued that, the Krol estimated coefficient was significantly small, because of the countries of coverage. According to him, the estimated coefficient was significantly large (0.6) when Luxembourg was removed from the sample.

Time series analysis was also utilized by the other group. Miller (1988); Jansen (1996); Coakley and Kulasi (1997); Sarno and Taylor (1998); Coiteux and Olivier (2000); Caporale *et al.* (2005) among others, employed the co-integration time series techniques to investigate long-run relationship between saving and investment. These researchers' all find sufficient evidence that, the Feldstein – Horioka puzzle holds in their different empirical studies.

However, in spite of different empirical techniques these researchers have employed in their various studies, the fact behind the theory all start from the same ground, that the saving – investment relationships must be a unit root processes. Some of the recent studies capture the existence of structural breaks, which they regarded as severe, if not captured, due to the low power feature common with the conventional unit root test and others due to small sample size. This study revisits the FH puzzle, using Turkey economy as a case study to investigate saving – investment correlation. In other to arrive at a scientific conclusion, dataset was sorted for Turkey, covering relatively 54 years (1960 – 2014) and evaluate the time series properties of the series, while enabling potential structural breaks. The preceding sections present the methodology, data, empirical results and conclusion respectively.

2. METHODOLOGY

In this section careful attention was given to the time series properties of the Turkey saving – investment rates as well as the model proposed for the study to explain their possible implication for the FH paradox. Graphical inspection of the series was embarked upon in other to trace their path for a stationarity test. This was done to confirm the existing literature that the series are unit root process. Attention was not given to the structural breaks (at least 4) in the series, because, a lot of information will be lost, in an attempt to smooth them out. The series was ordered 1(1) i.e. they are unit root process and conform to the existing literature. Since the series were of the same order, a pre-condition for co-integration, a long-run relationship existed between the series estimated. Lastly, Granger causality output result was of interest. It was discovered that, for Turkey, the series is useful predictor of one another. The simple model specified for the study is a follow:

$$I/Y_t = \beta_0 + \beta_1 S/Y_t + \varepsilon_t$$

Where dependent variable I/Y represent investment/GDP ratio and the independent variable S/Y represent saving/GDP ratio. Taking precedence from FH model, the $\beta_1$is expected to have a positive sign. If $\beta = 1$ this indicate total absence of mobility while $\beta = 0$ indicate presence of perfect capital mobility.

3. DATA

The dataset consists of yearly observations over coverage of 54 years between the periods 1960 to 2014. The data was sourced from the World Bank Development database. The variables are described below.

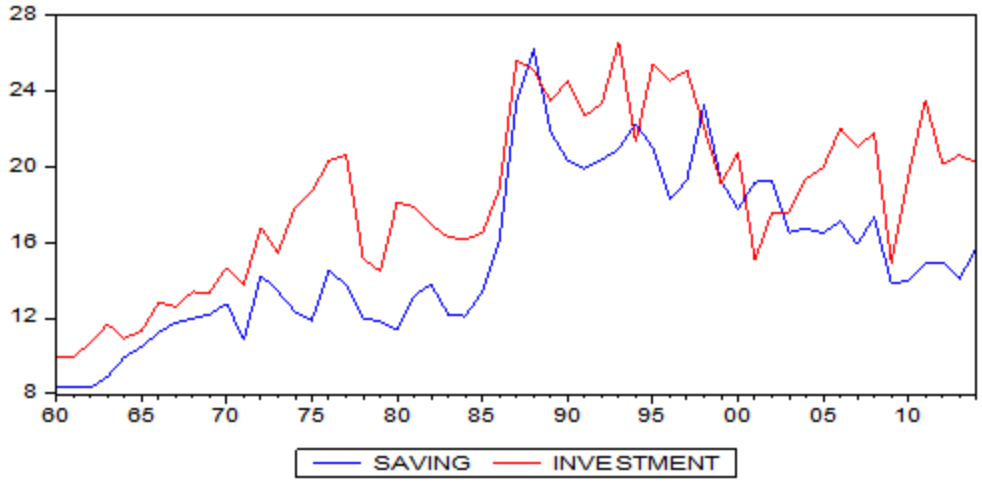
Saving: Domestic saving as a percentage of GDP for Turkey was employed. This is actually sourced for as it was laid down in the FH model. Thus, employing domestic saving would possibly eliminate impact of foreign investment.

Investment: Gross fixed capital formation was used as a proxy for investment. This comprises of land improvement, equipment purchases, construction of road, plant, railways, machinery, including commercial and private dwelling, hospital, schools, offices etc.

Gross Domestic Product: GDP is one crucial measure of economic growth or performance of an economy. However, the investment/GDP ratio and saving/GDP ratio was calculated by dividing the level of investment and saving by the GDP between the periods. The estimated value was used for the empirical analysis. The descriptive statistic of the data is presented in the appendix.

4. EMPIRICAL RESULTS

For better understanding of the basic relationships that exist between saving and investment, visual inspection in form of graphical analysis becomes expedient. From the diagram, it was clear that, the saving and investment has co-movement features. They are both trending upwards. Though, certain breaks were evident on the diagram. Attention was not paid to these breaks unlike the previous literature on the subject matter. Smoothing the series will amount to destroying vital information of the series. Though, it was discovered that, there was a major break in year 1993, through the Zivot and Andrew Break Test. Thus, it was concluded that the saving and investment exhibit a unit root process.



4.1. Unit Root and Co-Integration Test

The stationarity identity of the series is investigated by the ADF. The variables were put to unit roots test at their level and first difference forms.

Table-1. ADF Tests of unit root

Statistics (Level)	INV	Lag	SAV	lag
τ_T (ADF)	-2.693	(0)	-2.232	(0)
τ_μ (ADF)	-1.255	(0)	-1.303	(0)
τ (ADF)	-0.878	(0)	-0.894	(0)
Statistics (First Difference)	INV	Lag	SAV	lag
τ_T (ADF)	-9.104*	(0)	-6.809*	(1)
τ_μ (ADF)	-9.055*	(0)	-6.710*	(1)
τ (ADF)	-9.053*	(0)	-6.899*	(1)

Note: INV is the domestic investment; SAV is the domestic saving; T stands for the most general model with an intercept and trend; is the one without intercept and without trend. Numbers in parentheses are optimum lags in the case of ADF test (AIC). Unit root tests were performed from the most general to the most restricted model as also suggested by. *, ** and *** represent the rejection of the null hypothesis at alpha 1 percent, 5 percent and 10 Percent respectively. Tests were carried out in E-VIEWS 9.0.

The variables were found stationary at first difference which is a precondition for co-integration.

Table-2. Co-integrating Likelihood Ratio Test

Country	Null Hypothesis	Maximum Eigenvalue	TraceStatistics
Turkey	R = 0	52.33674*	78.22235*
	R ≤ 1	25.88561	2588561

Note * indicate rejection of H_0 at 1% significance level

Following the output result of the unit root test in Table 1, the co-integration test for investment and saving rates were conducted for Turkey. The likelihood ratio test was employed. The co-integrating order was determined using the SBC (Schwarz Bayesian Information Criterion). The trace statistic and the maximum eigenvalue were presented in the Table 2; the significance of the test was based on the critical values used in. From the test, it was discovered that, there is a long-run relationship between saving/GDP and investment/GDP ratio respectively. The short-run

dynamics show the confirmation of negative (-0.78) causality relationship from saving to investment. Thus, the series would revolve around equilibrium by 78 percent annually.

4.2. Granger Causality Test

Table-3. Long-run causality test

Country	SAR to INR	INR to SAR	Lag
Turkey	11.70075*	4.996504*	2

Note * indicate rejection of H_0 at 1% significance level

The movement/prediction of the long-run causality between saving and investment rates was tested. Table 3 presents the output results. For Turkey, the result reveals that, over a long-run, saving significantly Granger-cause investment, vice versa. There exist bi-directional relationships between the series. That is, the series are good and useful predictor of one another. Inference gathered from this result is that, there is high level of capital mobility in Turkey.

4.3. Co-Integrating Regression

Based on the model specified for the study, the Dynamic Ordinary Least Square (DOLS) co-integration analysis is presented in Table 4;

Table-4. DOLS regression result

I/Y = (S/Y)	
S/Y	0.765968
	(3.5045)

Note: T statistics are in parentheses

In Table 4 above, for Turkey, the 1 percent change in saving rates would bring about 76 percent changes in the level of investment. This tends to show, high capital mobility in Turkey. This one requirement is necessary to determine the possibility of the FH puzzle.

5. CONCLUSION

This paper investigates the empirical evidence of the Feldstein – Horioka puzzle, using Turkey as a case study. The main objective of this study is to investigate, if FH puzzle holds for Turkey. From the findings, the results show that, there is short-run and long-run relationship, between saving and investment, which is one basic prerequisite for international capital mobility. (see Tesar (1991)) Though, the series showed tendency for structural breaks, but this was not captured, in other to retain vital information of the series.

The outcome of this studies shed light on the Feldstein – Horioka paradox for Turkish economy. The co-integration relationship between saving and investment rates is in accordance with the view of high degree of capital mobility in Turkey. Thus, for Turkish economy in the long-run, the Feldstein – Horioka paradox holds. Since, a positive relationship exist between saving and investment, it can reasonably be attributed to ties that occur in international dealings. The increasing relationship between saving and investment is in line with the increasing degree of capital mobility. Conclusively, based on the year of coverage, the Feldstein - Horioka puzzle has been in existence in Turkey from 1960.

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