

Greece's Accession to the EU: Savings-Investment dynamics.

Anastasios Mastrogiannis¹

Department of International and European Studies, Panteion University, Syngrou Ave. 136, 17671 Athens, Greece

Abstract

In this paper we investigate the degree of integration of the Greek economy into international capital markets, using the analytical framework proposed by Felstein-Horioka. We examine the saving-investment relationship using an error correction model and taking into account the time profile of the institutional framework that governs current and capital account transactions. The results indicate a significant increase in the degree of integration of the Greek economy into the international capital market after 1992. Furthermore, the empirical results add another piece of evidence –albeit small– to the literature on the Feldstein-Horioka puzzle, indicating that the Feldstein-Horioka puzzle does not hold for the Greek economy.

JEL classification: F32, F41

Keywords: Investment; Saving; Feldstein-Horioka puzzle; Greece

1. INTRODUCTION

The degree to which a country is linked to international capital markets is an important issue for the functioning of its economy, as well as, for economic policy and academic reasons. For example, the mainstream view among economists is that national saving is the key to long run economic growth, for it is a necessary condition in achieving greater levels of investment, which, in turn, increase productive capabilities and lead to higher living standard. Therefore, –as is argued – economic policy should focus on increasing national savings, by promoting private saving and reducing public deficits. However, the mainstream view is challenged, if capital is mobile internationally. In this case, national savings need not remain home to finance domestic investment, but rather would flow anywhere in the world in search for the highest rate of return, other things being equal. Thus, increased national savings will

¹ E-mail: mastrotasos@gmail.com, tel.: +30 210 9201843

have negligible effects in achieving more investment and economic policy measures aiming at raising national savings may be inappropriate.

Furthermore, international capital mobility has important implications for the efficacy of fiscal and monetary as well as current account policies; the ability of a country to smooth its national consumption fluctuations; the design and the efficacy of tax policies for increasing investment and/or savings; the convergence of economies to similar capital-output ratios. The issue of capital mobility is also of academic interest, for the empirical validity of the assumption of perfect capital mobility --despite its importance to many open-economy macroeconomic and financial models-- is still a moot point.

During the last decades, there is a widespread perception that capital is highly mobile in the contemporary global economy. This perception, however, is challenged by the empirical evidence of the pertinent academic literature. In their pioneering work, Feldstein and Horioka (1980) (henceforth FH) found that a large part of national savings (almost 90%) remains home to finance domestic investment; and concluded that capital is rather immobile internationally.

The extensive empirical literature that followed FH's work is, to a large degree, supportive of their findings. As a result, the close empirical relationship between savings and investment is considered by many researchers an empirical regularity. As L. Tesar (1991) notes, "the correlation is not an artifact of a particular sample of countries or of a particular time period, but it is pervasive characteristic of saving and investment behavior of the OECD countries". However, the interpretation of the empirical finding is --still- a moot point, and constitutes one of the six major puzzles in international finance (Obstfeld and Rogoff 2000) .

Economists responded to the puzzle on both theoretical and empirical grounds. The plethora of papers that followed the work of FH can be classified in two categories. On the one hand, many researchers attribute the puzzle to factors that are unrelated to capital mobility, and they argue that the Feldstein-Horioka methodology is inappropriate for measuring capital mobility. For example, current account solvency constraints (Coakley *et al.*, 1998), the growth rate of income (Obstfeld, 1985), government policies targeting sustainable current account (Summers, 1985), non-traded goods and immobile factors (Engel and Kletzer (1987), productivity shocks (Obstfeld, 1985) country-size effects (Tsung-Wu Ho, 2003) can generate co-movements between savings and

investment, even if capital is mobile. On the other hand, another line of research supports the validity of the Feldstein and Horioka's methodology in measuring capital mobility, and they explain the puzzle on methodological and econometric grounds². ()

Within the second framework, a number of researchers focus on the role of policy regime changes. (Gundlach and Sinn 1992, Jansen 1996, Jansen and Schulze 1996, Sarno and Taylor 1998, Bajo-Rubio 1998, Ozmen and Parmaksiz, 2003, 2005, and Coakley *et al.* 2004). Their findings suggest that policy regime changes introduce structural breaks which significantly bias the empirical results towards rejecting the hypothesis of capital mobility. Such evidence calls for a "country by country" approach –as opposed to cross section analysis- in order to ensure that the particular characteristics of the economy under examination are incorporated explicitly into the empirical analysis (Corbin 2001, Coakley *et al.* 2004, Taylor 2002, Jansen 1996, Mark 2003, Giannone and Lenza 2004, provide an analysis of the effects of country heterogeneity on the estimation methodology).

Following this line of research, the objective of our study is to investigate the degree to which the Greek economy is linked to international capital markets using the FH's methodology and taking into account the possible existence of structural breaks in the data due to policy regime changes. Our study is distinctive in that the empirical analysis is combined with an analysis of the institutional framework that governs capital account transactions. This is important because it copes with two problems. First, drawing additional evidence from the analysis of the institutional framework that governs the capital account transactions, it enhances the reliability of the findings using the FH approach which is important given the theoretical debate on the validity of FH approach to measure capital mobility³. Second, in order to avoid "pre-test bias", the choice of the break date is based upon the results of the analysis of the historical evolution of the institutional framework that governs capital account transactions.

The motivation for our study is the observation that since its accession to EE, Greece's economy has undergone important structural changes. Both the visual inspection of saving and investment rates, as well as, the

² Tesar 1991, Coakley *et al.*, 1998, provide an excellent literature review

³ As Jansen and Schulze (1993) argue "when the saving-investment correlation is high, meaningful conjectures about capital mobility can be derived only by consulting further sources of information".

examination of the institutional framework suggests that a different mechanism governs the relationship between saving and investment after Greece's accession to EE. This, as already mentioned, may have important implications for economic policy. If domestic investment is primarily financed by national savings, then policies aimed at increasing national savings will best serve the goal of economic growth. On the other hand, if capital is mobile, policies aimed directly at increasing domestic capital formation are more efficient in achieving growth. Furthermore, Greece experience of joining the EU may provide useful lessons to the new EU countries of similar size, as well as, to the EU accession countries with respect to the challenges they will face in dealing with the issue of capital mobility.

The remainder of the paper is organized as follows. Section 2 discusses some methodological issues. Section 3 provides a description of the data, the empirical analysis and the results. Section 4 summarizes and concludes the study.

2. METHODOLOGICAL ISSUES

In order to measure international capital mobility, FH used estimates of the correlation between national saving and domestic investment. High (low) estimated correlation values were interpreted as evidence of low (high) capital mobility. The FH's argument is as follows: under condition of international capital mobility, an open economy's national savings would not necessarily remain home to finance domestic investment. Instead, they would be channeled to the country that offers the highest return on physical capital, other things being equal. Furthermore, domestic demand for investment funds will be met by a supply from an international pool of capital. Therefore, according to FH, national saving and domestic investment for an open economy, under conditions of international capital mobility, should be uncorrelated.

FH adopted a cross section estimation method. In a sample of 16 countries, they averaged data on gross savings and investment for subperiods from 1960 to 1974, to estimate the following model:

$$(1) \quad (I/Y)_j = \alpha + \beta (S/Y)_j + u_j$$

The coefficient β , called the "saving retention coefficient"⁴, is interpreted as measuring the amount of domestic saving retained for domestic

⁴ Feldstein and Bacchetta (1991)

investment. High (low) values of b are interpreted as indicators of low (high) capital mobility.

Many researchers also have employed equation 1 to estimate the saving retention coefficient using cross section analysis. In this study an error correction model is employed to formulate the saving investment relationship, and the saving retention coefficient is estimated using time series analysis. This choice is based on two reasons.

First, on theoretical grounds, much criticism has been concentrated on the lack of a theoretical frame of reference for equation 1; which, may result to misspecification problems as well as interpretation problems of the estimated parameters. In this paper, following the work of Jansen and Schulze, (1996), I rely on the theoretical framework provided by intertemporal equilibrium models⁵, which imply that saving and investment have a one-to-one relationship in the long run, as a result of the intertemporal budget constraint, even in the case of perfect capital mobility⁶. However, in the short run saving-investment dynamics are unrestricted and are subject to various shocks hitting the economy. Therefore, it is the short run correlation between savings and investment that is relevant in addressing the issue of the extent to which a country is integrated in the world capital markets. As a result, an error correction formulation of saving investment dynamics is considered more appropriate to examine the saving investment relationship, for it differentiates between long and short run dynamics.

Second, on econometric grounds, time series analysis is preferred to cross section analysis for a number of reasons. First, differences across countries are ignored when a cross-section approach is employed. Empirical evidence as well as macroeconomic theory suggests that savings-investment dynamics may be different for each country due to differences in economic structure, government policies, institutional frameworks and so on. Second, the results of time series analysis can be better understood for macroeconomic theory describes the relationship of a country's savings and investment over time. Third, (possible) cointegration between savings and investment rates biases upwards the estimate of the "savings retention coefficient". Last, time series analysis allows for a "country by country" approach which takes into account the

⁵ Blachard and Fisher (1989), Baxter and Crucini (1993)

⁶ Solvency constraints require that the current account (expressed as a ratio to GDP) is a stationary variable. Consequently, the same should hold for the saving-investment gap, since the current account balance equals the difference between saving and investment.

particular characteristics of each country. This approach addresses the question of international capital mobility from a different perspective. As Jansen (1996) points out if a significant number of countries are found to be linked with international capital markets, this may be significant evidence of international capital mobility (see Jansen, (1994), and Gundlach and Sinn, (1992), for a complete analysis). Last, but not least, the implications of the intertemporal equilibrium theoretical models can better be specified using cointegration analysis. In particular, the implied long run relationship between saving and investment indicate that the two variables should be cointegrated. This, in turn, according to Engle and Granger, (1987), allows us to formulate the relationship between savings and investment in terms of an error correction model, which provides information on both the long and short run dynamics between the two variables.

I use the following econometric specification for conducting the empirical analysis:

$$(2) \quad \Delta I_t = a^{ECM} + b^{ECM} \Delta S_t + c^{ECM} (S_{t-1} - I_{t-1}) + d^{ECM} S_{t-1} + \varepsilon_t$$

The coefficient b^{ECM} indicates the short run response of investment to a unit change of savings and corresponds to the saving retention coefficient. (i.e. is a measure of capital mobility).

The coefficient c^{ECM} indicates whether saving and investment rate are cointegrated, and also, provides an estimate for the speed of adjustment of investment to the previous period's deviation from the long-run equilibrium. Significant non-zero values for c^{ECM} imply that saving and investment rates are cointegrated. Furthermore, a positive value for c^{ECM} supports the view that it is domestic investment that responds to changes in domestic savings, since the change in the investment ratio from year to year varies proportionally with the savings-investment gap (Feldstein and Bacchetta, (1989) and Jansen, (1994).

The coefficient d^{ECM} is informative of the time series properties of the current account. If $d^{ECM} = 0$, the current account is stationary around some constant. If $a^{ECM} = d^{ECM} = 0$ the current account is stationary around zero⁷.

3. EMPIRICAL ANALYSIS

⁷ This is derived from the steady state solution of equation (2), which is: $0 = a^{ECM} + c^{ECM} (S - I) + d^{ECM} S$, see Jansen and Schulze, 1996, for further analysis.

The empirical analysis is based on annual data on gross national saving (S/Y) and gross domestic investment (I/Y), both expressed as a share of gross domestic product, for the 1960-2004 period. The source of the data is the Ministry of National Economy of Greece (The Ministry of National Economy, Hellenic Democracy, “The Greek Economy 1960-01”, Athens, 2001 and “Semi-annual Report”, May 2005).

First, we examine the time series properties of I/Y and S/Y using three tests: the Dickey Fuller (DF) test (Dickey and Fuller 1979), and the Augmented Dickey Fuller (ADF) test (Said and Dickey 1984). The results are presented in Table 1. The hypothesis that S/Y and I/Y are realizations of a stochastic series containing a unit root could not be rejected.

Next, I estimate the error correction model (2) for the period 1960-2004. The regression results are as follows (t-statistics in italics and parenthesis):

$$3. \quad \Delta I_t = 3.53 + 0.85 \Delta S_t + 0.72 (S_{t-1} - I_{t-1}) - 0.17 S_{t-1} + \epsilon_t$$

(3,71)
(11,54)
(4,45)
(-3,18)

$$R^2 = 0.80, \sigma = 1.18, DW = 1.83, BG(1) = 0.35, BG(2) = 1.39, ARCH(1) = 1.32, JB = 0.3$$

The estimate of c^{ECM} is significantly different than zero; indicating that saving and investment rates are cointegrated. The estimate of b^{ECM} is not significantly different than one, supporting the hypothesis that the Greek economy has not been integrated adequately into international capital markets. However, an inspection of the time profile of the institutional framework suggests that a structural break exists in the data which may result to biased estimates.

Examination of the time profile of the institutional framework governing current account and capital account transactions reveals that significant changes have taken place after Greece’s accession to the European Union (EU) on 1981. The extensive network of controls on international transactions which has been developed from 1960 up to 1981 was gradually dismantled after Greece’s accession to EU. By 1986, capital flows for non-residents were liberalized, and residents were allowed to invest in European Economic Community and European Investment Bank bonds. By 1988, residents could invest directly to EU member states. By 1991, repatriation of profits from direct investments by non-EU residents were fully liberalized; residents were allowed to buy shares, mutual funds and bonds (with a maturity of at least two years) issued by EU resident companies. By 1992, all remaining current account

restrictions were lifted, and Greece accepted the obligations of Art. VII of the IMF's Articles of Agreement (Tsaveas, 2001).

On the basis of the historical evolution the institutional framework that governs capital account transactions, I examine the possibility that b^{ECM} changes over time, by re-estimating equation 2 and allowing b^{ECM} to vary. Two regimes are specified: 1960-92 and 1992-2004. The regression results are as follows (t-statistics in italics and parenthesis):

$$(4) \Delta I_t = 3.36 + 0.87 (D1 * \Delta S_t) + 0.23 (D2 * \Delta S_t) + 0.55 (S_{t-1} - I_{t-1}) - 0.19 S_{t-1} + \varepsilon_t$$

(3.38) (6.68) (7.93) (5.6) (3.82)

$$R^2 = 0.69, DW=1.89, BG(1)=0.009, BG(2)=1.42, ARCH(1)=0.59, JB=0.47$$

where D1 and D2 denote dummies taking is unity during 1960-1992 and zero during the period 1992-2004.

The estimates of b^{ECM} are not significantly different than one during the first period, when indeed rather strict capital controls were in place. In contrast, they are not significantly different than zero during the 1992-2004 period. The hypothesis that the coefficient of ΔS_t is constant in the two periods is rejected using an F- test. Similar results are found by Özmen and Parmaksiz (2003a) for France, Özmen and Parmaksiz (2003b) for UK, Bajo-Rubio O. (1988), for Spain, and, for the Greek economy by Papapetrou (2006), Christopoulos (2007), Pelagidis and Mastroiannis (2003).

4. SUMMARY AND CONCLUSIONS

The paper examines the links of the Greek economy with international capital markets and investigates the role of policy regime changes in explaining the Feldstein-Horioka puzzle. The issue of capital mobility and the case of the Greek economy are of interest for a number of reasons. First, the effectiveness of economic policies crucially depends on the degree of capital mobility. Second, the case of the Greek economy is useful in drawing lessons on the process the new EU countries as well as the new accession countries of similar size will face regarding their participation to international capital markets. Third, the significant changes that took place in the institutional framework that governs Greek international transactions allow us to examine whether structural breaks in the data can provide an answer to the Feldstein-Horioka puzzle.

We examine the long and short run dynamics between savings and investment rates using an error correction model. Considering the whole period, the results support the hypothesis of capital immobility.

The time profile of the institutional framework that governs current and capital account transactions suggests the existence of a structural break in the data. Considering the subperiods before and after 1992, the tests show a significant increase in the degree of integration of the Greek economy into the international capital market after 1992.

Furthermore, the results –together with similar results for the economies of Italy, Norway, UK and France- point out a possible explanation for the Feldstein-Horioka puzzle. Policy regime changes in the financial environment introduce structural breaks in the data which, if ignored, biases the results of econometric analysis towards accepting the hypothesis capital immobility.

The conclusions are subject to two qualifications. First, the test results may be fragile due to the low number of observations, especially in the second subperiod. Second, an important question relates to the effect on the results of EU structural funds that Greece has received since its accession to EU. Further study is warranted.

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Table 1.

Dickey-Fuller unit root test

$$\square y_t = \square_c + \square_c t + \square_c y_{t-1} + \square_\square (1)$$

$$\square y_t = \square_b + \square_\square y_{t-1} + \square_\square (2)$$

$$\square y_t = \square y_{t-1} + \square_\square (3)$$

<u>A. Levels</u>	S	I
T_c	-1,77	-2,26
T_μ	-1,26	-1,71
T	-0,42	-0,31
<u>B. First Differences</u>		
T_c	-5,37*	-6,26*
T_μ	-5,36*	-6,16*
T	-5,42*	-6,25*
1. MacKinnon critical values for rejection of the null of unit root are used.		
* , ** , *** denote significance levels at 1%, 5%, 10% correspondingly		