

# Saving and Investment in Euroland, the EU and the enlarged EU<sup>α</sup>

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## Abstract

The Feldstein-Horioka puzzle has been recently included among the six major puzzles of international economics. It is a paradox that belongs to the large group of home biases that have become stylized facts. We investigate the F-H puzzle according to different definitions of Europe and by introducing a more suitable investment variable that results after netting out FDI. We find that the F-H coefficient decreases in all cases in which we adopt the correct investment definition. Over time we see a decrease of the F-H coefficient during the 1980's and an increase over the 1990's as a proof that the Maastricht Treaty discipline has made current account targeting biting. This does not happen for opting out and Eastern Europe countries.

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# 1 Introduction

Despite a huge amount of literature on the topic, the puzzle discovered more than twenty years ago by Feldstein and Horioka (F-H) (Feldstein and Horioka, 1980), and later refined, (Feldstein, 1983; Feldstein and Bacchetta, 1991) remains rather an open question. What they found is an empirical close relationship between domestic saving and investment in a cross section analysis based on averages of gross saving and gross investment ratios on GDP, calculated over the period 1960-1976. On a sample of 16 OECD countries the result is that some 85-95% of national saving is invested at home, or that domestic saving is an almost sure determinant of investment.

The question raised in the F-H puzzle is part of the broader issue of international capital mobility, that may be viewed also through different lenses. Indeed, testing the dependence of investment on domestic saving is not the unique way to assess financial markets openness. International differences in real interest rates, low correlation of consumption among countries, unexploited opportunities for international diversification of portfolios provide further stylized facts (Obstfeld, 1993; Obstfeld and Rogoza, 2000) that point to a lower than expected integration of international capital markets because of persistent domestic biases. Then, the F-H puzzle may be considered a chapter in the big book on several home biases that are quite common in international economics.

Most of these phenomena are related either to natural or man-made barriers. Obstfeld and Rogoza (2000) show that the six main puzzling home biases may be mostly explained by international transaction costs, i.e.: the costs of trading across borders. When dealing with the F-H paradox they show that

fairly reasonable international transaction costs put a wedge between the real interest rate of countries with a current account surplus vis à vis countries with a deficit. With international transport costs, a country with a current account deficit has a higher real interest rate than a country with a surplus. Empirical tests seem to confirm this theoretical statement. This implies that the current account is a costly way to obtain consumption smoothing, that may be affordable mostly by rich and advanced countries<sup>1</sup>. All these considerations add further constraints on domestic saving and investment.

If this is the case, the main problem with the saving and investment relationship is that they may be part of an aggregate accounting constraint that many countries tend to match in the short run, since they shun costly current account imbalances, mainly deficits. This is going to make saving and investment driven by current account targeting and therefore not free to move according to standard allocative incentives. Then, if we take for granted a smooth behaviour of consumption, investment and saving are liable to show quite systematic comovements. Since most of the analyses are conducted on cross sections using 4-5 year averages the effect of current account targeting may be even larger, since countries with temporary imbalances tend to reduce them with appropriate macropolicies targeted over a medium time span.

Many contributions have followed the original F-H paper in subsequent years. The resulting literature is extensive and rich. However, the main question raised by F-H seems to remain at the center stage despite many attempts to deny either the evidence of a close link between saving and

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<sup>1</sup>More variable consumption of developing countries seems to be the corollary of this. See Vamvakidis and Wacziarg (1998).

investment or the low capital mobility that the resulting evidence was meant to prove.

During the last decade there has been an increased number of contributions on the issue, witnessing a keen interest on capital mobility and its macroeconomic impact, owing to the fact that, recently, financial markets underwent major transformations reducing greatly the cost of crossborder trade in financial assets. Has the increased capital mobility changed, to some extent, the empirical evidence? For some scholars the dependency of investment on domestic saving has not vanished and remains rather an unsettled issue (Obstfeld and Rogoza, 2000). Others are fairly skeptical as to the way the evidence emerges. Jansen (1997) says that cointegration in the time dimension of saving and investment explains the saving-investment correlation discovered in cross section studies, making them rather uninformative. However, cointegration may depend on other omitted factors, among which low capital mobility could be overshadowed by the need to meet intertemporal budget constraint, i.e. current account targeting. The question of the common endogeneity of domestic saving and investment is not just the likely result of current account targeting but also of productivity shocks that may raise both investment and saving. Hussein (1998) tackles this problem using dynamic OLS (DOLS) and finds that dynamic common endogeneity changes the picture. The dependency of investment on domestic saving fades and only 5 out of a sample of 23 countries confirm the F-H paradox.

Taylor and Sarno (1997) use a VAR model to split temporary and permanent components in the saving and investment variables. They end up confirming the F-H puzzle since temporary components of the variables are

very closely related both in the US and the UK, where they perform the test. Their conclusion is that barriers in the capital markets of the two countries are substantial.

Hoxman (1999) proposes a new econometric measure of long run capital mobility and finds that, despite a robust matching between saving and investment, there is high mobility of capital in UK and US. In other words, correlations of the F-H type may not be much informative. Also Jansen and Schulze (1996) maintain that the high correlations are consistent with capital mobility, mainly if we recognize that there is a huge amount of two way capital flows, making a high correlation between saving and investment a necessary, yet not sufficient, condition for low capital mobility to occur.

However, despite the rich harvest of empirical tests and advanced econometrics there seems to remain a failure to recognize that current account targeting and non perfect capital mobility are two sides of the same coin and, therefore, the paradox just lies in the non perfect capital mobility issue, that is what F-H showed. As a confirmation of this, there comes the Obstfeld and Rogoza (2000) test, on OECD data. For the most recent period available, i.e. 1990-1997, the coefficient is lower than in the original F-H test, but remains "larger than one might expect in a world of fully integrated capital markets where global savings should flow to the regions with the highest rate of return." (Obstfeld and Rogoza, 2000, p. 11).

An interesting result that could be considered a puzzle in the puzzle is the one that concerns poorer countries. In both Obstfeld and Rogoza (2000) and Vamvakidis and Wacziarg (1998) it appears that the higher is the difference in average per capita income of countries, the weaker is the support for the

F-H paradox. This represents a further puzzle since it seems that for less developed countries current account discipline should be more severe than for rich countries, because, as seen above, it costs more to run current account deficits.

Coming finally back to Europe, the issue of capital mobility seems quite relevant in the EMU. Capital flows may be thought to be the most important escape way to cope with asymmetric shocks in countries having no individual monetary policy. Stirboeck and Heinemann (1999) found that capital mobility in the EMU has increased as it appears from a lower level of the F-H coefficient they supplement with exchange rate variability prior to the introduction of the euro.

This short introduction does not make any justice of the broad and rich literature, that has investigated both the theoretical aspects and the empirical evidence<sup>2</sup>. We have just emphasized some of the most relevant conundrums behind the still alive F-H puzzle.

However, it seems to us that there remains scope to analyze the F-H puzzle in many ways and our contribution will try to provide some new insights in both the empirical coverage and the definition of the variables that are currently used.

As far as the empirical coverage is concerned, we go through the analysis of the relationship between saving and investment in a highly integrated area, i.e. Europe, by considering different degrees of proximity, i.e.: the European Union (EU) with its present 15 members, the EU as it will appear

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<sup>2</sup>For a recent survey see Obstfeld and Rogoff (1995, 2000) and Coakley, Kulasi and Smith (1998).

in the second half of this decade, i.e.: the enlarged EU with inclusion of some Eastern Europe countries, and ...nally the pioneering group which has given rise to the EMU. Notice that, within EMU, current account targeting is losing any rationale. In the next future we may then be able to see whether the effect of current account on capital mobility is there or not. Yet, we are short of empirical support because the EMU started in 1999.

As far as the definition of the variable is concerned, we introduce some novelty for the investment. So far, in all tests of the F-H puzzle the investment variable includes both investments undertaken by residents and foreign direct investments (FDI). However, FDI should not be explained by the saving of the recipient country. Foreigners are responsible for FDI and they should not be driven by the level of saving available in the host country. On the contrary, this may be reasonable only if an increase in saving signals a faster productivity path, that is going to attract more FDI. Moreover, FDI are not limited by the intertemporal current account constraint of the recipient country, since they remain the property of foreigners who are subject only to their own (domestic) budget constraint.

We ...nally introduce exchange rate variability into the picture. We think that the higher the volatility of the exchange rate (ER) of a country the higher is the variability of its current account. This should make for a stronger discipline and therefore reinforce the dependence of investment on saving, while decreasing investment as the exchange rate variability increases. Therefore the coefficient of retention should increase as ER variability somehow raises the degree of insulation of the domestic capital market.

In the next section we shall provide some new specification of the F-H



puzzle without FDI. In section 3 we present the results of the econometric tests. In section 4 we consider the effect of exchange rate volatility, while in section 5 we draw some conclusions.

## 2 The exclusion of FDI in the empirical specification

The purpose of this section is to go through the definition of the investment variable used in almost all tests of the F-H puzzle. Our innovation concerns the definition of investment. The common wisdom in these tests is to use the investment in each country without subtracting FDI from the variable adopted. It seems to us that this is not the proper investment variable. To get the right investment, we should subtract from each figure of domestic investment the corresponding amount of net FDI inflow into the country. The reason behind this alteration of the dependent variable concerns the intertemporal budget constraint and/or current account discipline related to FDI. If a USA citizen sets up a new firm in Euroland the investment is undertaken without any regard to the intertemporal budget constraint of Euroland. The budget constraint is the one faced by the USA citizen who remains the owner of the real asset in Euroland. This means that investment should not be limited by the current account discipline that is faced by the expenditure of any European representative agent. As a consequence we rule out any causality going from internal saving to the net inflow of FDI. If we use the standard definition of domestic investment without subtracting FDI a F-H coefficient near to 1 is no sign of home biasedness of saving since part

of the investment draws on external saving.

We adopt this novel approach in a test that replicates those undertaken recently by Obstfeld and Rogoza (2000) and by Jansen (1997). Even though the statistical measure of FDI is not accurate and subject to serious drawbacks<sup>3</sup> it seems to be more appropriate than the investment variable that includes also FDI. A similar approach has been used recently on a narrower data set on a panel (Rossini and Zanghieri, 2001). The outcome is a F-H coefficient which is lower than both, the original one (and subsequent updated contributions: Feldstein, 1983; Feldstein and Bacchetta, 1991) and the coefficient that may be obtained on the same data set with the traditional investment variable.

The econometric tests we present are performed with panel estimation on groups of countries belonging to different areas.

The first area is represented by the EU made up of 14 countries (Luxembourg is not considered since it is too small and plays the role of a kind of tax heaven resort). In this area we expect that the degree of financial integration has increased quite substantially during the last two decades, gradually weakening the dependency of investment on domestic saving.

The second area is termed "pseudo EU" since we include Switzerland and Norway. We add those two countries since they are quite integrated with the rest of the Union, mainly from a financial point of view. Among other things, this is confirmed by the ability of Norway to run huge current

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<sup>3</sup>The statistical FDI definition includes also equity acquisitions by non residents. This may decrease the reliability of the FDI data to describe genuine investment by non residents. See, for a definition of the FDI data, IMF (2000). We are not aware of any better statistical specification of FDI.

account deficits in the 1970's and in the 1980's drawing mostly on capitals from European countries to finance the development of North Sea oil drilling plants. We expect in this area a higher F-H coefficient than in the authentic EU since we include countries that are anyway less integrated with the EU than the members of the EU among themselves.

The third area is the EMU. Here the level of financial integration may be even larger. However, we should make a distinction between what we expect after the introduction of the common currency, from 1999 onwards, and the path countries had to follow to qualify for the club. Maastricht treaty imposed limits on current account deficits (but not on surpluses) for qualifying countries<sup>4</sup>. This discipline may have induced a severe current account targeting in the years preceding the establishment of the EMU, phases 1 and 2 of the EMU, up to 1999, or even 2002, the year of the final stage of the transition to the single currency. Now current account targeting has lost any meaning and it remains just a historical record of a discipline that the single currency makes redundant. Then our expectation is for a confirmation of the F-H puzzle for the 1990's to a greater extent than in the past, while in the first decade of the new millennium we shall probably see a reversal of that within the EMU.

The fourth area is the enlarged EU, where we include some of the countries that are likely to join the EU during the present decade. Tests for these countries cover only part of the 1990's since data for the years before the beginning of the transition are meaningless.

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<sup>4</sup>The Maastricht Treaty mentions "sustainable balance of payments" (art. 3A) and the pattern for qualification imposes a discipline on current account (art. 109, h, i, j).

The relationship used in F-H style studies is:

$$\left(\frac{I}{Y}\right)_i = \beta_1 \left(\frac{S}{Y}\right)_i + \mu_i \quad (1)$$

where I is nominal investment, Y nominal GDP, S nominal saving and  $\mu_i$  is the error term. Subscript i refers to country. The relationship is tested using fixed effect panel estimation, considering both the entire time span and shorter 5 year subsamples.

The new specification, with FDI netting out, appears as<sup>5</sup>:

$$\left(\frac{I_i - FDI}{Y}\right)_i = \beta_2 \left(\frac{S}{Y}\right)_i + \nu_i \quad (2)$$

A further specification was used to take into account the effect on the current account of exchange rates (ER) variability. This approach has already been partially used by Stirboeck and Heinemann (1999) and seems to provide significant results due to the further discipline that ER risk imposes on current account and therefore on the saving investment relationship, implying that ER variability makes for a close relationship between I and S: To this purpose the specification adopted is:

$$\left(\frac{I}{Y}\right)_i = \beta_3 \left(\frac{S}{Y}\right)_i + \beta_4 \left(\frac{S}{Y} \times XR\right)_i + z_i \quad (3)$$

where  $XR_i$  stands for the variability of the exchange rate of country i; measured by the annual standard deviation of monthly percentage change of trade weighted exchange rate. XR is introduced interactively as a measure of openness, as in the original Feldstein and Horioka (1980) contribution.

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<sup>5</sup>FDI measure used is defined as net foreign direct investment in reporting country.

### 3 The results

We use fixed effect panel estimation with GLS in order to correct for heteroskedasticity and have consistent standard errors and covariances, for all specifications (1), (2), and (3).

The analysis is conducted over several different time intervals due to constraints on the availability of data.

#### 3.1 Area 1: EU

We present the results in table 1 of specification (1) and (2). Constants are country specific and are not reported.

	$\bar{1}$	$\bar{2}$
Table 1	0.30	0.26
t <sub>j</sub> Stat	12.48	12.44
R <sup>2</sup>	.75	.73

We may consider the evolution of (1) over time. We cannot perform the same exercise with the correction for FDI due to lack of consistent data.

The results are in table 2.

	$\bar{1}; 70-74$	$\bar{1}; 75-79$	$\bar{1}; 80-84$	$\bar{1}; 85-89$	$\bar{1}; 90-94$	$\bar{1}; 94-99$
Table 2	:37	:28	:37	:33	:72	:53
t <sub>j</sub> Stat	11:87	6:20	25:67	128:02	19:57	17:93
R <sup>2</sup>	:80	:75	:83	:84	:72	:95

#### 3.2 Area 2: Pseudo EU

We replicate what done for area 1 and we then get, for the panel over 1991-1997,

		$\bar{1}$	$\bar{2}$
Table 3		0.34	0.25
	t <sub>j</sub> Stat	18.13	13.67
	R <sup>2</sup>	.72	.73

while for the evolution of (1) over time we get table 4.

		$\bar{1}; 70-74$	$\bar{1}; 75-79$	$\bar{1}; 80-84$	$\bar{1}; 85-89$	$\bar{1}; 90-94$	$\bar{1}; 94-99$
Table 4		:39	:31	:35	:33	:73	:52
	t <sub>j</sub> Stat	11:50	7:06	28:02	29:75	24:14	20:70
	R <sup>2</sup>	:82	:83	:85	:86	:74	:90

### 3.3 Area 3: EMU

Let us replicate the same exercise for the EMU and get:

		$\bar{1}$	$\bar{2}$
Table 5		0.33	0.27
	t <sub>j</sub> Stat	21.72	17.50
	R <sup>2</sup>	.69	.74

  

		$\bar{1}; 70-74$	$\bar{1}; 75-79$	$\bar{1}; 80-84$	$\bar{1}; 85-89$	$\bar{1}; 90-94$	$\bar{1}; 94-99$
Table 6		:65	:49	:32	:33	:42	:53
	t <sub>j</sub> Stat	7:15	11:11	238:49	161:41	34:27	18:28
	R <sup>2</sup>	:68	:66	:76	:88	:65	:92

### 3.4 Area 4. Enlarged EU

Again, the results for enlarged EU are:

	$\bar{1}$	$\bar{2}$
Table 7	0.15	0.09
t <sub>j</sub> Stat	4.38	2.42
R <sup>2</sup>	.77	.81
	$\bar{1}; 90-94$	$\bar{1}; 94-99$
Table 8	:09	:32
t <sub>j</sub> Stat	2:60	14:89
R <sup>2</sup>	:79	:89

From tables 1, 3, 5, 7 we notice that the level of the coefficient of saving decreases as we go from the "gross" investment to the "net" domestic investment, i.e. without FDI. This means that the true F-H coefficient is lower than in the usual tests. FDI seems to have a compensating effect decreasing the excess demand for saving.

When we go through the analysis of specific areas we discover that in the EU the level of the F-H coefficient is rather low over the 1970's and the 1980's, while it increases quite substantially over the 1990's, suggesting that countries, in order to qualify for the euro club, were targeting the current account. The difference with respect to the EMU is quite relevant in the 1970's and in the period 1990-94. The inclusion of countries opting out seems to increase the coefficient as if they feared attacks on their currencies if they did not target the current account, implying that staying out of EMU meant even a stronger discipline on external account. A similar result appears for the Pseudo EU.

As far as the enlarged EU is concerned we found that the F-H coefficients are very low. With the "net" investment specification, over the period 1991-1998,

the coefficient is not significantly different from zero, as it is for the period 1990-94. This may be the sign that Eastern countries financial markets are quite open and countries are able to invest without having to comply with the strict constraint of domestic saving. This confirms the results of Vamvakidis and Wacziarg (1998). This could also be the effect of diversification of financial investments across countries of different levels of development. The explanation goes as follows: for a rich country, it is more convenient to diversify towards a developing country rather than to an economy at a similar level of development whose economy is more cyclically correlated to it.

## 4 The exchange rate volatility

The results obtained using specification (3) are in table 9 below.

Table 9

	3; 76-80	3; 81-85	3; 86-90	3; 91-95	3; 94-98	3; 76-98
$\beta_j$	:4711	:2735	:1611	:3953	:5324	:4553
$t_j$ Stat	28:0383	52:4626	81:2909	22:8626	17:4356	18:4675
	4;76j 80	4;81j 85	4;86j 90	4;91j 95	4;94j 98	4;76j 98
$\beta_j$	1:0387	:2053	9:1371	:7997	:0090	:2399
$t_j$ Stat	3:0193	6:7513	344:8365	8:5598	0:0979	1:2618

$R^2$

It seems that the introduction of exchange rate variability upsets quite strongly the F-H coefficient and in some cases it reverses the sign of it. We are rather uncertain about the effect of ER volatility on investment. We think that a better specification of ER variability is needed since the relationship



between ER volatility, the current account and ...nally investment doesn't appear robust.

## 5 Conclusions

We have gone through a test of the F-H paradox using a more cleaner measure of domestic investment, i.e. by subtracting from it the net inflow of FDI. In all cases examined it appears that the F-H coefficient becomes smaller. Then, once the specification of the dependent variable becomes more precise the comovements of saving and investment tend to become less important.

The test has been extended to various dimensions of Europe to assess the extent of capital markets openness. When we consider the effect of saving across time and different European areas we find that the degree of capital mobility, that the F-H coefficient signals, seems to be fairly high in all definition of the Europe (EMU, EU, pseudo EU and enlarged EU).

Surprisingly enough, the enlarged Europe shows a lower F-H coefficient over the 1990's, i.e.: pointing to a relevant capital mobility that is a good premise for the ongoing integration of Eastern Europe with incumbent members of the EU.

Interesting enough is a further effect emerging out of the Maastricht discipline for the EU and the EMU in the first half of the 1990's. Current account targeting was a common policy, needed to qualify for the euro, that made many countries loath to have quite diverse saving and investment levels. We are looking forward to analysing the same relationships as from 1999 onwards, when data will be available, since the single currency should make

current account targeting at the national level meaningless in the EMU.

## 6 Data bases

First we define the groups of countries belonging to EU, EU15 and Enlarged EU.

1. Pseudo EU:

Austria, Belgium, Switzerland, Germany, Denmark, Spain, Finland, France, UK, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Sweden.

2. EU 14 = pseudo EU minus Switzerland and Norway.

3. EMU: EU 14 minus Denmark, UK, Sweden.

4. Enlarged EU: EU plus Czech republic, Estonia, Croatia, Hungary, Poland, Slovakia.

Data come from World Bank (2001) for saving, investment and GDP, while data for exchange rates come from Datastream.

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