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Investment Home Bias in the European Union *

Work in progress

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Abstract

The creation of the European Single Market (ESM) and the adoption of the Euro eliminated barriers for capital mobility. This paper analysis the dependency of investment on domestic savings across European Union (EU) economies over three different time frames split by major milestones in the economic history of the union. Using a panel error correction model, I find evidence of low capital mobility before the creation of the ESM and after the crisis of 2008, suggesting that a solvency constraint can bind investment to domestic savings even when barriers for capital mobility are eliminated. The estimates suggest that there is a long-run relationship between the aforementioned aggregates associated with a solvency constraint. However, this constraint does not appear to be binding between 1993 and 2007, matching with an increased spread in the current account balances between high and low income economies among the EU. Between 2007 and 2020, restrictions on borrowing faced by some EU economies reduced capital mobility, despite the absence of capital controls and exchange rate risk.

Keywords: Current Account, Savings, Investment, Capital Mobility, Feldstein-Horioka Puzzle

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1. Introduction

Since 1993, with the introduction of the European Single Market (ESM), capital became freely mobile across countries belonging to the European Economic Area, the majority of which are European Union (EU) countries. Moreover, as the name suggests, the Euro Area (EA) countries share a common currency which eliminated exchange rate risk for those investing in countries that share the Euro. In the years that followed the creation of the ESM and the adoption of the Euro, poorer countries were able to support exceptionally high investment rates, in an era of cheap capital, well above their domestic savings. However, the post-crisis period severely penalized the capacity of countries like Portugal and Greece to finance investment with foreign capital. In Portugal, investment accounted for approximately 21% of Gross Domestic Product (GDP) in 2006, falling to 15% in 2013. Greece registered an investment rate of 27% in 2003 versus 10% in 2015.

Since 2012, domestic savings and investment have moved hand-by-hand in these economies, which is a reflection of their incapacity to finance investment with foreign capital as once was possible. It also shows an inversion in the globalization process concerning capital mobility. In light of this event, I find it worth to revisit the Feldstein-Horioka puzzle (FHP). Perceived by many as a solved issue in International Macroeconomics, the puzzle was brought to us by Feldstein and Horioka (1980), who found a surprisingly high correlation between domestic savings and investment in OECD economies. In theory, with perfect capital mobility, if a country increases its savings then these should be spread regardless of geographical location. The share allocated to each country would primarily depend on its marginal productivity. The high correlation was a sign of low capital mobility among OECD countries. However, Coackly et al., (1996) named the FHP a "statistical artifact" resulting from the fact that savings and investment co-integrate with a unit root coefficient, and does not reflect capital immobility. Their argument is that by nature, the current account as a share of GDP [1] has to be stationary, otherwise, an economy could borrow indefinitely. Because the

[1]The difference between the savings rate and the investment rate

original Feldstein-Horioka regression is a cross-section model which estimates the average long-coefficient, it ends up estimating this co-integrating relationship.

Nonetheless, Blanchard and Giavazzi (2002) found a strong decrease in this correlation in the EU and EA when using a panel version of the Feldstein-Horioka regressions with a time-frame that captures the period after the creation of the ESM. This could mean that capital mobility did in fact increase after 1993. So, even though an economy can not borrow forever, this does not imply that there can not be long time-spans when a country runs continuous deficits or surpluses. In fact, between 1980 and 2014, the average current account balance within the bottom 50% economies in terms of GDP *per capita* was always negative whereas the richer countries keep running continuous surpluses since 1994. This hardly matches a stationary behaviour for the current account in EU economies (Holmes (2006) and Litsios and Pilbeam (2017)). So, capital can present low mobility due to many factors, one of them being over-borrowing. The 2008 financial crisis provides an excellent opportunity to test Coackly et al., (1996) conclusion. This is because the bottom 50% GDP *per capita* economies were forced to reduced their current account deficits which evidences that the solvency restriction became binding. Should an increased correlation between savings and investment be found after the crisis, it would suggest lower capital mobility coinciding with tighter restrictions on borrowing.

In this paper, I access both the long and short run dynamics between domestic savings and investment using an error correction model (ECM) over the European Union economies. I split a 40 year window between 1980 and 2020 into three sub-periods with the intent of capturing changes in the coefficients reflecting the different stages of borrowing restrictions over time. To the best of my knowledge, this is the first study to analyse this relationship using data from 2015 onward.

2. Literature Review

This paper relates thoroughly to one of the central puzzles in International Economics: the Feldstein-Horioka puzzle named after Feldstein and Horioka (1980) seminal paper. A general equilibrium result is that when capital is freely mobile, investment and domestic savings should be uncorrelated over time and across countries. However, Feldstein and Horioka firstly estimated this correlation to be around 0.89 within a sample of 16 OECD countries, over the window 1960-1974. Also, Obstfeld and Rogoff (1996) estimated it at 0.62, within 22 OECD countries, between 1982 and 1991. Blanchard and Giavazzi (2002) estimated it to be 0.58 between 1975 and 2001, also within the OECD.

These results indicate a low level of capital mobility within OECD economies, implying that domestic savings are majorly reinvested in the home country, as concluded by Feldstein (1993) Schmidt-Hebbel et al., (1996) Coackly et al., (1996) and many others. One possible explanation could be the government targeting a current account balance, (Obstfeld (1996), Summers (1988) Coackly et al., (1996). Another reason for the high savings-investment correlation could be home-bias. Information costs and barriers to participate in foreign markets can mitigate the capacity of households and corporations to diversify investments internationally, especially in the case of small sized portfolios (Georgopoulos and Hejazi (2005)). French and Poterba (1991) document this bias for domestic holdings of domestic stocks. On the trade side there is the Armington assumption that goods can be preferred due to their origin (Shiells, Stern and Deardoff (1986) and Blonigen and Wilson (1999)). Moreover, a long-run relationship between domestic savings and investment could be consequential of an inter-temporal solvency condition that forces the present value of the sum of the current account balance to be zero (Coackly et al., (1996)).

Nonetheless, Blanchard and Giavazzi (2002) estimated a slump in the investment-savings correlation for the subperiod of 1991-2001, in the sub-sample of European Union (EU) and Euro Area (EA) countries, concluding that it was a reflection of the increased economic integration regions. In a later study, But et al., (2017) not only found evidence of low corre-

lation between domestic savings and investment after the creation of the common currency, 2003-2008, they also documented a strong resurgence after the 2008 financial crisis. This resurgence can be explained by the decrease in investor's confidence in a time of economic slowdown, suggesting an increase in the home bias. Moreover, as some of the Euro Area countries faced a shut down in the international bonds market, Catão (2017), investment should become tightly linked to domestic savings, as the inter-temporal solvency condition would require. This is where this study fits in. According to the aforementioned literature, the Feldstein-Horioka puzzle is still open to debate. Does the correlation between domestic savings and investment reflect capital immobility, or is just a mirror of how binding the current account solvency condition stands?

3. Data

The data used is from the AMECO data base as of 4th January of 2020. The full data-set ranges from 1960 to 2020, where the last year is a forecast, which I decided to include in the analysis to increase the sample size, and to use data as recent as possible. I only used data from 1980 onward because before that many observations are missing, and for countries where information regarding each variable was available. Some were excluded because their characteristics regarding size and fiscal regime are not representative of a typical economy. [1] Data from West Germany between 1980 and 1990 was considered as data of Germany.

The data set consists of a panel of 29 OECD countries and 40 years, although a few countries lack data until around 1993. Moreover, data for private and public savings was not available for the years before 1995. This study focuses on the EU, so the analysis conducted only includes countries who adhered to the EU, regardless of the moment in which they were admitted. In section 7 a robustness analysis is conducted using a partition of fourteen EU economies which I named EU14. [2] This group can be considered the core of the EU, as it leaves out countries for which I have less time observations, and which joined the EU in a later stage.

As for the variables, those that did not require treatment are GDP, *per capita* GDP, the growth rate of *per capita* GDP, Gross Savings as a proxy for Savings, Gross Fixed Capital Formation as a proxy for Investment, Net Lending/Borrowing from Government and Corporations proxy Government and Corporations savings respectively. Household Gross Savings represents Household savings. All ratios and summary statistics result from the author's calculations.

[1] Excluded countries: Cyprus, Latvia, Lithuania, Luxembourg and Malta.

[2] EU14 includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden and the United Kingdom

4. Empirical Approach

I decided to use an error correction model (ECM) proposed by Davidson et al., (1978) to study the dynamics of investment and domestic savings. The model assumes the variables to be co-integrated, for which evidence has been found by many authors (Coackly et al., (1996), Drakos et al., (2017) and others). This specification allows the study of both long and short run effects between highly persistent series. The long-run equilibrium equation is similar to the usual FH regression with a few extra controls identified as investment determinants in Catão (2017).

$$\frac{I}{Y}_{i,t} = \alpha_0 + \alpha_1 \times \frac{S}{Y}_{i,t} + \alpha_2 \tilde{y} + \gamma t + \varepsilon_{i,t} \tag{1}$$

I is investment, Y is output, S is savings, $\tilde{y}$ is output gap and t is a time trend. I also ran equation (1) controlling for total factor productivity and the long-run interest rates on government bonds, but these were not significant across samples. The coefficient α_1 captures the long-run effect of domestic savings on investment.

$$\Delta\frac{I}{Y}_{i,t} = \theta_i + \psi\Delta\frac{S}{Y}_{i,t} + \rho\varepsilon_{i,t} + u_{i,t} \tag{2}$$

The ECM in equation (2) shows the short-run effect of an increase in domestic savings on investment ψ, and an adjustment coefficient ρ which can be interpreted has how disequilibrium's in the long-run model affect the investment rate in the short run. In light of this study, a decrease in ρ signals a increase in the tightness of the solvency condition. Note that ρ should be negative implying that investment converges to its equilibrium level defined in equation (1). By measuring the speed of convergence to the equilibrium, it captures the impact of the solvency condition on the short-run dynamics of investment. The parameter α_1, measures the home bias of savings as it reflects by how much an increase in domestic savings translates to an increase in investment in the same country.

The data set was split into the following three periods:

- 1980 - 1993: a benchmark period before the creation of the ESM and the adoption of the Euro. Capital mobility is expected to be low as the major steps for economic and financial integration were not yet taken. Therefore, access to international capital markets was not only restricted, but also costly, due to exchange rate risk and the associated bureaucracies. So we can expect investment to be strongly driven by domestic savings and tighter restrictions on borrowing. This should translate in high estimates of α_1, and low estimates of ρ.

- 1993 - 2007: Capital mobility is expected to increase due to the creation of the ESM in 1993 and of the common currency in 2001. During this time period, low income economies within the EU presented exceptionally high investment rates financed by foreign savings. On the other hand, high income economies showed continuous CA surpluses which led Holmes (2006) and Litsios and Pilbeam (2017) to question the stationary behaviour of the CA balances. Consequentially, I expect the share of investment supplied by domestic savings (α_1) to be lower. Moreover, as the cost of borrowing decreased, I expect the solvency condition faced by EU economies to be less tightening. Another factor which may have also contributed to this event, is that by sharing a common currency, debt issued by Euro Area Economies is backed by a strong currency issued by the European Central Bank (ECB). Investors could have perceived that should an economy become insolvent, the ECB could intervene by buying assets or by lowering interest rates to avoid default, which we latter saw, during the crisis. ρ is thus expected to be closer to zero during this period.

- 2007 - 2020: with the emergence of the financial crisis, the solvency of highly indebted economies among EU became questionable and foreign capital became more expensive which translated into sharp decreases in investment. The incapacity of some economies to finance investment with foreign capital should translate into a higher α_1, as changes

in investment are more likely to be driven by domestic savings. Also, for high income economies, less borrowing from capital importers implies that the share of savings reinvested domestically should increase. We can also expect to find a more negative ρ estimate signaling the tightening of the solvency condition. The fact that low income economies among OECD had to reduce their CA deficits during this time span is indicative that deviations from the long-equilibrium should translate in increased shifts in investment.

5. Results

Table 1: **Panel Error-correction Estimates for the Investment - Savings Relationship**

DFE Estimates	1980 - 2020	1980 - 1993	1993 - 2007	2007 - 2020
LR Coefficient	0.427	0.728	0.244	0.512
	(0.080)	(0.161)	(0.145)	(0.134)
	[0.000]	[0.000]	[0.092]	[0.000]
Adjustment Term	-0.243	-0.350	-0.287	-0.324
	(0.020)	(0.053)	(0.040)	(0.034)
	[0.000]	[0.000]	[0.000]	[0.000]
SR Coefficient	0.233	0.406	0.129	0.259
	(0.040)	(0.095)	(0.050)	(0.073)
	[0.000]	[0.000]	[0.009]	[0.000]

Note: This table presents the DFE estimates for both the long and short-run effects of domestic savings on investment, as well as the estimates of the adjustment term coefficient. Standard errors are presented in brackets and p-values in squared brackets.

Table 1 presents the estimates of the panel error correction model specified in equations (1) and (2) for the savings-investment relationship for EU economies. Results for the entire sample (1980-2020) suggest some degree of capital mobility. The home bias is around 40%, statistically significant. The coefficient of the adjustment term indicates that deviations from the long-run equilibrium take close 4.1 years to correct. Looking at the benchmark period (1980 - 1993) we can see exactly what we predicted. The long-run coefficient shows high dependency of investment on domestic savings. The home bias is estimated at 72.8%, in line with Obstfeld and Rogoff (1996) estimate for a similar period. Moreover, the adjustment term predicts that deviations from the equilibrium fade away after 2.9 years, the shortest time span among the regressions. So, not only capital shows less mobility, but tight restrictions on borrowing are mirrored. The short-run coefficient is also the highest among the samples used indicating higher sensitiveness of investment to shocks in domestic savings.

Between 1993-2007, which encompasses the major milestones for economic and financial integration, the home bias is estimated at a much lower level. The point estimate of the long run coefficient dropped 48 p.p. to a record low of 24.4%. The adjustment term indicates

that deviations from the long-run relationship take approximately 3.5 years to fade away. This is also indicative of less tightening restrictions on borrowing. Moreover, the short-run coefficient is also much lower.

In the 2007-2020 period, the point estimate of the long-run coefficient is indicative of a stronger dependency of investment on domestic savings. The home bias is estimated at 51.2% Moreover, the estimate of the adjustment term decreased by roughly one standard deviation, indicating that deviations from the equilibrium take 3.1 years to correct. The short-run coefficient is about twice the estimate from the previous period.

These results favor the claim raised by Coackly et al., (1996), that investment and savings are co-integrated, as a result of a long-run solvency restriction (the coefficient of the adjustment term is statistically significant in all samples). I also find evidence that this relationship is not always tightening, and that there can be time spans when the home bias is relatively close to zero as in the 1993-2007 sample. In fact, the long-run coefficient is not statistically significant at the 5% nor 1% levels, confirming Blanchard and Giavazzi (2002) finding of increased capital mobility after the creation of the ESM. Although, evidence from the 2007-2020 period supports that the solvency condition could be jeopardizing the efforts made by European institutions during 1993-2007. In a nutshell, these results indicate that capital mobility can be accessed with an ECM, as this methodology is sensible to the effect of the solvency condition on the short-run dynamics, here accessed by the adjustment term coefficient. The long-run coefficient estimates are in line with the expectations drawn, suggesting that capital mobility is indeed sensitive to the tightness of the solvency condition. These results not only bring a relevant input to solve the Feldstein-Horioka puzzle, but also bring important consequences for the future of low income economies within the EU and the EA.

6. Further Issues

Table 2: **Average Current Account Balances for EU Income vs Low Income**

	1980-1993	1994-2000	2001-2007	2008-2014	2015-2020
EU High Income	-2.03	1.23	1.59	1.62	2.65
EU Low Income	-4.28	-4.13	-7.16	-3.09	0.64
Spread	**2.24**	**5.36**	**8.75**	**4.71**	**2.01**

Note: This tables shows the average current account balance as a percentage of GDP over different time periods across the EU 50% top and bottom countries in terms of GDP per capita.

In Table 2, we can see the consequence of the results presented in the previous section. If capital mobility is high and without restrictive barriers, we can expect low income countries to behave as capital importers, whereas high income ones should behave as creditors. A straightforward argument to support this claim is that theoretically, low income economies have higher marginal productivity resulting from their higher growth potential. The increased capital mobility estimated between 1993 - 2007, should result in higher CA deficits among low income economies within the EU and higher surpluses among the high income ones. This is exactly what we observe in Table 2. After the creation of the ESM in 1993, the top 50% economies in terms of GDP *per capita* show a improvement of 3.3 p.p. in their CA balances. As for the bottom 50%, CA deficits amplified by 3 p.p. after the creation of the common currency. When the crisis emerged in 2008, we expect low income economies to tighten their deficits as a consequence of the increased pressure on their solvency. So the "spread" between the CA balances between high income and low income economies should present and inverted u-shape trajectory as opposed to the home bias estimates presented in Table 1. The empirical evidence shown rigorously matches our expectations.

Next, I bring forward the decomposition of the CA balance of Portugal and Greece, two economies which were and continue to be, most affected by the long-run solvency restriction.

In fact, these countries were under the IMF supervision during the crisis of 2008 as their foreign debt became unsustainable. Table 3 and Table 4 present the average value of each

Table 3: **Portugal Current Account Decomposition**

Item	**1980 - 1993**	**1994 - 2000**	**2001 - 2007**	**2008 - 2014**	**2015 - 2020**
Current Account	-9.69	-7.16	-9.01	-5.46	0.12
Investment	30.14	26.56	24.34	18.54	17.58
Savings	20.45	19.40	15.33	13.08	17.70
Government		0.50	-1.02	-3.51	1.11
Private		19.49	16.36	16.59	16.58
Households		9.96	7.69	6.47	4.68
Corporate		9.53	8.67	10.12	11.91

Note: the table shows the evolution of the current account and its main items for Portugal over different time periods

Table 4: **Greece Current Account Decomposition**

Items	**1980 - 1993**	**1994 - 2000**	**2001 - 2007**	**2008 - 2014**	**2015 - 2020**
Current Account	-8.1	-5.7	-10.7	-8.4	-0.9
Investment	27.7	23.7	25.5	15.9	12.8
Savings	19.6	18.1	14.8	7.5	11.9
Public		-2.7	-1.8	-5.4	2.3
Private		20.9	16.6	12.9	9.6
Household		7.9	4.8	0.6	-3.2
Corporate		12.9	11.8	12.3	12.7

Note: the table shows the evolution of the current account and its main items for Greece over different time periods

item for the respective periods. We can see that from 1980 until 2007, both economies were able to run continuous and very large CA deficits, implying that investment was above their savings capacity for almost three decades. It might seem odd that between 1980 - 1993, these countries could run large CA deficits, when we estimated capital mobility to be low. However, this does not contradict the main finding of this paper. During these years, debt to GDP ratios were relatively small, so these economies faced none to little restrictions on the amount of debt they could issue per year. So it is important to highlight that capital mobility is estimated to be low between 1980 - 1993, not because of the long-run solvency

restriction, but because the major barriers (different currencies and capital controls) had not been lifted yet. The ESM was only established in 1993 and the common currency was fully adopted in 2002. But as more and more debt was accumulated in the decades that followed and with the rise of interest rates when the crisis emerged, investment slump. In the early stage of the crisis (2008 - 2014), these economies still recorded large CA deficits. Although investment decreased sharply, government deficits also increased significantly, as a result of smaller tax revenue and increasing unemployment. It was only between 2015-2020 that the governments were able to run surpluses, thus balancing the current account. At this stage, investment and domestic savings are expected to move hand-by-hand in the near future, thus mirroring the increase in the estimate of the long-run coefficient in the sample of 2007 - 2020. This has significant implications on the prospects of future growth in these economies. Portugal and Greece are among the poorest countries in the EU. Investment is one of the key factors that determines growth in terms of GDP *per capita*. By being deprived from borrowing, investment is mainly determined by domestic savings, which in turn should be small, as poorer economies tend to save less.

7. Robustness Analysis

Table 8 is a replicate of Table 1, only it considers a partition of the of the previous sample. This time, the DFE estimates were computed using the EU14 group. Regarding the point estimates Table 8 presents similar fluctuations in both the long-run coefficient and the adjustment term. The fact that the adjustment term is always statistically significant at the usual levels reinforces the previous result that savings and investment co-integrate. Focusing in the long-run coefficient estimates, the home-bias for the entire time range is considerably higher (63%). One major difference is in the 1993 - 2007 sample, where the coefficient is estimated to be 13 p.p. higher, and is now significant at the 5% level. Because the two estimates are within a one standard deviation radius from each other, we can not infer that the home bias was higher at the core of the EU. The opposite is true for the 2007 - 2020 sample, which is indicative of a tighter linkage between investment and savings in the EU core.

Table 9 presents the static panel estimates for the investment-savings relationship for both the EU and EU14 groups. I used Pooled OLS, Fixed Effects, Random Effects and Between Estimator method to estimate the long-run relationship between savings and investment. When considering a static panel, we can see that the home bias is considerably under estimated across all methodologies, between 1980 and 2020, when compared to the ECM results. Looking at the different sub-periods, similar estimates are produced in the EU and EU14 samples. The home-bias estimates, although relatively below the ECM ones, are above the ones computed in further periods, indicating an increase in capital mobility as economic and financial integration progressed. Considering the 2007 - 2020 sub-period, the results are particularly inconclusive. The coefficient estimates are only statistically significant when using Pooled OLS, even though we also observe increases in the point estimates in the remaining methodologies. The fact that the static panel regressions fail to capture the resurgence of the long-run relationship between investment and savings after the crisis could be explained by the apparent underestimated coefficients they generate.

8. Conclusion

In this paper I accessed the savings-investment relationship within the EU, with the intent of testing if the 2008 crisis had a significant impact on capital mobility within these economies, in the years that followed. The statistical evidence found using a panel error correction model suggests that capital mobility has decreased between 2007 and 2020 relatively to 1993 - 2007. I also find evidence that economic and financial integration reforms led by the EU have successfully reduced the home bias of investment between 1993 and 2007, mirroring increased capital mobility. The results support the existence of a solvency restriction identified by Coackly et al., (1996) as the reason for the co-integrating nature of savings and investment. Although, this paper shows that such restriction is not always binding, and thus there can be long time spans when countries can run continuous CA deficits, behaving as capital importers. Nonetheless, limits to borrowing can undermine capital mobility. The home bias estimate increased during 2007 - 2020 which is indicative that such restriction can have an actual impact on capital mobility. This may be confused with the barriers, which are ruled out, as many of the EU economies share a currency and have agreed on lifting restrictions on capital movements. This paper can shed light over a classical puzzle in International Economics, the Feldstein-Horioka puzzle.

These findings are of paramount importance for countries like Greece and Portugal, which stand among the bottom 25% percentile concerning GDP *per capita*, and benefited from importing foreign capital for three decades (1980 - 2010). As investment is one the main vehicles through which economic growth is achieved, domestic savings alone may not suffice for them to converge to their higher income peers. Countries in this situation should look forward to reduce the cost of financing investment with foreign capital in the short-run in order to overcome the limitations of being over dependent on domestic savings.

9. Appendix

Table 5: **Summary Statistics: OECD 1960 - 2020**

Variables	Investment (% of GDP)	Savings (% of GDP)	Current Account (% of GDP)	Output Gap (% of GDP)	GDP *per capita* (in thousands of Euros)
Mean	24	22	-1.9	-0.4	15.4
Std	5	5	4.6	2.9	13.7
Median	24	22	-1.7	-0.2	11.4
Q1	21	19	-4.5	-1.9	3.7
Q3	27	25	0.8	1.4	23.2
Min	1	1	-23.8	-15.8	0.4
Max	48	36	11.2	13.1	76.1

Note: the table shows the summary statistics for the entire data set, ranging from 1960 to 2020. The output gap is computed as a % of potential GDP of the current year.

Table 6: **Summary Statistics: EU 1980 - 2020**

Variables	Investment (% of GDP)	Savings (% of GDP)	Current Account (% of GDP)	Output Gap (% of GDP)	GDP per capita (in thousands of Euros)
Mean	23.5	22.0	-1.3	-0.4	18.3
Std	3.8	4.2	4.3	2.4	12.2
Median	23.1	22.1	-1.1	-0.2	16.0
Q1	20.6	19.0	-4.1	-2.0	8
Q3	25.8	25.3	1.9	1.4	27
Min	17.7	14.2	-9.7	-5.2	1.2
Max	32.1	28.9	5.8	3.9	41.6

Note: the table shows the summary statistics for the EU group between 1980 and 2020. The output gap is computed as a % of potential GDP of the current year.

Table 7: **Summary Statistics: EU14 1980 - 2020**

Variables	Investment (% of GDP)	Savings (% of GDP)	Current Account (% of GDP)	Output Gap (% of GDP)	GDP per capita (in thousands of Euros)
Mean	22.0	22.6	-0.6	-0.4	24
Std	4.3	3.3	4.3	2.0	11
Median	22.1	22.5	-0.6	-0.5	23
Q1	20.3	18.9	-3.2	-1.6	14
Q3	24.4	25.5	-2.8	0.9	33
Min	14.2	17.7	-0.6	-0.5	23
Max	28.9	32.1	5.8	3.9	42

Note: the table shows the summary statistics for the EU14 group between 1980 and 2020. The output gap is computed as a % of potential GDP of the current year.

Table 8: **Panel Error-correction Estimates for the Investment - Savings Relationship - EU14 sample**

DFE Estimates	1980 - 2020	1980 - 1993	1993 - 2007	2007 - 2020
LR Coefficient	0.634	0.781	0.375	0.751
	(0.113)	(0.187)	(0.177)	(0.156)
	[0.000]	[0.000]	[0.034]	[0.000]
Adjustment Term	-0.207	-0.333	-0.274	-0.378
	(0.025)	(0.059)	(0.049)	(0.052)
	[0.000]	[0.000]	[0.000]	[0.000]
SR Coefficient	0.314	0.433	0.140	0.107
	(0.054)	(0.105)	(0.070)	(0.105)
	[0.000]	[0.000]	[0.045]	[0.310]

Note: This table presents the DFE estimates of the investment-savings relationship using a selection of 14 EU representative economies and winsorized data. Standard errors are presented in brackets and p-values in squared brackets.

Table 9: **Static Panel Estimators for the Investment - Savings Relationship - EU and EU14 samples**

EU Sample	1980 - 2020				1980 - 1993				1993 - 2007				2007 - 2020			
Estimators	**Pooled**	**FE**	**RE**	**BE**	**Pooled**	**FE**	**RE**	**BE**	**Pooled**	**FE**	**RE**	**BE**	**Pooled**	**FE**	**RE**	**BE**
Savings	0.221	0.220	0.222	0.230	0.461	0.515	0.509	0.370	0.160	0.042	0.058	0.267	0.247	0.162	0.194	0.231
	(0.031)	(0.104)	(0.101)	(0.148)	(0.075)	(0.110)	(0.103)	(0.315)	(0.051)	(0.190)	(0.174)	(0.190)	(0.043)	(0.238)	(0.172)	(0.108)
	[0.000]	[0.047]	[0.028]	[0.136]	[0.000]	[0.000]	[0.000]	[0.266]	[0.002]	[0.826]	[0.739]	[0.176]	[0.000]	[0.504]	[0.260]	[0.046]
R-squared	0.248	0.312		0.139	0.336	0.473		0.269	0.194	0.343		0.193	0.331	0.285		0.42
Observations	738	738	738	738	185	185	185	185	289	289	289	289	299	299	299	299
Adj R-Square	0.246	0.31		0.0533	0.329	0.467		0.136	0.188	0.338		0.103	0.326	0.28		0.362

EU14 Sample	1980 - 2020				1980 - 1993				1993 - 2007				2007 - 2020			
Estimators	**Pooled**	**FE**	**RE**	**BE**	**Pooled**	**FE**	**RE**	**BE**	**Pooled**	**FE**	**RE**	**BE**	**Pooled**	**FE**	**RE**	**BE**
Savings	0.101	0.288	0.264	-0.095	0.468	0.547	0.538	0.323	-0.053	0.098	0.066	-0.203	0.196	0.359	0.301	0.033
	(0.034)	(0.114)	(0.104)	(0.150)	(0.079)	(0.112)	(0.104)	(0.360)	(0.033)	(0.198)	(0.164)	(0.199)	(0.052)	(0.226)	(0.180)	(0.152)
	[0.003]	[0.028]	[0.011]	[0.545]	[0.000]	[0.000]	[0.000]	[0.392]	[0.113]	[0.630]	[0.686]	[0.336]	[0.000]	[0.140]	[0.095]	[0.832]
R-squared	0.246	0.353		0.0422	0.337	0.438		0.258	0.306	0.481		0.149	0.348	0.349		0.477
Observations	481	481	481	481	157	157	157	157	180	180	180	180	168	168	168	168
Adj R-Square	0.243	0.35		-0.171	0.329	0.431		0.093	0.298	0.475		-0.0398	0.34	0.341		0.361

Note: This table presents the Pooled OLS, Fixed Effects, Random Effects and Between Estimator method estimates of the investment-savings relationship using a selection of 14 EU representative economies and winsorized data. The output gap was used as control variable. Standard errors are presented in brackets and p-values in squared brackets.

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