DEPUZZLING THE PUZZLE

As regards Feldstein-Horioka, I will only state the view that running regressions of the investment rate, I/Y, on the saving rate, S/Y, is one of themore pointless exercises in open economy macroeconometrics, even when it includes time-varying parameters. There must be 50 ways to account for changes in the contemporaneous correlation between saving and investment. No matter what pattern one finds in the data, the questions “and?” and “so what?” are unavoidable. For instance, a country could have a perfect positive correlation between saving and investment while running a persistent current account deficit of 25 percent of GDP. And? So what?

--- Willem H. Buiter

THE PUZZLE

In 1980 two economist Feldstein and Horioka\(^2\) by means of a startlingly simple method upset conventional economic theory. Fast forward several decades and their puzzle still stands. Obstfeld and Rogoff\(^3\) coined it in 2000 one of the six major puzzles in international macroeconomics. How relevant is it still and should we really expect anything different?

The conclusion of Feldstein and Horioka that there was no perfect international capital mobility has been challenged many times\(^4\) and some have proclaimed that it has been solved.\(^5\) However, if anything, the financial crisis of the last years has shown us the limits of international capital mobility. Moving capital across borders of sovereignty and jurisdiction is not only a question of economics but also of politics.

Hence, I will argue in the following pages that the exercise performed by Feldstein and Horioka and their conclusions drawn are ignoring the political dimension. Correlating savings and investments rates alone is not a strong indicator by itself, as the quote at the top of this page argues there are countless ways of accounting for the strong correlation found by Feldstein and Horioka under perfect capital mobility. However, low correlations have direct consequences and these are highly unlikely to be found in the international political system.

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3 Obstfeld, M., and Rogoff, K. (2000). The six major puzzles in international macroeconomics: is there a common cause?
5 Blanchard, O., and Giavazzi, F. (2002). Current account deficits in the Euro area. the end of the Feldstein-Horioka puzzle?
REDOING FELDSTEIN-HORIOKA

Repeating the exercise done by Feldstein-Horioka one finds that the correlation coefficient has gone down significantly, from 0.84 in the 80s to 0.00 in 2000s\(^6\). However, this result is no reason to rejoice. Doing the same exercise for other country groupings the picture muddies quickly.

Appendix: correlation table – savings and investments (percentages), page 8

The exact composition of the different groups is found in the appendix, with the exception two groups (Feldstein-Horioka, and G20) all the groups are based on IMF country groups used for the World Economic Outlook\(^7\). Two conclusions can be drawn, there is a huge discrepancy across different country groups and second the overall trend is downward.

Appendix: correlation savings and investments over time, page 9

Would one take absolute savings and investments instead of savings and investment rates as a percentage of GDP the results change considerably. Not only do correlation rates go up, nearly all in the range of 0.9–1.0. If one looks very carefully there is still a downward trend but it is near negligible

Appendix: correlation table – savings and investments (absolutes), page 10

There is a simple and straightforward explanation for the stark contrast. The original Feldstein-Horioka method takes every country at equal value. The savings and investments rates in the United States are equally important as those in Haiti. By taking absolute values one effectively takes a weighted sample, thereby making the United States count more heavily than others.

Appendix: correlation table – scatter charts, page 11

Using absolute values instead of rates is crucial when considering that the vast majority of international capital does not got to Haiti and does go to the United States.

THE WORLD AS A CLOSED SYSTEM

To illustrate why using rates is a problem consider what a correlation coefficient of zero would imply. As correlation approaches zero, savings and investments become disconnected so that if the savings rate increases by 1% in country X investments are unaffected. In the real world this would imply that if people in the United States would start to save more per year, investments in the United States would be unaffected. In other words, all those extra savings would go abroad to other economies.

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The problem with this reasoning is that 1% of a big number, as the US GDP, is a big number and the world is not that big a place. The idea that the world could absorb all the extra US savings is unimaginable. Is the lack of a partial equilibrium analysis and as any general equilibrium analysis illustrates there is always a feedback loop. In the case of US savings, at least a part of that would go back into US investments.

This illustrates the impossibility of realistically having zero correlation. By size the world economy would be large enough to absorb most of the extra US savings, however, in practice the vast majority stays within the US. The correlation between investment and savings rates in the US between 1980 and 2009 is a very high 0.83. Similarly, the correlation coefficient of the G7 over the same period is an extremely high 0.94.

THE BIGGER PICTURE

The Feldstein-Horioka puzzle cannot be seen in a vacuum. Obstfeld and Rogoff\(^8\) have made an attempt at putting the Feldstein-Horioka puzzle in a larger framework of transaction costs. They argument is that by introducing transaction costs it becomes possible to explain four different puzzles at the same time: the (McCallum) home bias in trade, the (Feldstein-Horioka) savings-investment puzzle, the (French-Poterba) equity home bias and the Backus-Kehoe-Kydland consumption correlations puzzles.

Their hypothesis was confirmed by Kool and Keizer in 2009\(^9\) who using panel data found that the Feldstein-Horioka coefficient goes down as countries are more open and have a less strong bias to invest equity at home. Kool and Keizer used only a sample of OECD countries and there will undoubtedly follow countless of other studies, for now it helps to frame thinking on Feldstein-Horioka in a broader context.

Following Feldstein-Horioka and assuming that a high correlation between savings and investments implies limited capital mobility and would thus imply a larger equity home bias. Thinking once again in terms of a closed world system we expect the same result, since large economies are unable to invest all their domestic savings abroad they will by default invest a larger part at home, thus confirming the equity home bias.

SIZE MATTERS

The obvious conclusion to draw is that size matters. Bigger economies are more likely to invest savings at home for the reasons mentioned above. The implication is that one would expect a much smaller (absolute) gap between savings and investments as well as a higher correlation.

\(^8\) Obstfeld, M., and Rogoff, K. (2000). *The six major puzzles in international macroeconomics: is there a common cause?*

The data confirms this, when grouped in quartiles (relative to absolute size of GDP) there is a clear distinction between the top 25% and the bottom 25%. The 25% largest economies have the lowest gap between savings and investments and the highest correlation. Using the same measure, the (absolute) gap between savings and investments, there is a very similar pattern across the country groups as defined by the IMF.

Still, also here we can see a trend towards what Feldstein and Horioka would consider perfect capital mobility. When taking the world as whole we can see that the correlation is on a trend towards zero and the savings–investment gap is climbing.

The data is, however, not adequately showing how the trend has reversed in the years since 2009. Especially in Europe the correlation between savings and investments has shot up from 0.02 in 2008 to 0.69 in 2011. Similarly the average gap between savings and investment is going down rapidly from 7.01 in 2008 to 4.47 in 2011.

Does this imply that capital mobility is on a decline? Although many counties have imposed restrictions on capital mobility after the financial crisis, countries in Europe have not been amongst them. Quite ironically, it has been the free flowing of international capital mobility that gave cheap credit to Greece and caused its downfall when it disappeared in the wake of the financial crisis in the United States.

**IT’S THE POLITICS, STUPID**

The case of the Eurozone is a good illustration of the problems that international capital faces. Capital controls are an obvious obstacle but in today’s world hardly the only one. Different jurisdictions and language barriers complicate matters but can be overcome. A fundamental problem that will always persist though is the simple fact that crossing borders into a foreign country always carries risk.

The record of sovereign defaults throughout history is long and is unlikely to end any time soon\(^{10}\). Greece is only the most recent victim but will definitely not be the last. When push comes to shove, governments rarely prioritize foreign investors over domestic investors. For a limited time investors thought that in the Eurozone this was no longer the case. They treated German bonds the same as Greek bonds, however, as soon as European solidarity started to show cracks investors withdrew their assets.

The idea of a country having a persistent gap between savings and investments is problematic. The associated current account deficit or surplus cannot be sustained indefinitely. At some point investors will want their money back, in the case of the US, it is all fine as long as the Chinese are willing to keep buying bonds.

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\(^{10}\) Reinhart, C. M., and Rogoff, K. (2011). *This time is different*
Investors are not willing to take such risks and the larger the country the more money is at stake. Hence, it is not surprising that small countries have a much larger gap between investments and savings, the sums of money are considerably smaller and investors are more willing to take such risks. However, in the end, the safest place to invest remains home, hence the persistence of the Home Equity Bias.

**CONCLUSION**

The Feldstein-Horioka puzzle is interesting but not very relevant. The implications of zero correlation are not attainable in a world separated by national borders and ruled by sovereign nations. Following the Feldstein-Horioka puzzle also misrepresents international capital markets by giving equal weights to small and large countries alike, even though the latter form the bulk of international capital flows.

Comparing the Feldstein-Horioka puzzle for countries by size of their economy shows that large economies are have a much tighter relation between savings and investments than small economies. This is caused by two factors.

First, the world is a closed system that cannot absorb any excess savings without question. There are only a limited number of investment opportunities and the majority of those lie in the large economies. So even if a country would have a perfect portfolio of the world market they would still invest a significant portion at home.

Secondly, investing abroad carries costs but most of all it carries risk. The crisis in the Eurozone has illustrated this perfectly. When investors believed there was no political risk a strong divergence between savings and investments rates could be observed but those as easily reversed with the return of political risk and talks of a Greek departure out of the Eurozone.

Does that mean that there is not international capital mobility. To me it does not. Capital is free to move over most of the world, especially in the developed countries. However, investors chose often not to, for the reasons set out above. However, this is not an economic problem, it is a political problem. Hence, the Feldstein-Horioka puzzle is not an economic puzzle but a political puzzle and it should be seen as such.

As a political puzzle, however, the observation by Feldstein and Horioka is hardly surprising or interesting and that makes is irrelevant.
APPENDIX

COUNTRY LISTS

Feldstein-Horioka
Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Israel, Italy, Japan, Luxembourg, Norway, Portugal, Spain, Sweden, United Kingdom, United States

Advanced Economies
Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong SAR, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan Province of China, United Kingdom, United States

Euro Area
Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Slovak Republic, Slovenia, Spain

Major Advanced Economies (G7)
Canada, France, Germany, Italy, Japan, United Kingdom, United States

European Union
Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, United Kingdom

Emerging and Developing Economies
Afghanistan, Albania, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Azerbaijan, The Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Democratic Republic of the Congo, Republic of Congo, Costa Rica, Côte d'Ivoire, Croatia, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Ethiopia, Fiji, Gabon, The Gambia, Georgia, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, India, Indonesia, Islamic Republic of Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kosovo, Kuwait, Kyrgyz Republic, Lao P.D.R., Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, FYR Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Qatar, Romania, Russia, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Solomon Islands, South Africa, Sri Lanka, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Sudan,
Suriname, Swaziland, Syria, Tajikistan, Tanzania, Thailand, Democratic Republic of Timor-Leste, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, Ukraine, United Arab Emirates, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe,

Central and Eastern Europe
Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Hungary, Kosovo, Latvia, Lithuania, FYR Macedonia, Montenegro, Poland, Romania, Serbia, Turkey

Commonwealth of Independent States
Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Mongolia, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan

Developing Asia
Afghanistan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Fiji, India, Indonesia, Kiribati, Lao P.D.R., Malaysia, Maldives, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Democratic Republic of Timor-Leste, Tonga, Tuvalu, Vanuatu, Vietnam

Latin America and the Caribbean
Antigua and Barbuda, Argentina, The Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela

Middle East and North Africa
Algeria, Bahrain, Djibouti, Egypt, Islamic Republic of Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, United Arab Emirates, Yemen

Sub-Saharan Africa

G20
Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, United Kingdom, United States

Other Advanced Economies
Australia, Czech Republic, Denmark, Hong Kong SAR, Iceland, Israel, Korea, New Zealand, Norway, Singapore, Sweden, Switzerland, Taiwan Province of China
## CORRELATION TABLE - SAVINGS AND INVESTMENTS (PERCENTAGES)

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### Additional Tables

**Depuzzling the Puzzle**

Marijn W. Otte  Paper 3

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Page 8 of 13
CORRELATION SAVINGS AND INVESTMENTS OVER TIME

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0.20
0.40
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1.00
1.20

80-82 83-85 86-88 89-91 92-94 95-97 98-00 01-03 04-06 07-09

World
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Advanced Economies
Euro Area
Major Advanced Economies (G7)
European Union
Emerging and Developing Economies
Central and Eastern Europe
Commonwealth of Independent States
Developing Asia
Latin America and the Caribbean

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1.00
1.20

World
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Euro Area
Major Advanced Economies (G7)
European Union
Emerging and Developing Economies
Central and Eastern Europe
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Developing Asia
Latin America and the Caribbean

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SCATTER CHARTS

Percentages

Absolute values

Log values

Weighted Percentages
Graphs per Quartile

Gap - Savings and Investments

Correlation - Savings and Investments