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Abstract

This paper uses new statistical estimates to test for effects of economic integration in Europe on international capital mobility. In a world of perfect capital mobility, one should experience little or not statistically significant relationship between the amount of domestic savings and domestic investment. Alternatively, under less-than perfect capital international mobility, diverse portfolio preferences and country-specific transactions costs would create impediments for long-term capital flows. This would result in direct connection between any changes (increases) in domestic savings and domestic investment. According to empirical results of a similar empirical study by Feldstein and Horioka (1980) for developed countries (including some of current EU members included in this investigation), there were portfolio preferences and institutional rigidities, which resulted in almost equal corresponding differences in domestic investment rates driven by domestic savings rates among major industrial countries. The current study tests for capital mobility in the EU Member States (2010-2020) discussing compatibility of findings with previous evidence found in the literature (Feldstein and Horioka 1980). It also addresses the optimal national savings policy, tax incidence and concludes on capital formation in the EU.

KEYWORDS: domestic savings, domestic investment, capital mobility, tax incidence, optimal savings policy, European Union.

Introduction

Theoretical benefits of economic integration include boosting output growth by a multitude of reasons. The most prominent reason here is a reduction in transactions costs (Bywaters and Mlodkowski 2012), considered as central to any economic analysis already by A. Smith. It results from adoption of the EU legal and institutional framework by each of countries admitted to the European Union. As reported already by Daugeliene and Mlodkowski (2014), the Common Market has facilitated intra-union flow of capital (both short- and long-term), creating a stable pattern of debtors and creditors in the EU. It was Ford and Horioka (2017), who pointed out the solution for the Feldstein-Horioka puzzle based on goods market integration, as necessary for international capital mobility. Their disarmingly simple solution called for empirical testing on a set of countries, which meet this specific requirement. The current paper is an attempt to verify validity of Ford and Horioka (2017) claims.

That European Union with its Common Market, and within it, the free flow of goods, labor, and capital is supposed to be an economic space allowing for equalization of yields. This is what we know from our own lectures and currently published textbooks. However, one may wonder how internationally mobile is the European supply of capital. Do the incremental saving in one EU Member State remains to be invested there, or it is attracted elsewhere by higher yields? One may therefore ask if capital really flows among the EU countries and whether the flow equalizes the yield to investors. Another question is about domestic savings, its optimal rate and the incidence of tax changes. The current study therefore offers insights also into issues reported in Panama Papers, Pandora Papers, and substantial international capital flows, which are driven by pre-tax-yield and post-tax-yield considerations.

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One may wonder about implications of intra-EU capital mobility for the related national and union-wide policies. The first stage of the analysis is focused on determination of optimal savings policy at Member State level. According to the theory of economics, the yield on additional saving domestically equals the domestic marginal product of capital. This is true in a closed economy, without any international capital mobility. However, in case of the EU, where intra-union capital mobility should be taken for granted, this may not hold. When considering EU-27, there may be a certain asymmetry in de facto intra-union capital mobility, especially when Eurozone and non-Eurozone Member states are analyzed. For non-Eurozone states, the transactions costs and exchange rate volatility seem to be the first to blame for less-than perfect capital mobility within the Common Market.

National governments may try to stimulate increase in the saving rate, but this is equivalent to postponing current consumption in order to receive benefits in the future equal to the domestic marginal product of capital. This particular policy question was discussed already by Feldstein (1977) and later estimated by Feldstein and Summers (1977).

When the situation is analyzed from a nation point of view, then the underlying society receives the whole MPC, which is not lowered by taxes on capital income. Therefore, as stated by Feldstein and Horioka (1980), this is the pretax MPC that influences the national saving policy in a close economy case.

However, what should be the guiding rule for the optimal national savings policy in the EU, where (perfect) intra-union capital mobility is taken for granted? Would any incremental saving leave the home country, if the country is already exporting capital? Alternatively, would it replace any foreign sources of capital that would otherwise be invested in the home country, if it is already importing foreign capital? The pattern of debtors and creditors in the EU was reported as stable by Dugeliene and Mlodkowski (2014), based on post 2004-time series.

Under perfect international capital mobility (i.e. as should be assumed for EU Member States) the actual yield to the home country of additional saving is the net-of-tax return received by the investor, and not the previously argued pretax MPC, in the closed economy case. This is because, these are any foreign governments, which benefit by obtaining additional capital-tax revenue.

The other situation, for importers of capital, is when additional saving domestically reduces capital imported. The tax revenue for home country government will be the same, which means that the national income increases by the after-tax yield received by domestic investors. Optimal savings policy, as argued already by Feldstein and Horioka (1980), depends critically on whether the actual situation is closer to the perfect capital mobility, or to the closed economy case.

Mobility of capital seems to be vital for any extensions for tax burden distribution. The early studies on public finance in the Bretton Woods times of low, or no capital mobility in the global economy (Harberger 1962, Shoven and Whalley 1972, and Miezkowski 1969) assumed a closed economy for static and dynamic analysis. Globalization and regional economic integration changed this feature greatly. On one hand, economic and monetary integration introduced and facilitated intra-union capital mobility. On the other hand, globalization stimulated (and was stimulated by) far-reaching liberalization of financial and capital account of the Balance of Payments of most countries in the world.

What are actual consequences for any theoretical analysis of savings, distribution of tax burden and international capital flows? In a closed economy model operating with a fixed stock of capital, any taxes on the income of all capital used in production is borne in full by domestic owners of capital.

Under perfect capital mobility, when domestic savings can seek a higher yield within the EU, or globally, the tax burden could be shifted to domestic labor and to foreign capital owners provid-

ing it to the home economy (McLure 1976). This means that CIT would be borne much less by capital owners, and more by domestic labor to the extent that capital is mobile across national boundaries within the EU, or globally. If the capital can escape abroad from the home country, this reduces domestic labor ability to shift a tax on labor income to domestic owners of capital by the means of reducing labor supply. If there is a perfect capital mobility in the world these days (as of 2022), it would imply a major revision of theories of tax burden.

The focus of the current study is on contemporary international capital flows, and their impact on equating net-of-tax yields within the EU. There is no question that there is a very rapid reaction of liquid capital to any short-term international yield differentials. This feature of the global financial system was reported already in the first post-Bretton Wood period, in 1970s (Feldstein and Horioka 1980). Modernization of trading platforms, and amazing development of ICT, since then, contributed to higher market efficiency. Any arbitrage opportunities popping out in markets of short-term securities disappear these days within seconds. Is there a similar mechanism for expected real, net-of-tax yields on long-term portfolio capital or direct investments? If there is no such equalization effect by the means of the flows of the long-term capital, this would represent a failure to exploit available opportunities for profit. At the end of 1970s, there was much skepticism about this kind of long-term arbitrage. What seems to be the situation today? This empirical investigation is an attempt to shed light on this matter with focus on the EU Member States, EU capital gain tax incidence, and actual capital mobility within the EU, and globally.

Extreme form of portfolio theory of investment assumes that under free intra-union and international capital mobility, capital will flow to the highest yielding opportunity. Because country-specific risk factors and risk of investing in currencies are not perfectly correlated, international investors prefer portfolios of instruments, which expected rate of return is not the same. There are also domestic investors, who refrain from foreign investment, discouraged by their exacerbated perception of risks involved in employing their capital abroad. Traditionally, this kind of behavior has been associated with longer-term and therefore, less liquid investments. This is the reason for an assumption about lower long-term capital mobility and its consistence with short-term liquid asset arbitrage. There is a possibility that even without long-term capital international mobility, yields on long-term assets would be equalized across countries. This would be achieved indirectly, but only if short-term assets are arbitraged internationally. This would force assets of all maturities to be arbitraged domestically. According to Feldstein and Horioka (1980), such equalizing arbitrage was far from being perfect at the end of 1970s. The reason was in portfolio considerations. What is more, any international flows of short-term capital would rather widen the differential between domestic interest rates for short and long-term capital. Flow of such capital between countries would limit itself by depressing the forward discount on the domestic currency (i.e. due to its appreciation).

National governments, when changing tax policies to influence saving rates may not induce any substantial international capital flows. Such a response depends, of course, critically on sensitivity to yield differentials of aggregate portfolio demand functions. However, observing explosion of tax avoidance practices, as reported in Panama Papers, one can expect that these aggregate portfolio demand functions became highly sensitive to yield differentials recently.

In the past, there were a few other serious considerations, which were keeping domestic savings at home. One could list here the fear of future capital controls by countries hosting foreign investment, or fear of some adverse changes in their taxation. The war in Ukraine resulted in withdrawing from Russia by most of Western companies. Losses recognized on such an occa-

sion reassemble introduction of capital controls and exchange restrictions, which , in fact, were imposed on all investors in Russian market. Changes in capital controls and adverse changes to taxation were common in the past. It was still a real threat to all international investors in the second half of the previous century. However, since the 1990s the global economy experienced liberalization of the financial account of BOPs of most countries. Since more or less the same period, one could witness outright competition for FDI by the means of favorable tax treatment. Therefore, this factor does not seem to be present in portfolio decisions anymore, when allocation of capital is done domestically and abroad. In particular, both fears (of capital controls and adverse taxation changes) seem to be no longer valid, especially for intra-EU capital flows.

Another reason for less-than-perfect capital international mobility have been legal requirements on management of domestic savings in some countries. Prominent cases include Japan, which did not allow for any foreign holdings of government debt, until 1976, forcing domestic savings to sponsor the deficit. And then there has been the U.S., where saving institutions have been required by law to invest in mortgages on domestic real estate. A related factor for propensity to invest savings domestically is risk management aimed at matching liabilities and assets of insurance companies and financial institutions in terms of currency in which they are denominated. For all Eurozone countries this consideration has also been no longer valid, as long as they invest within the Euro Area. As such, one can recognize a direct impact of monetary integration on international capital mobility via the channel of investment portfolio demand function.

FDI in the times of strict capital controls and lack of tax competition (ca 1950s - 1970s) was driven by marketing strategies, exploiting production knowledge, or as a way to avoid trade restrictions (Caves 1971). Systematic liberalization changed guiding rules and motivation for international capital allocation. Since 1990s there was not much of trade restrictions to be overcome by producing abroad in order to sell in that country. Capital started flowing internationally, guided by yields, and in particular by after-tax-yield patterns.

The previous situation, before liberalization, resulted in existence of countries, which were importing and exporting capital in the same time. The current global setup facilitates the world with specialized capital exporters, and capital importers. Financial flows have been driven by expected yield differentials. As explained by Feldstein and Horioka (1980), FDI until the end of 1970s, was not responding to changes in domestic taxation, or relative capital supplies. They seem to respond to these factors today.

The world has changed greatly, but the question of international capital flows remained. What is the relationship between domestic savings and international capital flows? This empirical paper is an attempt to answer this question. Previous studies, for the period of fixed exchange rates and significant capital controls reported that almost all incremental saving remained in the country of origin. Those findings for Bretton Woods era were inconsistent with the assumption of complete arbitrage in a perfect world capital market. Today, the global financial system seems to be at most of the perfect international mobility of capital, but does the empirical evidence confirms such expectations?

The next section presents the method of statistical measurement and describes the data used in the exercise. The basic results and a number of extensions are presented in section 3. Then, the following section dis-aggregates both saving and investment into household, corporate, and government sectors. Separate time series results for individual countries are discussed in section 5. Conclusions follow, and include comments on implications of the results.

Specification and data

This paper uses data on the EU-27 (the main focus) and non-EU OECD countries (the control group) to measure the extent to which a higher domestic saving rate in a country is associated with a higher rate of domestic investment. Under assumption of perfect mobility of capital, there should be no statistically significant relation between domestic saving and domestic investment. This means that saving decisions in each of EU-27 countries, as well as in the control group, respond to worldwide opportunities for investment, while the investment projects in each country are sponsored by the global pool of capital. If, however, there are some reasons for reduced capital mobility for EU-27 and the control group, incremental saving should be invested in the country of origin. This results in differences between countries in their respective investment rates, and the differences should be closely matching the differences in the saving rates.

The results of the current investigation into saving and investment rates are cast against results reported by Feldstein and Horioka (1980) for OECD countries. The reason for such a comparison is in matching the coverage of the EU-27 analysis with coverage of Feldstein-Horioka study. This allows for conclusions on changes, if any, occurring since the 1970s.

When the results are compared with the situation reported for the period 1965-1974, one can see that in case of OECD countries the average domestic saving rate has remained basically the same (0.25). EU-27 countries are characterized by a slightly higher, but statistically insignificantly different average rate, while non-EU27 OECD economies have average saving rate just below 0.25. Since 1970s, there has been a significant increase in the standard deviation of the saving rate, both for EU-27, and for all other OECD countries. This result suggests much higher diversity of member states. It has been symptomatic that this was Greece characterized with the lowest saving rate, and Ireland saving at most in the EU. Then, among OECD countries, which are not members of the European Union, Norway was the highest saver, and Colombia, the least-saving economy.

When testing for stability of these characteristics, the sample period was divided into three five-year periods for the purpose of correlation analysis between pairs of sample periods.

Correlation analysis results reported in Table 2 indicate stability of high and low saving rates over 2004-to-2020. A similar magnitude of positive correlation and stability of it was reported by Feldstein and Horioka (1980).

Table 1

Saving rates in the EU27, and non-EU27 OECD countries (2004-2020), and OECD (1960-1974)

	OECD (1960-1974)	EU-27	Non-EU27 OECD
High	0.372 Japan	0.623 Ireland	0.431 Norway
Low	0.184 the UK	0.074 Greece	0.124 Colombia
Average	0.250	0.253	0.246
Standard deviation	0.045	0.084	0.066

Source: Author, based on WDI database, Feldstein and Horioka (1980)

Table 2

Correlation coefficients of saving rates for the EU27, non-EU27 OECD (2004-2020), and OECD (1960-1974)

	2004-2009 (1960-64)	2010-2014 (1965-69)	2015-2020 (1970-74)
2004-2009	1	Non-EU27: 0.961 (0.974)	Non-EU27: 0.845 (0.931)
2010-2014	EU27: 0.919 (0.974)	1	Non-EU27: 0.900 (0.895)
2015-2020	EU27: 0.814 (0.931)	EU27: 0.889 (0.895)	1

Source: Author, based on WDI database, and Feldstein and Horioka (1980) for OECD 1960-1974

Table 3
Investment rates in the EU27, and non-EU27 OECD countries (2004-2020), and OECD (1960-1974)

	OECD (1960-1974)	EU-27	Non-EU27 OECD
High	0.368 Japan	0.547 Ireland	0.361 Norway
Low	0.186 U.S.	0.119 Greece	0.139 Iceland
Average	0.254	0.229	0.236
Standard deviation	0.041	0.048	0.041

Source: Author, based on WDI database, and Feldstein and Horioka (1980) for OECD 1960-1974

This should not be surprising that in case of investment rates (I/GDP) one finds significant variation among countries in each group and period, but the pattern of high and low investment ratios is also highly stable over time.

Testing for a relationship between savings rates and investment rates was based on a simple regression analysis.

$$\left(\frac{Inv}{GDP}\right)_i = \alpha + \beta\left(\frac{Sav}{GDP}\right)_i + \varepsilon \quad (1)$$

where:

$\frac{Inv}{GDP}$ is gross domestic investment divided by the gross domestic product in country 'i'.

$\frac{Sav}{GDP}$ is gross domestic saving divided by the gross domestic product in country 'i'.

This simple regression equation has an interesting and non-trivial interpretation. Under assumption of perfect international capital mobility (as many claim is true these days), any additional saving in a country 'i' should result in an increase in investment in all countries. The way this additional saving in country 'i' is distributed among other countries depends on two characteristics in the opposite manner. It depends positively on each other (receiving) country initial capital stock. It depends negatively on elasticity of the country's marginal product of capital schedule. When the country experiencing increase in savings is a very small economy, and represents a tiny fraction of total world capital, estimates of 'β' would be zero. All the additional savings would be absorbed by other countries (ROTW), and the domestic investment would not respond at all in such an extreme case. This means that the value of 'β' under perfect capital mobility (associated with equalizing yield across the countries) represents each country share in total world capital. All additional domestic savings add to this global stock, without any fractions withheld from it due to any legal, institutional, or transactions costs-reasons (Bywaters and Mlodkowski 2012).

Under conditions of no capital mobility, the equation 1 would return estimates of 'β' at unity. This would reflect the fact that any incremental saving in each country remains in the domestic economy and fuels domestic investment only. As noted already by Feldstein and Horioka (1980), in case savings and investment are driven by the same exogenous factors, estimates of 'β' may be close to unity. However, such interpretation is inconsistent with the hypothesis of perfect world capital mobility. The domestic saving rate does not depend on the domestic investment opportunities, unless it is a closed economy in which exogenous changes in the level of investment influence adjustments in income, until savings equal investment (as stated already by J. M. Keynes).

Past empirical research on relationship between saving and investment (Byrne et al. 2009. Drakos et al. 2018. Ginama et al. 2018, and a review of a multitude of these studies by Apergis and Tsou-

mas 2009), under growing international capital mobility delivered mixed evidence. High observed values of 'β' may have reflected many country- and period-specific causes of the variation in both of these macroeconomic aggregates. High positive relationship between investment and savings domestically has a straight interpretation against presence of world capital mobility.[1]

The Data Set

The sample comprises of 43 countries. There are 27 European Union Member States, and the remaining 16 other subjects are non-EU OECD countries. The period for estimating linear regression models is from 2010 to 2020. This choice was based on data availability, as well as reasons resulting from 2008-crisis impact on saving and investing behavior. An initial coverage (2004-2020), which included immediate pre-crisis and post-crises years, resulted in non-robust results. Reducing the period covered by the study to 2010-2020 increased greatly the robustness of results. However, there has still been a significantly weaker fit of regressions run for 2010-2014 period. All the blame is here on post-2008-crisis recovery.

For each of 43 countries in the sample, time series for Gross Domestic Product, Gross Capital Formation (dependent variable), and Gross Domestic Savings (independent variable) were retrieved from the World Development Indicators Database, by the World Bank. Annual records of all variables were denominated in the domestic currencies. These records served in calculation of saving and investment ratios for each year over the sample period (2010-2020). Then, the sample was divided into two sub-periods: 2010-2014, and 2015-2020, following the methodology developed by Feldstein and Horioka (1980) for an identical testing. Due to substantial diversity of economies included in the sample, a few separate sub-sets were subject to Least-Square estimation of the relationship between domestic savings and investment.

Appendix presents in Table A1 savings and investment ratios for a group of countries that match closely the sample used by Feldstein and Horioka (1980). This allows interested readers to compare the situation in regard to domestic savings and investment. It serves the purpose of positioning the current study in the open economy macroeconomics literature. Table A2 in the Appendix presents results of individual country-level regression analysis of the whole sample.

The composition of all other samples is based on membership in the EU and OECD, respectively. Regression models were estimated separately for both sample periods (2010-2014, and 2015-2020).

Parameter estimates refer to equation 1 in the text. All equations are based on observations for 16 countries (1960-1974) and 21 countries matching Table 1 list for 2010-20, with variables averaged for the sample period indicated. Standard errors are shown in parentheses.

Table 4

The relation between Domestic Saving Ratios and Domestic Investment Ratios: 1960-74 and 2010-20

Sample period	Gross Saving and Investment		
	Constant	S/Y	R^2
1960-74	0.035 (0.018)	0.887 (0.074)	0.91
2010-20	0.16 (0.016)	0.227 (0.058)	0.278

Source: Author for 2010-20 and Feldstein and Horioka (1980) for 1960-74

Feldstein and Horioka (1980) concluded their study with comments labeled as 'a puzzle'. They claimed there was no capital mobility over the period from 1960 to 1974. The current study returns a much different picture of international capital mobility (captured as mobility of incremental domestic savings). As can be directly derived from regression results reported in Table 4, estimated parameter 'beta' is far from unity. In addition, R^2 indicates that

[1] A regression of (net foreign investment/GDP) on domestic savings rate: $\left(\frac{Sav-Inv}{GDP}\right)_i = \alpha + (\beta - 1)\left(\frac{Sav}{GDP}\right)_i + \varepsilon$ would have a coefficient of 'β-1', and would allow for testing a hypothesis that the international capital flows do not depend on domestic savings.

the volatility of investment could be explained by changes in domestic savings in less than 30%. This result allows to claim that, in comparison with the period 1960-74, there was much higher capital mobility over the last decade.

The intended focus, has been, however, on EU27 States, and the control group of non-EU27 OECD countries. Table 5 reports regression results for both samples in two distinctive sample periods. A suggested interpretation is as follows. EU27 States seem to be characterized with a much higher capital mobility, both intra-union and globally. In both sample periods 'beta' is significantly lower than for all other OECD countries. Volatility of investment in the EU is also explained in much lesser extent by incremental domestic savings (vide R^2). In case of non-EU27 OECD countries one can notice quite stable situation in regard to capital mobility. First, the constant is almost the same for models estimated on 2010-2014 and 2015-2020 data. Second, 'beta' estimates are not statistically different between sample periods. Third, for R^2, the situation is also the same in both periods. Volatility of investment is explained in much higher extent by domestic savings, indicating lesser capital mobility for non-EU27 OECD countries. All the results for both samples are less robust in the first sample period (vide F-statistic, and p). The reason seems to be in post-2008 crisis recovery affecting savings and investment, especially in the EU.

Table 5

The relation between Domestic Saving Ratios and Domestic Investment Ratios among EU27 Member States and Non-EU27 OECD countries: 2010-20

Country groups/periods	Constant	t-Stat	β	t-Stat	R2	F-stat	p
EU-27 2010-2014	0.1813	9.324	0.116	1.511	0.084	2.283	0.143
EU-27 2015-2020	0.1415	6.987	0.297	4.192	0.413	17.57	0.00030
Non-EU27 OECD 2010-2014	0.1234	4.119	0.445	3.765	0.503	14.18	0.00209
Non-EU27 OECD 2015-2020	0.1145	4.795	0.490	5.174	0.657	26.77	0.00014

Source: Author

Table 6

The relation between Domestic Saving Ratios and Domestic Investment Ratios in countries in Set 1, Set 2, Set 3, and Set 4: 2010-14, and 2015-20

Country set & Period	Constant	t-Statistic	β	t-Statistic	R2	F-stat	p
Set_1_2010-2014	0.196	5.4	0.0588	0.388	0.021	0.1505	0.71
Set_1_2015-2020	0.129	9.402	0.4187	8.84	0.918	78.14	0.00005
Set_2_2010-2014	0.0986	5.149	0.5214	6.489	0.840	42.1	0.00019
Set_2_2015-2020	0.0431	1.763	0.6965	7.034	0.861	49.48	0.00011
Set_3_2010-2014	0.0986	5.149	0.5214	6.489	0.840	42.1	0.00019
Set_3_2015-2020	0.0431	1.763	0.6965	7.034	0.861	49.48	0.00011
Set_4_2010-2014	0.2147	5.813	0.022	0.166	0.003	0.02754	0.872
Set_4_2015-2020	0.2396	7.35	-0.0347	-0.322	0.013	0.1039	0.756

Source: Author

Set #1 are the biggest OECD countries: Austria, Canada, Denmark, Finland, France, Ireland, New Zealand, the U.K., and the U.S. This set was chosen on the basis of country-level regression results, and comprises of 9 cases with the highest R^2.

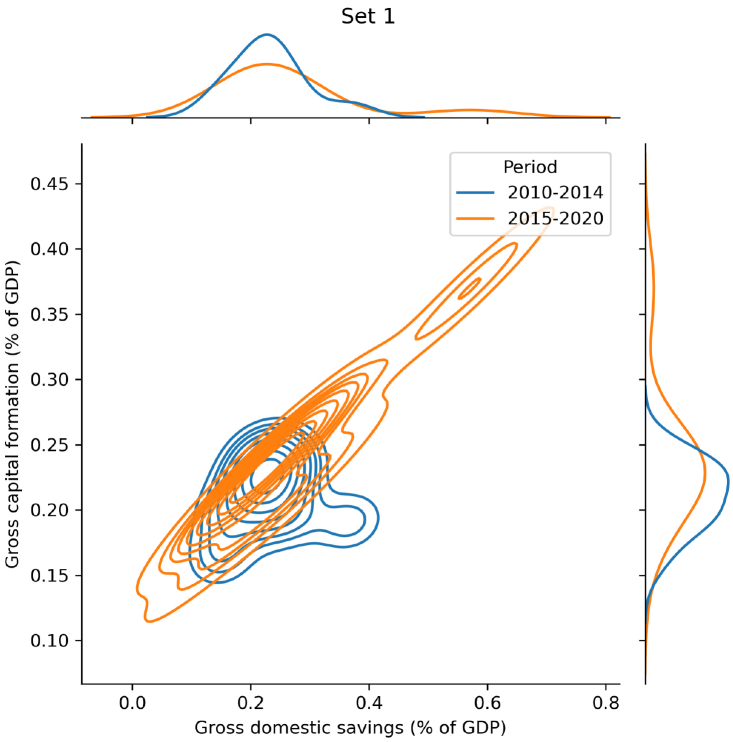
Set #2 are countries, which in regression revealed negative individual estimation of β-parameter. These countries are: Bulgaria, Costa Rica, Greece, Italy, Korea, Lithuania, Mexico, Norway, Poland, and Slovenia.

Set #3 includes Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Portugal, Spain.

Set #4 includes all the small EU27 economies, which are in most cases the New Member States. These are: Croatia, Cyprus, Czechia, Estonia, Hungary, Latvia, Luxembourg, Malta, Romania, Slovakia. Many of them joined the EU from 2004 onwards. According to the global capital mobility interpretation, such small (or tiny) open economies should have the β-parameter close to zero. This is due to their relatively negligible contribution to global pool of savings. Regression results seem to confirm this original interpretation by Feldstein and Horioka (1980).

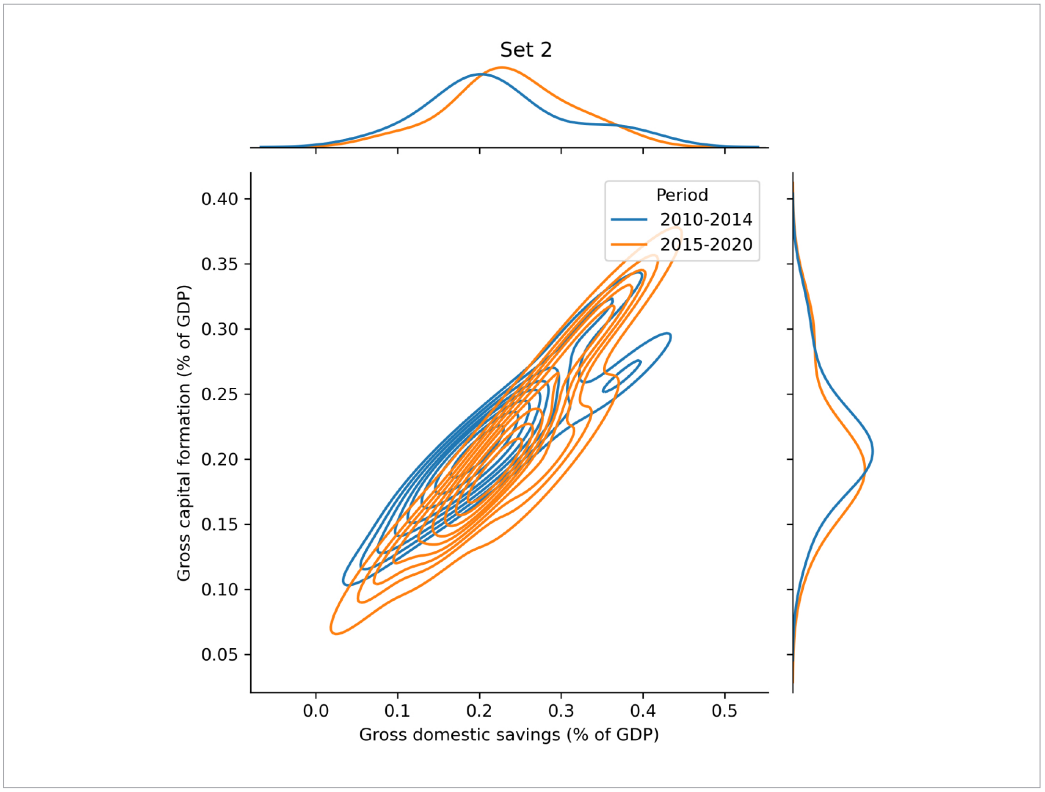
Figure 1

Joint plot for kernel density estimation (KDE joint plot) for Gross Domestic Savings and Capital Formation, set #1, 2010-14 and 2015-20



Source: Author

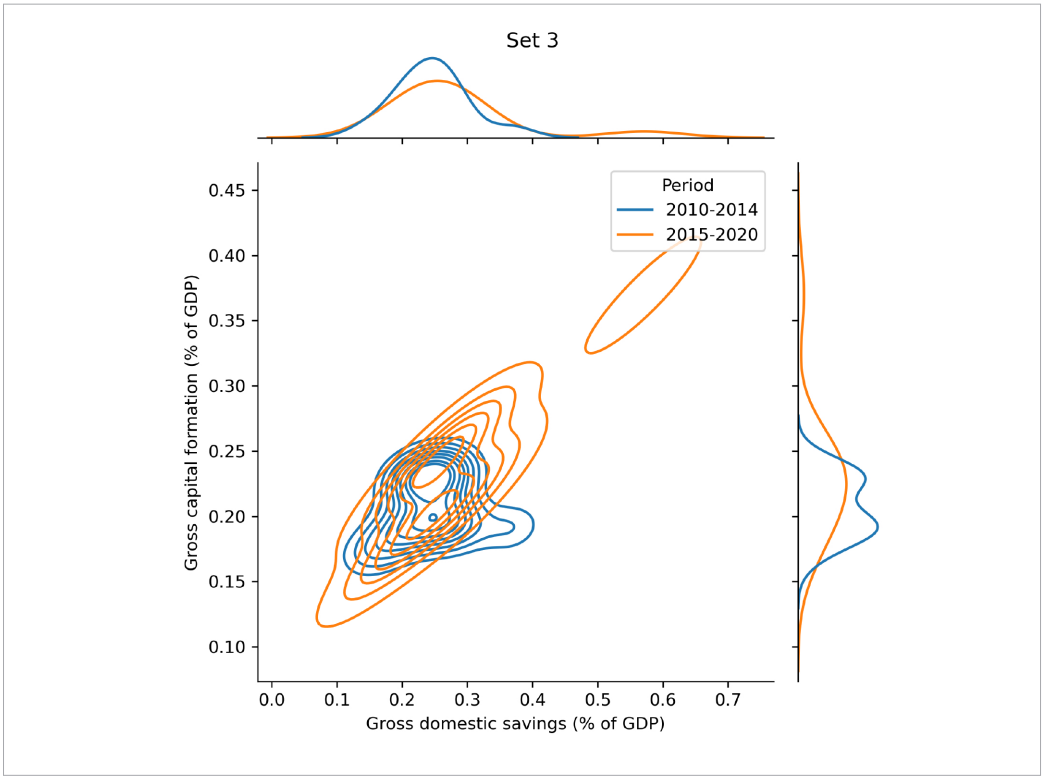
In case of the first set of countries, there was no relationship between gross domestic savings and the gross capital formation over the whole 'blue' period 2010-2014. This situation changed significantly during the 'orange' period of 2015-2020. A new, statistically significant, and quite well pronounced positive relationship between domestic savings and investment emerged. The big OECD countries entered a period when any changes in the fraction of GDP saved, were reflected in adjustment of gross capital formation by the factor of 0.4187 (β). No capital mobility was associated by Feldstein and Horioka (1980) with β = 1, unless the financial integration made all countries respond to the same exogenous factors in the same manner. During the period of 2015-2020 the statistically significant coefficient β at 0.41 is well below unity. This allows to conclude that the big OECD countries were exporting and importing savings, achieving high capital mobility. Distribution of both variables also seemed to be very much Gaussian over the period.



Source: Author

Figure 2

KDE joint plot for Gross Domestic Savings and Capital Formation, set #2, 2010-14 and 2015-20



Source: Author

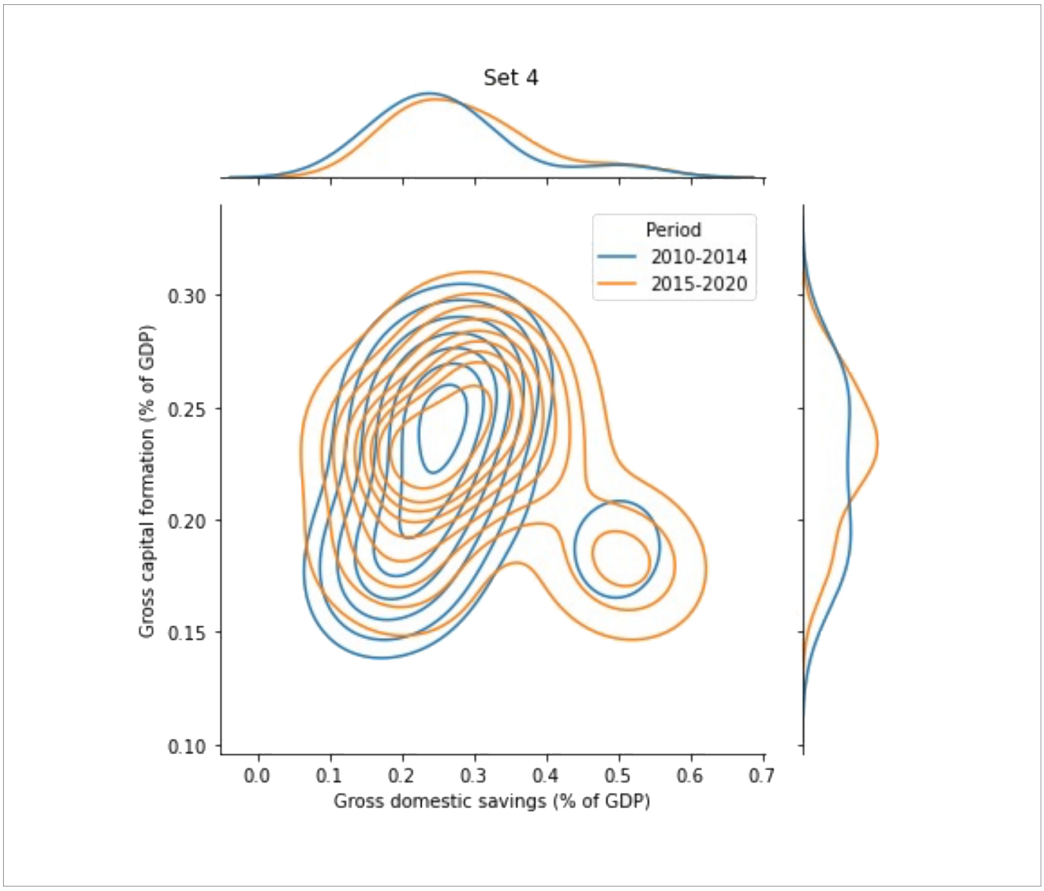
Figure 3

KDE joint plot for Gross Domestic Savings and Capital Formation, set #3, 2010-14 and 2015-20

Results obtained for set #3 seem consistent and statistically significant. First, the period of 2010-2014 (blue) was time of less pronounced relationship between gross domestic savings and gross domestic capital formation, similar to set #1. Recovering from 2008-crisis might be responsible for such a result. Then, in the period of 2015-2020, a much more pronounced positive relationship between savings and investment emerged domestically, with β at almost 0.7, much higher than in set #1. This could be a sign of a much lower domestic savings mobility for these countries, or a much stronger response to common exogenous factors.

Figure 4

KDE joint plot for Gross Domestic Savings and Capital Formation, set #4, 2010-14 and 2015-20



Source: Author

The outlier here is Luxembourg, for obvious reasons associated with the leading tax heaven status and high capital mobility. All other small economies included here fit very well in the original interpretation offered by Feldstein and Horioka (1980). The value of estimated β is much closer to zero than for any other set of countries. Reiterating the interpretation one should point out that this result reflects absolutely tiny, and therefore negligible, contribution to global pool of savings by such economies. These results confirm the findings by Feldstein and Horioka (1980).

And then, for the benchmarking set, the first period (2010-2014) seems to be not much different from the other one. The usual position of Luxembourg south-east of the rest of the OECD indicates its economy as having even higher capital mobility combined with its relative contribution to the global pool of savings.

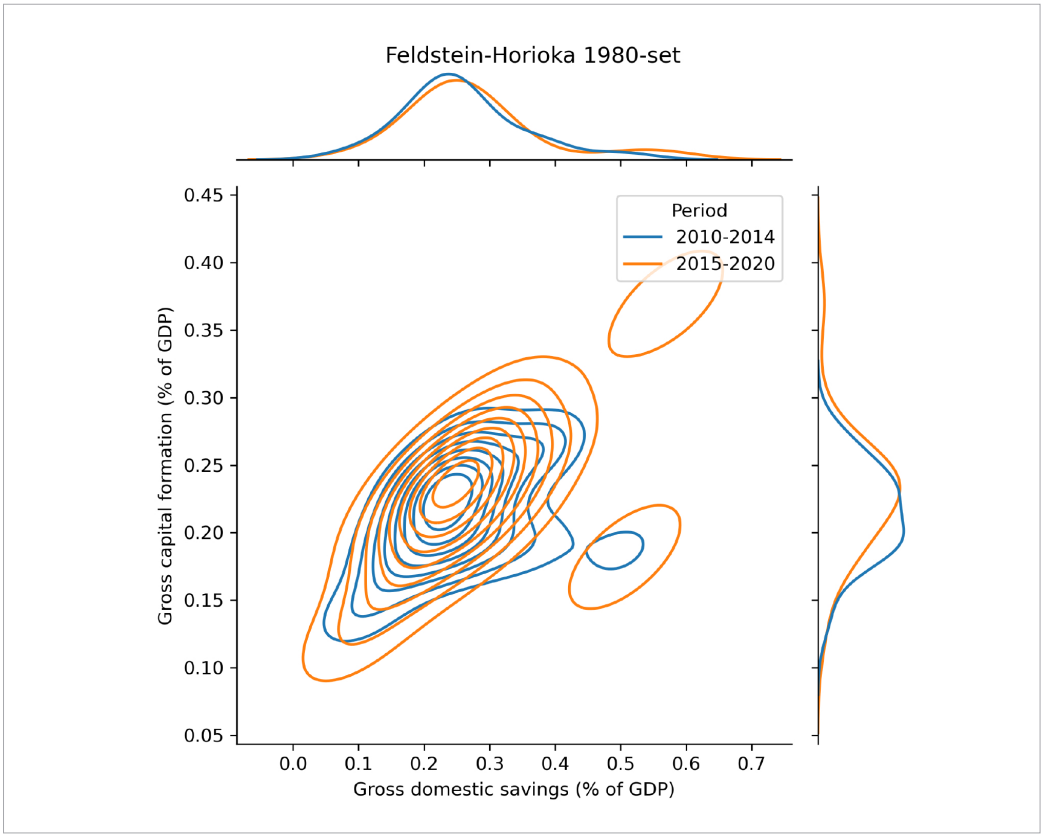


Figure 5
KDE joint plot for Gross Domestic Savings and Capital Formation, Feldstein-Horioka set, 2010-14 and 2015-20

Source: Author

Conclusions

International capital mobility tested for Bretton Woods era was pioneering work in open economy macroeconomics that opened a long discussion on multitude of related topics. The fact of no capital mobility, reported by Feldstwin and Horioka (1980) does not seem so surprising today. When comparing the ease of 'going global' by individual and institutional investor portfolio management in 1960s and after year 2000, the 'puzzle' is not so puzzling.

The current empirical investigation into the nature of the relationship between domestic savings and investment revealed a very different situation from the one reported for 1960-1974. There has been a significant improvement in capital allocation. Savings generated in one country are in much lesser extent 'grounded' domestically. Instead, globalization, or in fact, regional economic integration in the EU, allows savers to seek higher yields outside their domestic economies.

This is not a surprise that the EU27 States enjoy much higher international capital mobility than the other OECD countries (Table 5). The Common market operates for more than two decades for many of the current Members. Any arguments, by Feldstein and Horioka (1980) that might justify reluctance of savers (investors) to move savings (capital) abroad but within the EU, do not seem to be valid anymore. Other OECD countries, and in particular the Feldstein and Horioka (1980) set, have also moved to a much higher international capital mobility stage. Figure 4 allows to claim that this situation is quite stable, with some disturbance in the 2010-2014 sample period due to post 2008 crisis recovery.

Summarizing, all the results indicate a substantial increase in international capital mobility since 1960s-1970s. This means that savings fuel investment that maximizes benefits to savers without restricting available options to domestic projects.

The biggest gains associated with the highest international capital mobility are enjoyed by the EU27. This empirical study is an explicit proof that economic integration in Europe offers benefits in a form of increased efficiency. Scarce resources (i.e. capital) are used more productively. Capital keeps flowing intensively between the EU countries to allow for implementation of investment projects with the highest yields regionally and to high extent also globally.

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Appendix

Table A1

Mean Gross Domestic Saving and Investment Ratios for selected OECD Countries 2010-20 (Feldstein-Horioka 1980 set)

Countries	Gross domestic savings (% of GDP)	Gross capital formation (% of GDP)	|S-I|/GDP	S-I/S
Australia	0.258	0.256	0.013	0.005
Austria	0.275	0.244	0.032	0.115
Belgium	0.248	0.240	0.009	0.032
Canada	0.219	0.237	0.018	-0.085
Denmark	0.275	0.208	0.067	0.244
Finland	0.228	0.233	0.008	-0.022
France	0.219	0.231	0.012	-0.054
Germany	0.269	0.207	0.062	0.230
Greece	0.098	0.132	0.034	-0.383
Ireland	0.479	0.289	0.190	0.412
Italy	0.201	0.182	0.026	0.095
Japan	0.242	0.247	0.010	-0.021
Luxembourg	0.504	0.184	0.320	0.634
Netherlands	0.301	0.203	0.097	0.323
New Zealand	0.233	0.225	0.010	0.033
Norway	0.346	0.277	0.070	0.187
Spain	0.220	0.196	0.026	0.107
Sweden	0.281	0.242	0.039	0.139
Switzerland	0.365	0.256	0.110	0.300
United Kingdom	0.159	0.171	0.013	-0.080
United States	0.174	0.205	0.031	-0.180
Mean	0.271	0.223	0.058	0.111
S.D.	0.096	0.038	0.077	0.216

Source: Author

Table A2

Country-level regression results for 43 O.E.C.D. countries 2010-2020

Country	Constant	t-Statistic	β	t-Statistic	R-squared	F-statistic	P-statistic
Australia	0.1218	1.105	0.5205	1.217	0.141	1.482	0.25
Austria	0.0016	0.043	0.8793	6.492	0.824	42.15	0.00011
Belgium	0.0549	0.886	0.7464	2.988	0.498	8.927	0.015
Bulgaria	0.2853	8.237	-0.3536	-2.235	0.357	4.996	0.052
Canada	0.0817	4.494	0.71	8.547	0.890	73.05	0.00001
Chile	0.1585	2.733	0.2986	1.275	0.153	1.625	0.23
Colombia	0.1708	7.256	0.2808	2.168	0.343	4.702	0.058
Costa Rica	0.3101	6.053	-0.6909	-2.401	0.390	5.764	0.040
Croatia	0.1327	2.887	0.3874	1.669	0.236	2.786	0.13
Cyprus	0.071	1.048	0.6294	1.598	0.221	2.553	0.15
Czechia	0.2122	3.118	0.1673	0.798	0.066	0.6363	0.45
Denmark	-0.0447	-2.051	0.9192	11.6	0.937	134.6	1.0E-06
Estonia	-0.0078	-0.042	0.9085	1.454	0.190	2.114	0.2
Finland	0.0882	2.119	0.6349	3.492	0.575	12.2	0.0068
France	0.0618	1.574	0.7713	4.3	0.673	18.49	0.0020
Germany	0.0657	0.922	0.525	1.982	0.304	3.929	0.079
Greece	0.1516	3.671	-0.1957	-0.47	0.024	0.2212	0.65
Hungary	-0.0617	-0.607	1.025	2.924	0.487	8.552	0.017
Iceland	0.024	0.234	0.6666	1.591	0.220	2.532	0.15
Ireland	-0.1436	-1.446	0.9025	4.458	0.688	19.88	0.0016
Israel	0.1365	3.843	0.3184	2.033	0.315	4.133	0.073
Italy	0.2765	3.533	-0.4717	-1.214	0.141	1.475	0.26
Japan	0.162	3.882	0.3505	2.04	0.316	4.162	0.072
Korea, Rep.	0.3686	2.635	-0.1587	-0.402	0.018	0.1613	0.70
Latvia	0.1891	2.001	0.2115	0.479	0.025	0.2291	0.64
Lithuania	0.2671	3.433	-0.3681	-0.983	0.097	0.9659	0.35
Luxembourg	0.1701	1.359	0.0279	0.112	0.001	0.01266	0.91
Malta	0.1145	3.47	0.3073	2.881	0.480	8.298	0.018
Mexico	0.2958	2.319	-0.3102	-0.556	0.033	0.3096	0.59
Netherlands	-0.0027	-0.038	0.6857	2.899	0.483	8.406	0.018

Country	Constant	t-Statistic	β	t-Statistic	R-squared	F-statistic	P-statistic
New Zealand	-0.0108	-0.169	1.0137	3.681	0.601	13.55	0.0051
Norway	0.3728	12.412	-0.2772	-3.207	0.533	10.29	0.011
Poland	0.3041	6.525	-0.4533	-2.177	0.345	4.739	0.058
Portugal	0.1924	3.156	-0.1211	-0.327	0.012	0.1072	0.75
Romania	0.196	3.088	0.2493	0.86	0.076	0.7394	0.41
Slovakia	0.1288	1.729	0.3864	1.306	0.159	1.705	0.22
Slovenia	0.2086	5.321	-0.0283	-0.191	0.004	0.03654	0.85
Spain	0.1031	1.077	0.4228	0.972	0.095	0.9442	0.36
Sweden	-0.0144	-0.134	0.9126	2.384	0.387	5.684	0.04
Switzerland	-0.1251	-0.37	1.0421	1.126	0.123	1.268	0.29
Turkey	0.2474	3.011	0.16	0.505	0.028	0.2547	0.63
U.K.	0.0475	1.852	0.7795	4.828	0.721	23.31	0.00094
United States	0.1031	12.261	0.5831	12.09	0.942	146.2	0.0000007

Source: Author

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