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Income smoothing and foreign asset holdings

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Abstract In this paper we construct a new methodology to measure the international income smoothing and we present stronger connection between foreign asset holding and international income smoothing for OECD countries.

Keywords Capital Market Integration · Home Bias · Income Smoothing

JEL Classification F155 · F36 · F41

1 Introduction

In this paper, we re-examine the ties between international portfolio allocation and income smoothing. We propose a revised approach of measuring income smoothing via foreign asset holdings that focuses on factor income

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inflows as opposed to the commonly used net factor income in the literature mainly proposed by Sørensen et al. (2007). A compelling reason for purely concentrating on factor income inflows is mainly that during recession periods wages, interest, and profits tend to be lower and this may entail a reduction in outflows, consequently an overestimation of net foreign factor income and its impact on income smoothing via international asset holdings. Using net factor income in our views carries the potential drawback of producing higher (lower) smoothing than normal during recession (expansion). The factor income inflow by contrast does not suffer from this shortcoming. Its movement or magnitude does not necessarily synchronize with fluctuations in domestic output. Since this paper's primary concern is to construct the strong tie with the international portfolio allocation and international income smoothing, it is less likely to add factor outflows to get a valid estimation of income smoothing via domestic investors' international portfolio allocation.

Macroeconomic models are built on the central assumption that economic agents are either rational or near-rational. Grubel (1968) explains investors' rationale for holding internationally diversified portfolio by looking at the mean-variance of both portfolios with purely domestic assets and portfolios with a combination of domestic and foreign assets. He shows that the mean-variance of the latter is smaller than the former. Lewis (1999) substantiates Grubel's main findings by providing both theoretical foundation and empirical evidence. However, French and Poterba (1991) and Tesar and Werner (1995) have observed that investors in high income countries do not hold foreign financial assets as much as they should optimally. A large portion of their financial assets are from the domestic market, a behavior that is known as "home bias". Nevertheless, over the last decade, capital market integration has grown tremendously leading to higher volumes of international assets trading across borders. This has led to a downward trend in home bias levels, in particular among high-income OECD members. In aggregate level data, Sørensen et al. (2007) have recently shown that there is a strong connection between the volume of cross-border assets holding and income smoothing. More intuitively, this implies that the more internationally diversified an investor's portfolio is the higher possibility to smooth income as they are able to switch income from the foreign markets to the domestic market to keep their levels of consumption relatively stable over time at home.

2 Methodology

The literature on income smoothing via international asset holding suggests that investors who diversify their portfolio enjoy income smoothing via their holding of international assets. Therefore, foreign assets' holding is equivalent to an insurance against economic downturns at home. It is customary in the literature to use the difference between gross domestic product (GDP) and gross national product (GNP) as a proxy of the amount of net income flows

across countries to gauge the extent of income smoothing across countries. That is:

$$\text{GNP} \approx \text{GDP} + R_{\text{d}} * A_{\text{d}} - R_{\text{f}} * A_{\text{f}} \ ,$$

where A_{f} is the stock of domestic assets owned by foreign residents, R_{f} is the rate of return on these assets, and A_{d} and R_{d} are the stock of and the return on domestically-owned foreign assets, respectively.[1]

At the aggregate level, Sørensen and Yosha (1998) applied the following regression to measure income smoothing via cross border asset holdings:

$$\Delta \log \text{GDP}_t^i - \Delta \log \text{GNP}_t^i = \nu_{f,t} + \beta_f \ \ \Delta \log \text{GDP}_t^i + \epsilon_{i,t} \ , \tag{1}$$

where $\Delta \log \text{GDP}$ is the annual change in GDP per capita in constant prices and $\Delta \log \text{GNP}$ is the annual change in GNP per capita in constant prices. When coefficient of β_f is the coefficient estimate that captures income smoothing from net factor income flows, $\nu_{f,t}$ and $\epsilon_{i,t}$ are fixed effect and error terms, respectively. A positive value of β_f implies that net factor income from abroad is not perfectly correlated with idiosyncratic output shocks; thereby offering some income smoothing for the domestic output shocks. As β_f approaches 1, the country under consideration experiences greater income smoothing from international asset holdings.

Our approach for excluding the income outflows from the net factor income can be explained by the fact that during recession (expansion) periods wages, interest, and profits tend to be lower (higher) and this may entail a reduction (expansion) in outflows, consequently an overestimation (underestimation) of net foreign factor income and its impact on income smoothing via international asset holdings. Net factor income in our views carries the potential drawback of producing higher (lower) smoothing than normal during recession (expansion). However, factor income inflows are not be effected from those estimation biases. Therefore, we reconstruct this methodology by proposing a measure of income that is reflective of purely international asset holding earnings to capture income smoothing effectively.

Our model can be written as follows;

$$\Delta \log \text{GDPin}_t^i - \Delta \log \text{GDP}_t^i = \nu_{f,t} + \beta_{f+} \ \ \Delta \log \text{GDP}_t^i + \epsilon_{i,t} \ , \tag{2}$$

where GDPin is defined as GDP + factor income inflows. The structure of this equation documents that we only consider the income inflows coming from abroad instead of the net income flows.

[1] In fact this is only an approximate relationship between the GDP and GNP. However, we neglect the remittances which is counted in GNP calculation. For detailed the formula you may check the U.N. Statistics Database.

3 Data

We use a broad sample of high-income OECD countries to investigate the relationship between international portfolio allocation and income smoothing and test whether our innovation of solely focusing on factor income inflow

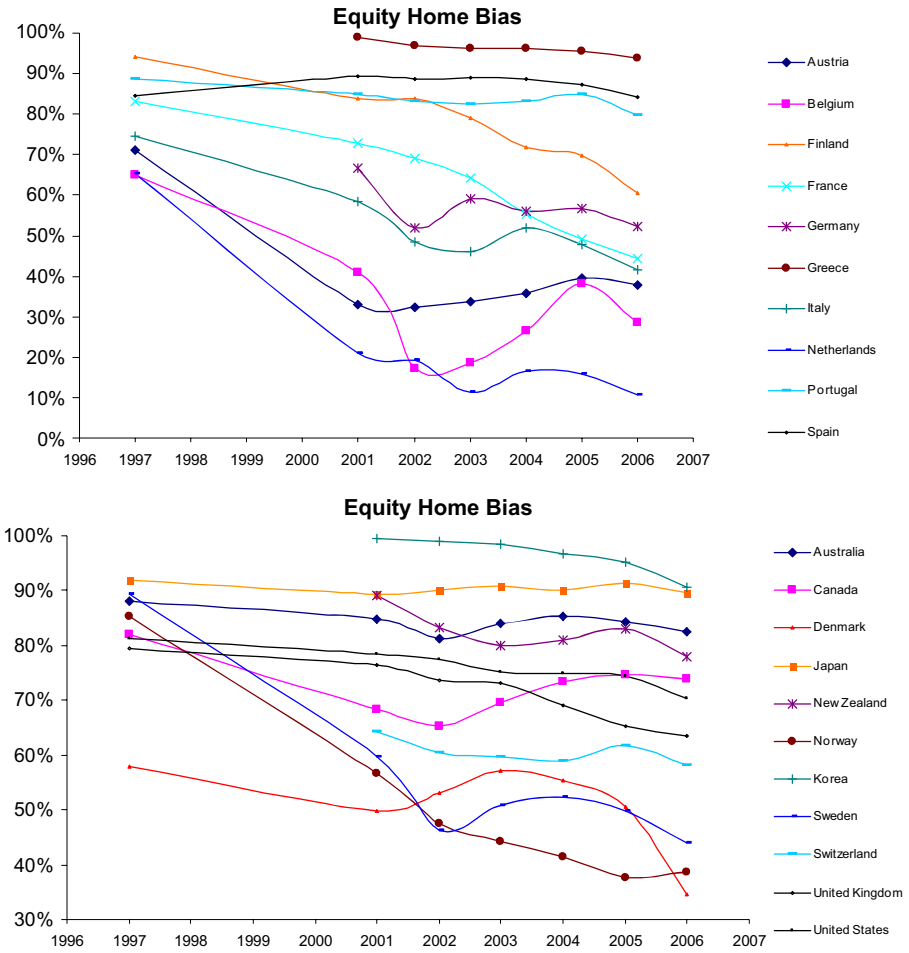

Fig. 1 Data Source, IMF's CPIS database, and World Banks' WDI indicator. Equity home bias index for foreign equity holding for years, 1997, 2001–2006. EQUITY HOME BIAS=1−(Foreign Equity in total Equity Portfolio for Country i)/(1−Domestic Market Share of country i in World Market Capitalization) Total equity of a country=Stock market capitalization+foreign equity held by the citizens−amount of country's equity held by foreigners. Domestic market capitalization is the share of the market capitalization of the world. Note: Ireland is not included since equity home bias is highly negative

makes a difference to the existing literature.[2] We obtained a pair-wise volume of cross border equity holdings in US dollars from the International Monetary Fund's Coordinated Portfolio Investment Surveys (CPIS). Total market capitalization of equity markets are obtained from the World Development Indicators Database. To estimate the income smoothing regressions, we gather national accounts data from OECD National Accounts–Main Aggregates (Volume I) and detailed tables (Volume II) that cover the period 1970–2006.

We define "home equity bias" as the excessive investment in domestic portfolio compared with the optimal amount of allocation of domestic portfolio that international CAPM model. The home equity bias index is calculated as:

$$\text{HOME BIAS}_t^i = \frac{\left(1 - F_t^i\right)}{\left(1 - D_t^i\right)}. \tag{3}$$

where F_t^i is the foreign equity ratio in total equity portfolio of country i at time t. Total equity portfolio of country i is equal to stock market capitalization + foreign equity held - amount of country's equity held by foreigners. D_t^i is a ratio of stock market capitalization of country i to stock market capitalization of the world. Figure 1 contains the home bias levels of the sample. We clearly observe gradual decrease in the home equity bias which is consistent with the higher volume of foreign asset trading for the OECD members.

4 Empirical findings

Table 1 shows both our innovation to focus on factor income inflows and the net factor income flows. Both models report higher levels of income smoothing in the very last years which is perfectly consistent with capital market integration. By looking at Fig. 1, for the euro members, since home equity bias levels are quite lower than non-EMU OECD members, we shall expect higher level income smoothing via international asset holdings which is further documented in Table 1.

We carry out a sensitivity analysis to determine whether the difference in the methodology stands on firm grounds. We drop Ireland and Netherlands, which have the lowest home equity bias levels among euro members from the sample.[3] The results are reported in Table 2 with three panels. Table 2 (EMU without Ireland and Netherlands) shows the results of the truncated sample defined above. It can be gleaned that the coefficient of smoothing via factor income inflows, β_+, decreases considerably in the last two sub-periods whereas the net factor income smoothing, β_f, does not change that much, though we expected it to decrease also. The coefficients in "EMU without Ireland and

[2]Data set include Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Australia, Canada, Japan, Iceland Korea, New Zealand, Norway, Singapore, Sweden, Switzerland, UK, and US.

[3]Since it has negative level, Ireland's home equity bias levels has not been reported in Fig. 1.

Table 1 Income smoothing (percent) via international factor income

	1971–1980	1981–1990	1991–2000	2001–2006
	OECD-EU			
β_{f+}	−1.64	−0.52	2.32	2.96
	(0.95)	(0.94)	(1.47)	(2.66)
β_f	1.41	−2.95	−1.98	2.26
	(0.62)	(1.42)	(1.29)	(2.93)
	EMU			
β_{f+}	0.43	−3.1	6.25	12.13
	(0.91)	(1.52)	(2.06)	(6.06)
β_f	−0.98	−2.01	4.61	9.47
	(0.75)	(1.93)	(2.34)	(2.52)

OECD-EU: Australia, Canada, Japan, Korea Republic, New Zealand, Norway, Switzerland, and US. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain. We exclude Luxembourg, since it is an outlier with its position. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. The table shows, for incoming factor income, the coefficient β_{f+}, the GLS estimate of the slope in the regression of $\Delta \log(\text{GDP}^i + \text{international factor income received}) - \Delta \log \text{GDP}^i$ on $\Delta \log \text{GDP}^i$. The coefficient β_f, is the GLS estimate of the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GNP}^i$ on $\Delta \log \text{GDP}^i$

Netherlands" indicates that income smoothing is much higher if we consider Ireland and the Netherlands which are the most "open" countries across the Euro area.

In "EMU without Greece" of Table 2, we drop Greece, the member with the highest home equity bias level among euro members, from the regression

Table 2 Income smoothing (percent) from international factor income

	1971–1980	1981–1990	1991–2000	2001–2006
	EMU without Ireland and Netherlands			
β_{f+}	1.14	−4.04	0.57	4.87
	(0.81)	(1.81)	(2.23)	(5.82)
β_f	−1.23	−3.32	−0.3	8.48
	(0.69)	(1.75)	(2.57)	(2.63)
	EMU without Greece			
β_{f+}	1.34	−2.03	7.31	17.06
	(0.86)	(1.77)	(2.06)	(6.86)
β_f	−1.64	−3.13	4.49	5.33
	(0.77)	(1.93)	(2.41)	(3.17)
	OECD-EU without Switzerland			
β_{f+}	−2.75	−3.61	1.16	1.63
	(0.88)	(1.42)	(1.79)	(1.94)
β_f	0.83	−3.37	−3.13	2.11
	(0.61)	(0.92)	(1.43)	(3.46)

OECD-EU: Australia, Canada, Japan, Korea Republic, New Zealand, Norway, Switzerland, and US. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain. We exclude Luxembourg, since it is an outlier with its position. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. The table shows, for incoming factor income, the coefficient β_{f+}, the GLS estimate of the slope in the regression of $\Delta \log(\text{GDP}^i + \text{international factor income received}) - \Delta \log \text{GDP}^i$ on $\Delta \log \text{GDP}^i$. The coefficient β_f, is the GLS estimate of the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GNP}^i$ on $\Delta \log \text{GDP}^i$

equation instead. Expectedly, the income smoothing via factor income inflows increases from 12% to 17% and are statistically significant for the last two subperiods, whereas the former smoothing model does not have that sensitivity, even it reacts in the opposite direction after we drop Greece. In "OECD-EU without Switzerland" of Table 2, we performed a similar test for non-EU OECD members, by dropping Switzerland, having the lowest home equity bias level among OECD-EU members, income smoothing through our methodology decreases from 3% to 2% whereas regressions based up on the net income flows does not show that level of sensitivity after dropping Switzerland.

This simulation demonstrates that a clear relationship between foreign equity holdings and income smoothing via net factor inflows exists but the same cannot be said for net factor income inflows. In light of these facts, and considering the genuine relationship between the foreign asset holdings and income smoothing, we surmise that our approach of using factor income inflows is superior to the existing net factor income approach in the literature to measure income smoothing via capital markets across countries.

5 Conclusion

In this paper we present new empirical evidence on the linkages between international asset trading and income smoothing. We have used factor income inflows instead of net factor income that is common in the literature and found strong correlation between risk sharing and international asset holdings. Our results are more robust compared to the previous literature estimations.

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