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Income Insurance and the Determinants of Income Insurance via Foreign Asset Revenues and Foreign Liability Payments*

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Abstract

We document that the net factor income smoothing channel in OECD countries is primarily driven by net financial asset income, while the other two sub-components (net compensation of employees, net taxes on imports) turn out to be ineffective. Once factor income inflows are distinguished from outflows, empirical evidence suggests a non-significant effect of inflows in terms of income smoothing as opposed to a positive and significant role of factor income outflows (18 percent for the EMU and 16 percent for the EU). Factor income outflows also appear robust with respect to positive output shocks, while neither factor income inflows nor factor income outflows provide insurance against negative output shocks. In terms of the determinants of income smoothing, results indicate that an increase in foreign equity and debt liabilities positively affect the extent of smoothing via factor income outflows. Whereas, contrary to the current literature, an increase in foreign assets holding does not have a positive impact on smoothing via factor income inflows. The tendency of European investors' in allocating a sizeable portion of their assets within the Euro zone is shown to undermine income smoothing.

JEL Codes: F36.

Keywords: Factor income flows; Consumption smoothing; Income smoothing; International portfolio diversification.

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1 Introduction

In today's globalized world, in addition to the amount of risk sharing taking place via domestic channels,[1] households could also minimize their income/consumption risk by investing in foreign assets. By investing in foreign assets, that do not necessarily yield identical *timing* of returns, domestic investors can reduce the overall variance (a common metric of measuring risk) of their financial portfolios. Grubel (1968) pointed out that international diversification can improve mean-variance trade-off compared to holding a purely domestic portfolio. In spite of the supposed benefits from international diversification, investors during 1990s showed very little inclination towards holding foreign assets. Analyzing cross-border equity holdings, French and Poterba (1991) observe very high domestic ownership of shares in world's five largest stock markets: United State (92.2%), Japan (95.7%), United Kingdom (92%), Germany (79%), and France (89.4%). The observation that investors hold too little of their wealth in foreign assets has been dubbed as (equity) "home bias" in the literature.[2]

In recent years, however, portfolio home bias has declined (rather disproportionately). Table 1, adopted from Kang and Melas (2010), reports the extent of home bias reduction in selected OECD markets over the 1997-2007 period. The figures reveal significant reduction in home bias in several European markets (notably in the Netherlands), while Japan remains the most home-biased (83.7%), and the US and UK both exhibiting a level of home bias around 52% in 2007. "Such high levels of home bias represent a significant diversion from a market-cap-based global equity portfolio" (Kang and Melas, 2010, p. 3). Although European markets show a decline in home bias over the last decade, a closer look at the equity allocation patterns reveal that European asset owners have adopted a regional approach to equity allocation. That is, over the years, EU investors' holdings of EU-originated assets (than other destinations) has tremendously increased. Demyanyk, Ostergaard, and Sørensen (2008) (hereafter DOS) noticed that about 60 percent of total EU equity investments were invested within the EU. A similar pattern was observed in investments in debt securities. This recent phenomenon has been dubbed as (portfolio) "Euro bias" in the literature – see Balli *et al.* (2010) and the references

[1] Within a country risk sharing can be achieved in at least three ways: (i) by cross-ownership of productive assets facilitated by a developed capital market, (ii) through the tax-transfer system of the federal (central) government, and (iii) through lending and borrowing on national credit markets. For empirical applications of channels of risk sharing see, among others, Asdrubali *et al.* (1996) for U.S. states; Balli *et al.* (2009) for Canadian provinces; and Balli and Sørensen (2007) for OECD nations.

[2] See Lewis (1999) and Karolyi and Stulz (2003) for excellent surveys of the home bias literature. Foad (2008) offers various explanations to the home bias puzzle.

therein for related discussion.

As higher international diversification (or lower home bias) is presumed to generate higher income risk sharing, a large home bias likewise is associated with low risk sharing. Hence, home bias and risk sharing can be viewed as manifestations of the same underlying behavior. Sørensen, Wu, Yosha, and Zhu (2007) (hereafter SWYZ) empirically analyze this hypothesis for 24 OECD countries over the 1993-2003 period. To quantify income smoothing as a measure of risk sharing, SWYZ use the net factor income channel which is the difference between gross domestic product (GDP) and gross national income (GNI).[3] Income smoothing via the net factor income flows primarily takes place through two ways. One way is from the proceeds on factor income flows via the asset side so that when receipts from foreign assets strongly counter-move with aggregate (or group) output growth, high income smoothing occurs. However, income dis-smoothing can be witnessed if foreign asset returns co-move one-to-one (or react more strongly to the changes in domestic output) with domestic output. The other way is through payments on foreign owned domestic assets via the liabilities side. A higher amount of income smoothing results when the payments on foreign liabilities are closely connected to domestic output growth. Taking this approach, the amount of income smoothing depends on the degree of co-movement between foreign payments and domestic output growth. SWYZ find that a high level of foreign portfolio assets is positively and robustly related to income risk sharing. For consumption risk sharing, SWYZ find that the equity and foreign direct investment (FDI) components of international assets holdings are more relevant than debt holding. SWYZ find no significant role for liabilities in income risk sharing, save for some evidence of consumption risk sharing through FDI liabilities. SWYZ, however, did not give much emphasis on the importance of financial liability payments on income smoothing. Interestingly, for the EU region, even though income smoothing via net factor income has recently increased (Balli and Sørensen, 2007), the connection between the level of financial asset holdings and smoothing via factor income flows is not strong enough, according to DOS. Both these statements suggest that the relation between the amount of foreign asset holdings and income smoothing via foreign asset revenues should be revisited again.

Taking SWYZ as our benchmark study, this paper makes two contributions to the literature. First, extending the GDP variance decomposition due to Asdrubali *et al.* (1996), we decompose the net factor income channel into *factor income inflows* and *factor income outflows* in order to

[3]GNI was previously known as gross national product (GNP).

examine the sole effect of revenues from foreign asset holdings on income smoothing.[4] Preliminary results indicate that the net factor income channel in the OECD countries during 1999-2007 period is mainly driven by net financial asset income, while the other two sub-components (net compensation of employees, net taxes on imports) turn out to be ineffective. Once factor income inflows are distinguished from outflows, empirical evidence suggests a non-significant effect of inflows in terms of income smoothing as opposed to a positive and significant role of factor income outflows (18 percent for the EMU and 16 percent for the EU). When shocks to income are decomposed into positive and negative realizations, results indicate that factor income outflows are statistically significant only to smooth the positive shocks to GDP, while neither inflows or outflows channels are significant enough in attenuating negative output shocks. Furthermore, the factor income outflow channel appears robust to longer lasting shocks than factor income inflows, whereas the latter is shown to play important role in consumption smoothing. Second, we present an analysis of the determinants of income smoothing in accordance with the empirical strategy first introduced by Mèlitz and Zumer (1999) and subsequently developed by other contributors (among others, SWYZ). Our findings can be summarized as follows: an increase in foreign equity and debt liabilities positively affects the extent of smoothing via factor income outflows. Whereas, contrary to the current literature, an increase in foreign assets holding does not have a positive impact on smoothing via factor income inflows.

The rest of the paper is organized as follows. Section 2 briefly outlines the theory underpinning risk sharing. Section 3 describes the specification of models employed throughout the paper. It also includes a short discussion on the construction of an index of diversification for foreign asset holdings, which we used as a potential determinant of income smoothing. Section 4 presents data and empirical results. Section 5 discusses empirical evidence on the determinants of income smoothing. Finally, Section 6 concludes the paper.

2 Theoretical framework

Risk sharing indicates that economic agents or countries can share risk with each other. In this section we briefly outline the basic ideas for endowment economies with one homogeneous tradable good. For a fuller discussion interested readers are referred to Obstfeld and Rogoff

[4] According to the IMF's fifth edition of its Balance of Payments Manual (BOPM5), net factor income flows are decomposed into the net income flows from non-immigrants living abroad (the net compensation of employees from rest of the world), net tax (subsidy) on imports and net income from foreign assets (net interest receivables and net dividend receipts and net retained earnings).

(1996).

Let us consider period t per capita output of country i is an exogenous random variable with a commonly known probability distribution. Each country's representative consumer is a risk averse expected utility maximizer. Consumers within each country are identical with Constant Relative Risk Aversion (CRRA) utility functions, and we also assume that perfect Arrow-Debreu markets for contingent claims exist. When risk is fully shared among countries, the consumption of a country co-moves with world consumption but not with country-specific shocks.

A testable implication of perfect risk sharing is that consumption growth rates are identical for all countries, *i.e.*, $\Delta \log c_t^i = c + \beta_t \Delta \log \mathrm{C}_t^{\mathrm{W}} + \epsilon_{it}$, where c is a constant, c_t^i is country i's per capita consumption, $\mathrm{C}_t^{\mathrm{W}}$ is world per capita consumption in period t, and ϵ_{it} are error terms (due to either taste shocks or noise). The general intuition is that after controlling for aggregate consumption growth, the consumption growth rate of a country should not be a function of output growth of that country. Regression based tests for full risk sharing at the country level were studied by Obstfeld (1994), Canova and Ravn (1996), and Lewis (1996) – see Lewis (1995) for a comprehensive survey.[5]

It is of practical interest to quantify the extent of risk sharing between countries rather than testing the abstract notion of perfect risk sharing. It is also useful to identify the channels through which risk is shared and to quantify the amount of risk sharing obtained via each channel. There are several mechanisms for sharing output risk. The most straightforward way of sharing risk internationally is through international income diversification, *i.e.*, through cross-border ownership of financial assets. Net income from foreign assets is reflected in the national accounts data as the difference between GDP and GNI. Specifically, net factor income flows from abroad explain the difference between income earned by residents in foreign countries less the income earned by non-residents in the domestic economy. This type of risk sharing is termed income smoothing that is mainly an outcome of countries owning assets in other countries. The main idea behind income smoothing via net factor income is that if domestic economic agents have diversified their investments abroad, then foreign asset income will be facilitated in terms of smoothing income by partially detaching it from domestic output shocks.

[5]The first tests for full risk sharing, using individual-level data, were performed by Cochrane (1991), Mace (1991), and Townsend (1994). The International Real Business Cycle literature, most notably Backus *et al.* (1992), Baxter and Crucini (1995), and Stockman and Tesar (1995), examined the prediction that the correlation of consumption across countries should be equal to unity. The data, however, are far from confirming that prediction.

3 Model specifications

The literature on income smoothing has shown that agents can insure their income against country-specific output risks by holding an internationally diversified portfolio. Holding of foreign financial assets may generate net factor income flows that might partially insulate against the idiosyncratic fluctuations in GDP. SWYZ apply the following regression to measure the level of factor income smoothing:

$$\Delta \log \widetilde{\text{GNI}}_t^i = v_{i,t} + \beta_f \Delta \log \widetilde{\text{GDP}}_t^i + \epsilon_{i,t}, \tag{1}$$

where $\Delta\widetilde{\log \text{GDP}}_t^i$ is the annual change in GDP per capita in constant prices minus the union-wide counterpart ($\Delta \log \text{GDP}_t$), $\Delta \log \widetilde{\text{GNI}}_t^i$ is the annual change in GNI per capita in constant prices minus the union-wide counterpart($\Delta \log \text{GNI}_t$), and $\nu_{i,t}$ and $\epsilon_{i,t}$ are constant and error terms, respectively.[6] β_f measures the co-movement of a country's GNI growth rate with GDP growth rate. The remaining amount, 1-β_f, measures the amount of income smoothing via net factor inflows.[7] As β_f approaches to zero, GNI and GDP per capita growth rates will be less correlated, thereby resulting in higher income smoothing via net factor income channel. As value of β_f approaching to 1 implies that GNI and GDP per capita growth rates are perfectly correlated, so that net factor income flow channel does not yield any meaningful income smoothing.

3.1 Decomposition of income smoothing via the net factor income

We decompose income smoothing via the net factor income channel into factor income *inflows* and factor income *outflows*. Dividing the differences between GDP and GNI into two parts– adding in the income inflow and then deducting the income outflow–leads to the following relationships:

$$\Delta \log \widetilde{\text{GDPIN}}_t^i = \nu_{f,t}^+ + \beta_f^+ \ \Delta \log \widetilde{\text{GDP}}_t^i + \epsilon_{i,t}^+, \tag{2}$$

$$\Delta \log \widetilde{\text{GDPOUT}}_t^i = \nu_{f,t}^- + \beta_f^- \Delta \log \widetilde{\text{GDP}}_t^i + \epsilon_{i,t}^-, \tag{3}$$

[6] "Union-wide" in this paper specifically corresponds either to EU-14 or to high income OECD members. For instance, in the case of EU-14, $\Delta\widetilde{\log \text{GDP}^i}$ is equal to the real GDP per capita growth rate of country i minus the aggregate real GDP per capita growth rate of EU-14.

[7] The derivation of equation (1) is explained in details in the Appendix.

where GDPIN = GDP + FACTOR INCOME INFLOW; GDPOUT = GDP − FACTOR INCOME OUTFLOW. Adding these two equations together yields the following equation:

$$\beta_f \approx \beta_f^+ + \beta_f^-, \tag{4}$$

where β_f^+ (β_f^-) is the coefficient of income smoothing via the factor income inflows (outflows) channel.

3.2 Determinants of smoothing via factor income inflows and outflows

In order to gauge the determinants of income smoothing via the factor income channels, we follow Mèlitz and Zumer (1999) in modeling income smoothing as a time-varying process and impose the following structure on the coefficient estimates of smoothing from factor income flows. Equations (2) and (3), by allowing the income smoothing channels to change over time, are to be explained by other factors:

$$\Delta \log \widetilde{\text{GDPIN}_t^i} = \gamma_t^+ \Delta \log \widetilde{\text{GDP}_t^i} + \epsilon_{i,t}^+, \tag{5}$$

$$\Delta \log \widetilde{\text{GDPOUT}_t^i} = \gamma_t^- \Delta \log \widetilde{\text{GDP}_t^i} + \epsilon_{i,t}^-, \tag{6}$$

where γ^+ (γ^-) measures the co-movement of a country's idiosyncratic GDPIN (GDPOUT) growth and GDP per capita growth, and 1-γ^+ (1-γ^-) measures income smoothing via the factor income inflows (outflows) channel.

We assume that both channels are explained by some factors:

$$\gamma^+ = \gamma_0^+ + \gamma_1^+ \delta_i, \tag{7}$$

$$\gamma^- = \gamma_0^- + \gamma_1^- \delta_i, \tag{8}$$

where δ_i is an interaction variable that is assumed to explain the corresponding sub-channels. Following Mèlitz and Zumer (1999) and SWYZ, we extend the existing methodology as:

$$\gamma^+ = \gamma_0^+ + \gamma_1^+(\text{TREND} - \overline{\text{TREND}_t}) + \gamma_2^+(X_t^i - \overline{X_t}), \tag{9}$$

and

$$\gamma^{-} = \gamma_0^{-} + \gamma_1^{-}(\text{TREND} - \overline{\text{TREND}_t}) + \gamma_2^{-}(X_t^i - \overline{X_t}), \tag{10}$$

where X is a set of interaction variables that are considered to explain the income smoothing via factor income inflow and outflow channels. TREND denotes the linear time trend. In the first model, $1-\gamma_0^{+}-\gamma_1^{+}(\text{TREND}-\overline{\text{TREND}_t})-\gamma_2^{+}(X_t^i-\overline{X_t})$ measures the extent of smoothing via factor income inflows achieved by country i for period t. Specifically, the parameter γ_0^{+} measures the unweighted pooled average income smoothing via the factor income inflow channel; γ_1^{+} measures the average year-by-year increase in income smoothing; and γ_2^{+} measures the extent of linkage between interaction variables and income smoothing. Likewise, in the second model, $1 - \gamma_0^{-} - \gamma_1^{-}(\text{TREND} - \overline{\text{TREND}_t}) - \gamma_2^{-}(X_t^i - \overline{X_t})$ measures the extent of smoothing via factor income outflows obtained by country i for period t. The parameters γ_0^{-}, γ_1^{-}, and γ_2^{-} have similar interpretation but from the perspective of factor income outflows.

3.2.1 Index of diversification for foreign asset holdings

As a possible determinant of income smoothing, we propose an index of diversification for foreign equity and bond holdings across different countries as follows:

$$DIV_{i,t} = \frac{FMC_{i,t}}{\sum_{j=1}^{N} |(\theta_{i,t}^{j} - \theta_{i,t}^{max})|}, \tag{11}$$

where θ_i^j is the ratio of equity (bond) holdings of OECD member i from country j over total foreign equity holdings of country i. θ_i^{max} is the maximum ratio of foreign equity holdings of country i from country j. N is the number of the countries that country i diversifies its foreign portfolio with, which is set equal to 30.[8] FMC stands for ratio of the market (bond and equity) capitalization of country i to world market capitalization. The index gives larger weight to countries with highly diversified foreign equity (bond) portfolios with higher rate of stock market capitalization, and smaller weight to those that hold equity (bond) from a limited number of foreign markets with lower rate of stock market capitalization.

We end the discussion of this section by briefly outlining the econometric methodology employed throughout the paper. To account for autocorrelation in the residuals we assume that the error terms in each equation/country follow an AR(1) process. Due to short sample we restrict the autocorrelation parameter to be identical across countries/equations. We allow for country

[8] We used different values of N ranging from 20 to 35, the results did not change substantially.

specific variances of the error terms. Following Sørensen and Yosha (1998), the estimation is carried out using a two-step Generalized Least Squares (GLS) procedure: (i) the entire panel is estimated using ordinary least squares (which is equivalent to a seemingly unrelated regressions type estimation since the model contains identical regressors), and (ii) residuals from first step is used to estimate variance for each country and corrected for heteroscedasticity. Unless stated otherwise, we use differenced data at the yearly frequency.

4 Empirical results

4.1 Data

We use a broad sample of high-income OECD countries to investigate the relationship between international portfolio allocation and income smoothing.[9] We obtain pair-wise volume of cross border-equity holdings in US dollars from the International Monetary Fund's Coordinated Portfolio Investment Surveys (CPIS) for the period 2001–2007. This survey data-set is known to be reliable, since the surveys were conducted using guidelines that are consistent in measuring bonds and equity holdings across countries. The financial assets and liabilities of each country were taken from IMF's International Financial Statistics (IFS) database. National accounts data were taken from OECD's National Accounts, Main Aggregates (Volume I) and the detailed tables (Volume II) that cover the period 1970–2007. Further details are provided in the Appendix.

4.2 Income smoothing via factor income inflows and outflows

As a first step, we decompose the net factor income flows into three sub-channels, namely, net compensation of employees (short-term labor income), net taxes on imports (indirect business tax), and net financial asset income. The empirical model concerning income smoothing for the three sub-channels are specified as follows:

$$(\Delta \log \text{GDP} + \widetilde{\text{NET COMP. OF EMPLOYEE}})_t^i = \nu_{cp,t} + \beta_{cp} \Delta \log \widetilde{\text{GDP}}_t^i + \epsilon_{i,t}, \tag{12}$$

[9]The dataset include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Netherlands, Portugal, Spain, New Zealand, Norway, Sweden, Switzerland, the UK, and the US. We consider three sub-groups: EMU (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain); EU-14: (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, and the UK.) Non-EU OECD: (Australia, Canada, Japan, Korea, New Zealand, Norway, Switzerland, and the US.)

$$(\Delta \log \text{GDP} + \text{NET } \widetilde{\text{TAX ON IMPORT}})_t^i = \nu_{tp,t} + \beta_{tp} \Delta \log \widetilde{\text{GDP}}_t^i + \epsilon_{i,t}, \tag{13}$$

$$(\Delta \log \text{GDP} + \text{NET } \widetilde{\text{FIN. ASSET INCOME}})_t^i = \nu_{fa,t} + \beta_{fa} \Delta \log \widetilde{\text{GDP}}_t^i + \epsilon_{i,t}, \tag{14}$$

The estimated coefficients of the above three equations are presented in Table 2. Results indicate that neither net compensation of employees nor net taxes on imports appear as a significant source of net factor income smoothing. The estimated coefficients are small in magnitude and in some cases they indicate dis-smoothing, but these effects are not statistically significant. By contrast, the estimated coefficients of net financial asset revenues is positive and strongly significant, particularly for the EMU and EU samples, suggesting that factor income smoothing in the OECD countries during 1999-2007 was primarily driven by income flows from net foreign asset holdings.[10]

Next, Table 3 presents estimation results for income smoothing via aggregate factor income flows, factor income inflows, and factor income outflows. Results are presented over four sub-periods for EMU, EU, and non-EU OECD countries. The topmost row in each panel in Table 3 presents overall income smoothing via net factor income, indicated by $(1 - \beta_f)$. Results show that income smoothing via net factor income $(1-\beta_f)$ has begun only in the most recent decade[11], as indicated by the positive and statistically significant coefficient. The effect is unambiguously stronger for EMU countries compared to the EU and non-EU OECD countries. This is to be expected, as EMU countries enjoyed the benefit(s) of monetary union in terms of increased cross-border portfolio holdings and lowered trading costs. For both the EU and non-EU OECD countries, it has a similar positive effect, with borderline significance (p-value around 0.10), which may be considered significant in view of the rather small sample size (7 years). Both SWYZ and DOS obtain similar results documenting net factor income as a significant channel of income smoothing for OECD countries. These findings are fully consistent with the recent decline in 'home bias' puzzle mentioned in the Introduction.

We are also able to identify whether income smoothing occurred as a result of factor income inflows or factor income outflows, or both. The second row in each panel in Table 3 presents the estimated coefficients of income smoothing via factor income inflows $(1 - \beta_f^+)$. An interesting

[10]Nonetheless, compensation of employees contributed to consumption smoothing for the EU15 countries over the 1980-2005 period, while indirect taxes generated consumption dis-smoothing. Further discussion is available in Afonso and Furceri (2007).

[11]Over the 1966-1990 period, Sørensen and Yosha (1998) did not find any significant evidence of cross-country factor income flows to cross-country risk sharing. This was likely due to the small difference between GDP and GNI (as a ratio of GDP) in most industrial countries, as noticed by Atkeson and Bayoumi (1993) over the 1963-1986 period.

result emerges. Factor income inflows caused income dis-smoothing in EU and EMU countries in the past two decades. Particularly, during the 1991-2000 period the extent of income dis-smoothing was relatively higher and strongly significant. Post-Euro, the effect declined in magnitude by 50% for the EU countries, although the impact is not statistically significant. By comparison, the non-EU OECD countries experienced a lesser extent of dis-smoothing during 1991-2000, and some indication of positive income smoothing during 2001-2007 period (though it is not statistically significant). One possible explanation for this surprising result is the increased business cycle synchronization across EU economies, which resulted in a higher exposure to mainly symmetric shocks by member countries. Thus, while higher correlation of business cycle was pursued in order to minimize the stabilization cost of giving up an independent monetary policy, the adoption of the Euro has however prevented monetary policy from adjusting to shocks and has led to economic dislocation in some of its members (as became clear during the recent economic and financial crises).[12] This result encompasses the finding by Afonso and Furceri (2007), where a staggering 63% of shock to GDP among the 15 EMU countries remained unsmoothed.[13] Furthermore, we suspect that the tendency of European assets owners in the post-Euro era to hold more intra-Euro portfolios than international portfolios worked unfavorably in achieving cross-country risk sharing from cross-country factor income (in)flows.[14]

The last row in each panel of Table 3 reports estimated coefficients of the extent of income smoothing via factor income outflows, $(1 - \beta_f^-)$. Income smoothing is unambiguously negative in 1970s and 1980s, thereafter it is positive with a strong and significant impact particularly for the EMU and EU countries. Why income smoothing is positively related with factor income outflows? Intuitively, the pro-cyclicality between higher outflows from home country and higher output growth in the host country drives this result. As an example, consider France sending outflows to Germany. A positive and strong output growth in Germany will result in higher dividend payments by German companies to French investors, causing positive income smoothing in France. However, due to increased output correlation among EU countries (see, de Haan *et al.*, 2008), German investors investing in France will also benefit from portfolio outflows. Nevertheless, not all countries may simultaneously benefit from portfolio outflows, since much depend on host country's ability to channel capital inflows into productive investments.

[12] See de Haan *et al.* (2008) for surveys of empirical research dealing with business cycle synchronization among the current members of the monetary union in Europe.

[13] Not surprisingly, for an enlarged EMU with 25 members, the unsmoothed component rises to 69%.

[14] A recent study by Balli *et al.* (2010) has demonstrated the rising trends in intra-Euro debt and equity holdings, they however did not relate their results to income smoothing.

Whilst our panel estimates show evidence of positive and significant income smoothing from factor income outflows, we cannot rule out the possibility of subdued effect on income smoothing at the individual country level due to differences in country size, labor market condition, and government policies. We hope to explore this issue in a future research.

It is worth stating that if the size of overall asset portfolios are small relative to GDP, home bias may be of little importance for risk sharing. One could thus claim that the lack of risk sharing from factor income flows documented in this paper could be due to the smaller overall size of inflows than outflows relative to GDP. To appreciate this point, in Figure 1 we display the share of foreign asset receipt and foreign liability payments relative to GDP. As can be seen, save for Ireland and Korea, the two ratios track each other closely, implying that our results are not driven by lower asset portfolio to GDP ratio. Finally, Figures 2a,b graphically illustrate the results presented above. The year-by-year coefficients are obtained after smoothing the time-variation using a Normal kernel with bandwidth (standard deviation) 2. The Figures speak for themselves and are consistent with the results presented above.

4.3 Income smoothing via asymmetric output shocks and their persistence

The preceding discussion made no allowance for the distinction between positive and negative output shocks, an omission that could bias the coefficients attached to output, thereby leading to a misinterpretation of the results. For example, when a country is on a positive growth path, it likely to face more permanent positive shocks over negative ones, causing the absolute value of the coefficient attached to positive shocks to inflate. If the economy is fairly well insured against negative shocks, not distinguishing positive shocks from negative shocks might result in lack of recognition of these insurance capabilities (Pierucci and Ventura, 2010, p. 711).[15] To guard against this possibility, following Pierucci and Ventura (2010), we augment our income insurance regression by explicitly distinguishing between "positive" and "negative" realizations of the GDP shock variable:

$$\Delta \log \widetilde{\text{GDPIN}}_t^i = \nu_{f,t}^+ + \beta_{f1}^+ \Delta \log \widetilde{\text{GDP}_{it}^+} + \beta_{f2}^+ \Delta \log \widetilde{\text{GDP}_{it}^-} + \epsilon_{i,t}^+, \tag{15}$$

$$\Delta \log \widetilde{\text{GDPOUT}}_t^i = \nu_{f,t}^- + \beta_{f1}^- \Delta \log \widetilde{\text{GDP}_{it}^+} + \beta_{f2}^- \Delta \log \widetilde{\text{GDP}_{it}^-} + \epsilon_{i,t}^-, \tag{16}$$

[15] We thank an anonymous referee for bringing this point to our attention.

where GDP_{it}^{+} and GDP_{it}^{-} are the positive and negative output shocks respectively. Following Pierucci and Ventura (2010), we use an output gap process to distinguish between positive and negative realizations of the GDP. Assuming that trend output[16] is the level of output that a country wishes to secure, negative GDP component is defined as those corresponding to periods of negative output gap (actual GDP minus trend GDP), and positive GDP components to those corresponding to periods of positive output gap.

The results are reported in Table 4. Consistent with the results shown in Table 3, the estimated coefficients of positive domestic output shocks ($\Delta \log \widetilde{\text{GDP}_{it}^{+}}$) are positive and statistically significant for factor income outflow and net factor income flow channels during the 2001-2007 period for all three groups of countries. Moreover, the extent of income smoothing over the 1991-2007 period from outflow and net factor income channels are clearly higher for EMU and EU countries reflecting the increase in output growth correlations across these economies. Whereas over the same time period, although negative output shocks ($\Delta \log \widetilde{\text{GDP}_{it}^{-}}$) have not been significantly smoothed by these two channels (excluding the factor income outflow channel for non-EU OECD countries), overall the estimated coefficients are positive indicating an improvement in risk-sharing mechanism to deal with negative idiosyncratic shocks when compared with previous decades. Noticeably, factor income outflow channel has contributed to a persistent smoothing of negative output shocks for non-EU OECD countries over the entire sample period. This underscores the insurance capabilities of the non-EU OECD economies in dealing with negative idiosyncratic shocks to output.

A closer look at the coefficients of factor income inflows reveals the relevance of splitting the idiosyncratic shocks into positive and negative components. Quite surprisingly, factor income inflows have resulted in dis-smoothing with respect to both positive and negative output shocks over the 1991-2007 period, but these effects are statistically insignificant for the negative realization of idiosyncratic risk. Ironically, both EMU and EU countries appear to be benefitted from factor income inflows during the pre-1990 period than the post-1990 period. This is clearly seen from the positive and significant coefficients of $(1 - \beta_f^{+})$ attached to negative shocks and in two incidents with respect to positive shocks. This finding appears to contradict with the objectives of the European monetary union where member nations are expected to benefit from increased financial integration with each other, in which factor income inflow is one of the means of insuring against idiosyncratic risk. In retrospect, it is easy to see why the financial crisis of

[16]We use the Hodrick and Prescott (1997) filter to extract the time- varying trend from the original data.

2007-2008 has taken a heavy toll on European economies (particularly the PIIGS[17] countries). As evident from our results, post-Euro factor income inflows didn't contribute to risk sharing at all in EMU/EU countries. All in all, our findings suggest that income smoothing via net factor income flows or factor income outflows are significant only to smooth positive output shocks, these channels are not significant enough in attenuating negative output shocks.

We now examine in what way the channels of income smoothing are affected by the persistence of idiosyncratic shocks. As pointed our by Asdrubali *et al.* (1996, p. 1098): "highly persistence shocks can be insured through advance purchase of securities on capital markets but are difficult to smooth ex post on credit markets since those who wish to borrow are unable to repay." That's exactly what some PIIGS countries have faced in recent years when borrowing became much harder once the financial crisis intensified after the failure of Lehman Brothers in mid-September 2008. We have followed Asdrubali *et al.* (1996) and re-estimated equations (12)-(14) with a three-year difference interval in order to capture the response of changes in income/consumption to longer lasting shocks to GDP. Shorter term fluctuations in income/consumption have small welfare implications compared to longer lasting fluctuations and hedging against longer-term fluctuation are therefore important. Results are displayed in Table 5. The amount of income smoothing via factor income outflow and net factor income channels over the 1990-2007 period are slightly higher with the differing frequency[18], compared to those presented in Table 3. This finding is in line with Sørensen and Yosha (1998), who found that smoothing from cross-ownership of assets is much more "permanent." Echoing earlier results, factor income inflows generated significant income dis-smoothing with longer lasting shocks.[19]

4.4 Consumption smoothing via factor income inflows and outflows

The discussion so far has ignored consumption smoothing. Following DOS, consumption smoothing here captures risk sharing from all sources including income smoothing.[20] The basic regression specification that is used to quantify the amount of consumption smoothing via factor

[17] PIIGS: Portugal, Ireland, Italy, Greece, and Spain.

[18] Although results are less encouraging for the non-EU OECD economies, particularly with respect to the net factor income channel.

[19] We have also considered a longer differencing period, however, the results remain unaffected, and therefore not presented here to conserve space. These unreported results are available on request.

[20] Generally, consumption smoothing is defined to reflect whether consumption is smoother than disposable income. Our choice of alternative definition is mainly for expository purposes.

income flows is given by:

$$\Delta \log \widetilde{(\text{C})}_t^i = \upsilon_c + \beta_c \log \widetilde{\text{GDP}_t^i} + \epsilon_{i,t}^+, \tag{17}$$

where $\Delta \log \widetilde{(\text{C})}_t^i$ is the difference between country i's per capita final consumption and aggregate per capita final consumption for the group at time t, υ and $\epsilon_{i,t}^+$ are the constant and error terms, respectively. The coefficient β_c measures the average co-movement of a country's idiosyncratic consumption growth with respect to its idiosyncratic GDP growth in year t. The lower the co-movement, the higher amount of consumption is buffered against GDP fluctuations, therefore a lower β_c is expected; $1 - \beta_c$, measures the total consumption smoothing. To quantify the effect of the factor income inflows and outflows on consumption smoothing, we estimate the following regressions:

$$\Delta \log \widetilde{(\text{C} - \text{FACTOR INCOME INFLOW})}_t^i = \upsilon_c^+ + \beta_c^+ \log \widetilde{\text{GDP}_t^i} + \epsilon_{i,t}^+, \tag{18}$$

and

$$\Delta \log \widetilde{(\text{C} - \text{FACTOR INCOME OUTFLOW})}_t^i = \upsilon_c^- + \beta_c^- \log \widetilde{\text{GDP}_t^i} + \epsilon_{i,t}^-, \tag{19}$$

where coefficients β_c^+ (β_c^-) measure the average co-movement of a country's idiosyncratic consumption with factor income inflow (outflow) growth with respect to its idiosyncratic GDP growth in period t, and $1 - \beta_c^+$ (1-β_c^-) measures the amount of consumption smoothing via factor income inflows (outflows).

Results are presented in Table 6. It is clear that from 1971 to 1990 factor income inflows or outflows did not positively affect consumption smoothing in any of the three country groups. Since 1990s, however, factor income inflows contributed considerably to consumption smoothing. Between 1991 and 2000, consumption smoothing, on the back of capital income inflows, increased by 21%, 20%, and 14% respectively in EMU, EU, and non-EU OECD countries. Although in the recent decade the extent of smoothing has significantly declined, one can still observe positive amount of consumption smoothing via factor income inflows during 2001-2007. By comparison, factor income outflows caused positive consumption smoothing only for the EMU nations.

5 Determinants of income smoothing

To shed light on the underlying factors behind income smoothing via factor inflows and outflows, we estimate equations (5) and (6), which incorporate the amount of foreign assets and liabilities,

and an index of diversification of foreign assets constructed earlier. The estimation results are presented in Table 7, which includes the impact of the stocks of foreign assets (debt, equity, and FDI) on income smoothing via factor income inflows for the EU and non-EU OECD samples. It is immediately clear that, and contrary to SWYZ, the amount of foreign assets via factor income inflows cause income dis-smoothing across EU and non-EU OECD countries. While most of the effects are statistically insignificant, particularly for the EU members an increase in foreign asset holdings (*i.e.*, equity inflows) is shown to generate significant income dis-smoothing. Comparable results for factor income outflows are reported in Table 8. Both equity and debt liabilities generate significant amount of income smoothing for the EU countries, whereas the effect of FDI liabilities on income smoothing is although positive but statistically insignificant. Surprisingly, the impact of equity, debt, and FDI liabilities on income smoothing is negative in non-EU OECD countries.

Next, we examine to what extent allocation patterns of cross-border investment affect income smoothing via factor income inflows. The results are reported in Tables 9 and 10 respectively for EU and non-EU OECD countries. The third and fourth rows in Table 9 indicate to what extent risk sharing is correlated with the amount of assets invested in EMU countries (where returns are likely to be more synchronized). The third row reports the estimated coefficient of Euro countries' share of foreign debt holdings, which is negative with respect to income smoothing. This is not surprising given the remarkable degree of convergence achieved among government bond yields as well as corporate bond returns across Euro markets.[21] The observed high extent of convergence has in turn diminished the scope of risk sharing from debt instruments. On the contrary, cross-border equity investment provided positive (but statistically insignificant) income smoothing. The last two rows report the estimated coefficients of the diversification index created for foreign debt and equity portfolios respectively. As can be seen, both debt and equity provided significant positive smoothing, indicating that when countries diversify their portfolios equally across different markets, risk sharing improves. Turning to non-EU OECD countries, we observe that holding debt and equity assets from Euro region caused income dis-smoothing (see Table 10). By comparison, both diversification indices for equity and bond assets have cased positive and significant coefficients. Similar to the results in Table 9, countries with a greater diversified foreign portfolios experienced higher risk sharing.[22]

[21] See, *e.g.*, Baele *et al.* (2004), Pagano (2004), Balli (2009), Balli *et al.* (2010), and Fuss *et al.* (2010).

[22] As a check of robustness, we have also employed the alternative measures of diversification proposed by Lane and Milesi-Ferretti (2007). Our proposed measure of diversification shows a strong positive correlation

6 Conclusions

In this paper we decompose the net factor income channel into factor income inflows and factor income outflows in order to examine the sole effect of revenues from foreign asset holdings on income smoothing. We find that net factor income channel in the OECD countries during 1999-2007 period is mainly driven by net financial asset income, while the other two sub-components (net compensation of employees, net taxes on imports) turn out to be ineffective. Once factor income inflows are distinguished from outflows, empirical evidence suggests a non-significant effect of inflows in terms of income smoothing as opposed to a positive and significant role of factor income outflows (18 percent for the EMU and 16 percent for the EU). We document that both (i) the tendency of European investors to allocate a sizeable portion of their assets within the Euro zone, and (ii) the increasing business cycle synchronization among EU economies have lead to pro-cyclical movements between the foreign asset revenues and domestic output shocks, thereby undermining the risk sharing mechanism. When shocks to income are decomposed into positive and negative realizations, results reveal that factor income outflows are statistically significant only to smooth the positive shocks to GDP, while neither inflows or outflows channels are significant enough in attenuating negative output shocks. Furthermore, the factor income outflow channel appears robust to longer lasting shocks than factor income inflows, while the latter play an important role for consumption smoothing in recent years. We go on to explore the determinants of income smoothing and document that an increase in foreign equity and debt liabilities positively affects the extent of smoothing via factor income outflows. Whereas, contrary to the current literature, an increase in foreign assets holding does not have a positive impact on smoothing via factor income inflows. We also notice that the diversification of foreign equity and bond holdings across various markets leads to an improvement in risk sharing through factor income inflows.

with that of the Lane and Milesi-Ferretti (2007): 0.73 for the entire sample, and 0.82 for the EU sample. Not surprisingly, empirical results presented in Tables 9 and 10 are not significantly affected when using the Lane and Milesi-Ferretti (2007) measure. These unreported results are available on request.

A Data appendix

Bilateral foreign equity and debt asset data are taken from IMF's coordinated portfolio investment surveys (CPIS), 2001-2007. GDP, GNI, factor income inflows, factor income outflows, population and consumer price indices are obtained from OECD's National Accounts database (volume I), 1970-2007. We compute purchasing power parity (PPP) adjusted GDP, GNI, GDPIN, and GDPOUT by deflating all series with the implicit private consumption deflator. We do not use quantity indices for real GDP because we want to measure how the purchasing value of GDP is insured internationally. Growth rates of GDP, GNI, GDPIN, and GDPOUT are the growth rates of per capita PPP-adjusted variables. The PPP-adjusted series are aggregated to the EMU-wide, EU-wide, and non-EU OECD wide series. The disaggregation of net factor income variable, *i.e.*, net compensation of employees, net financial asset incomes, and net tax on imports are obtained from OECD's National Accounts Detailed Tables (volume II), 1999-2007.

Stock market capitalization for a country is measured as the value of publicly traded equity listed on the stock market exchange(s). This data is published by Standard and Poor's. We define world market capitalization as the sum of the stock market capitalizations of the 30 developed and 81 emerging stock markets listed according to Standard and Poor's. We obtain data for the market capitalization of bond markets from the Bank for International Settlements (BIS) Quarterly Review. We measure the size of a country's total bond market capitalization as outstanding domestic debt securities minus outstanding short term (less than one year remaining maturity) domestic securities plus outstanding international bonds and notes. Again we create the bond world market capitalization as the sum of the stock market capitalizations of the 30 developed and 81 emerging stock markets listed according to Standard and Poor's.

B Derivation of equation (1)

The derivation of equation (1) follows directly the cross-section decomposition in output proposed by Asdrubali *et al.* (1996). Interested readers are referred to the original paper for full details. Consider the following identity:

$$\text{GDP}^i = \frac{\text{GDP}^i}{\text{GNI}^i}\text{GNI}^i, \tag{B.1}$$

where all magnitudes are in real per capita terms and i denotes an index of country. To stress the cross-sectional nature of the derivation, time index is omitted. Taking logs and differences on both sides of the above equation, multiply both sides by $\Delta \log \text{GDP}^i$ (minus its mean) and taking the cross-sectional average, we obtain the following variance decomposition:

$$\text{var}\{\Delta \log \text{GDP}^i\} = \text{cov}\{\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\}$$

In this equation, "varX" and "covX,Y" denote the statistics $\frac{1}{N}\sum_{i=1}^{N}(\text{X}^i - \bar{\text{X}})^2$ and $\frac{1}{N}\sum_{i=1}^{N}(\text{X}^i - \bar{\text{X}})(\text{Y}^i - \bar{\text{Y}})$, respectively, where N is the number of countries in the sample. Now, dividing by $\text{var}\{\Delta \log \text{GDP}^i\}$, we get $1 = \beta_f + \beta_u$, where,

$$\beta_f = \frac{\text{cov}\{\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\}}{\text{var}\{\Delta \log \text{GDP}^i\}}, \tag{B.2}$$

is the ordinary least squares estimate of the slope in the cross-sectional regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$ on $\Delta \log \text{GDP}^i$; and,

$$\beta_u = \frac{\text{cov}\{\Delta \log(\text{C}^i + \text{G}^i), \Delta \log \text{GDP}^i\}}{\text{var}\{\Delta \log \text{GDP}^i\}}, \tag{B.3}$$

which is the ordinary least squares estimate of the slope in the cross-sectional regression $\Delta \log(\mathrm{C}^i + \mathrm{G}^i)$ on $\Delta \log \mathrm{GDP}^i$. We do not impose any restriction on β_f, which could take a value of 100%, which implies that real GNI growth rate is perfectly uncorrelated with real GDP growth rate. Likewise, when β_f takes a value of 0%, indicates that real GNI growth rate is perfectly correlated with real GDP growth rate. Moreover, since β_f is not restricted to be a positive number, when per capita consumption growth is highly sensitive to per capita GDP growth (*i.e.*, $\beta_u > 1$), β_f might be negative, indicating consumption dis-smoothing.

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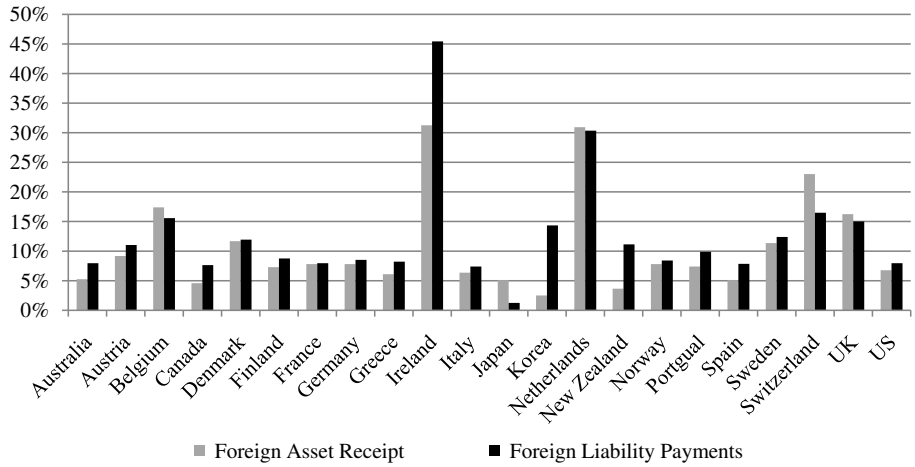
Figure 1: Foreign asset receipts to GDP and foreign liability payments to GDP ratios in OECD countries, 1970-2007



Source: U.N. Detailed National Accounts Database, and authors' own calculations. Both foreign asset receipts to GDP and foreign liability payments to GDP ratios are averaged over the 1970-2007 period.

Figure 2: Income smoothing via net factor income, factor income inflows, and factor income outflows channels in EMU and non-EU OECD economies, 1972-2007

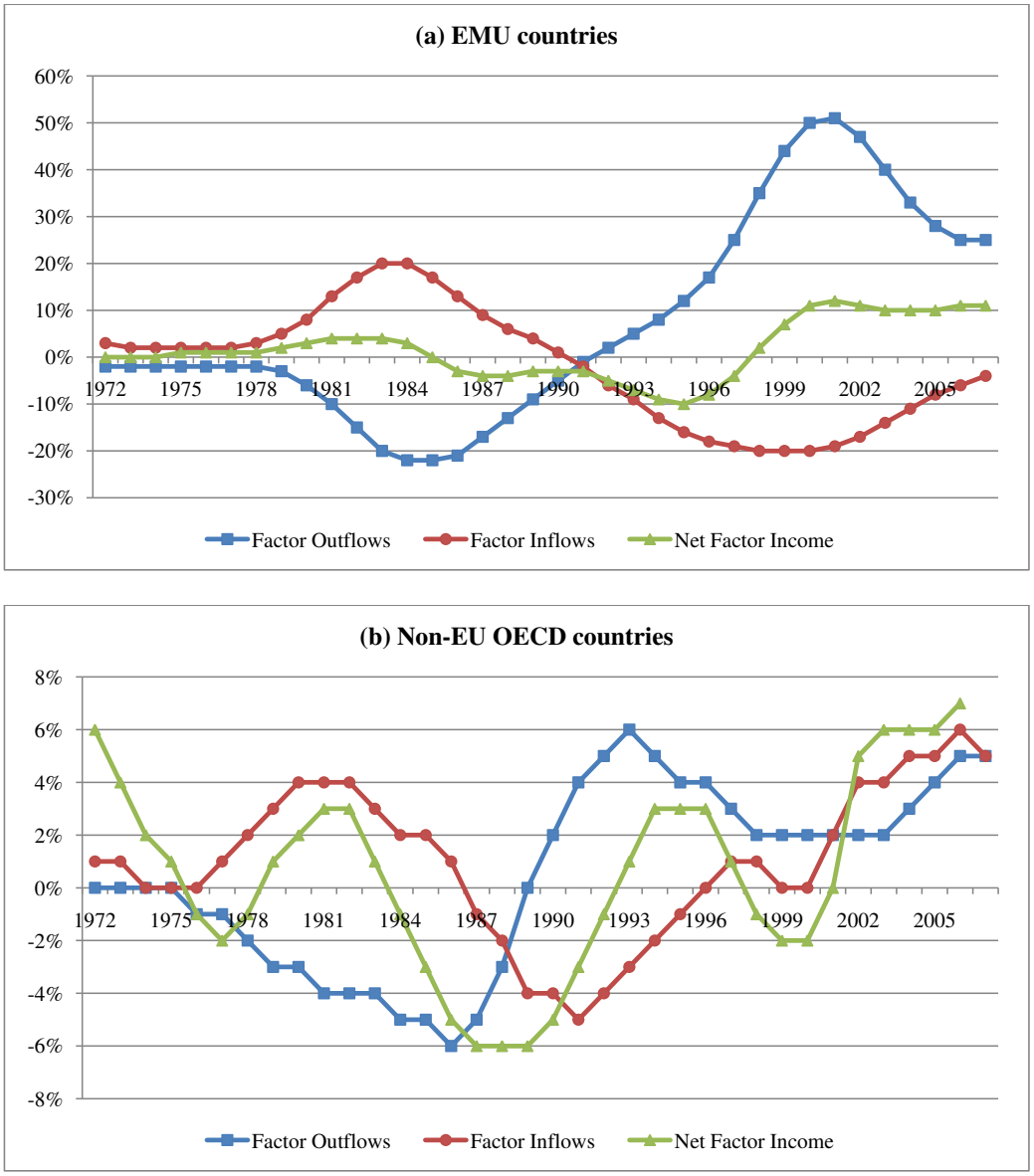


Table 1: Equity home bias in selected markets (percent)

Country	1997	2001	2004	2007
Denmark	79.7	56.1	51.4	48.5
Finland	94.1	74.4	51.3	48.8
France	83.5	69.4	59.5	62.7
Germany	NA	49.9	43.3	42.3
Netherlands	70.2	35.4	20.1	12.2
Norway	84.6	50.4	46.1	46.8
Sweden	79.2	51.1	50.8	49.7
Switzerland	NA	57.3	52.6	51.1
United Kingdom	75.9	64.0	56.1	52.2
USA	79.0	69.6	59.1	52.3
Japan	92.1	86.1	84.7	83.7

Source: Kang and Melas (2010). Home bias is defined as 1 – (actual international equity allocation / market-cap based international equity allocation). NA: not applicable.

Table 2: Decomposition of international income smoothing via components of net factor income channel (percent)

	1999–2007 NET COMP. OF EMPLOYEE $(1-\beta_{cp})$	1999–2007 NET TAX ON IMPORT $(1-\beta_{tp})$	1999–2007 NET FIN. ASSET INCOME $(1-\beta_{fa})$
EMU	-1	1	13
	(1)	(1)	(3)
OBS	88	88	88
EU	-1	(1)	12
	(0)	(1)	(4)
OBS	112	112	112
OECD	1	(0)	7
	(0)	(1)	(4)
OBS	176	176	176

EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain.

EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, and the UK.

OECD: Australia, Austria, Belgium, Canada Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the UK, and the US.Percentages describe the shocks absorbed at each level of smoothing.

Income smoothing percentage from net compensation of channel is $(1-\widetilde{\beta_{cp}})$, where β_{cp} is the GLS estimate of the slope in the regression of $\Delta \log (\text{GDP} + \text{NET COMP. OF EMPLOYEE})_t^i$ on $\Delta \log \widetilde{\text{GDP}_t^i}$. The income smoothing percentage from the net tax on imports channel is $(1-\widetilde{\beta_{tp}})$, where β_{tp} is the GLS estimate of the slope in the regression of $\Delta \log (\text{GDP} + \text{NET TAX ON IMPORT})_t^i$ on $\Delta \log \widetilde{\text{GDP}_t^i}$. The income smoothing percentage from net revenue from financial assets is $(1-\beta_{fa})$, where $\widetilde{\beta_{fa}}$ is the GLS estimate of the slope in the regression of $\Delta \log \widetilde{\text{GDP}_t^i} - \Delta \log (\text{GDP} + \text{NET FIN. ASSET INCOME})_t^i$ on $\Delta \log \widetilde{\text{GDP}_t^i}$.

Table 3: International income smoothing via net factor income and its subcomponents (percent)

	Panel A: EMU			
	1971–1980	1981–1990	1991–2000	2001–2007
$(1-\beta_f)$	0	0	4	8
	(1)	(3)	(3)	(2)
$(1-\beta_f^+)$	4	1	–10	–9
	(2)	(3)	(3)	(6)
$(1-\beta_f^-)$	–3	–2	14	18
	(1)	(1)	(7)	(8)
OBS	110	110	110	77
	Panel B: EU			
	1971–1980	1981–1990	1991–2000	2001–2007
$(1-\beta_f)$	0	–2	0	7
	(1)	(2)	(3)	(4)
$(1-\beta_f^+)$	3	4	–12	–6
	(1)	(2)	(3)	(7)
$(1-\beta_f^-)$	–3	–7	14	16
	(1)	(3)	(6)	(10)
OBS	140	140	140	98
	Panel C: Non-EU OECD			
	1971–1980	1981–1990	1991–2000	2001–2007
$(1-\beta_f)$	–1	–3	0	5
	(1)	(1)	(3)	(3)
$(1-\beta_f^+)$	–1	1	–2	4
	(1)	(4)	(7)	(3)
$(1-\beta_f^-)$	0	–4	2	3
	(1)	(3)	(2)	(1)
OBS	80	80	80	56

EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain.
EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, and the UK.
Non-EU OECD: Australia, Canada, Japan, Korea, New Zealand, Norway, Switzerland, and the US.
We exclude Luxembourg, since it is an outlier with its position. Percentages describe the shocks absorbed at each level of smoothing. Standard errors are shown in brackets. $(1-\beta_f)$ is the amount of income smoothing via the net factor income flow channel and the coefficient β_f is the GLS estimate of the slope in the regression of $\Delta \log \widetilde{\text{GNI}}_t^i$ on $\Delta \log \widetilde{\text{GDP}}_t^i$. $(1-\beta_f^+)$ is the amount of income smoothing via factor income inflow channel where β_f^+, the GLS estimate of the slope in the regression of $\Delta \log \widetilde{(\text{GDP} + \text{FACTOR INCOME INFLOW})}_t^i$ on $\Delta \log \widetilde{\text{GDP}}_t^i$. $(1-\beta_f^-)$ is the amount of income smoothing via the net factor income flow channel, and the coefficient β_f^- is the GLS estimate of the slope in the regression of $\Delta \log \widetilde{(\text{GDP} - \text{FACTOR INCOME OUTFLOW})}_t^i$ on $\Delta \log \widetilde{\text{GDP}}_t^i$.

Table 4: International income smoothing via net factor income and its subcomponents under asymmetric shocks (percent)

Panel A: EMU								
	1971–1980	1971–1980	1981–1990	1981–1990	1991–2000	1991–2000	2001–2007	2001–2007
	$\Delta \log \text{GDP}^+$	$\Delta \log \text{GDP}^-$	$\Delta \log \text{GDP}^+$	$\Delta \log \text{GDP}^-$	$\Delta \log \text{GDP}^+$	$\Delta \log \text{GDP}^-$	$\Delta \log \text{GDP}^+$	$\Delta \log \text{GDP}^-$
$(1-\beta_f)$	0	2	6	1	9	–3	13	3
	(2)	(2)	(4)	(4)	(3)	(6)	(6)	(3)
$(1-\beta_f^+)$	4	4	−1	7	−9	–10	−19	1
	(2)	(2)	(6)	(3)	(2)	(5)	(11)	(15)
$(1-\beta_f^-)$	−3	0	2	−11	24	4	17	11
	(2)	(1)	(7)	(5)	(6)	(3)	(8)	(16)
Panel B: EU								
	1971–1980	1971–1980	1981–1990	1981–1990	1991–2000	1991–2000	2001–2007	2001–2007
	$\Delta \log \text{GDP}^+$	$\Delta \log \text{GDP}^-$	$\Delta \log \text{GDP}^+$	$\Delta \log \text{GDP}^-$	$\Delta \log \text{GDP}^+$	$\Delta \log \text{GDP}^-$	$\Delta \log \text{GDP}^+$	$\Delta \log \text{GDP}^-$
$(1-\beta_f)$	−2	2	−1	0	−9	9	10	0
	(1)	(1)	(2)	(4)	(3)	(3)	(5)	(9)
$(1-\beta_f^+)$	1	4	8	4	−5	−9	−18	−1
	(2)	(1)	(3)	(2)	(3)	(3)	(11)	(10)
$(1-\beta_f^-)$	−3	0	−4	−11	12	7	18	16
	(1)	(1)	(5)	(5)	(3)	(8)	(10)	(16)
Panel C: Non-EU OECD								
	1971–1980	1971–1980	1981–1990	1981–1990	1991–2000	1991–2000	2001–2007	2001–2007
	$\Delta \log \text{GDP}^+$	$\Delta \log \text{GDP}^-$	$\Delta \log \text{GDP}^+$	$\Delta \log \text{GDP}^-$	$\Delta \log \text{GDP}^+$	$\Delta \log \text{GDP}^-$	$\Delta \log \text{GDP}^+$	$\Delta \log \text{GDP}^-$
$(1-\beta_f)$	−5	6	−6	−9	1	3	4	0
	(3)	(2)	(3)	(5)	(4)	(5)	(3)	(10)
$(1-\beta_f^+)$	−2	−3	−4	0	−5	3	−8	−4
	(1)	(1)	(3)	(3)	(3)	(5)	(4)	(3)
$(1-\beta_f^-)$	−3	4	2	10	7	8	10	9
	(3)	(2)	(3)	(5)	(4)	(5)	(4)	(4)

See Table 2. Percentages describe the shocks absorbed at each level of smoothing. Standard errors are shown in brackets. $(1-\beta_f)$ is the amount of income smoothing via the net factor income flow channel and the coefficient β_f is the GLS estimate of the slope in the regression of $\Delta \log \widetilde{\text{GNI}}_t^i$ on $\Delta \log \widetilde{\text{GDP}}_{it}^+$ and $\Delta \log \widetilde{\text{GDP}}_{it}^-$. $\Delta \log \widetilde{\text{GDP}}_{it}^+$, $\Delta \log \widetilde{\text{GDP}}_{it}^-$ are positive and negative realizations of GDP shocks, respectively. See the text for the definitions of these variables. $(1-\beta_f^+)$ is the amount of income smoothing via factor income inflow channel where β_f^+, the GLS estimate of the slope in the regression of $\Delta \log (\text{GDP} + \widetilde{\text{FACTOR INCOME INFLOW}})_t^i$ on $\Delta \log \widetilde{\text{GDP}}_{it}^-$ and $\Delta \log \widetilde{\text{GDP}}_{it}^+$. (1-$\beta_f^-$) is the amount of income smoothing via the net factor income flow channel, and the coefficient β_f^- is the GLS estimate of the slope in the regression of $\Delta \log (\text{GDP} - \widetilde{\text{FACTOR INCOME OUTFLOW}})_t^i$ on $\Delta \log \widetilde{\text{GDP}}_{it}^-$ and $\Delta \log \widetilde{\text{GDP}}_{it}^+$.

Table 5: International income smoothing via net factor income and its subcomponents with three-year frequency of the data (percent)

	Panel A: EMU			
	1971–1980	1981–1990	1991–2000	2001–2007
$(1-\beta_f)$	−3	−9	8	14
	(2)	(5)	(3)	(4)
$(1-\beta_f^+)$	−3	−1	–16	–7
	(3)	(2)	(3)	(4)
$(1-\beta_f^-)$	2	–9	25	21
	(1)	(4)	(9)	(8)
OBS	110	110	110	77
	Panel B: EU			
	1971–1980	1981–1990	1991–2000	2001–2007
$(1-\beta_f)$	−2	–6	4	13
	(2)	(3)	(3)	(4)
$(1-\beta_f^+)$	0	4	–12	–1
	(2)	(2)	(3)	(5)
$(1-\beta_f^-)$	–1	–11	17	14
	(3)	(4)	(4)	(6)
OBS	140	140	140	98
	Panel C: Non-EU OECD			
	1971–1980	1981–1990	1991–2000	2001–2007
$(1-\beta_f)$	5	1	1	–2
	(2)	(3)	(2)	(3)
$(1-\beta_f^+)$	1	–6	–4	–12
	(1)	(2)	(3)	(4)
$(1-\beta_f^-)$	3	8	7	11
	(2)	(3)	(3)	(4)
OBS	80	80	80	56

EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain.
EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, and the UK.
Non-EU OECD: Australia, Canada, Japan, Korea, New Zealand, Norway, Switzerland, and the US.
We exclude Luxembourg, since it is an outlier with its position. Percentages describe the shocks absorbed at each level of smoothing. Standard errors are shown in brackets. $(1-\beta_f)$ is the amount of income smoothing via the net factor income flow channel and the coefficient β_f is the GLS estimate of the slope in the regression of $\Delta \log \widetilde{\text{GNI}}_t^i$ on $\Delta \log \widetilde{\text{GDP}}_t^i$. $(1-\beta_f^+)$ is the amount of income smoothing via factor income inflow channel where β_f^+, the GLS estimate of the slope in the regression of $\Delta \log \widetilde{(\text{GDP} + \text{FACTOR INCOME INFLOW})}_t^i$ on $\Delta \log \widetilde{\text{GDP}}_t^i$. $(1-\beta_f^-)$ is the amount of income smoothing via the net factor income flow channel, and the coefficient β_f^- is the GLS estimate of the slope in the regression of $\Delta \log \widetilde{(\text{GDP} - \text{FACTOR INCOME OUTFLOW})}_t^i$ on $\Delta \log \widetilde{\text{GDP}}_t^i$.

Table 6: Consumption smoothing via net factor income and its subcomponents (percent)

	Panel A: EMU			
	1971–1980	1981–1990	1991–2000	2001–2007
$(1-\beta_c)$	61	39	55	62
	(8)	(8)	(7)	(9)
$(1-\beta_c^+)$	47	28	76	68
	(6)	(9)	(9)	(8)
$(1-\beta_c^-)$	50	35	48	68
	(7)	(7)	(6)	(14)
OBS	110	110	110	77
	Panel B: EU			
	1971–1980	1981–1990	1991–2000	2001–2007
$(1-\beta_c)$	50	38	54	58
	(7)	(6)	(6)	(7)
$(1-\beta_c^+)$	43	32	74	65
	(5)	(8)	(8)	(13)
$(1-\beta_c^-)$	48	37	52	58
	(5)	(7)	(6)	(12)
OBS	140	140	140	98
	Panel C: Non-EU OECD			
	1971–1980	1981–1990	1991–2000	2001–2007
$(1-\beta_c)$	56	51	54	59
	(7)	(4)	(10)	(6)
$(1-\beta_c^+)$	49	50	68	61
	(5)	(5)	(5)	(14)
$(1-\beta_c^-)$	44	44	47	57
	(5)	(11)	(5)	(9)
OBS	80	80	80	56

EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain.
EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, and the UK.
Non-EU OECD: Australia, Canada, Japan, Korea, New Zealand, Norway, Switzerland, and the US.
We exclude Luxembourg, since it is an outlier with its position. Percentages describe the shocks absorbed at each level of smoothing. Standard errors are shown in brackets. $(1-\beta_c)$ is the amount of consumption smoothing. β_c is the $\widetilde{\text{GLS}}$ estimate of the slope in the regression of $\Delta \log \widetilde{\text{C}}_t^i$ on $\Delta \log \widetilde{\text{GDP}}_t^i$. $(1-\beta_c^+)$ is the amount of consumption smoothing via factor income inflow channel where β_c^+, the $\widetilde{\text{GLS}}$ estimate of the slope in the regression of $\Delta \log (\text{C} - \text{FACTOR INCOME INFLOW})_t^i$ on $\Delta \log \widetilde{\text{GDP}}_t^i$. $(1-\beta_c^-)$ is the amount of income smoothing via the net factor income flow channel, and the coefficient β_c^- is the $\widetilde{\text{GLS}}$ estimate of the slope in the regression of $\Delta \log (\text{C} + \text{FACTOR INCOME OUTFLOW})_t^i$ on $\Delta \log \widetilde{\text{GDP}}_t^i$.

Table 7: Determinants of income smoothing via net factor income inflows: Stock of foreign assets (percent), 2001–2007.

	EU	EU	EU	Non-EU OECD	Non-EU OECD	Non-EU OECD
γ_0^+	11	19	9	13	19	9
	(15)	(17)	(16)	(11)	(11)	(16)
TREND	−5	−6	−3	−5	−6	−3
	(5)	(1)	(4)	(5)	(3)	(4)
EQUITY ASSETS	–7			−5		
	(3)			(1)		
DEBT ASSETS		11			−1	
		(11)			(2)	
FDI ASSETS			−7			−2
			(11)			(2)
OBS	98	98	98	56	56	56

EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, and the UK.
Non-EU OECD: Australia, Canada, Japan, Korea, New Zealand, Norway, Switzerland, and the US.
Heteroscedasticity-consistent standard errors are given in parenthesis. The amount of income smoothing via factor income flow is: $100*(1-\gamma_0^+)-\gamma_1^+-\gamma_2^+$. The parameters, γ_0^+, γ_1^+, and γ_2^+ are estimated from the following regression model: $\Delta \log (\text{GDP} + \text{FACTOR INCOME INFLOW})_t^i = \gamma^+ \Delta \log \widetilde{\text{GDP}}_t^i + \epsilon_t^i$. where $\gamma^+ = \gamma_0^+ + \gamma_1^+(\text{TREND} - \overline{\text{TREND}_t}) + \gamma_2^+(X_t^i - \overline{X_t})$. γ_0 is the average amount of income smoothing via factor income inflows. TREND is the time trend variable. X_t^i contains EQUITY ASSETS_t^i, DEBT ASSETS_t^i, and FDI ASSETS_t^i. $\overline{X_t}$ is the (un-weighted) average across countries of variable X_t^i. EQUITY ASSETS_t^i is the stock of foreign equity assets (in logarithms) that country i has at time t. DEBT ASSETS_t^i is the total stock of foreign debt assets (in logarithms) that country i has at time t. FDI ASSETS_t^i is the total stock of foreign direct investments that country i has at time t.

Table 8: Determinants of income smoothing via net factor income outflows: Stock of foreign liabilities (percent), 2001–2007.

	EU	EU	EU	Non-EU OECD	Non-EU OECD	Non-EU OECD
γ_0^-	24	20	11	13	19	9
	(27)	(22)	(18)	(11)	(11)	(16)
TREND	1	−5	−4	−5	−6	−3
	(7)	(5)	(4)	(5)	(3)	(4)
EQUITY LIABILITIES	29			−5		
	(13)			(1)		
DEBT LIABILITIES		70			−1	
		(44)			(2)	
FDI LIABILITIES			12			−2
			(24)			(2)
OBS	98	98	98	56	56	56

EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, and the UK.

Non-EU OECD: Australia, Canada, Japan, Korea, New Zealand, Norway, Switzerland, and the US.

Heteroscedasticity-consistent standard errors are given in parenthesis. The amount of income smoothing via factor income flow is: $100 * (1 - \gamma_0^-) - \gamma_1^- - \gamma_2^-$. The parameters, γ_0^-, γ_1^-, and γ_2^- are estimated from the following regression model: $\Delta \log (\text{GDP} - \text{FACTOR INCOME OUTFLOW})_t^i = \gamma^- \Delta \log \widetilde{\text{GDP}}_t^i + \epsilon_t^i$, where $\gamma^- = \gamma_0^- + \gamma_1^- (\text{TREND} - \overline{\text{TREND}_t}) + \gamma_2^- (X_t^i - \overline{X_t})$. γ_0 is the average amount of income smoothing via factor income inflows. TREND is the time trend variable. X_t^i contains $\text{EQUITY LIABILITIES}_t^i$, $\text{DEBT LIABILITIES}_t^i$, and $\text{FDI LIABILITIES}_t^i$. $\overline{X_t}$ is the (un-weighted) average across countries of variable X_t^i. $\text{EQUITY LIABILITIES}_t^i$ is the stock of foreign equity liabilities (in logarithms) that country i has at time t. $\text{DEBT LIABILITIES}_t^i$ is the total stock of foreign debt liabilities (in logarithms) that country i has at time t. $\text{FDI LIABILITIES}_t^i$ is the total stock of foreign direct investments (in logarithms) inflows that country i has at time t.

Table 9: Determinants of income smoothing via net factor income inflows: Diversification index and Euro portfolio shares (EU countries, percent)

	(1)	(2)	(3)	(4)
γ_0^+	23	18	26	24
	(27)	(8)	(18)	(11)
TREND	−10	−12	−12	–11
	(7)	(6)	(5)	(5)
EURO SHARE DEBT ASSETS	−24			
	(7)			
EURO SHARE EQUITY ASSETS		8		
		(8)		
DIVERSIFICATION OF DEBT PORTFOLIO			31	
			(14)	
DIVERSIFICATION OF EQUITY PORTFOLIO				29
				(8)
OBS	98	98	98	98

EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain, Sweden, and the UK. Heteroscedasticity-consistent standard errors are given in parenthesis. The amount of income smoothing via factor income flows is: $100 * (1 - \gamma_0^+) - \gamma_1^+ - \gamma_2^+$. The parameters, γ_0^+, γ_1^+, and γ_2^+ are estimated from the following regression model: $\Delta \log (\text{GDP} + \widetilde{\text{FACTOR INCOME INFLOW}})^i_t = \gamma^+ \Delta \log \widetilde{\text{GDP}}^i_t + \epsilon^i_t$, where $\gamma^+ = \gamma_0^+ + \gamma_1^+(\text{TREND} - \overline{\text{TREND}_t}) + \gamma_2^+(X_t^i - \overline{X_t})$. γ_0 is the average amount of income smoothing via factor income inflows. TREND is the time trend variable. X_t^i contains EURO SHARE DEBT ASSETS$_t^i$, EURO SHARE EQUITY ASSETS$_t^i$, DIVERSIFICATION OF DEBT PORTFOLIO$_t^i$, DIVERSIFICATION OF EQUITY PORTFOLIO$_t^i$. $\overline{X_t}$ is the (un-weighted) average across countries of variable X_t^i. EURO SHARE DEBT ASSETS$_t^i$ is the share of Euro countries in the foreign debt assets of country i at time t. EURO SHARE EQUITY ASSETS$_t^i$ is the share of Euro countries in the foreign equity assets of country i at time t. DIVERSIFICATION OF DEBT PORTFOLIO is a diversification index created to measure the extent of the diversification of the foreign debt assets country i has at time t. DIVERSIFICATION OF EQUITY PORTFOLIO is a diversification index created to measure the extent of the diversification of the foreign equity assets country i has at time t.

Table 10: Determinants of income smoothing via net factor income inflows: Diversification index and Euro portfolio shares (Non-EU OECD countries, percent)

	(1)	(2)	(3)	(4)
γ_0^+	−29	−31	25	17
	(12)	(12)	(17)	(11)
TREND	8	6	11	–6
	(3)	(3)	(7)	(6)
EURO SHARE DEBT ASSETS	−36			
	(18)			
EURO SHARE EQUITY ASSETS		−23		
		(15)		
DIVERSIFICATION OF DEBT PORTFOLIO			25	
			(13)	
DIVERSIFICATION OF EQUITY PORTFOLIO				69
				(26)
OBS	56	56	56	56

Non-EU OECD: Australia, Canada, Japan, Korea Republic, New Zealand, Norway, Switzerland, and the US.

Heteroscedasticity-consistent standard errors are given in parenthesis. The amount of income smoothing via factor income flows is: $100 * (1 - \gamma_0^+) - \gamma_1^+ - \gamma_2^+$. The parameters, γ_0^+, γ_1^+, and γ_2^+ are estimated from the following regression model: $\Delta \log (\text{GDP} + \widetilde{\text{FACTOR INCOME INFLOW}})^i_t = \gamma^+ \Delta \log \widetilde{\text{GDP}}^i_t + \epsilon^i_t$, where $\gamma^+ = \gamma_0^+ + \gamma_1^+(\text{TREND} - \overline{\text{TREND}_t}) + \gamma_2^+(X^i_t - \overline{X_t})$. γ_0 is the average amount of income smoothing via factor income inflows. TREND is the time trend variable. X^i_t contains $\text{EURO SHARE DEBT ASSETS}^i_t$, $\text{EURO SHARE EQUITY ASSETS}^i_t$, $\text{DIVERSIFICATION OF DEBT PORTFOLIO}^i_t$, $\text{DIVERSIFICATION OF EQUITY PORTFOLIO}^i_t$. $\overline{X_t}$ is the (un-weighted) average across countries of variable X^i_t. $\text{EURO SHARE DEBT ASSETS}^i_t$ is the share of Euro countries in the foreign debt assets of country i at time t. $\text{EURO SHARE EQUITY ASSETS}^i_t$ is the share of Euro countries in the foreign equity assets of country i at time t. DIVERSIFICATION OF DEBT PORTFOLIO is a diversification index created to measure the extent of the diversification of the foreign debt assets country i has at time t. DIVERSIFICATION OF EQUITY PORTFOLIO is a diversification index created to measure the extent of the diversification of the foreign equity assets country i has at time t.