Risk Sharing among OECD and EU Countries: The Role of Capital Gains, Capital Income, Transfers, and Saving

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Abstract

We estimate the amount of income and consumption smoothing (risk sharing) between OECD countries during the period 1970–2003 with a particular focus on EU and EMU countries. Income smoothing from international factor income has increased in the EU and, in particular, the EMU but not in the non-EU OECD since the introduction of the Euro. Consumption smoothing from pro-cyclical government saving has declined in the EMU, but not in the non-EU OECD, since the signing of the Maastricht treaty. We find that when capital gains and losses on international asset positions are considered part of income, the magnitude of capital gains leads to huge amounts of income smoothing and dis-smoothing although, at the time horizons we examine, the capital gains or losses are only weakly reflected in consumption. Understanding the role of capital gains in risk sharing appears to be of first order importance.

Keywords: Government Deficits, Income Insurance, International Capital Markets, International Integration, Risk Sharing, External Capital Gains.

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1 Introduction

Income and consumption smoothing (risk sharing) between countries can increase welfare. For countries in a monetary union, risk sharing may be particularly important because monetary policy is unable to address "asymmetric" shocks, where some countries experience negative shocks while others are booming. Sala-i-Martin and Sachs (1992) suggest that the risk sharing provided to states by the U.S. federal government may be essential in making the United States a successful "monetary union."[1]

We refer to the situation where consumption grows at identical rates in all countries as full risk sharing and we label the growth rate of a country-level variable minus the union-wide counterpart as the "idiosyncratic" growth-rate. We consider risk sharing to be higher, the less idiosyncratic consumption growth co-varies with idiosyncratic income growth. There are different ways that countries can obtain risk sharing which we refer to as channels of risk sharing. The main channels are cross-ownership of assets that "smooth" income (making income growth in a country less sensitive to output growth in that country), transfers that smooth disposable income for given income, and borrowing and lending that smooth consumption for given disposable income. Asdrubali, Sørensen, and Yosha (1996) (ASY) derive a simple way of quantifying the relative contributions of various channels of income and consumption smoothing within a common framework. ASY find, for the United States, that market institutions provide the bulk of risk sharing through income smoothing. Sørensen and Yosha (1998) (SY) use similar methods to evaluate channels of risk sharing between countries in the European Union (EU) and in the Organization for Economic Cooperation and Development (OECD). They find that risk sharing was mainly provided by pro-cyclical government saving with some risk sharing resulting from by pro-cyclical corporate saving at shorter horizons.

A key development in the last decade has been the steep increase in international asset trade—or "financial globalization" in the words of Lane and Milesi-Ferretti (2006). Developed countries have expanded their gross and, to a smaller extent, net holdings of foreign assets dramatically. If, say, German investors hold large quantities of dollar denominated

[1]For early contributions, see von Hagen (1992), Atkeson and Bayoumi (1993), Goodhart and Smith (1993), and Bayoumi and Masson (1995).

foreign assets while foreign countries hold liabilities of Germany denominated in Euros, then fluctuations in asset prices and/or fluctuations in exchange rates can have very large effects on the net worth of a country. Lane and Milesi-Ferretti (2005) and others point out that such valuation effects can play a significant role in the process of adjustment of international imbalances—in particular, the large net debt position of the United States has been reduced significantly through valuation effects since the beginning of the new millennium. In this paper, we examine if capital gains have played a major role in international income and consumption smoothing.[2]

Our work focusses on countries in the OECD with a particular focus on members of the EU and the European Monetary Union (EMU) and one objective of the paper is to gauge if the formation of the EMU has had an impact on risk sharing in the EU. It is feasible, indeed likely, that risk sharing is endogenous to the formation of a currency union.[3] A common currency is likely to reduce the costs of trading or information gathering and therefore lead to higher cross-ownership of financial assets. The removal of currency risk may further stimulate foreign direct investment and the integration of bond markets—already documented for the EMU see, for example, Adam et al. (2002) and Baele et al. (2004)—will imply deeper and more liquid markets for borrowing and lending.[4] It is less obvious how important these effects are quantitatively for risk sharing. Several years have passed since the adoption of the Euro and while integration of financial markets likely takes time to evolve, making it to early to draw definitive conclusions, we can get a preliminary reading.[5]

We find that smoothing through factor income flows—resulting from international cross-ownership of assets—after being negligible in the past has increased steeply in the EMU although it is still at a low level. On the other hand, smoothing of consumption through

[2]Note that the term "capital gains" is used whether the "gains" are positive or negative.

[3]Following Frankel and Rose (1998), De Grauwe and Mongelli (2005) consider more carefully how the criteria for optimally of currency areas may be endogenous and provide evidence from the EMU.

[4]Sørensen, Wu, Yosha, and Zhu (2007) show that larger holdings of foreign assets are associated with more international risk sharing. Demyanyk, Ostergaard, and Sørensen (2007) demonstrate that the integration of banking markets in the United States was following by increasing income smoothing.

[5]Shocks to the EMU economies have become more shallow in the last decade as documented by, for example, Ginannone and Reichlin (2005)—potentially reducing the importance of risk sharing. This reduced volatility seems to be a world-wide phenomenon and the reasons for it are not well understood, leaving open the possibility that this is a temporary pattern.

government counter-cyclical saving has declined sharply for the group of EMU countries leading to less overall risk sharing. Whether this pattern is due to the constraints on fiscal deficits imposed by the Growth and Stability pact and whether it is a permanent pattern remains to be seen as the monetary union matures.

Risk sharing through net capital gains from external positions is potentially very important.[6] Capital gains on international positions have been numerically large since the early 1990s and, when included in income, has significantly buffered or amplified output shocks in different countries—in other word capital gains have very large effects on income risk sharing but the effect is often not in the direction that smooth income. Most capital gains and losses have been absorbed in savings and have not had a large impact on overall consumption risk sharing at the horizons that we explore—risk sharing from capital gains is, however, estimated very imprecisely. A more precise evaluation is likely not possible without longer samples which are not available until the era of financial globalization has been with us for another decade or two.

The remainder of the paper is laid out as follows. Section 2 outlines the basic theory of perfect risk sharing and our way of measuring the degree of risk sharing from various channels. Section 3 discusses our econometric approach while Section 3 presents the empirical results. Section 4 examines the role of capital gains and Section 5 concludes. An appendix shows how capital gains are estimated and regresses capital gains on potential determinants as a background for interpreting their role in risk sharing.

2 Full Risk Sharing and Perfect Consumption Smoothing: Theory

The basic theory of international risk sharing is well known—see Obstfeld and Rogoff (1996)—and we only outline the basic ideas for endowment economies with one homogeneous tradable good. Period t per capita output of country i is an exogenous random variable with a commonly known probability distribution. The representative consumer of

[6] We calculate international capital gains following Lane and Milesi-Ferretti (2005).

each country is a risk averse expected utility maximizer.[7] Consumers within each country are identical with Constant Relative Risk Aversion utility functions and perfect Arrow-Debreu markets for contingent claims exist. Optimal consumption then satisfies the full risk sharing relation where k^i is a country specific constant, c_t^i is country i per capita consumption, and $\mathrm{C}_t^{\mathrm{W}}$ is world per capita consumption in period t. When risk is fully shared among countries, the consumption of a country co-moves with world consumption but not with country specific shocks.

If the period t utility function of country i is $\theta_t^i\, u(\cdot)$ where θ_t^i is an idiosyncratic taste shock (normalized so that $\Sigma_i(1/\theta_t^i) = 1$ in all periods), then consumption, assuming perfect markets for contingent output, will satisfy the relation

$$c_t^i = \theta_t^i\; k^i\; C_t^{\mathrm{W}}, \tag{1}$$

in any state of nature. Consumption in country i is no longer a fixed fraction of world consumption, but the central property of equation (1) is preserved: Consumption of country i is affected by aggregate shocks and by idiosyncratic taste shocks, but not by other idiosyncratic shocks (including income shocks).

A testable implication is that consumption growth rates are identical for all countries; i.e., $\Delta \log c_t^i \; = \; c \; + \; \Delta \log \mathrm{C}_t^{\mathrm{W}} \; + \; \epsilon_{it}$, where c is a constant and ϵ_{it} is an error term—due to either taste shocks or noise. An implication 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 conducted by Obstfeld (1994), Canova and Ravn (1996) and Lewis (1996)—see Lewis (1995) for a comprehensive survey.[8]

It is of more interest to quantify the extent of risk sharing between countries rather than

[7] We do not consider non-separabilities in the utility function between consumption and leisure or non-tradable output. See Canova and Ravn (1996) and Lewis (1996) for a treatment of these issues in the context of international risk sharing.

[8] 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, Kehoe, and Kydland (1992), Baxter and Crucini (1995) and Stockman and Tesar (1995) have examined the prediction that the correlation of consumption across countries should be equal to unity. The data are, however, far from confirming that prediction.

test the abstract ideal of perfect risk sharing. It is also interesting to identify the exact channels through which risk is shared and to quantify the amount of risk sharing obtained via each channel. ASY developed a method for answering these questions. The method takes equation (1) as a benchmark, and quantifies the deviation from this benchmark, interpreting the deviation as the amount of risk that is not shared.

2.1 Channels of income insurance and consumption smoothing

There are several mechanisms for sharing risk. The most straightforward way of sharing risk internationally is through international income diversification; i.e., through cross-border ownership of productive assets. Net income from foreign assets is reflected in the National Accounts data as the difference between Gross Domestic Product (GDP) and Gross National Income (GNI). We initially ignore potential capital gains. [9] If risk is fully shared through this channel, country level GNI-growth will be proportional to world GNI-growth: $\Delta \log \text{GNI}_t^i = c \; + \; \Delta \log \text{GNI}_t^{\text{W}} \; + \; \epsilon_{it}$.

If risk is not fully shared through factor income flows, there are further possible channels for smoothing consumption. Depreciation doesn't vary one-to-one with GDP—this source of risk sharing is not very interesting but it needs to included if we want to consider all "wedges" between GDP and consumption. GNI minus depreciation is (net) National Income (NI). NI can be smoothed through international transfers. We refer to NI plus net (incoming) international transfers as Disposable National Income (DNI). If DNI is not perfectly diversified consumption can be smoothed through pro-cyclical saving behavior. Individuals save and dis-save in order to smooth consumption intertemporally. If DNI is highly persistent, individuals may—if there behavior is guided by permanent income considerations—-optimally choose to engage in very little consumption smoothing through saving although patterns of life-cycle saving may or may not help smooth consumption. If fluctuations in DNI are transitory, individuals will optimally choose to engage in consumption smoothing through saving.[10]

[9] GNI was previously called Gross National Product (GNP).

[10] Baxter and Crucini's (1995) showed that even if only a riskless asset can be traded, equation (1) will approximately hold if shocks to GDP are transitory. That is, when shocks to GDP are transitory, borrowing and lending in the credit market is a close substitute for income insurance. In contrast, if shocks to GDP

The variance decomposition described below allows us to measure the fraction of shocks to GDP that are smoothed through international factor income flows, through saving, and the fraction of shocks that are not smoothed, namely, the residual deviation of the international consumption allocation from equation (1), the full risk sharing benchmark.

2.2 Decomposing the cross-sectional variance of shocks to GDP

Consider the identity, holding for any period t,

$$\text{GDP}^i = \frac{\text{GDP}^i}{\text{GNI}^i}\frac{\text{GNI}^i}{\text{NI}^i}\frac{\text{NI}^i}{\text{DNI}^i}\frac{\text{DNI}^i}{\text{C}^i + \text{G}^i}(\text{C}^i + \text{G}^i), \tag{2}$$

where all the magnitudes are in per capita terms, and i is an index of countries. To stress the cross-sectional nature of our derivation, we suppress the time index.

Taking logs and differences on both sides of (2), multiply both sides by $\Delta \log \text{GDP}^i$ (minus its mean) and taking the cross-sectional average, we obtain the variance decomposition

$$\begin{aligned}
\text{var}\{\Delta \log \text{GDP}^i\} \quad = \quad & \text{cov}\{\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\} \\
& + \text{cov}\{\Delta \log \text{GNI}^i - \Delta \log \text{NI}^i, \Delta \log \text{GDP}^i\} \\
& + \text{cov}\{\Delta \log \text{NI}^i - \Delta \log \text{DNI}^i, \Delta \log \text{GDP}^i\} \\
& + \text{cov}\{\Delta \log \text{DNI}^i - \Delta \log(\text{C}^i + \text{G}^i), \Delta \log \text{GDP}^i\} \\
& + \text{cov}\{\Delta \log(\text{C}^i + \text{G}^i), \Delta \log \text{GDP}^i\} \ .
\end{aligned}$$

In this equation "var{X}" and "cov{X, 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. Dividing by $\text{var}\{\Delta \log \text{GDP}^i\}$ we get $1 = \beta_f + \beta_d + \beta_\tau + \beta_s + \beta_u$, where, for example,

$$\beta_f = \frac{\text{cov}\{\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\}}{\text{var}\{\Delta \log \text{GDP}^i\}} \tag{3}$$

is the ordinary least squares estimate of the slope in the cross-sectional regression of

are highly persistent, consumption smoothing through trade in a riskless bond will not approximate the allocation in equation (1), namely, the credit market will not closely mimic the role of capital markets—shocks that were not insured ex-ante on capital markets will not be smoothed ex-post on credit markets.

$\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$ on $\Delta \log \text{GDP}^i$, and similarly for β_d, β_τ, and β_s. The last coefficient in the decomposition is given by:

$$\beta_u = \frac{\text{cov}\{\Delta \log(\text{C}^i + \text{G}^i), \Delta \log \text{GDP}^i\}}{\text{var}\{\Delta \log \text{GDP}^i\}}, \tag{4}$$

which is the ordinary least squares estimate of the slope in the cross-sectional regression $\Delta \log(\text{C}^i + \text{G}^i)$ on $\Delta \log \text{GDP}^i$.

If there is full risk sharing, $\text{cov}\{\Delta \log(\text{C}^i + \text{G}^i), \Delta \log \text{GDP}^i\} = 0$, and hence $\beta_u = 0$. If full risk sharing is not achieved, then consumption in country i varies positively with idiosyncratic shocks to country i's output, and $\beta_u > 0$. A cross-sectional regression of consumption on output, controlling for fluctuations in world consumption is, therefore, a test of full risk sharing.[11]

If full risk sharing is achieved through income insurance via factor income flows, $\text{cov}\{\Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\} = 0$ and hence, $\text{cov}\{\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\} = \text{var}\{\Delta \log \text{GDP}^i\}$, implying $\beta_f = 1$. Moreover, in this case, since consumers in each country can consume their national income, namely, $\text{C}^i + \text{G}^i = \text{GNI}^i$, consumption will not co-vary with income, implying $\beta_u = 0$.[12]

Suppose that full risk sharing is not achieved through income insurance via factor income flows and capital depreciation, but is achieved through the combination of factor income flows, depreciation, and international transfers. Then DNI will be perfectly correlated with "world" DNI and, by analogous reasoning, $\beta_f + \beta_d + \beta_\tau = 1$, and since consumers in each country will consume their DNI, $\beta_u = 0$. Similarly, if the full risk sharing allocation is achieved through factor income flows, depreciation, international transfers, and saving, consumption C+G will satisfy equation (1). Then, by analogous reasoning, $\beta_f + \beta_d + \beta_\tau + \beta_s = 1$ and $\beta_u = 0$.

β_u is the fraction of shocks to GDP that is not smoothed. The coefficients β_f, β_d, β_τ, and

[11] This is the test suggested by Mace (1991) and Townsend (1994) who test for full risk sharing by running cross-sectional (or panel) regressions of consumption on income, controlling for aggregate movements in income and consumption. Cochrane's (1991) test is very similar.

[12] If full risk sharing is not achieved through income insurance via factor income flows, then $\text{cov}\{\Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\} > 0$ and hence, $\text{cov}\{\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i, \Delta \log \text{GDP}^i\} < \text{var}\{\Delta \log \text{GDP}^i\}$, implying $\beta_f < 1$.

β_s are interpreted as the fraction of shocks absorbed through factor income flows, depreciation, international transfers, and saving, respectively. If consumption satisfies equation (1), they sum to unity and $\beta_u = 0$. If not, they sum to less than unity. In either case, they reflect the incremental amount of smoothing achieved through the various channels discussed above.

We not impose any restrictions on the sign of the β-coefficients. If a country that is hit by a positive shock has a smaller share of GDP allocated to, e.g., capital consumption, then depreciation provides cross-sectional dis-smoothing. Similarly, if taxes increase or decrease less than proportionately with output, they provide dis-smoothing.

2.3 The role of Government, Personal, and Corporate Saving in Consumption Smoothing

Pro-cyclical saving is often the major channel of risk sharing and in order to obtain a deeper understanding we examine which components of saving are more counter-cyclical. Net national saving consists of three components: Personal, corporate, and government saving. This role of each of these components can help shed light on institutional barriers to consumption smoothing—for example, whether the 1992 Maastricht requirements regarding government debt, and the subsequent Stability and Growth Pact, have been impediments to risk sharing from pro-cyclical government saving.[13]

The corporate sector will contribute to income insurance if it adjusts patterns of earnings retention so that a larger share of profits is distributed to shareholders during recessions.[14]

Individuals may desire to smooth consumption through personal saving by borrowing and lending. The ability of individuals to smooth their consumption through cross-country borrowing and lending depends on whether the banking system, and credit markets in general, are sufficiently integrated internationally—otherwise, say, an increase in the demand for loans may increase the domestic interest rate leading to less borrowing. Ostergaard,

[13]Gali and Perotti (2003) find that the Maastricht rules in practice have not limited the ability of fiscal policy in the EMU to be counter-cyclical. However, their metric is somewhat different from our risk sharing measure.

[14]This is consistent with the standard textbook view that corporations smooth dividend payout ratios, adjusting them only in response to shifts in long-run sustainable earnings; see, e.g., Brealey and Myers (1991, Chapter 16).

Sørensen, and Yosha (2001) and Sørensen and Yosha (2000) find that aggregate state-level consumption and, therefore, savings patterns are closer to the prediction of the Permanent Income Model than aggregate country-level consumption. Whether this implies more or less risk sharing at the country-level in our metric depends on the time-series properties of shocks to disposable income.

2.4 Allocation of Saving

The amount of consumption smoothing achieved through saving can also be decomposed according to the "destination" of savings, namely, domestic physical investment versus investment abroad. Net investment abroad equals the current account surplus CA and $\mathrm{S} = \mathrm{I} + \mathrm{CA}$, where "I" denotes net domestic physical investment. If higher saving in a country in a particular year is mainly reflected in higher investment in that country in the same year, this would indicate that international investment patterns do not respond strongly to shocks and, therefore, do not contribute to cross-country consumption smoothing. The well-known paper by Feldstein and Horioka (1982) raises the question of why saving and investment at the country-level are so highly correlated. While there may be conditions where this is an optimal outcome, a high correlation between investment and saving is typically considered a symptom of lack of international financial integration.

In theoretical work risk sharing is typically modeled as the shipping of goods abroad in good times.[15] We denote net export by $\mathrm{X}^i - \mathrm{M}^i$ and examine if $\mathrm{GDP}^i - \mathrm{X}^i + \mathrm{M}^i$ is smoothed relative to output (after controlling for aggregate effects).

3 Estimation

3.1 Estimating channels of risk sharing

At the practical level, the following (panel) equations are estimated:

$$\begin{aligned} \Delta \log \mathrm{GDP}_t^i - \Delta \log \mathrm{GNI}_t^i &= \nu_{f,t} + \beta_f \;\; \Delta \log \mathrm{GDP}_t^i + \epsilon_{f,t}^i \;, \\ \Delta \log \mathrm{GNI}_t^i - \Delta \log \mathrm{NI}_t^i &= \nu_{d,t} + \beta_d \;\; \Delta \log \mathrm{GDP}_t^i + \epsilon_{d,t}^i \;, \end{aligned}$$

[15]See Heathcote and Perri (2004) for an example.

$$\begin{aligned}
\Delta \log \text{NI}_t^i - \Delta \log \text{DNI}_t^i &= \nu_{\tau,t} + \beta_\tau \;\; \Delta \log \text{GDP}_t^i + \epsilon_{\tau,t}^i \;, \\
\Delta \log \text{DNI}_t^i - \Delta \log(\text{C}_t^i + \text{G}_t^i) &= \nu_{s,t} + \beta_s \;\; \Delta \log \text{GDP}_t^i + \epsilon_{s,t}^i \;, \\
\Delta \log(\text{C}_t^i + \text{G}_t^i) &= \nu_{u,t} + \beta_u \;\; \Delta \log \text{GDP}_t^i + \epsilon_{u,t}^i \;,
\end{aligned} \tag{5}$$

where $\nu_{\cdot,t}$ are time fixed effects. The time fixed effects capture year specific impacts on growth rates, most notably the impact of the growth in aggregate EU (or OECD) output. Furthermore, with time fixed effects the β-coefficients are weighted averages of the year-by-year cross-sectional regressions. To take into account autocorrelation in the residuals we assume that the error terms in each equation and in each country follow an AR(1) process. Since the samples are short, we assume that the autocorrelation parameter is identical across countries and equations. We further allow for state specific variances of the error terms. In practice, we estimate the system in (5) by a two step Generalized Least Squares (GLS) procedure. Unless we say otherwise, we use differenced data at the yearly frequency, although we will also show results for longer differencing intervals. Because our method is based on panel estimations with time fixed effects, it yields fully consistent estimates even if there are worldwide taste shocks.

3.2 Finding determinants of risk sharing

Consider, for example, the estimated income smoothing from factor income flows, β_f. Mélitz and Zumer (1999) impose structure on β_f so that $\beta_f = \beta_{f0} + \beta_{f1}\,\gamma_i$, where γ_i is an "interaction" variable that affects the amount of smoothing that country i obtains. Sørensen, Wu, Yosha, and Zhu extended this method by allowing β_f to change over time, as follows:

$$\beta_f \,=\, \beta_{f0} \,+\, \beta_{f1}\,(t \,-\, \bar{t}) \,+\, \beta_{f2}\,(X_{it} \,-\, \overline{X})\,, \tag{6}$$

where X_{it} is a variable that potentially may impact on risk sharing. We subtract the mean of the "interaction variables" in order to leave the interpretation of β_{f0} as the average amount of income smoothing.

In practice, we estimate the time varying amount of income smoothing by running the regression

$$\Delta \log \text{GDP}_t^i - \Delta \log \text{GNI}_t^i \;=\; \nu_{f,t} + \beta_{f0}\ \Delta \log \text{GDP}_t^i + \beta_{f1}\ \Delta \log \text{GDP}_t^i * (t - \bar{t}) + \beta_{f2}\ \Delta \log \text{GDP}_t^i * (X_{it} - \overline{X}) + \epsilon_{f,t}^i\ ,$$

possibly including further interaction variables. We, similarly, examine if the amount of consumption smoothing from saving, β_s, varies with interaction variables.

4 Results

4.1 Data

The data are from the OECD National Accounts, Main Aggregates (Volume I) and Detailed Tables (Volume II), various issues, covering the period 1970–2003. The OECD countries in our sample consist of all 2005 members except Luxembourg (very small and atypical), Iceland (incomplete data), and Czech Republic, Hungary, Korea, Mexico, Poland, Slovakia, and Turkey (less developed countries). We use three subsets of the OECD members in the various regressions. The EMU countries with the exception of Luxembourg.[16] "EU" denotes all the 2003 EU member countries, excluding Luxembourg.[17] OECD–EU denotes the OECD members in our sample excluding the 14 member countries of the EU.[18]

4.2 Income insurance and consumption smoothing among EMU and OECD countries

Table 1 displays the estimated percentages of GDP-shocks smoothed through each channel, among EU, EMU, Non-EU developed OECD ("OECD") countries, for the period 1971–2003. Conceptually, the coefficients add up to 100 percent but we choose not to impose this constraint.

[16]Our EMU sample consists of Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain.

[17]The EU sample consists of the EMU sample plus Denmark, Sweden, and U.K.

[18]OECD–EU consists of Australia, Canada, Japan, New Zealand, Norway, Switzerland, and the United States.

From the first line in Table 1, it is immediately apparent that the contribution of cross-country factor income flows to cross-country risk sharing, among EU as well as OECD countries, was not been significantly different from zero on average.[19] Of course, it is well known that cross-country assets holdings were small during that period as documented by French and Poterba (1991) and Tesar and Werner (1995), so this result is no big surprise. Foreign factor income flows consists almost solely dividend, interest, and other earnings accruing to capital. Income of, say, a U.S. *resident* working in the UK is also part of factor income, but earnings of, say, a Turkish *citizen* who is a resident of Germany is part of German GNI and doesn't enter factor income flows.

Depreciation contributed negatively to income smoothing. This variable isn't very interesting because depreciation is a function of past investment and, besides, is mainly imputed. However, the negative sign is intuitive because when output goes up depreciation typically doesn't move with output and therefore a larger share of output is available for income and consumption. We will not further comment on this channel.

During 1971–2003, transfers did not contribute to risk sharing. Transfers include official transfers, such as contributions to the EU budget and foreign aid, and workers remittances which, on average during this period, were fairly small.

The fourth line in Table 1 indicates that the bulk of consumption smoothing of EU and OECD countries is achieved via saving. Such smoothing need not involve actual cross-border flows of funds but can be reflected in domestic fixed or inventory investment. The point estimate for consumption smoothing through national saving is higher for the OECD countries but the difference is not statistically significant. Overall, two-thirds of output shocks were not smoothed during this period. SY found virtually identical results for the period 1966–1980 and for the OECD (including EU) in the 1980s. We will examine how our results vary by subperiods and in particular if risk sharing has increased in the EMU in recent periods.

SY stated: "..the large amount of consumption smoothing achieved in the European Community via government borrowing may not be sustainable in an EMU where fiscal coordination must be maintained. Until private capital and credit markets develop, there

[19] SY found a similar results for the period previous to 1990.

may be a need for a greater insurance role of European Community institutions." So, did the role of government change? Table 2 repeats the exercise of Table 1 for the period 1999—2003 after the introduction of the Euro. Two things have indeed changed: First, factor income now smooth 11 percent of GDP shocks in the EMU and still nothing in the OECD and, second, consumption smoothing through national saving has decreased steeply in the EMU and increased in the OECD: 72 percent of shocks to GDP in the OECD are smoothed while only 34 percent are smoothed in the EMU. transfers contribute modestly, but significantly, to income smoothing in the EMU. We do not have enough observations to make clear statements of the difference between the EMU and the three EU members that are not member of the EMU;[20] however, including the non-EMU EU countries weakens the effect of factor income smoothing lending at least weak support to the notion that the common currency is helping this channel of risk sharing.

Did factor income smoothing increase slowly over the full sample or steeply after the introduction of the Euro? Table 3 addresses this question. The answer is: Factor income smoothing rose steeply after the introduction of the Euro. The table also shows that factor income smoothing robustly has been zero before 1999—the one significant number for the 1970s for the EMU is the lone significant number before that period. This recent increase is consistent with the large decline in home bias in asset holdings documented by, for example, Sørensen, Wu, Yosha, and Zhu (2007). Foreign asset holdings need to be very large in order to provide significant smoothing. To fix thoughts, think of the case where all capital in a country is owned by foreigners and residents of the country own foreign assets in the same amount.[21] Assume, as is also often done, that one third of GDP accrues to capital. Then one would expect 33 percent of output shocks to be smoothed by factor income. As an illustration, consider how our measure works in a 1-period case where GDP in a country starts at GDP_0 and $\text{GDP}_1 = 1.1 * \text{GDP}_0$. If world per capita GDP in both periods is fixed at GDP_0 then $\text{GNI}_1 = .33 * \text{GDP}_0 + 0.66 * \text{GDP}_1 = \text{GDP}_0 + 0.66 * (\text{GDP}_1 - \text{GDP}_0)$. We have $\Delta \log \text{GNI}_1 \approx 0.66 * \Delta \log \text{GDP}_1$ which show that 33 percent of the output shock is smoothed

[20] Particularly since Denmark ties its currency very tightly to the Euro so that it isn't really obvious how it would be better classified.

[21] The capital-output ratio is often assumed to be around three so, roughly, this would be a case where the level of gross foreign asset holdings is three times GDP.

by factor income flowing to other countries in a situation where all capital is owned by foreigners and foreign output is uncorrelated with domestic output.

Mechanically, there are two reasons why foreign net factor income might smooth GNI: First, when output goes up factor income paid to other countries typically increases—proportionally to output in our simple example and, second, factor income received does not move one-to-one with output. In reality, many other patterns can occur and it is possible for factor income to even dis-smooth. An example would be a country that pays interest on debt and pays a very large risk premium on bonds issued. In the face of high domestic growth the risk premium on debt may decline and interest payment to foreigners may decline. The high growth is overall a good situation for the country, but in this example it results in negative insurance. Of course, the reverse situation when output falls and interest paid goes up is particularly onerous. A more likely situation for OECD countries may be one where a country has a large net debt position and the world interest rate falls, to take a concrete example, leading to lower debt payments. If creditor countries happen to grow fast during such a period while debtor countries grow slowly, debt holdings could contribute negatively to measured risk sharing.

We examined if risk sharing from factor income paid is higher than from factor income received. We did not obtain significant coefficients and the coefficient were unstable when estimated for different sub-periods and we do not tabulate the results. More years with substantial international factor income flows are needed to be able to answer this question empirically.

Table 4 displays a breakdown by subperiods for risk sharing from transfers. Transfers contribute positively to income smoothing in the EU area since 1980 although the effect has been relatively small since 1999. Smoothing from transfers captures the combined impact of EU official transfers and remittances. The magnitude is not large, about 5 percent in the 1980s and 1990s and a bit smaller since 1999 but the impact is statistically significant and appears robust. For no subperiod do transfers smooth income significantly in the OECD outside of the EU.

We observed that saving contribute much less to consumption smoothing in the EU than in the remaining OECD since 1999. Is that a recent phenomenon? Table 5 addresses that issue. For all subperiods are the amount of consumption smoothing through saving smaller in the EU. The numbers are very similar for EU and EMU countries so the indication is that this may have more to do with EU institutions than with the common currency. The divergence between the EU and the OECD since 1999 is striking. We examined if the high numbers for the OECD were due to an outlier like Norway, where the government saves large amounts of oil-revenues, but this is not the case. We will next explore which components of saving is the cause of this behavior.

Table 6 examines sub-channels of consumption smoothing through government, corporate, and private saving. Pro-cyclical government saving have provided increasing consumption smoothing outside of the EU area and since 1996 an amazing 86 percent of GDP fluctuations have been smoothed by the government. The pattern is very different in the EU, starting from insignificant smoothing from government saving in the late 1980s, 36 and 46 percent of shocks were smoothed in the EU and EMU areas, respectively, in the early 1990s but since 1996 government saving became significantly less pro-cyclical in these countries. Corporate saving contributes significantly to consumption smoothing in the EU although the exact amount varies somewhat over time while corporate saving has not contributed significantly to consumption smoothing in the remaining OECD. Private saving has been dis-smoothing (counter-cyclical in the EMU and EU until 1996 after which the effect is positive but statistically insignificant). It is not necessarily rational for consumers to smooth income shocks: Permanent income theory of consumption would predict that consumption reacts to future expectations and if a positive income shock leads to expectations of future positive income shocks it may be rational to raise consumption by more than income. In the OECD, private saving has also not contributed to consumption smoothing since 1996 although in the earlier periods private saving did contribute positively to consumption smoothing.

In Figures 1–4 we illustrate the results discussed so far in graphical form for non-EU and EMU countries (EU countries are similar). Figure 1 shows the total amount smoothed and the contribution from saving. While there is some noise the pattern of increasing contributions from saving in the OECD is fairly clear and the decreasing contribution from saving in the EMU is particularly clear. In the OECD the combined contribution from other channels of smoothing is negative in all years while in the EMU this is, fortunately, not the case: As the contribution from saving has declined to near zero by the new century other channels of smoothing has kept the overall amount of risk sharing at about 40 percent. Figure 2 shows the decomposition of the contribution from saving. The divergent trends in consumption smoothing from government saving in the EMU versus the non-EU OECD are particularly visible. Private, including corporate, saving displays an increasing contribution to consumption smoothing in the EU but little long-trend in the OECD.

Figure 3 displays the contributions from transfers and factor income. In the EMU, factor income has contributed little to income smoothing until about 1994 where a strong increasing trend become visible. Sørensen, Wu, Yosha, and Zhu (2007) show that this pattern is highly correlated with increasing holding of foreign assets. Smoothing from transfers were initially negative but turned positive around 1980 with a slow decline since the mid 1980s. In the OECD, transfers do not contribute either way and the impact from factor income flows is also very small with a negative contribution around 1991. Negative income smoothing is the case where GNI, say, declines more than GDP which occurred in some countries in the early 1990s (for example, in Sweden a severe banking crises resulted in a drop in GDP and an even larger drop in GNI).

The patterns in consumption smoothing from government saving are very strong and in order to interpret the results we, in Figure 4, display the ratio of the saving components to GDP. (This is not a measure of risk sharing because there is no controls for OECD-wide effects; nonetheless, the ratio is informative about determinants of risk sharing.) The ratio of government saving to GDP dips in the OECD during the recessions in the early 1980s, the early 1990s, and early in the present century which is what our regressions correctly pick up as consumption smoothing. In the EMU, this pattern is much weaker—it seems that for some reason EMU governments switched from surpluses to large deficits until the mid-1990s after which they steeply increased saving, presumably to meet the Maastricht criteria. Overall, we are left wondering if this is a particularly optimal pattern of saving although we of course do not evaluate the myriad of non-risk sharing considerations that may have motivated this. Counter-cyclical behavior of corporate saving is visible since 1990 in the EMU.

The term "risk sharing" indicates that countries or agents share risk with others. Nonetheless, risk sharing as we, and others, usually measure it, may be obtained even in autarky if countries allocate a larger share of GDP to physical investment in good times. Recall that national saving is the sum of net investment and the current account surplus, where the latter equals financial investments abroad. We measure the contribution from each of these channels in an alternative decomposition of consumption smoothing from saving. It may also be of interest to examine how net exports correlated with output fluctuations because theoretical economic models often consider risk sharing as the net shipment of goods abroad in good times. We measure the fraction of shocks smoothed via domestic net investment by estimating the coefficient in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - \text{I}^i)$ on $\Delta \log \text{GDP}^i$. Similarly, we measure the fraction of shocks smoothed via the current account surplus ("investment abroad") as the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - \text{CA}^i)$ on $\Delta \log \text{GDP}^i$. Due to non-linearity (and to the way we correct for heteroskedasticity and autocorrelation) the smoothing from the current account and from investment will not add up to the smoothing from saving but conceptually it does.

The results, displayed in Table 8, for four sub-periods, indicate that until 1999 all smoothing is achieved via domestic investment. The finding that shocks to output are smoothed via domestic net physical investment is consistent with the pro-cyclical behavior of investment in aggregate U.S. data; see Blanchard and Fischer (1989). In the 1970s investment achieved the bulk of income smoothing in all regions while the impact declined in the 1980s and 1990s and for the 1999–2003 period the impact is only 11 percent in the EMU and insignificant in the EU. In the OECD, the decline is smaller and net investment still smooth 25 percent of shocks. The joint observations of large smoothing from saving and large smoothing from investment is consistent with the observation ("puzzle") of Feldstein and Horioka (1990) that saving and investment is highly correlated at the country level—a finding that usually is interpreted as a reflection of low financial integration between countries.

Surprisingly, the current account contributed negatively, or not at all, before 1999. In the period after 1999 there is no effect in the EMU (reflecting that overall saving is not contributing to consumption smoothing) but for the OECD this channel contributes

35 percent to consumption smoothing. This result indicates that the Feldstein-Horioka "puzzle" is becoming less serious as countries become more prone to invest their savings world-wide.[22]

We use a similar regression to see if net exports smooth income: The coefficient in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - (\text{X}^i - \text{M}^i))$ on $\Delta \log \text{GDP}^i$ measures the fraction of shocks. The results show that until very recently, net exports played no role in consumption smoothing. However, for the OECD countries there has been a large contribution to consumption smoothing through net exports since 1999.

Short term fluctuations in consumption have small welfare implications compared to longer lasting fluctuations and hedging against longer run fluctuation are therefore important. Table 9 examines if the results are different when the time-period considered is three years, rather than one. SY found that consumption smoothing was significantly lower at the three-year frequency, in particular due to smoothing through corporate saving being of short duration.[23] Comparing the results with those of Table 1, we see slightly less risk sharing at the longer horizon but not significantly less so.[24]

ASY and SY found evidence that smoothing from cross-ownership of assets is much more "permanent" than smoothing from saving. In Table 10 we examine smoothing from factor income in the upper panel and from saving in the lower panel by sub-periods. In the EMU, we find a very large smoothing effect from factor income for 2000–2002. Due to the short sample (a single 3-year period) this is only suggestive but the result is accordance with our prior expectations. On the other hand, it is puzzling why factor income flows provided negative risk sharing at this frequency for the OECD countries.[25]

Table 11 and Table 12 study if income smoothing from factor income and consumption smoothing, respectively, vary systematically with time, being a member of monetary union,

[22]Blanchard and Giavazzi (2002) argue that the Feldstein-Horioka puzzle is a thing of the past in the Euro area.

[23]Becker and Hoffmann (2006) perform a more systematic examination of risk sharing at different frequencies.

[24]This sample includes only one observation per country so the results are imprecisely estimated as indicated by the large standard error. Clearly more observations are needed to corroborate that this result reflects more than transitory conditions.

[25]These results are mainly suggestive and we choose to end the sample in 2002 because this break-up into sub-periods gives the strongest contrast between the 1990s and the 2000s.

etc. Sørensen, Wu, Yosha, and Zhu (2007) showed that risk sharing increase with holdings of foreign assets and we do not revisit that issue. Instead we follow Mélitz and Zumer (1999) and examine if richer (high GDP), and EMU countries obtain more risk sharing and there is a trend in risk sharing.[26] We show results for an early (1971–1987) and a late (1988–2003) sample.

For international factor income, we find that richer countries obtained significantly less income smoothing in the early part of the sample. This result also hold for the later sample but no longer with statistical significance. The trend is insignificant but negative in the early sample and positive and significant in the later sample—this isn't surprising given our earlier results. The EMU dummy is positively significant in the late sample but otherwise insignificant. For saving we find, in Table 12, that richer countries obtained significantly more consumption smoothing. EMU countries obtained dramatically less consumption smoothing while the trend is significant and positive to the late sample. Longer samples and, likely, more variables are needed in order to determine a longer list of determinants of risk sharing but our results serve to demonstrate that the different patterns of risk sharing found for the EMU countries are not simply capturing variables such as output level or interest rates that were left out in the earlier tables.

5 Capital Gains on International Assets and Risk Sharing

Recorded international factor income flows reflect interest, dividends, and realized capital gains but typically not unrealized capital gains. Therefore, our results this far may vastly understate the role of international assets in the provision of risk sharing. For common stocks, capital gains often swamp dividend flows—and for international assets, currency fluctuations are likely to further create large capital gains. Such gains have increased significantly in magnitude in later years as gross financial holdings of foreign assets, in particular equity, have gained importance. For example, during the last three years of our

[26] We also examined if risk sharing depends on the world (U.S.) interest rate, with country-specific interest rates, with world output, with the world aggregate business cycle (the output of our total sample filtered through a Hodrick-Prescott filter). Neither of these interaction terms delivered significant results and we do not display the estimated coefficients.

sample, 2001–2003, capital gains of U.S. investors from external portfolio holdings were around 8 percent of GDP on average. It is therefore important to consider the role of capital gains in risk sharing—a role that seems not to have been previously explored.

Capital gains smooth income if capital gains typically are negative when a country has high GDP growth. In this situation, one might expect negative capital gains because domestic stocks typically gain in relative value during economic booms. Also, high growth may be associated with currency appreciation which decreases the value of foreign assets which are typically denominated in foreign currency. In order to measure income smoothing via capital gains, we estimate the relation

$$\Delta \log \mathrm{GDP}_t^i - \Delta \log(\mathrm{GDP}_t^i + \mathrm{CAPITALGAIN}_t^i) = \nu_{k,t} + \beta_k \, \Delta \log \mathrm{GDP}_t^i + \epsilon_{i,t} \ , \tag{7}$$

where "(capital gains)$_t^i$" is the year t net international capital gains and losses. $\nu_{k,t}$ is a time fixed effect. The regression examines if output plus capital capital gains (which can be considered as "income" available before other channels of risk sharing) varies less that one-to-one with output. If that is the case, there is positive risk sharing from capital gains. The estimated coefficient β_k is our measure of such risk sharing.

If capital gains are considered part of "income," the estimates of consumption smoothing will look quite different from those presented so far. We estimate consumption smoothing in this case by examining how "saving" (income plus net capital gains minus consumption) covaries with with output growth after controlling for aggregate effects. I.e., we estimate the relation

$$\Delta \log(\mathrm{DNI}_t^i + \mathrm{CAPITALGAIN}_t^i) - \Delta \log(\mathrm{C}_t^i + \mathrm{G}_t^i) = \nu_{ks,t} + \beta_{ks} \ \Delta \log \mathrm{GDP}_t^i + \epsilon_{s,t}^i \ . \tag{8}$$

In this regression, $\nu_{ks,t}$ is a time fixed effect and β_{ks} is the measure of consumption smoothing.

Table 13 displays income smoothing from capital gains for the periods 1992–1999 and 1999–2003. It is immediately apparent from Table 13 that capital gains can have very large effects. It is also apparent that these effects are extremely unstable and may change signs from from one period to another—this lack of stability is also reflected in large standard errors. This should not be surprising: Imagine a country with foreign assets of an order equal to GDP. If assets are denominated in foreign currency units and the currency appreciates by 10 percent the country suffers a negative capital gain equal to 10 percent of GDP which typically is of a larger magnitude than growth. If the country happened to be growing faster than average such a negative capital gain constitutes a very large amount of risk sharing while for a country that suffers a negative capital gain at a time of slow growth, the capital gain creates large negative risk sharing. Either way, volatility of exchange rates spills over into volatility of risk sharing. In the Appendix we show results from a regression of capital gains on interest rates, exchange rates, etc. These results verify that exchange rate movements have been a major source of capital gains, in particular for countries with large debt positions. Lane and Milesi-Ferretti (2006) study the role of exchange rates in creating capital gains in much more detail.

The columns labeled β_k report income risk sharing from capital gains. The results can vary a lot with the sample, indeed for these results the EU and EMU results a dramatically different, likely reflecting different stock market and exchange rate experiences for the UK and the EMU countries. For the EMU, income risk sharing has been large and negative during 1999–2003 where the EMU countries were relative laggards in terms of growth while the Euro was appreciating. Did this pattern lead to volatile consumption? It appears not, because when we include capital gains and losses in income this tends to lead to large and opposite effects on the estimated risk sharing from saving. For example, for EMU countries we found very little risk sharing from saving in the late period in Table 2 and here we find more than 100 percent risk sharing from saving! This result reflects that individuals do not adjust consumption much in the face of international capital gains and losses. Large amounts of foreign assets are held by financial institutions or indirectly through pension or mutual funds and apparently the marginal propensity to consume from capital gains on such funds is typically small at shorter time horizons. However, over long periods of time, capital gains are bound to matter: For example, pension funds will eventually pay out pensions as a function of the value of the assets held.

In Table 14, we examine the role of capital gains in the same manner as in Table 13 but over 3-year intervals. The results for income smoothing look even more unstable than the 1-

year results. This partly reflects that the early sample contains just two 3-year periods and the latter sample only one; however, we still clearly observe that large increases or declines in income smoothing from capital gains typically are almost fully matched by opposite movements in consumption smoothing from saving when capital gains are counted as part of income.

Overall, risk sharing from capital gains appears very unstable and we are not really able to say if such capital gains may help smooth consumption in the long run. But possibly such capital gains may dominate other sources of income and consumption smoothing. Much longer time series are needed in order to answer this question but as foreign asset holdings become increasingly large, international capital gains are likely to impact more on consumption. The role of international capital gains in risk sharing is worthy of much more attention that it has achieved this far.

6 Concluding Remarks

We found clear patterns in risk sharing when capital gains are ignored: Steep increases in consumption smoothing outside of the EU due to increasingly pro-cyclical government saving. In the EU risk sharing has been declining due to less pro-cyclical government saving although this is partly compensated by increasing income smoothing from net foreign factor income.

Capital gains and losses, when added to income, can totally swamp other channels of risk sharing but it appears that, say, positive capital gains are saved rather than consumed resulting in little change in overall consumption risk sharing at least for the horizons we can study at the present.

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Table 1

Income and Consumption Smoothing (percent) by National Accounts Categories

	EU 1971–2003	EMU 1971–2003	OECD–EU 1971–2003
Factor Income (β_f)	0	2	−1
	(1)	(1)	(1)
Depreciation (β_d)	−5	−5	−7
	(1)	(1)	(2)
Transfers (β_τ)	1	1	0
	(1)	(1)	(0)
Saving (β_s)	36	41	53
	(3)	(4)	(4)
Not Smoothed (β_u)	68	61	56
	(3)	(3)	(4)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and U.K. OECD–EU: Australia, Canada, Japan, New Zealand, Norway, Switzerland, and the United States. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. β_f is the GLS estimate of the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$ on $\Delta \log \text{GDP}^i$, β_d is the slope in the regression of $\Delta \log \text{GNI}^i - \Delta \log \text{NI}^i$ on $\Delta \log \text{GDP}^i$, and similarly for β_τ and β_s. β_u is the coefficient in the regression of $\Delta \log(\text{C}^i + \text{G}^i)$ on $\Delta \log \text{GDP}^i$. We interpret the β-coefficients as the incremental percentage amounts of smoothing achieved at each level, and β_u is the percentage of shocks not smoothed.

Table 2

Income and Consumption Smoothing (percent) by National Accounts Categories

	EU 1999–2003	EMU 1999–2003	OECD–EU 1999–2003
Factor Income (β_f)	6	11	−1
	(3)	(4)	(3)
Depreciation (β_d)	7	8	−7
	(3)	(3)	(3)
Transfers (β_τ)	3	3	−1
	(1)	(2)	(1)
Saving (β_s)	12	12	81
	(8)	(7)	(9)
Not Smoothed (β_u)	73	66	28
	(6)	(6)	(4)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and U.K. OECD–EU: Australia, Canada, Japan, New Zealand, Norway, Switzerland, and the United States. Percentages of shocks absorbed at each level of smoothing. Standard errors are in brackets. β_f is the GLS estimate of the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$ on $\Delta \log \text{GDP}^i$, β_d is the slope in the regression of $\Delta \log \text{GNI}^i - \Delta \log \text{NI}^i$ on $\Delta \log \text{GDP}^i$, and similarly for β_τ and β_s. β_u is the coefficient in the regression of $\Delta \log(\text{C}^i + \text{G}^i)$ on $\Delta \log \text{GDP}^i$. We interpret the β-coefficients as the incremental percentage amounts of smoothing achieved at each level, and β_u is the percentage of shocks not smoothed.

Table 3

Factor Income Smoothing (percent) among OECD Countries

	EU	EMU	OECD–EU
1971–1980	1	3	−2
	(1)	(1)	(1)
1981–1990	−2	1	−2
	(2)	(2)	(2)
1991–1999	0	3	−1
	(2)	(3)	(3)
1999–2003	6	11	−1
	(3)	(4)	(2)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and U.K. OECD–EU: Australia, Canada, Japan, New Zealand, Norway, Switzerland, and the United States. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. β_f is the GLS estimate of the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$ on $\Delta \log \text{GDP}^i$.

Table 4

International Transfers Smoothing among OECD Countries

	EU	EMU	OECD–EU
1971–1980	−2	−3	−1
	(1)	(1)	(1)
1981–1990	4	5	0
	(1)	(2)	(0)
1991–1999	4	6	0
	(2)	(2)	(1)
1999–2003	2	3	−1
	(1)	(1)	(1)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and U.K. OECD–EU: Australia, Canada, Japan, New Zealand, Norway, Switzerland, and the United States. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. β_f is the GLS estimate of the slope in the regression of $\Delta \log \textsc{ni}^i - \Delta \log \textsc{dni}^i$ on $\Delta \log \textsc{gdp}^i$.

Table 5

Total Savings Smoothing among OECD Countries

	EU	EMU	OECD–EU
1971–1980	53	53	62
	(5)	(6)	(7)
1981–1990	24	26	43
	(4)	(6)	(6)
1991–1999	34	41	47
	(6)	(7)	(9)
1999–2003	12	12	81
	(7)	(8)	(9)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and U.K. OECD–EU: Australia, Canada, Japan, New Zealand, Norway, Switzerland, and the United States. Standard errors in brackets. The table shows β_s, the GLS estimate of the slope in the regression of $\Delta \log \text{DNI}^i - \Delta \log \text{CON}^i$ on $\Delta \log \text{GDP}^i$.

Table 6

Smoothing via Government, Private and Corporate Saving among OECD Countries

	Government Saving			Corporate Saving			Private Saving		
	EU	EMU	OECD-EU	EU	EMU	OECD-EU	EU	EMU	OECD-EU
1987–1990	9	0	25	10	8	6	−17	−15	12
	(7)	(11)	(5)	(7)	(5)	(10)	(4)	(5)	(11)
1991–1995	36	46	50	7	4	−11	−18	−17	21
	(8)	(9)	(8)	(9)	(8)	(6)	(11)	(6)	(8)
1996–2001	10	19	83	12	9	−4	1	6	-5
	(5)	(6)	(7)	(3)	(1)	(2)	(6)	(6)	(7)

Notes. EMU: Austria, Belgium, Finland ,France, Germany, Greece, Ireland, Italy, Netherlands Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece,Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and U.K. OECD–EU: Australia, Canada, Norway, U.S. and after 1990 Japan. Standard errors in brackets. The table shows the GLS estimates of the slope in the regressions of $\Delta \log \text{DNI}^i - \Delta \log(\text{DNI}^i -$ net government saving) on $\Delta \log \text{GDP}^i$, $\Delta \log \text{DNI}^i - \Delta \log(\text{DNI}^i -$ corporate saving) on $\Delta \log \text{GDP}^i$ and $\Delta \log \text{DNI}^i - \Delta \log(\text{DNI}^i -$ private saving) on $\Delta \log \text{GDP}^i$.

Table 7

Smoothing through Domestic Net Physical Investment, Current Account and via Net Exports among OECD Countries for years 1971-2003

	EU	EMU	OECD–EU
Net Investment	43	37	33
	(4)	(4)	(6)
Current account	−10	−7	3
	(3)	(3)	(4)
Net Exports	−3	−4	3
	(3)	(2)	(3)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and U.K. OECD–EU: Australia, Canada, Japan, New Zealand, Norway, Switzerland, and the United States. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. We measure the fraction of shocks smoothed via domestic net physical investment by estimating the coefficient in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - \text{I}^i)$ on $\Delta \log \text{GDP}^i$. Similarly, the coefficient in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - \text{CA}^i)$ on $\Delta \log \text{GDP}^i$ measures the fraction of shocks smoothed via investment abroad and the coefficient in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - (\text{X}^i - \text{M}^i))$ on $\Delta \log \text{GDP}^i$ measures the fraction of shocks smoothed via net exports.

Table 8

Smoothing through Domestic Net Physical Investment, Current Account and via Net Exports among OECD Members for Different Subperiods.

	Net Investment			Current Account			Net Export		
	EU	EMU	OECD–EU	EU	EMU	OECD–EU	EU	EMU	OECD–EU
1971–1980	65	61	60	−7	−14	3	−8	−3	4
	(7)	(9)	(12)	(3)	(6)	(4)	(4)	(5)	(9)
1981–1990	34	39	30	−15	−13	−6	−7	−8	1
	(6)	(7)	(10)	(5)	(7)	(6)	(5)	(6)	(5)
1991–1999	31	35	18	0	1	4	2	2	−3
	(4)	(4)	(7)	(4)	(5)	(5)	(3)	(4)	(5)
1999–2003	6	11	25	−6	−5	35	1	5	23
	(4)	(5)	(10)	(2)	(5)	(11)	(2)	(5)	(11)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and U.K. OECD–EU: Australia, Canada, Japan, New Zealand, Norway, Switzerland, and the United States. Percentages of shocks are absorbed at each level of smoothing. Standard errors in brackets. We measure the fraction of shocks smoothed via domestic net physical investment by estimating the coefficients in the regressions of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - \text{I}^i)$ on $\Delta \log \text{GDP}^i$ Similarly, coefficient in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - \text{CA}^i)$ on $\Delta \log \text{GDP}^i$ measures the fraction of shocks smoothed via the current account surplus and coefficient in the regression of $\Delta \log \text{GDP}^i - \Delta \log(\text{GDP}^i - (\text{X}^i - \text{M}^i))$ on $\Delta \log \text{GDP}^i$ measures the fraction of shocks smoothed via net exports.

Table 9

Income and Consumption Smoothing (percent) by National Accounts Categories.

Three-Year Frequency of Observation.

	EU 1971–2003	EMU 1971–2003	OECD–EU 1971–2003
Factor Income (β_f)	−2	1	−3
	(2)	(2)	(2)
Depreciation (β_d)	−4	−4	−6
	(2)	(2)	(2)
Transfers (β_τ)	1	0	0
	(1)	(2)	(1)
Saving (β_s)	31	34	48
	(4)	(5)	(7)
Not Smoothed (β_u)	74	69	61
	(4)	(5)	(6)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and U.K. OECD–EU: Australia, Canada, Japan, New Zealand, Norway, Switzerland, and the United States. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. β_f is the GLS estimate of the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$ on $\Delta \log \text{GDP}^i$, β_d is the slope in the regression of $\Delta \log \text{GNI}^i - \Delta \log \text{NI}^i$ on $\Delta \log \text{GDP}^i$, and similarly for β_τ and β_s. β_u is the coefficient in the regression of $\Delta \log(\text{C}^i + \text{G}^i)$ on $\Delta \log \text{GDP}^i$. We interpret the β-coefficients as the incremental percentage amounts of smoothing achieved at each level, and β_u is the percentage of shocks not smoothed. "ΔX_t" here refers to $X_t - X_{t-3}$ for any variable X. Non-overlapping observations.

Table 10 Factor Income and Total Saving Smoothing among OECD Countries. Three-Year Frequency of Observation.

	Panel A: Factor Income		
	EU	EMU	OECD–EU
1982–1990	−5	−7	−2
	(3)	(4)	(4)
1992–2000	9	−2	−6
	(3)	(3)	(1)
2001–2003	14	15	3
	(7)	(7)	(9)
	Panel B: Total Saving		
1982–1990	30	42	27
	(8)	(9)	(11)
1992–2000	26	22	39
	(7)	(6)	(6)
2001–2003	−6	−8	87
	(2)	(2)	(30)

Notes. EMU: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, and Portugal. EU: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Spain, Portugal, Sweden, and U.K. OECD–EU: Australia, Canada, Japan, New Zealand, Norway, Switzerland, and the United States. Percentages of shocks absorbed at each level of smoothing. Standard errors in brackets. Factor income smoothing is the GLS estimate of the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$ on $\Delta \log \text{GDP}^i$, similarly the total saving smoothing is calculated by regressing $\Delta \log \text{DNI}^i - \Delta \log \text{CON}^i$ on $\Delta \log \text{GDP}^i$. "ΔX_t" here refers to $X_t - X_{t-3}$ for any variable X. Non-overlapping observations.

Table 11

Smoothing via Factor Income (percent) by National Accounts Categories with the Interaction Variables for OECD Countries.

	1970–2003	1970–1987	1988–2003
$\Delta \log \text{GDP}$	−1	−1	−1
	(1)	(1)	(1)
$\Delta \log \text{GDP}^{*}\text{GDP}^{ave}$	−9	−9	−8
	(4)	(5)	(5)
$\Delta \log \text{GDP}^{*}\text{TREND}$	−1	−5	6
	(1)	(2)	(2)
$\Delta \log \text{GDP}^{*}\text{EMU}$	4	−4	9
	(3)	(4)	(4)

Notes: OECD: Australia, Austria, Belgium, Canada, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, U.K., and the United States. Standard errors in brackets. The dependent variable is $\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$. GDP^{ave} refers to real GDP per capita averages of OECD countries. EMU is a dummy variable taking 1 for the countries that are members of European monetary union, 0 elsewhere.

Table 12

Smoothing via Saving (percent) by National Accounts Categories with the Interaction Variables for OECD Countries.

	1970–2003	1970–1987	1988–2003
$\Delta \log$ GDP	64	57	68
	(2)	(3)	(3)
$\Delta \log$ GDP*GDP^{ave}	73	35	127
	(18)	(22)	(23)
$\Delta \log$ GDP*TREND	6	−1	18
	(3)	(7)	(6)
$\Delta \log$ GDP*EMU	−32	−35	−33
	(12)	(15)	(15)

Notes: OECD: Australia, Austria, Belgium, Canada, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, U.K., and the United States. Standard errors in brackets. The dependent variable is $\Delta \log \text{GDP}^i - \Delta \log \text{GNI}^i$. GDP^{ave} refers to real GDP per capita averages of OECD countries. EMU is a dummy variable taking 1 for the countries that are members of European monetary union.

Table 13

Smoothing via Factor Income and Saving Including Net Capital Gain from External Assets

	1992–1999		1999–2003	
	β_k	β_{ks}	β_k	β_{ks}
EU	41.54	−15.94	6.68	21.11
	(27.88)	(37.21)	(52.10)	(59.33)
EMU	10.67	9.49	−129.11	197.62
	(56.90)	(72.45)	(77.95)	(84.51)
OECD-EU	7.67	39.24	28.83	−13.50
	(13.60)	(18.95)	(13.37)	(23.14)

Notes: EMU: Austria, France, Germany, Italy, Netherlands, Spain, and Portugal. Belgium, Finland, Ireland, and Greece are excluded due to missing data. EU: Austria, France, Germany, Italy, Netherlands, Spain, Portugal, Sweden, and U.K. OECD–EU: Australia, Canada, New Zealand, Japan, Switzerland, and the United States. Percentages of shocks absorbed at each level of smoothing. Standard errors are in brackets. β_k is the GLS estimate of the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GDPK}^i$ on $\Delta \log \text{GDP}^i$, where $\text{GDPK} = \text{GDP}+$ net capital gains. β_{ks} is the GLS estimate of the slope in the regression of $\Delta \log \text{DNIK}^i - \Delta \log \text{CON}^i$ on $\Delta \log \text{GDP}^i$ where $\text{DNIK} = \text{DNI}+$ net capital gains.

Table 14

Smoothing via Factor Income and Saving Including Net Capital Gain from External Assets. Three year Frequency of Observation.

	1995–2000		2001–2003	
	β_k	β_{ks}	β_k	β_{ks}
EU	−27.49	41.78	−176.60	238.69
	(19.23)	(26.98)	(187.6)	(189.21)
EMU	−25.01	71.70	−183.50	247.59
	(23.67)	(41.03)	(226.20)	(225.33)
OECD–EU	18.68	30.23	146.80	−94.58
	(37.84)	(38.74)	(57.17)	(58.35)

Notes: EMU: Austria, France, Germany, Italy, Netherlands, Spain, and Portugal. Belgium, Finland, Ireland, and Greece are excluded due to missing data. EU: Austria, France, Germany, Italy, Netherlands, Spain, Portugal, Sweden, and U.K. OECD–EU: Australia, Canada, New Zealand, Japan, Switzerland, and the United States. Percentages of shocks absorbed at each level of smoothing. Standard errors are in brackets. β_k is the GLS estimate of the slope in the regression of $\Delta \log \text{GDP}^i - \Delta \log \text{GDPK}^i$ on $\Delta \log \text{GDP}^i$, where GDPK = GDP+ net capital gains. β_{ks} is the GLS estimate of the slope in the regression of $\Delta \log \text{DNIK}^i - \Delta \log \text{CON}^i$ on $\Delta \log \text{GDP}^i$ where DNIK = DNI+ net capital gains."ΔX_t" here refers to $X_t - X_{t-3}$ for any variable X. Non-overlapping observations.

APPENDIX

Calculation of Capital Gains from External Assets

Net capital gains from external assets are not directly available. Therefore, we employ the method of Lane and Milesi-Ferretti (2005) who provide a detailed accounting framework that separates the basic factors—trade imbalances, investment income flows, and capital gains. Net capital gains from foreign assets are derived as

$$\text{KG}_t = \Delta\text{FA}_t - \text{CA}_t - \text{ERR}_t, \tag{9}$$

where KG_t is the capital gains on net foreign assets in aggregate levels, FA_t is the net foreign asset position of the domestic country i at time t, and ΔFA_t is the change in the net foreign asset position. The current account, CA, equals to the sum of the balance on goods, services, and current transfers while the term ERR_t includes factors such as capital account transfers and errors and omissions that leads to discrepancies between a country's current account and net inflows of capital.[27]

We calculated the net foreign asset position using the IMF's balance of payment components. The net foreign asset position, FA_t, is roughly defined as the sum of the net debt, net equity, net foreign direct investment (FDI) positions, and foreign exchange reserves. We use the following identity to calculate the foreign asset position of country i at time t:

$$\text{FA}_t = \text{DEBT(A)}_t + \text{EQUITY(A)}_t + \text{FDI(A)}_t + \text{FX}_t - \text{DEBT(L)}_t - \text{EQUITY(L)}_t - \text{FDI(L)}_t \ , \tag{10}$$

where DEBT(A), EQUITY(A) and FDI(A) are the stocks of debt, equity, and FDI assets. Similarly DEBT(L), EQUITY(L) and FDI(L) are the stocks of debt, equity and FDI liabilities respectively, and FX refers to the foreign exchange reserves of the country. All the variables used in creating the net foreign asset position are extracted from the IMF International Financial Statistics (IFS).

[27] Detailed codes and descriptions of each variable extracted from the International Financial Statistics Database(IFS) are listed in Lane and Milesi-Ferretti (2001).

Estimating Determinants of Net Capital Gains

In order to help interpret the results involving capital gains we conduct a minor study of the determinants of capital gains. Changes in exchange rates are likely to result in capital gains for countries with large holding of assets and liabilities because assets and liabilities often are denominated in different currencies. Similarly, world-wide swings in stock market valuations are likely to result in capital gains and losses. We regress country-level capital gains (in dollar terms normalized by the U.S. consumer price index) on the value of external equity assets and liabilities, on external debt assets and liabilities, on the change in the exchange rate (the amount of appreciation), on the interaction of external debt assets and liabilities with appreciation, on the interaction of debt assets with the U.S. interest rate (10-year bond yield), on the interaction of debt liabilities with the domestic interest rate, on the interaction of equity assets and liabilities with appreciation, and on the interaction of equity assets and liabilities with the value of the U.S. stock index and national stock index, respectively.

To conduct the panel data regression, we utilize annual returns on equity and debt markets for OECD members. The data for standard national stock indices are taken from Morgan Stanley Capital International Database (MSCI) for 1970 through 2004. MSCI provides national stock indices that have become the most widely used international equity benchmarks by institutional investors. For the debt returns, for the same sample, we used the 10-year risk-free bond returns extracted from the International Monetary Fund's International Financial Statistics database.

Tables A1 and A2 display the results of the following panel regression:

$$\text{CAPITALGAIN}_t^i = \delta_0 + \delta_1 \, \text{DEBT(A)}_t^i + \delta_2 \, \text{DEBT(L)}_t^i + \delta_3 \, \text{EQUITY(A)}_t^i \quad (11)$$

$$+ \; \delta_4 \, \text{EQUITY(L)}_t^i + \delta_5 \, \Delta\text{EXCH}_t^i + \Sigma_k \delta_{5+k} \, X_{kt}^i; \quad (12)$$

where the X_k terms refer to interaction variables. The interaction variables enter in the form (say, for debt assets and appreciation): $(\text{DEBT(A)}_t^i - \overline{\text{DEBT(A)}}_{\cdot}^i) * (\Delta\text{EXCH}_t^i - \overline{\Delta\text{EXCH}}_{\cdot}^i)$ where $\overline{X}_{\cdot}^i$ for any variable X is the average over time for country i.

The results for the EMU countries are presented in Table A1 for 1992–1998 and for

1999–2003. It is immediately clear that the estimated effects are much larger in the later sample, consistent with the EMU economies becoming more open and increasing their international financial exposure. We comment on the 1999–2003 period: the coefficients to debt and equity assets are positive and significant implying that countries with large asset holdings have obtained capital gains. Countries that appreciated also obtained capital gains on average although this effect isn't economically large as the dependent variable is measured in millions of dollars. The interacted terms have clear interpretations. Countries with large holdings of foreign assets suffered negative capital gains when the U.S. interest rate increased. This is intuitive but the coefficient is not significant. Countries obtained capital gains if they had large debt liabilities and the domestic interest rate increased. Countries with large equity asset holdings enjoyed capital gains when the national equity index increased while they suffered losses if they had large equity liabilities and the domestic stock market boomed. As for the interactions involving the exchange rates, we find a very large significant coefficient for debt liabilities interacted with the exchange rate. If domestic bonds outstanding in international markets are denominated in domestic currency then negative capital gains are to be expected when the domestic currency appreciates—similar effects will be found a countries with debt issued in Euros if bonds are held in, say, the United States. A smaller but also significant coefficient is found for equity liabilities. The effects for asset holdings are of the opposite sign, as expected, but not as significant.

The results for the OECD are similar with much higher statistical significance of the estimates in the later sample. However, the estimated coefficients tend to be somewhat smaller for this group of countries.

Table A1
Panel Data Estimations for the Determinants of Net Capital Gains for EMU Countries.

	1992–1998	1999–2003
DEBT(A)	1.38	15.01
	(1.28)	(2.63)
DEBT(L)	−3.11	−4.42
	(1.40)	(3.10)
EQUITY(A)	−1.42	10.02
	(0.94)	(3.35)
EQUITY(L)	−2.53	0.30
	(0.87)	(2.29)
ΔEXCH	−0.23	31.58
	(4.69)	(8.86)
DEBT(A)*ΔR^{us}	3.29	−7.01
	(1.34)	(5.09)
DEBT(L)*ΔR^{i}	−1.39	5.12
	(0.93)	(2.17)
EQUITY(A)*$\Delta \text{EQUITYINDEX}^{us}$	0.21	75.51
	(5.85)	(16.62)
EQUITY(L)*$\Delta \text{EQUITYINDEX}^{i}$	3.78	−26.92
	(0.77)	(16.62)
DEBT(A)*ΔEXCH	5.23	25.60
	(9.41)	(26.22)
DEBT(L)*ΔEXCH	−3.01	−148.33
	(12.87)	(37.16)
EQUITY(A)*ΔEXCH	−0.17	−22.91
	(10.30)	(32.90)
EQUITY(L)*ΔEXCH	10.07	−36.43
	(10.63)	(16.91)

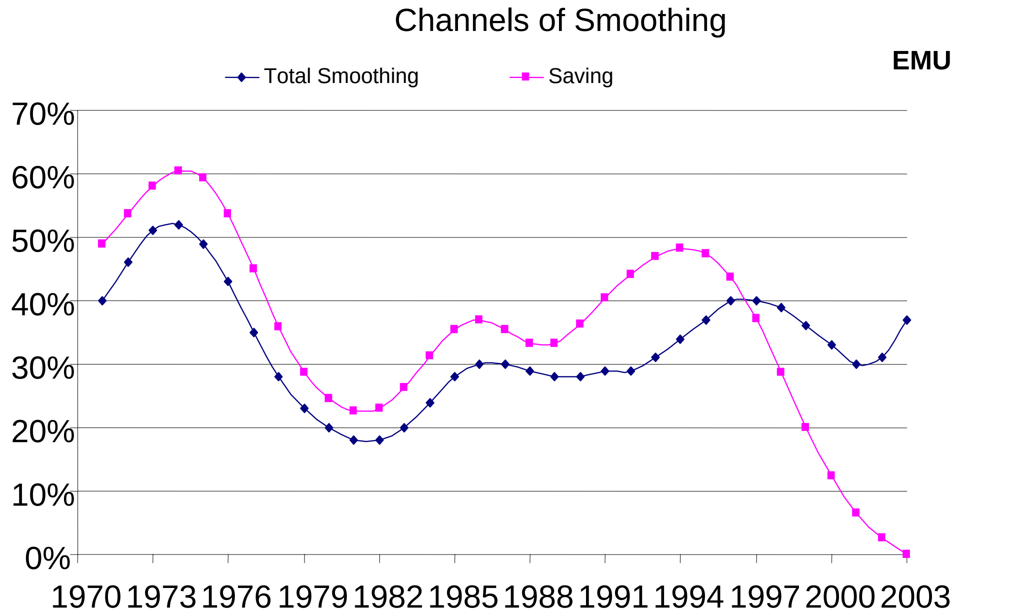
Notes: Standard errors are in brackets. EMU: Austria, Finland, France, Germany, Italy, Netherlands, Portugal, and Spain. Other EMU members are omitted from regressions due to missing data. Columns contain the GLS estimates from the regression of net annual capital gain on various explanatory factors. The dependent variable is the net annual capital gain of country i from its external positions in U.S. dollars. (Here "i" refers to relevant country observation in the panel.) DEBT(A) and EQUITY(A) are the external debt and equity asset positions of country i in (deflated) U.S. dollars. Similarly, DEBT(L) and EQUITY(L) are the debt and equity liability positions. ΔEXCH is the annual change in the value of the country i's currency per U.S. dollar. ΔR^{us} and ΔR^{i} are the annual(percentage) changes in the 10-year government bond yield for the U.S. and country i, respectively. Similarly, $\Delta \text{EQUITYINDEX}^{us}$ and $\Delta \text{EQUITYINDEX}^{i}$ are annual percentage changes in the Morgan Stanley Capital International (MSCI) equity index for the U.S. and country i markets respectively.

Table A2
Panel Data Estimations for the Determinants of Net Capital Gains for OECD Countries.

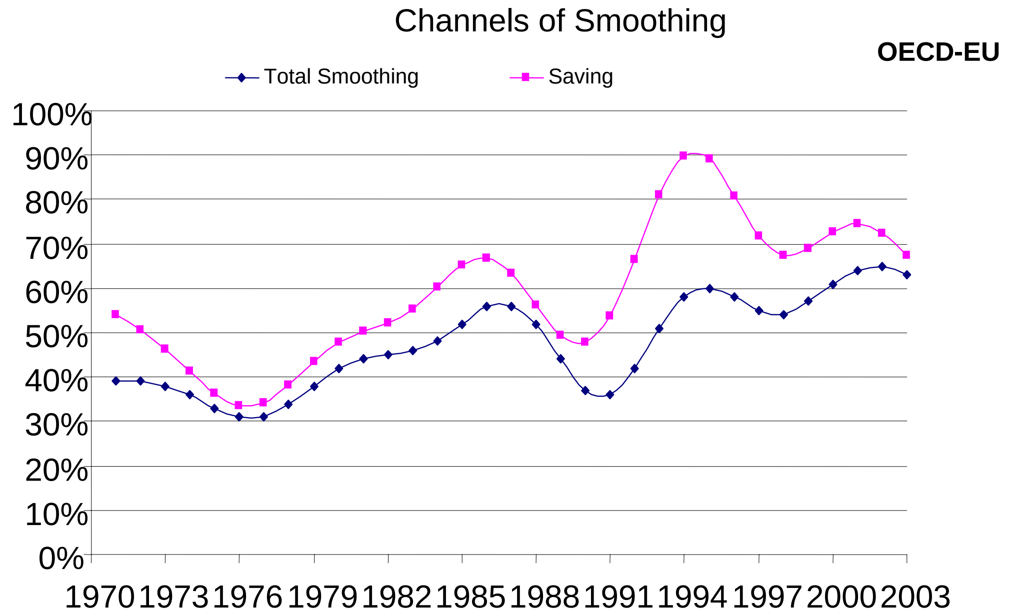
	1992–1998	1999–2003
DEBT(A)	1.32	−2.81
	(0.81)	(1.66)
DEBT(L)	−1.35	3.08
	(0.62)	(2.60)
EQUITY(A)	−1.36	6.26
	(0.64)	(1.97)
EQUITY(L)	−0.83	−1.12
	(0.35)	(0.63)
ΔEXCH	3.96	11.62
	(1.99)	(3.09)
DEBT(A)*ΔR^{us}	0.39	1.45
	(0.75)	(3.24)
DEBT(L)*ΔR^{i}	−0.43	−5.85
	(0.45)	(1.21)
EQUITY(A)*ΔEQUITYINDEX^{us}	−7.47	21.62
	(4.40)	(8.64)
EQUITY(L)*ΔEQUITYINDEX^{i}	−1.95	−14.65
	(0.80)	(2.53)
DEBT(A)*ΔEXCH	−2.87	49.86
	(5.62)	(21.40)
DEBT(L)*ΔEXCH	12.10	−56.87
	(7.86)	(27.84)
EQUITY(A)*ΔEXCH	6.32	26.84
	(2.97)	(14.84)
EQUITY(L)*ΔEXCH	−0.68	−11.36
	(4.30)	(5.99)

Notes: Standard errors are in brackets. OECD: Australia, Austria, Finland, France, Germany, Italy, Netherlands, New Zealand, Portugal, Spain, Sweden, Switzerland, and U.K. Rest of the OECD members are omitted from regressions due to missing data. Columns contain the GLS estimates from the regression of net annual capital gain on various explanatory factors. The dependent variable is the net annual capital gain of country i from its external positions in U.S. dollars. (Here "i" refers to relevant country observation in the panel.) DEBT(A) and EQUITY(A) are the external debt and equity asset positions of country i in (deflated) U.S. dollars. Similarly, DEBT(L) and EQUITY(L) are the debt and equity liability positions. ΔEXCH is the annual change in the value of the country i's currency per U.S. dollar. ΔR^{us} and ΔR^{i} are the annual percentage changes in the 10-year government bond yield for the U.S. and country i, respectively. Similarly, ΔEQUITYINDEX^{us} and ΔEQUITYINDEX^{i} are annual percentage changes in the Morgan Stanley Capital International (MSCI) equity index for the U.S. and country i markets respectively.

Figure 1

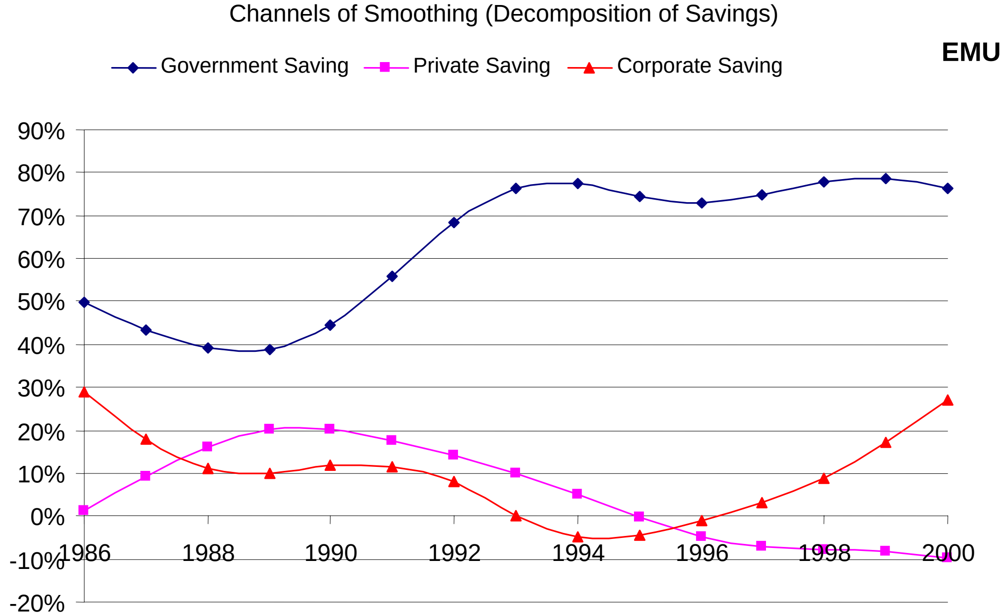


Risk Sharing is estimated year by year and smoothed using a Kernel with a bandwidth (standard deviation equal to 2). EMU includes EMU 12 w/o Luxembourg.

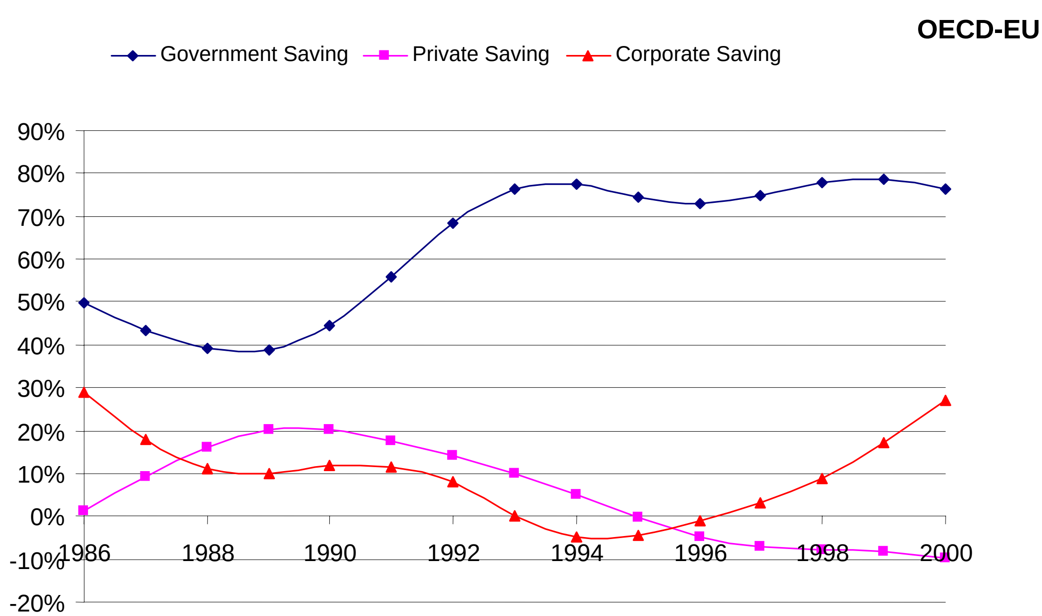


OECD-EU countries include Australia, Canada, Japan, New Zealand, Norway, Switzerland, and U.S..

Figure 2

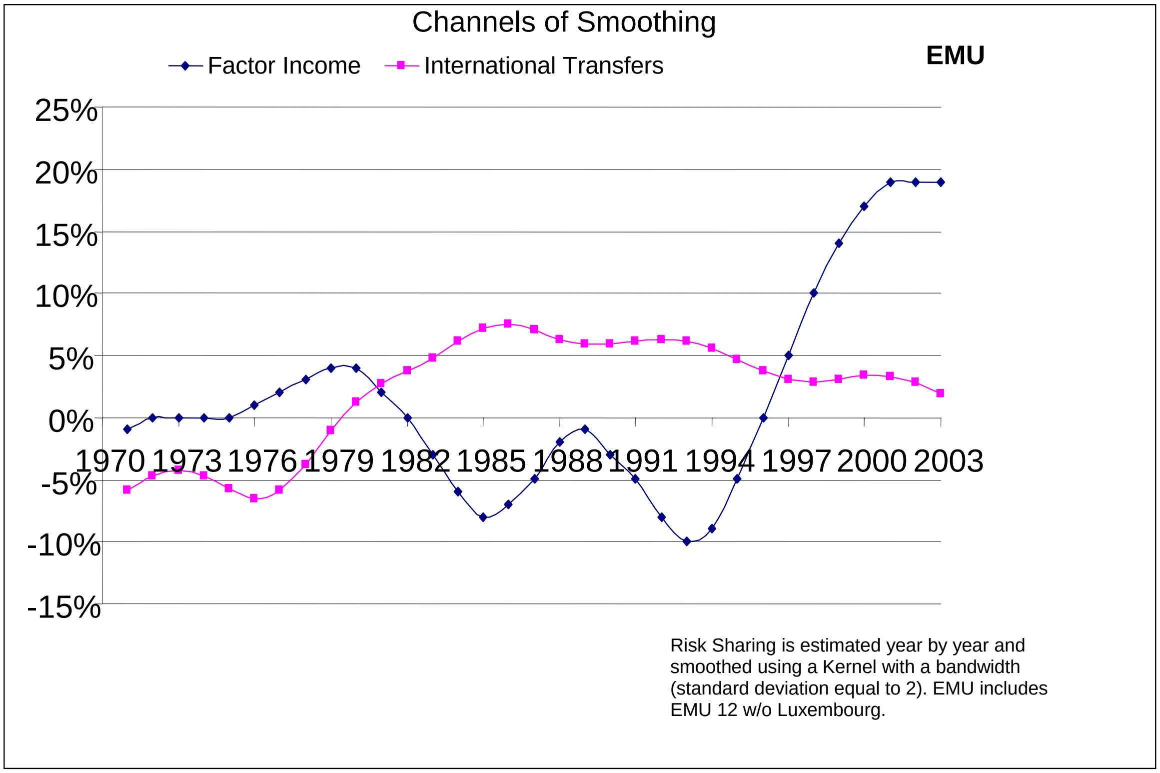


Risk Sharing is estimated year by year and smoothed using a Kernel with a bandwidth (standard deviation equal to 2). EMU includes EMU 12 w/o Luxembourg.



OECD-EU countries include Australia, Canada, Japan, New Zealand, Norway, Switzerland, and U.S..

Figure 3


Channels of Smoothing
EMU
Factor Income
International Transfers
25%
20%
15%
10%
5%
0%
-5%
-10%
-15%
1970 1973 1976 1979 1982 1985 1988 1991 1994 1997 2000 2003
Risk Sharing is estimated year by year and smoothed using a Kernel with a bandwidth (standard deviation equal to 2). EMU includes EMU 12 w/o Luxembourg.

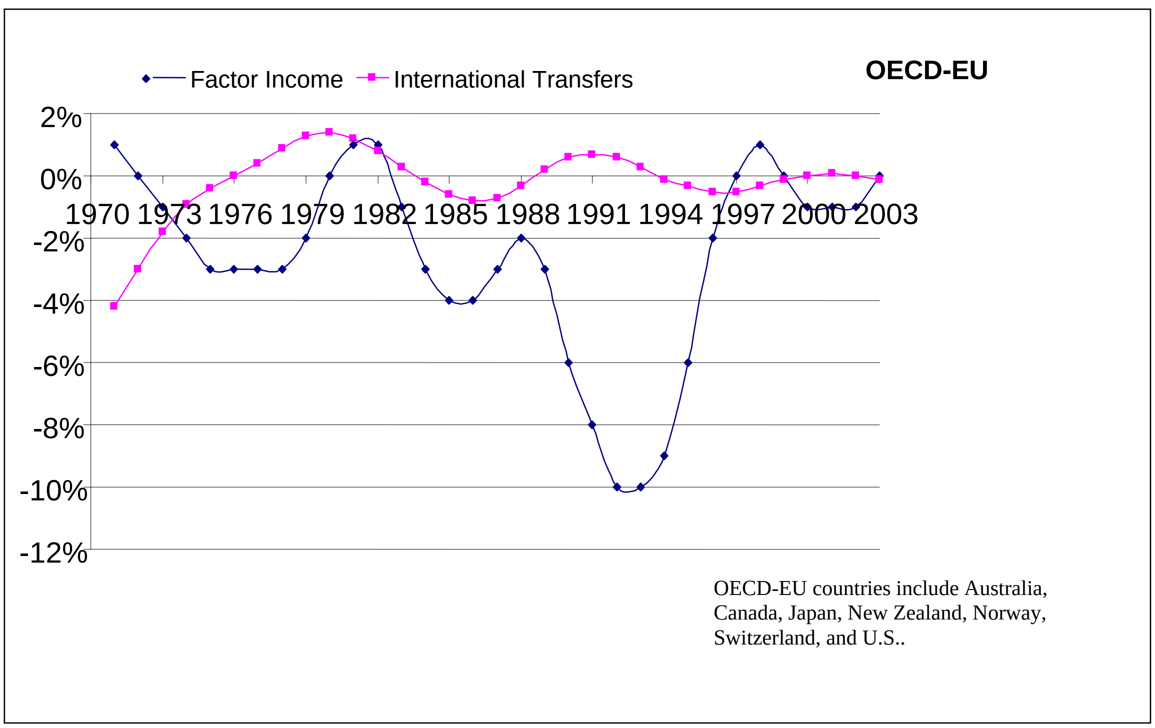
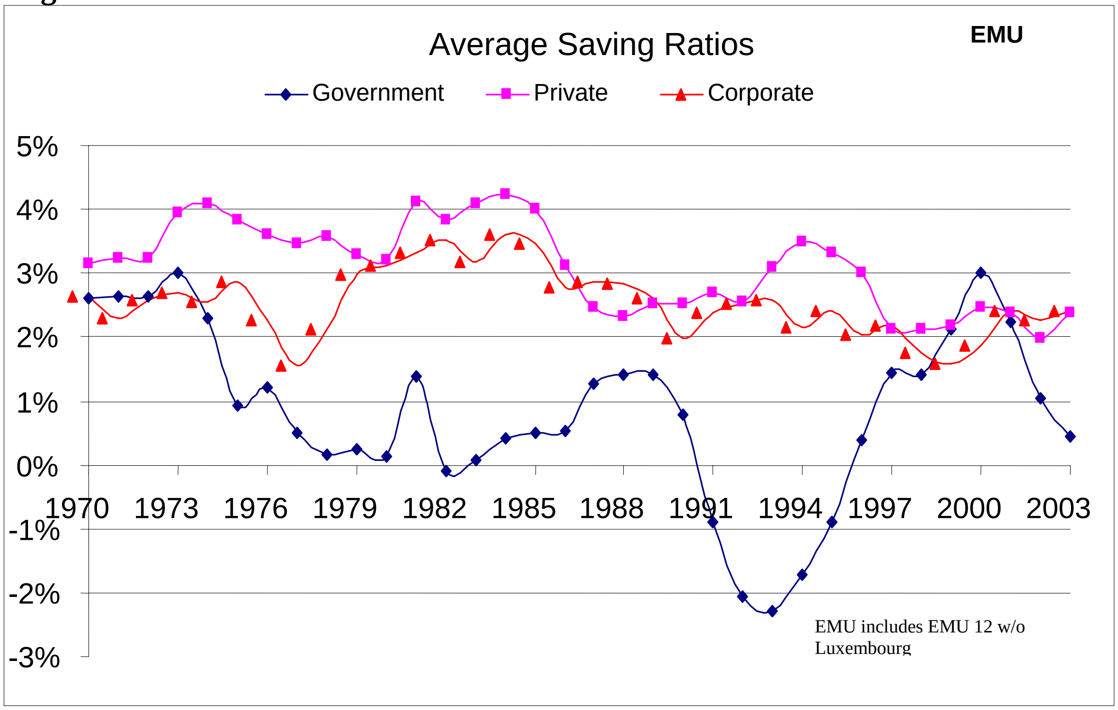
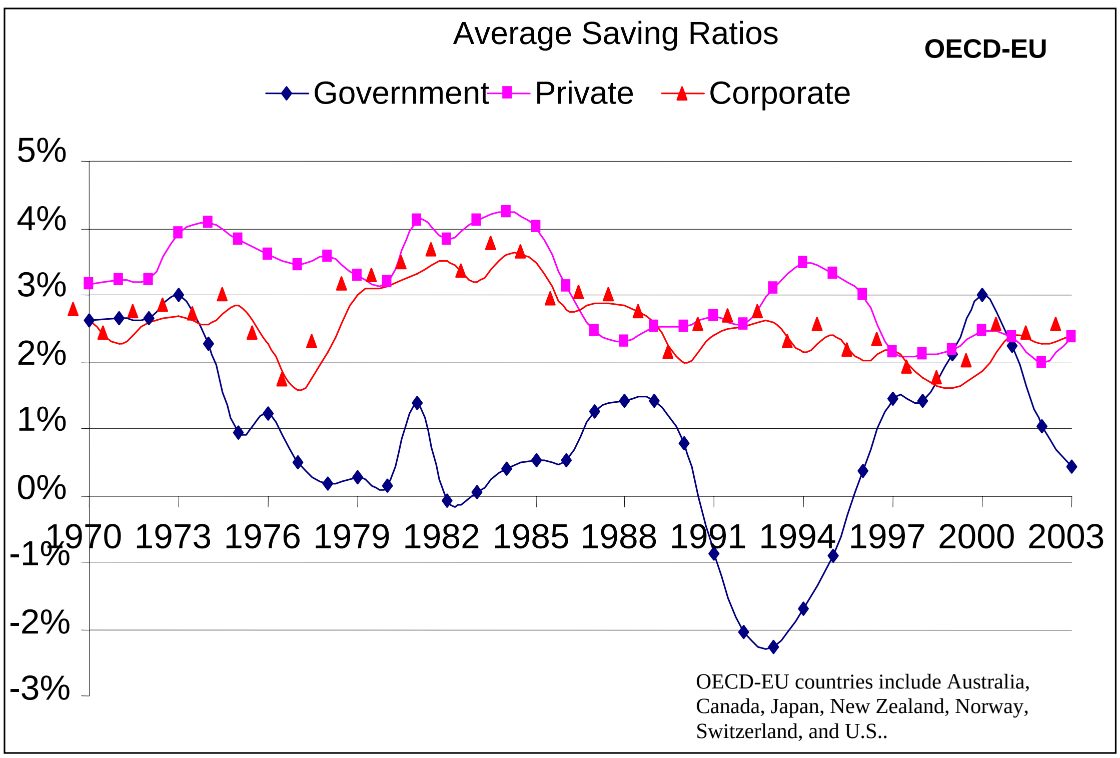

OECD-EU
Factor Income
International Transfers
2%
0%
-2%
-4%
-6%
-8%
-10%
-12%
1970 1973 1976 1979 1982 1985 1988 1991 1994 1997 2000 2003
OECD-EU countries include Australia, Canada, Japan, New Zealand, Norway, Switzerland, and U.S..

Figure 4


Average Saving Ratios
EMU
Government
Private
Corporate
5%
4%
3%
2%
1%
0%
-1%
-2%
-3%
1970
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
EMU includes EMU 12 w/o Luxembourg


Average Saving Ratios
OECD-EU
Government
Private
Corporate
5%
4%
3%
2%
1%
0%
-1%
-2%
-3%
1970
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
OECD-EU countries include Australia, Canada, Japan, New Zealand, Norway, Switzerland, and U.S..