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CAPITAL GAINS VERSUS INCOME FLOWS

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In 2008 all ECB publications feature a motif taken from the €10 banknote.

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Abstract

Global financial integration unlocks a huge potential for international risk sharing. We examine the degree to which international equity holdings act as a risk sharing device in industrial and emerging economies. We split equity returns into investment income (dividend distribution) and capital gains to investigate which of the two channels delivers the largest potential for risk sharing. Our evidence suggests that net capital gains are a more potent channel of risk sharing. They behave in a countercyclical way, that is they tend to be positive (negative) when the domestic economy is growing more slowly (rapidly) than the rest of the world. Countries with more countercyclical net capital gains experience improved consumption risk sharing. The empirical analysis furthermore suggests that these risk sharing properties of net capital gains have increased through time, in particular in the 1990s and early-2000s, on the back of a declining equity home bias and financial market deepening.

Keywords: International risk sharing, International portfolio diversification, Consumption smoothing, Cross-border investment, Valuation effects

JEL Classification: F21, F30, F36

Non-technical summary

Over the past years, the global economy has seen an unprecedented deepening of financial markets. Between 1990 and 2006, the total outstanding amount in global equity markets increased sixfold, from USD 6 trillion to USD 40 trillion. Even when scaled by global GDP, the increase in global stock market capitalisation is remarkable, from around 30 to over 80 percent of GDP. This financial deepening has been accompanied by even more strongly growing cross-border holdings of financial assets. In the case of portfolio equity assets, cross-border positions increased more than twenty-fold, from USD 0.7 trillion in 1990 to USD 14 trillion in 2006.

These two trends, financial deepening and growing internationalisation of financial asset holdings, have profound implications for the global economy. One such implication is that financial investors benefit from improved opportunities for portfolio diversification. Cross-border diversification reduces the exposure of investors to domestic financial markets and thus provides opportunities to smooth returns. This financial phenomenon of cross-border portfolio diversification has a macroeconomic flip-side, related to cross-border risk sharing. Risk sharing in a macroeconomic sense refers, in a country context, to the possibility for economic agents and for consumers in particular to reduce their exposure to idiosyncratic risks arising from country-specific output shocks, and to effectively share these risks with consumers in other countries. Clearly, cross-border financial holdings offer one channel to achieve such macroeconomic risk sharing. A number of stylised models indeed show that complete financial markets may allow, under certain assumptions, for perfect consumption risk sharing, such that the path of consumption over time is not correlated with the path of domestic output.

A rich empirical literature shows that perfect risk sharing does not hold in the real world. Some empirical contributions find output growth to be actually more highly correlated across countries than consumption growth, a phenomenon known as the consumption correlations puzzle or the quantity anomaly. Recent work has confirmed that the degree of risk sharing remains far from perfect but has nevertheless increased over time. Some authors document an increase in risk sharing during the second half of the 1990s and in the early-2000s. They attribute this mainly to the growing internationalisation of portfolios as manifested by a declining home bias of financial investors.

What remains, however, largely unexplored are the concrete operational channels through which risk sharing operates. For most financial instruments, including portfolio equity which is the investment category reviewed in this paper, there are two distinct channels of returns. The first one is the investment income channel, which works through dividend payments as recorded in the income balance of the balance of payments. These payments accrue to the disposable income of investors and may therefore be used directly for consumption smoothing. The second channel is the capital gains channel, which reflects changes in the price of the financial assets expressed in the domestic currency of the investor. While such capital gains do not generate an immediate stream of financial

flows and are not recorded in the balance of payments, they may have an impact on saving and investment decisions through wealth effects and thereby promote consumption smoothing. The potential importance of the second channel, i.e. the capital gains channel, has been underscored in the theoretical literature on valuation effects, but its empirical relevance has so far not been examined systematically.

This paper examines the potential role of net investment income and net capital gains channel for consumption risk sharing, with a specific focus on international portfolio equity holdings. It uses a newly constructed dataset on capital gains and investment income for 35 industrial and emerging market economies with up to 35 years of data for most countries. The dataset covers over 90 percent of global stock market capitalisation.

Our main finding is that the net capital gain channel appears to be more important than the net investment income channel for risk sharing through portfolio equity holdings. This assessment is based on a two-step analysis. In a first step, we examine the cyclical behaviour of net capital gains and net investment income. For risk sharing to operate, net capital gains and net investment income should be countercyclical, i.e. in the event of a negative idiosyncratic shock to domestic output, a country should benefit from positive net capital gains and from positive net investment income flows. We find that this cyclicality property holds for net capital gains, either scaled to domestic GDP or using implied real rates of capital gains, but not for net investment income. In a second step, we look at consumption risk sharing behaviour by estimating a traditional risk sharing equation that examines co-movements between real consumption and real output. We augment this equation with cyclicality measures of net capital gains and net investment income and find that countries with more countercyclical net capital gains experience better consumption risk sharing.

These risk sharing properties of net capital gains apply mainly in our subsample of industrial countries. In emerging market economies, by contrast, results do not hold for both steps of the analysis, i.e. net capital gains do not behave in the required countercyclical way and they do not seem to have an influence on actual consumption risk sharing. This suggests that financial globalisation has so far led to asymmetric benefits globally, in that industrial countries are able to smooth consumption more easily via the capital gains channel, whereas emerging market economies do not seem to benefit from such risk sharing.

Another finding relates to the existence of clear patterns over time. In both steps of the analysis, we find net capital gains to have increasing countercyclicality over time, with a marked increase in estimated coefficients in particular since the mid-1990s. The analysis highlights that two separate factors may help explain this increase in the potential role of capital gains as a hedge against country-specific shocks, namely (i) a generalised decline in home bias and (ii) a deepening of stock markets across most countries.

1 Introduction

Global financial integration has proceeded rapidly over the past decades. Cross-border holdings of portfolio equity have expanded from less than 2 percent of global GDP in the early 1970s to over 25 percent in 2005. This has important macroeconomic and financial implications. It allows for a decoupling of saving and investment decisions, facilitates the financing of current account deficits, promotes a more efficient allocation of resources, may spur economic growth, and allows investors to diversify their risks and smooth their returns.

This last aspect of risk diversification relates to a phenomenon known in the literature as cross-border risk sharing. By diversifying financial asset holdings internationally, economic agents hedge against asymmetric economic shocks that hit their domestic economy. Standard models predict that financial integration can lead to perfect consumption risk sharing, whereby fluctuations in consumption are decoupled from idiosyncratic fluctuations in output (Backus, Kehoe and Kydland, 1992, and Obstfeld and Rogoff, 1996). A rich empirical literature shows that the model-based prediction of perfect risk sharing does not hold in the real world. Notable empirical contributions include Backus, Kehoe and Kydland (1995) and Lewis (1996), who find output growth to be actually more highly correlated across countries than consumption growth (consumption correlations puzzle or quantity anomaly). Recent work has confirmed that the degree of risk sharing remains far from perfect, but has nevertheless increased over time.

What remains, however, largely unexplored are the concrete operational channels through which risk sharing operates. For most financial instruments, including portfolio equity which is the investment category reviewed in this paper, there are two distinct channels of returns: the first one is the *investment income channel*, taking the form of dividend payments in the case of portfolio equity. Investment income is recorded in the income balance of the balance of payments, accrues to the disposable income of investors and may be used directly for consumption. The second channel is the *capital gains channel*, which reflects changes in the price of the financial assets expressed in the domestic currency of the investor. Capital gains may therefore result from changes in the market price of the asset as well as from changes in exchange rates. In the case of portfolio equity, capital gains include the effect of retained earnings, i.e. earnings that are not paid out in the form of dividends but that affect the valuation of the company. Such capital gains do not generate an immediate stream of financial flows and are not recorded in the balance of payments. They may nevertheless, through wealth effects, have an impact on saving and investment decisions and thereby promote consumption smoothing.

There are no strong priors in support of the investment income channel or the capital gain channel as the dominant mode through which risk sharing takes place. Arguably, the importance of one or the other channel may differ on the specific financial instrument at hand. Generally, one main argument in support of the investment income channel is that income allows to smooth consumption directly, as it forms part of disposable income, in contrast with capital gains that can

have only indirect wealth effects on consumption. At the same time, available empirical evidence shows that, for the financial instrument under consideration, i.e. portfolio equity, capital gains are much larger in size than investment income, which would support capital gains as a potentially more important channel.

There has been limited empirical analysis on these two channels of risk sharing. The income channel has received some attention, in particular by Lane (2001), who analyses international investment income flows and finds limited evidence in support of such flows as a potential source of income smoothing at business cycle frequencies, and by Artis and Hoffmann (2006) who find that growing income flows in recent years fall short of explaining consumption risk sharing.

By investigating the capital gains channel, this paper also relates to the growing literature on valuation effects. Capital gains and valuation gains as defined in the literature on external positions are equivalent terms which can be used interchangeably. Valuation effects have come under close scrutiny in the recent years of accelerating global financial integration, but this recent work is largely theoretical, examining for instance the desirability of capital gains from a welfare perspective (Benigno, 2006), their role in current account adjustment (Bems and Dedola, 2006; Cavallo and Tille, 2006), or their implications for the conduct of monetary policy (Hoffmann and Schmidt, 2007). Empirical work on valuation effects remains confined to a few countries, mainly the United States (e.g. Lane and Milesi-Ferretti, 2005 and Gourinchas and Rey, 2007a). Very few countries (the United States and Australia are examples) provide statistical data, and capital gains have to be computed indirectly, combining both stock and flow data, to obtain a large cross-section. Several theoretical contributions have flagged the potential role of the capital gains channel for international risk sharing (see, for instance, Obstfeld, 2004). On the empirical side, Schmitz (2007) analyses the potential to hedge domestic output fluctuations by means of capital gains of foreign investors on domestic stock and bond markets.

Our paper examines one specific category of international financial assets, namely portfolio equity holdings. The motivation for this is twofold: first, available literature on risk sharing suggests that portfolio equity (alongside FDI) is the main asset category through which cross-country risk sharing is taking place (Kose, Prasad and Terrones, 2007). Second, data quality and availability are comparatively better for this type of asset than for other investment categories (FDI and debt), allowing for the construction of comparatively more reliable estimates of investment income and capital gains.

The paper starts with the construction of a new dataset on capital gains and investment income on international portfolio equity holdings, using data for 35 industrial and emerging market economies with up to 35 years of data for most countries. Our main focus is on net capital gains and net investment income, that is including both the asset and liability side. The country selection is essentially driven by data availability and quality, but is sufficiently representative as it covers over 90 percent of global stock market capitalisation. This allows a unique assessment of the role of capital gains as a risk sharing device in comparison to the more traditional channel of investment

income.

Our examination of capital gains and investment income as risk sharing channels proceeds in two stages. In a first stage, we investigate the properties of net income and net capital gains on portfolio equity in relation to domestic and international business cycles. This first stage checks a key prerequisite of risk sharing, namely that net capital gains and net investment income on international assets are countercyclical from the point of view of the domestic investor. In order to facilitate risk sharing, international equity holdings should generate a higher return when the domestic economy is performing less well vis-à-vis the rest of the world. In a second stage, we turn to consumption risk sharing by estimating a standard risk sharing coefficient, which is then augmented with country-specific cyclicality coefficients of capital gains and income flows. This allows to assess whether the potential risk sharing characteristics of cross-border investment are actually helpful in order to smooth consumption plans.

Our main finding is that, for risk sharing through portfolio equity holdings, the capital gain channel appears to be more potent than the investment income channel. Moreover, we find that the risk sharing properties of equity generally hold better for industrial countries than for emerging market economies. In somewhat more detail, our results can be grouped in three points:

- In the first step, checking the cyclicality properties of capital gains and income, we find clear evidence that net capital gains are countercyclical and thus offer a potential insurance against idiosyncratic output shocks in the domestic economy. Such countercyclicality is found for rates of net capital gains (which are essentially the difference between rates of capital gains on foreign assets and liabilities) and for the overall size of net capital gains (as captured by capital gains divided by domestic GDP). For the latter measure, the potential for insurance has increased markedly over time, especially since the mid-1990s. For investment income (dividends), results are more mixed, with limited evidence that they act as a buffer against output shocks. The potential for risk sharing through portfolio equity is found to be existing only for industrial countries.

- Refining this first-stage analysis, our analysis highlights two separate factors that may help explain the increase in the potential role of capital gains as a hedge against country-specific shocks, namely (i) a generalised decline in home bias and (ii) a deepening of stock markets across most countries.

- Finally, in the second step, we find that countries with more countercyclical net capital gains on portfolio equity also experience more consumption risk sharing. When augmenting the traditional risk sharing estimation with cyclicality measures of capital gains, we find that more countercyclical net capital gains also imply a higher degree of consumption smoothing. This result again holds only for industrial countries, but not for emerging market economies. This suggests that financial globalisation leads to asymmetric benefits globally: Industrial

countries are able to smooth consumption more easily via the capital gains channel, whereas emerging market economies do not benefit from such risk sharing.

One implication of these results concerns the effect of exchange rate fluctuations. Capital gains, expressed in domestic currency of the investor, consist of a pure return-driven component and an exchange rate-driven component. Available data do not allow to disentangle these two components for a broad range of countries.[1] However, the fact that our results on the risk sharing properties of capital gains also hold on the liabilities side could suggest that currency movements do not play a dominant role in our results. This is because equity liabilities, that is equity held by foreign investors, are typically denominated in domestic currency and are hence not directly affected by exchange rate fluctuations from a domestic viewpoint.

The rest of the paper is organised as follows. The next Section discusses the motivation of the paper in the context of the existing literature. Section 3 presents our dataset. The two legs of the empirical analysis, namely the cyclicality of capital gains and income and its effect on consumption risk sharing, are presented in Sections 4 and 5, respectively. Section 6 concludes.

2 Motivation and literature overview

By reviewing the role of capital gains as opposed to investment income as a risk sharing channel, this paper stands at the cross-road of an established literature on consumption risk sharing and a more recent strand of work on capital gains and valuation effects. We briefly review these two strands of research and present our contributions to them.

2.1 Literature on consumption risk sharing

Several theoretical contributions elaborate the benchmark case for risk sharing through financial markets. Workhorse models have been developed, inter alia, by Backus, Kehoe and Kydland (1992) and Obstfeld and Rogoff (1996). These model have a number of testable implications. One implication is that cross-country correlations of consumption growth should be above cross-country correlations of output growth. Another implication is that, within a given country, consumption growth should be less volatile than output growth, as risk sharing should allow to smooth consumption in the face of output shocks. Initial empirical work testing for these implications, for instance by Backus, Kehoe and Kydland (1995) and Lewis (1996), found the degree of risk sharing to be very low or even negative. This feature of the data is known as the consumption correlation puzzle (consumption growth *less* correlated than output growth, whereas it should be more highly correlated according to theory) or quantity anomaly.[2] Various extensions of this empirical work,

[1] Lane and Shambaugh (2007) provide empirical estimates that underline the important contribution of currency movements to the valuation channel for a large panel of countries over 1990-2004.

[2] Several authors have extended the benchmark models to account for the quantity anomaly. Examples are Kollmann (1995) and Baxter and Crucini (1995), who build models with incomplete financial markets, Chari et al. (2002),

inter alia by Ambler et al. (2003), Obstfeld (1994), Sørensen and Yosha (1998), and Stockman and Tesar (1995), have largely confirmed the limited degree of risk sharing.

More recent literature has partly nuanced this view and documented a marked increase of risk sharing since the 1990s, even though estimates suggest that risk sharing remains far from perfect. Artis and Hoffmann (2006) and Sørensen et al. (2007) estimate that risk sharing among industrial countries has increased steadily throughout the 1990s and early-2000s. A similar increase in risk sharing is found in Kose et al. (2007), but they also show that this result does not hold for emerging market economies. Giannone and Reichlin (2006) find an increase in risk sharing since the early-1990s within the euro area. Sørensen et al. (2007) attribute it mainly to the growing internationalisation of portfolios, i.e. the decline in home bias, in particular on equity holdings. Fratzscher and Imbs (2007) confirm this finding also for bilateral portfolio holdings.

Our paper mainly inscribes itself in the line of the recent empirical literature, as our results confirm a marked increase in the degree of international risk sharing, especially since the 1990s, i.e. during the era of very strongly increasing international financial integration. The main contribution we add to this literature is our examination of the specific channels through which risk sharing operates, as we examine the respective roles of income flows (dividends) and capital gains on international equity portfolios.

2.2 Literature on capital gains on international portfolios

Compared to the literature on risk sharing, the analysis of capital gains on international portfolios is more limited and remains, so far, largely theoretical and mostly limited to studies of external adjustment. Several authors hint at the theoretical implications of growing capital gains or valuation effects. Among those, Benigno (2006) and Hoffmann and Schmidt (2007) study, respectively, the welfare implications and the monetary policy implications of valuation effects. Lane (2001) and Obstfeld (2004) argue that capital gains, even if unrealised, could help smooth output shocks through wealth effects. A series of authors, including Bems and Dedola (2006) Cavallo and Tille (2006) Meredith (2007) also point to the potential role of valuation effects in times of current account adjustment, and highlight that these effects could cushion the size of the exchange rate correction that would typically come with such an adjustment.

While these contributions hint at the theoretical importance of capital gains, empirical work is more scarce and by and large contained to the case of the United States. This is essentially a matter of data availability, as only few countries publish official estimates of capital gains on international assets and liabilities. Curcuru, Dvorak and Warnock (2007) present a very detailed review of developments in US capital gains and find the return differential of assets over liabilities to

who consider nominal price rigidities, Kehoe and Perri (2002), who introduce imperfect enforceability of international financial contracts, and Stockman and Tesar (1995), who add a non-traded goods sector to the model. All of these model extensions generate lower consumption correlations than in the benchmark case, although they usually do not manage to explain why consumption correlations are even lower than output correlations.

be close to zero. Gourinchas and Rey (2007a and 2007b) also use US data and find capital gains in that country to contribute to, and even predict, external adjustment. Gourinchas (2007) discusses empirical characteristics of valuation effects for the United States and Australia, a second country where detailed statistics are available. Schmitz (2007) uses a financial market approach and finds evidence for medium-term pro-cyclicality of capital gains on domestic stock markets, which can consequently act as a smoothing device for domestic output fluctuations.

We deliberately adopt a broader angle by examining capital gains for a broad cross-section of countries.

3 Data compilation and empirical regularities

3.1 Data compilation

We build a comprehensive dataset for 35 countries with annual data between 1970 and 2005. In contrast to most research in the area so far, we focus on a rather broad range of countries, including 18 industrial countries and 17 emerging market economies (EMEs).[3] The country selection is essentially driven by data quality and consistency requirements. We keep from an original sample of over 100 countries only those series that display no unusual breaks and that have at least 10 years of continuously available data. Despite these strict selection criteria, the remaining sample of 35 countries is a very representative part of the global economy, covering 92 percent of global stock market capitalisation and of 94 percent of global cross-border holdings of portfolio equity.[4]

Data for investment income can be obtained either directly from statistical sources (we used the IMF's International Financial Statistics) or can be computed indirectly by applying dividend yields from market index portfolios on outstanding stocks of foreign equity assets and liabilities. Our dataset comprises data on the basis of both methodologies, i.e. direct measures of income and indirect measures of income applying dividend returns (taken from Datastream) on outstanding stocks (as defined below).[5] We compute both approaches to check for consistency, but use the direct measures in our empirical estimations.

Specifically, net income in year t equals:

$$INC_t = INC_t^A - INC_t^L = i_t^A A_t - i_t^L L_t \tag{1}$$

where INC_t^A and INC_t^L are annual investment income flows on equity assets and liabilities, i_t^A and

[3] Some authors also include non-industrial countries in their sample, for instance Obstfeld (1994), Lewis (1999), and Kose, Prasad and Terrones (2007). See Table 1 for the complete country list.

[4] These figures exclude data on Luxembourg, which has very sizeable cross-border equity holdings but is not included in the dataset.

[5] One complication with the indirect method is that i_t^A and i_t^L are not directly observable, as that would require information on the precise portfolio composition of assets and liabilities. A rough approximation for i_t^A is provided by the dividend return on global stock markets, while a rough approximation for i_t^L is given by the dividend return on the domestic stock market.

i_t^L are the dividend returns on assets and liabilities, and A_t and L_t are the stocks of outstanding assets and liabilities.

Data for capital gains on international assets are, by contrast, not directly available, with few exceptions such as Australia and the United States. We therefore approximate net capital gains on the basis of the following equation:[6]

$$KG_t = [(A_t - A_{t-1}) - FlowA_t] - [(L_t - L_{t-1}) - FlowL_t] \tag{2}$$

where $FlowA_t$ and $FlowL_t$ are capital outflows and inflows of portfolio equity.[7] For these flows, we use data from the IMF's International Financial Statistics. For outstanding stocks, we employ the comprehensive External Wealth of Nations Mark II (Lane and Milesi-Ferretti, 2007) dataset which provides carefully compiled data on stocks of foreign assets and liabilities for the period 1970-2004.[8] To extend our analysis as far as possible, we update this dataset with 2005 and 2006 observations from the IMF's International Financial Statistics.[9]

For example for foreign liabilities, one can calculate real rates of capital gains as follows:

$$kg_t^L = \frac{(L_{it} - L_{it-1}) - FlowL_{it}}{L_{it-1}} - \pi_t \tag{3}$$

where π_t refers to the CPI inflation rate. The rate of net capital gains is defined as the differential between the rate of capital gains on foreign assets and the rate of capital gains on foreign liabilities.

Our dataset also includes net total returns, which are equal to the sum of net income flows and net capital gains:

$$RET_t = INC_t + KG_t \tag{4}$$

On a more general level, also reinvested earnings and undistributed profits are an important part of financial returns. Retained earnings can potentially be an important driver of capital gains, as they increase the market value of a company listed on the stock market.[10]

We closely scrutinise these data with regard to outliers and potential breaks. However, data on portfolio equity are rather reliable and robust which was also an essential reason for us to focus

[6] See Lane and Milesi-Ferretti (2005) for a derivation of the associated accounting framework.

[7] The US Bureau of Economic Analysis uses an equivalent approach - employing stocks and flows data - to calculate capital gains on the US international investment positions. These total capital gains, or valuation adjustments in the BEA terminology, are further broken down into price, exchange rate and other changes.

[8] See Lane and Milesi-Ferretti (2008) for problems associated with calculating capital gains using external positions data.

[9] To compute these updates, we also check consistency between the EWN II and the IMF's International Financial Statistics (IFS) data. Specifically, the newer IFS data are used only if both sources indicate similar magnitudes for the years 2002-2003.

[10] The statistical treatment of retained earnings differs across investment categories. While they are not recorded as income flows for portfolio equity, the category of assets under investigation in this paper, they are estimated and recorded as income flows for foreign direct investment.

on this category (next to the various theoretical arguments given above). The data in their raw form are US-dollar based. We transform them using IFS data on bilateral spot exchange rates. It is crucial for this calculation to employ year-end exchange rates for stock data and yearly average rates for flow data.

Our dataset also contains the cyclical component of real GDP growth and of real private consumption growth. Real GDP and real private consumption data are taken from different sources, including the IMF's International Financial Statistics and World Economic Outlook and the OECD's Quarterly National Accounts. Where possible, we computed growth rates on the basis of fourth-quarter data (e.g., the growth rate for 2006 compares 2006Q4 with 2005Q4 data) rather than yearly average growth rates as conventionally done. This is in our view essential to ensure consistency with the income and capital gains data, which are derived from end-of-year outstanding stocks. We apply the same method to the calcualtion of CPI inflation rates. We use an HP-filter to obtain the cyclical components of GDP and consumption growth.[11] For our analysis, we also need data on real GDP growth in the rest of the world. To generate this rate carefully, we do not rely on global GDP growth figures, but compute rest-of-the-world GDP growth for each country individually, using GDP levels in US dollar terms as weights. Our dataset is completed with stock market capitalisation data from Datastream.

3.2 Some empirical regularities from our dataset

Our dataset allows to present some first insights in the development of international equity holdings and the associated income flows and capital gains. To start with, the data confirm the very rapid increase in international financial integration over the past decades, as already documented in the literature (see e.g. Lane and Milesi-Ferretti, 2005 and Obstfeld, 2004). Conventionally such integration is measured by the global stock of cross-border financial holdings as a share of global GDP. For the asset category under investigation in this paper, i.e. portfolio equity, this ratio has increased from around 2 percent in the 1970s to over 25 percent in 2005, with a particular acceleration during the 1990s (Figure 1, solid line). Also in comparison to global stock market capitalisation, international holdings of portfolio equity have increased strongly, from around 10 percent in the 1970s to 25 percent today (Figure 1, dashed line). This suggests a fundamental change in investment patterns, with a growing share of equity investment held across borders.

Not surprisingly, this increase in cross-border holdings of international portfolio equity has translated into larger capital gains and income flows. For the 35 countries in the sample, gross income flows averaged over 0.5 percent of GDP in 2005, compared to 0.2 percent in the 1970s. Capital gains have also increased rapidly and stood on average at 4.5 percent of GDP in 2005 up from around 0.5 percent in the 1970s (Figure 2). An interesting feature of the data is that capital gains are, on average, far higher than investment income. In 2005, capital gains were roughly

[11] In line with Ravn and Uhlig (2002), we set the smoothing parameter λ at 6.25 for our annual data.

ten times as high as investment flows. At first glance, this would suggest that capital gains may potentially play a much more important role than income flows as a channel for income smoothing. Yet, this first impression could potentially be misleading: income flows generate an immediate transfer of resources that can be used one-for-one for consumption or investment purposes, whereas capital gains generate only a change in wealth and have therefore only an indirect impact on consumption through wealth effects. The relative importance of capital gains vis-à-vis income flows for income smoothing purposes can therefore not be directly read from Figure 2, but should be determined on the basis of the empirical analysis below.

It is interesting to compare *international* capital gains with *domestic* capital gains. In principle, it could be that the capital gains on international portfolios are completely dwarfed by the gains that equity investors make on their domestic portfolios. Figure 3 shows that this is not the case. In 2005, capital gains on international portfolio holdings constituted nearly half of the capital gains on domestic equity markets, while they were only around 15 percent of domestic capital gains in the 1970s. Thus, we observe an indication for an increase in the relative importance of capital gains on international investment positions.

Finally, we present some country-specific data in Table 1, showing average values over the period 2001-2005. The table includes figures for overall portfolio equity assets and liabilities, capital gains and income flows (in absolute value), market capitalisation on the domestic equity markets ($MCAP$) and measures of home bias of domestic investors (HB) as well as home bias of foreign investors with regard to the country concerned (HB^W).[12] The table points to considerable divergence within the sample. International equity assets, for instance, range from close to 0 percent of GDP in India and Russia to 123 percent of GDP in Singapore. Reflecting these differences in cross-border investment, also the size of capital gains and income flows are very different across the sample. For most countries, though, the general pattern remains that capital gains are clearly above income flows.

The Table also highlights differences between country groupings, in particular industrial versus emerging market economies. Taking simple averages across the countries in the sample, international equity asset holdings represent almost 30 percent of GDP in industrial countries against 11 percent in emerging market economies. A similar picture emerges on the liabilities side. In line with this, capital gains on equity holdings are far more important in industrial countries, where they represent over 4 percent of GDP, against 2.5 percent of GDP for emerging markets.

4 The cyclicality of capital gains and income flows

As a first step of our risk sharing analysis, we examine the cyclical properties of capital gains and income flows on portfolio equity. This allows to check for a key prerequisite of risk sharing, namely

[12] Precise definitions of these two home bias measures are provided in Section 4.4.

whether net capital gains and net income are countercyclical. Such cyclicality is indicated by the sign and magnitude of the reaction of capital gains and net income to swings in domestic relative to global output. We also analyse developments over time and explore whether the potential for risk sharing is influenced by the degree of home bias in international portfolios as well as the depth of financial markets.

4.1 Estimation strategy

The first step of the empirical analysis consists of estimating the co-movement between output shocks, on the one hand, and capital gains and income flows, on the other hand. Consider the case of net capital gains: The mechanism of international risk-sharing implies that a country experiencing a positive shock to its output (relative to the rest of the world) would incur net capital losses. Conversely, an economy that is relatively underperforming should receive net capital gains. To check this empirically, we estimate a panel regression based on the following equation:

$$kg_{it} = \alpha_i + \delta_t + \gamma(y_{it} - y^*_{it}) + u_{it} \tag{5}$$

where kg_{it} are net capital gains and $y_{it} - y^*_{it}$ is the difference between domestic and foreign real GDP growth, for a given country i and year t. Equivalent equations are estimated for net income inc_{it} as well as for total returns, ret_{it}, i.e. the sum of capital gains and net income. We both follow Lane (2001) and Schmitz (2007) who use implied yield and capital gains *rates*, respectively, but we also opt for using actual *levels* of capital gains and investment income in order to get a clear picture about wealth and welfare effects through international investment.

Thus, we use two different methods for the left-hand side variable. First as also used by Curcuru et al. (2007) or Gourinchas and Rey (2007a), we use implied real rates of returns (or capital gains) as calculated in equation (3). This allows to test whether these implied rates exhibit the necessary cyclical properties to provide international risk sharing. However, it does not provide information on the size of the capital gains or income flows. We therefore employ a complementary method that consists of scaling returns by domestic GDP. This second measure allows to simultaneously explore whether returns exhibit the necessary cyclical properties *and* whether they are of sufficiently large size to generate income or wealth effects.

The coefficient γ can be interpreted as a cyclicality coefficient. It gives a first idea whether international risk sharing is functioning, that is whether net capital gains can provide an insurance against idiosyncratic output shocks. To allow risk sharing, the coefficient should be negative, i.e. higher growth domestically should generate a net capital loss or a net income loss.

The interpretation of this cyclicality coefficient depends crucially on the method we use. By using implied rates of returns on foreign assets and liabilities, we test whether they have the correct sign to provide for risk sharing. By expressing returns as a ratio to GDP, we assess both the sign and the size of the returns. This allows to gauge the effect of financial globalisation on international

returns and allows for looking at the wealth effects of cross-border asset ownership in a meaningful way. For instance, a coefficient of -1 would imply that every 1 percentage point negative shock to GDP generates a counterbalancing return of 1 percent of GDP. The total absence of risk sharing would imply a coefficient of 0. A positive coefficient would imply that capital gains or income actually worsen the potential for risk sharing.

The estimation includes country fixed effects α_i and time fixed effects δ_t so as to focus on the idiosyncratic part of GDP growth only. For both domestic and foreign growth rates, we use cyclical components so as to avoid capturing structural differences in growth levels.[13] This corresponds to theoretical concept of risk sharing as an insurance against volatility of output, not insurance against different average growth levels.

Our estimation also allows to examine whether the countercyclical behaviour of capital flows derives mainly from the asset or from the liabilities side. To do so, we disentangle equation (5) in the following asset and liability components:

$$kg_{it}^{L} = \alpha_i + \delta_t + \gamma_L y_{it} + u_{it} \tag{6}$$

$$kg_{it}^{A} = \alpha_i + \gamma_A y_{it}^{*} + u_{it} \tag{7}$$

where we again employ the two methods for measuring capital gains, that is by the implied rates of return and by scaling to domestic GDP. We estimate specifications (6) and (7) with first-order autoregressive disturbances (in order to adjust for persistence and auto-correlation in the error term) as well as heteroskedasticity robust standard errors. Capital gains on foreign liabilities, which are *losses* to domestic residents and *gains* to foreign investors, need to be pro-cyclical in order to generate risk-sharing, and we thus expect γ_L to be positive. Extending this reasoning to the rest of the world implies that capital gains on foreign assets should be pro-cyclical with GDP growth of the rest of the world, i.e. we expect also γ_A to have a positive sign.[14] In the same way we run estimations for income flows and total investment returns.

4.2 Overall results

Starting with the estimation of rates of net capital gains, we find evidence that those act in a countercyclical way. The estimated cyclicality coefficient (-1.4) has the expected negative sign and is significant at the 10 percent level (Table 2). Hence an increase in the cyclical component of domestic real GDP growth relative to the rest of the world co-moves negatively with the real rate

[13] We use the residual of GDP growth obtained from an HP-filter with a $\lambda = 6.25$. This allows for focusing on the cyclical component of GDP growth rates. See Section 3.1 for details on the computation of GDP growth rates.

[14] As we evaluate capital gains in domestic currency this can of course only hold if exchange rate movements do not distort the relation notably.

We omit time fixed effects in the estimation as we are now explicitly interested in global shocks.

of net capital gains from portfolio equity.

The result does not hold for investment income, as the coefficient has the desired sign but is not statistically significant. This suggests that net income on portfolio equity, on average, does not have the required countercyclical properties to act as a channel for risk sharing. One explanation of this result could be the corporate finance motivations behind dividend distribution, in particular the desire of firms to keep dividends relatively constant in the presence of fluctuations in profits. For the rate of total returns (capital gains plus income), the estimated coefficient is again negative and significant (at the 10% level), implying that the capital gains channel dominates the investment income channel in this case.

Separating out the liability and the asset sides, we find rates of capital gains on the liabilities side to co-move with GDP growth with a coefficient of 1.7 (significant at the 1 percent level). This is consistent with the assumption in theoretical frameworks (see e.g. Davis, Nalewaik and Willen, 2001) that domestic equity market returns tend to be procyclical. This result has the property of risk-sharing being "created"from within the economy, that is through domestic stock markets. Also for the asset side, capital gains have the expected relation, as they positively co-move with GDP growth in the rest of the world, with a coefficient of 3.3 (significant at the 1 percent level).[15]

This full set of results remains largely unchanged, but more significant, when we perform estimations on the returns scaled by GDP. Specifically, an increase of one percentage point in the GDP growth differential co-moves with a net capital loss of 0.15 percent of GDP (Table 3, Panel A, significant at the 1% level). This implies a wealth transfer of 0.15 percent of GDP to the rest of the world when domestic GDP growth is increasing by one percentage point relative to the rest of the world. This does not hold for income flows, but for total returns where the estimated coefficient is negative and significant (-0.2).

Results for assets and liabilities are also very similar for this scaling method: for the liabilities side, we find capital gains to co-move with GDP growth with a coefficient of 0.18 (significant at the 5 percent level). Also for the asset side, capital gains have the expected relation that is required for risk sharing, as they positively co-move with rest of the world-GDP growth, with a coefficient of 0.4 (significant at the 1 percent level). In contrast to Table 2, we do not see a significant positive coefficient on the liability side for total returns. This is probably driven by the significantly negative cyclicality coefficient on investment income outflows.

As a robustness check, we perform this last set of estimations again, adding two control variables, a time trend and total financial holdings (Table 3, Panels B and C). These two control variables are important as their omission could create a bias in our estimation results. This is particularly true because capital gains and income flows, expressed as a ratio to GDP, have increased markedly over time, in line with holdings of foreign equity assets and liabilities. The relation between capital gains and the business cycle may therefore be instable over time. As for the time trend, we

[15]The same mechanism also holds for the total returns. The coefficients on investment income, by contrast, are found to be insignificant on the asset side, whereas positive and significant on the liability side.

observe significant values for some of the net and asset side estimations, confirming that capital gains have increased with time. Importantly, however, the estimated cyclicality coefficients remain largely unaffected, as their significance remains unchanged and their size changes only marginally. Likewise, the inclusion of foreign equity assets and liabilities as a control variable does not affect our estimation results substantially.

Therefore, in conclusion, employing the control variables does not change our overall results notably. This is also consistent with the fact that our results in particular for capital gains and total returns are very much alike regardless of the method used.

Finally, we rerun the regressions for a number of subgroups, in particular industrial countries, euro area countries, and emerging market economies (Table 4 and Table 5). In Table 4, net capital gains have the correct and significant signs only for the overall estimations, whereas they are significant for both the overall sample and industrial countries, when scaled by GDP (in Table 5). For emerging markets, we do not observe significant cyclicality coefficients on net capital gains. This might be severe for these countries as their output volatility tends to be much higher, and consequently benefits from financial integration could be very helpful in order to stabilise these economies.

By and large, we crucially find that international risk-sharing through cross-border equity seems feasible as cyclical, idiosyncratic fluctuations in GDP growth rates are at least partly off-set by net capital gains on foreign equity investment positions. However, variations in net income flows do not seem to be related in any significant way to output shocks, suggesting that the potential for consumption smoothing through such flows is severely limited.

4.3 Developments in cyclicality over time

With growing financial integration, it seems natural that the behaviour of capital gains and income flows has changed over time. To explore such changes over time, we perform, as a first check, estimations over a subsample running from 1993 to 2005, covering the years of enhanced international financial integration as observed above.

Table 4 reports results based on implied rates of capital gains. The cyclicality coefficient γ turns out to be modestly higher in the subsample 1993-2005 than for the full sample. In particular the coefficient on foreign assets increased from 3.3 to 6.2 and the coefficient on net capital gains changes from -1.4 to -1.8. This suggest that risk sharing possibilities have improved in the last decade.

The results for capital gains scaled to GDP are reported in Table 5. Also for this measure, there has been a marked increase in the cyclicality coefficient throughout the sample. For the full set of countries, the coefficient increases (in absolute terms) from -0.15 over the whole sample to -0.21 over the more recent sub-sample. Similar results hold for assets and liabilities separately, as well as for the different country groupings (in particular industrial countries).

For a more refined analysis of trends over time, we run a specification where the cyclicality coefficient γ_t is allowed to change over time. We do so by re-running the regressions over rolling five year-periods.[16] The resulting γ-coefficients are reported in Figures 4 and 5.[17] The results confirm that the cyclicality of capital gains has changed markedly over time, and in particular that the average response of those gains to output shocks has increased over time. Using the implied rates of capital gains, one can detect a declining trend in the γ-coefficient for the full sample of countries (Figure 4, Panel A). Using GDP as a scaling factor, the cyclicality coefficient on net capital gains has reached unprecedented high negative values after 1997, reflecting developments in the industrial countries, where - in contrast to the previous method - the γ-coefficient has moved close to -1 towards the end of the sample (Figure 5, Panel B).

Analysing the role of assets and liabilities separately, the increase in the cyclicality coefficient can be observed on both sides. Developments on the foreign liability side (Panel B of Figures 4 and 5) show a gradual increase in the pro-cyclicality of portfolio equity. Also on the side of foreign assets (Panel C of Figures 4 and 5), the co-movement with rest-of-the-world GDP growth has strengthened remarkably. Furthermore, the distinction between assets and liabilities confirms that the increasing cyclical behaviour of capital gains is more pronounced for industrial countries than for emerging market economies.

Repeating this exercise for investment income, we find very different results (see Figure 6 for implied income yields and Figure 7 for income scaled to GDP). Overall, net investment income (Panel A) was broadly countercyclical until the 1990s, although at very low levels. After that, the coefficients have moved even closer to zero, suggesting that barely any co-movement has taken place. In Figure 7, we actually see for industrial countries a trend towards very limited *pro*-cyclicality of net income flows after 2000, whereas counter-cyclicality is observable for emerging markets. Separate results on assets and liabilities (Panels B and C) confirm that coefficients are very small, without clear trends over time.

4.4 Explaining the cyclical properties of capital gains

The next step of our empirical exercise is to test whether variations in home bias and in financial market depth help explain the cyclical properties of the ratio of net capital gains to GDP. To do so, we rerun estimations (5) - (7), imposing a structure on γ that depends on home bias and financial deepening.[18] We let

$$\gamma = \gamma_0 + \gamma_1 HB_{it} + \gamma_2 HB^*_{it} + \gamma_3 MCAP_{it} + \gamma_4 MCAP^*_{it} \tag{8}$$

[16] These estimations are pooled to avoid possible distortions to the estimates arising from the very short time spans.

[17] In the figures, the γ_t coefficient plotted for a given year t corresponds to an estimate over the five-year period between $t-4$ and t. For presentational purposes, the coefficients are smoothed using the Lowess-method with a bandwidth of 0.8.

[18] In these estimations we scale capital gains by GDP in order to explicitly capture the effect of the increasing magnitude of international financial markets.

where HB_{it} and HB^*_{it} are the home bias of the domestic economy and the rest of the world, respectively, and $MCAP_{it}$ and $MCAP^*_{it}$ refer to domestic and world stock market capitalisation relative to domestic and world GDP. Obviously, we impose a structure containing domestic variables for capital gains on foreign liabilities estimations and global variables for the foreign asset side. For the estimation, home bias in international equity is measured following French and Poterba (1991) as:

$$HB_{it} = 1 - \frac{\frac{A_{it}}{W_{it}}}{1 - \frac{MCAP_{it}}{MCAP^W_{it}}} \tag{9}$$

where A_{it} is the foreign asset position in portfolio equity and W_{it} equals $MCAP_{it} + A_{it} - L_{it}$, corresponding to domestic wealth in terms of portfolio equity. Hence, if HB_{it} equals zero there is no home bias in the investment strategy of the investing country, i.e. country i's investment in its own stock market is in line with the share of the domestic to the global stock market. Conversely, we define a somewhat less conventionally used measure, the international home bias from country i's perspective (i.e. the aggregate home bias of the rest of the world on its investment in country i), as:

$$HB^*_{it} = 1 - \frac{L_{it} * MCAP^*_{it}}{(W^W_t - W_{it}) * MCAP_{it}} \tag{10}$$

where W^W_t represents global wealth in terms of portfolio equity and is computed as the sum of all W_{it} in our sample, that is global wealth in terms of portfolio equity.

Table 6 presents the estimation results. The first row shows that the cyclicality of capital gains on foreign equity liabilities has a highly significant γ_L-coefficient of more than unity, but international home bias has a negative effect on the procyclicality of the foreign liability side. The second row highlights that, if we additionally include domestic stock market capitalisation (as a proxy for financial deepening), results are again very significant: A one percentage point increase in the stock market to GDP ratio increases the cyclicality coefficient by 0.01.[19]

Regarding capital gains on foreign assets we impose a structure with equivalent variables (third and fourth rows). These are the home bias when investing abroad as well as global stock market capitalisation. Both variables are significant with coefficients of about -1 for home bias and 2.4 for global stock market capitalisation, again suggesting that financial deepening is beneficial for international risk-sharing.

Finally we impose the same structure on the estimation of γ for net capital gains (fifth and sixth rows). Both in the estimation with and without stock market capitalisation, the estimated coefficient γ suggests counter-cyclicality with a coefficient close to -1. The structural variables are not significant in this estimation suggesting that they off-set each other.

[19]This result is in line with Schmitz (2007), who uses a different methodology showing that the procyclicality of domestic stock markets increases with stock market capitalisation.

To summarise, we find that international home bias and a lack of financial depth significantly hamper international risk-sharing.

5 Consumption risk sharing

5.1 Overall empirical evidence

After having analysed the cyclicality of capital gains and income, we turn to evaluate actual risk sharing in terms of consumption. Following Lewis (1996), we are interested in determining to what extent consumption paths are buffered from output shocks. As described above findings in the literature suggests a rather low degree of risk sharing. Our empirical strategy in order to evaluate the extent of consumption smoothing involves the standard risk sharing equation:

$$c_{it} = \delta_t + \beta y_{it} + u_{it} \tag{11}$$

where c_{it} and y_{it} are the cyclical components of consumption and output growth, respectively. It is crucial to include time fixed effects (δ_t) in order to isolate the idiosyncratic parts of consumption and output growth.[20] Time fixed effects control for global shocks that are uninsurable risks. The coefficient β measures the co-movement of the two. In a world of perfect risk sharing β should be equal to zero, such that consumption paths are completely buffered against domestic output fluctuations. The consumption correlations puzzle refers to the fact that estimates of β are still large and, in some estimates, even above 1. Corsetti, Dedola and Leduc (2007) show that accounting for terms of trade changes, for example due to productivity shocks, alters the value of the coefficient associated with perfect risk sharing, i.e. it should no longer be equal to zero. Bearing this fact in mind, we are interested to observe in our empirical set-up, in line with Sørensen et al. (2007) and Fratzscher and Imbs (2007), how the risk sharing coefficient *changes* once we control for increased financial integration and the cyclicality of capital gains and investment income flows.

Considering the standard risk sharing equation over the full time period from 1971 to 2005 (see Table 7, Panel A), we find values for β to be high and significantly different from zero (0.73 for the complete sample), suggesting that consumption risk sharing is not perfect. Strikingly estimates for industrial countries (0.50) are considerably lower than for emerging markets (0.90) - a finding consistent with Kose et al. (2007) who find consumption smoothing to work more effectively for industrial than for emerging market economies.[21]

Recent empirical work (e.g. Sørensen et al., 2007, Fratzscher and Imbs, 2007) augments the consumption risk sharing equation with interaction terms in order to impose a structure on the β coefficient. Specifically they introduce holdings of foreign assets and liabilities (as de facto measures

[20] Employing country fixed effects does not have a significant impact in this estimation as we use cyclical components.

[21] For consistency reasons we only include observations of the years that were available for the cyclicality analysis of net capital gains.

of international financial integration - see Lane and Milesi-Ferretti, 2004) as well as holdings of different asset classes (e.g. portfolio equity, FDI etc.). We verify these results for our dataset by running run equation (11) once more with the imposed structure

$$\beta = \beta_1 + \beta_2 FOEQ_{it} \tag{12}$$

where $FOEQ_{it}$ measures the sum of foreign portfolio equity assets and liabilities divided by nominal GDP (Panel B). Augmenting with this specific measure of financial openness, we observe for the subgroup of industrial countries a significant positive effect (indicated by a coefficient of -0.5, significant at the 1% level) of de facto portfolio equity integration on consumption risk sharing (as also identified by Sørensen et al., 2007). For emerging market economies, however, no evidence for a beneficial effect of cross-border investments is found (in line with Kose et al., 2007).

While these estimations reproduce results that have already been identified in the literature our main contribution to the risk sharing literature is to explicitly introduce the potential channels of international risk-sharing as identified above: the capital gains channel and income flows. In line with the analysis of this paper we focus on portfolio equity investments. Thus, we impose for example the following structure on the risk sharing coefficient:

$$\beta = \beta_1 + \beta_2 \widehat{\gamma_{kg}} \tag{13}$$

where $\widehat{\gamma_{kg}}$ are the set of country-by-country cyclicality estimates of net capital gains from the portfolio equity category. We estimate these in a first step by running the country-by-country equivalent specifications of (5) to (7). Using the cyclicality coefficients in the augmentation of the traditional risk sharing equation allows us to observe if countries that exhibit for international risk sharing desirable cyclicality patterns, are also the countries with improved consumption risk sharing properties.[22] We also run specification with the cyclicality estimations on capital gains on assets and liabilities separately. In other specifications we use the coefficients on net investment income to investigate the impact of dividend payments and total returns to examine the joint impact of capital gains and dividends.[23] Regarding net capital gains and income flows, we expect β_2 to have a positive sign, i.e. to bring the overall risk sharing coefficient closer to 0, if the associated cyclicality coefficients are negative. In line with analysis of the previous section we expect a negative sign on β_2 for the asset and liability side estimations.

Our results in Table 7 shows that we find the expected coefficients for the overall sample and industrial countries. This holds for both the cyclicality coefficients on net capital gains (Panel C) as well as for capital gains on foreign assets or liabilities (Panel D and E, respectively). Hence, we have established that countries with the required cyclical properties regarding capital gains

[22] The cyclicality estimates are time invariant for each country. We weight by the in the country-by-country estimation obtained t-statistics.

[23] We use the cyclicality coefficients from the specification where capital gains are measured as a ratios to GDP.

experience significantly higher international risk sharing. For the Euro Area sample however, we find significant β_2-coefficients in the opposite direction, whereas no significant results are found for emerging markets (except for the coefficient on capital gains on foreign assets).

As a next step we consider the cyclical properties of net investment income as a driver of consumption risk sharing. Results on β_2 suggest for the overall and industrial sample that countries with more counter-cyclical net investment income flows also experience more consumption smoothing (Panel F). Coefficients are less significant than the ones for net capital gains, however. Also, we should bear in mind that the overall panel results in the previous section did not indicate counter-cyclicality for net investment income flows. For the coefficients on total returns on portfolio equity we do not observe a a positive impact on international risk sharing (Panel G).

Overall, one can infer from this analysis that industrial countries benefit from financial globalisation in terms of improved risk sharing, whereas emerging markets do not. This finding holds both in our first-step cyclicality analysis as well as in the consumption risk sharing analysis.[24]

5.2 Estimating risk sharing over time

The next step in the analysis is the exploration of possible trends over time. We rerun the regressions for the time period from 1993 - 2005 in order to capture the recent time period of financial globalisation.[25] Noticeably, for our overall sample there is an improvement in international risk-sharing (Table 8, Panel A): The overall coefficient decreases from 0.73 to 0.70. The improvement is most pronounced for industrial countries with a coefficient of 0.29 (against 0.50 for the full time period) and even more so for the euro area countries with a value of 0.24 (against 0.58). For emerging markets, on the other hand, even a small decline from 0.90 to 0.91 can be observed.

Regarding the channels of risk sharing, we find less evidence compared to the full time period. The overall coefficient on β_2 is significant only at the 10% level, whereas it is not significant for industrial countries. Also the coefficients for investment income flows are not significant for this time period. Hence, for example among industrial countries, the observed increased consumption risk sharing is not significantly higher for countries with more counter-cyclical net capital gains. However, in Table 5, we observed improved counter-cyclicality of net capital gains for this group. Thus, either differences among industrial countries with regard to their cyclicality patterns have diminished or other cross-country differences play a more important role for consumption risk sharing.

[24] A similar pattern is found in the literature on the effects of financial globalisation on output growth, where e.g. Kose et al. (2006) suggest that countries need to pass a certain threshold in their development in order to benefit from financial globalisation.

[25] Accordingly, we estimate the country-by-country cyclicality coefficients for the period 1993-2005

6 Conclusions

This paper has reviewed one of the real economy implications of growing financial integration, namely international risk sharing. The basic intuition behind risk sharing through financial markets is that international portfolio diversification helps to reduce volatility on investment returns, which in turn helps smooth variations in income and in consumption across countries.

The main question of interest in this paper was to understand whether such risk sharing is functioning in practice, and, if so, through which channels. We have examined specifically the role of capital gains versus that of income on international securities, with a focus on portfolio equity for both theoretical reasons and practical reasons.

The dataset allows to check whether capital gains and income help smooth income in the face of idiosyncratic output shocks. Our empirical strategy has proceeded in two stages: first, do idiosyncratic output shocks translate into net capital gains and income in the desired direction? Second, do the cyclicality patterns of investment returns have a significant impact on consumption risk sharing? Overall we find net capital gains to have the required countercyclical properties in the first stage of the analysis and also to have an impact on consumption risk sharing in the second stage. For income flows, however, results are less promising, as coefficients on income flows are insignificant for most specifications. This may reflect the preference of firms to keep dividend streams relatively constant in the presence of fluctuations in their profits.

Extensions of this empirical analysis have also allowed to investigate the development of risk sharing over time. Overall, we find that the reaction of capital gains to idiosyncratic output shocks has increased over time. In the 1970s, net capital gains on international equity hardly moved in response to output shocks, whereas in the 2000s the coefficient has come close to values that would be compatible with perfect risk sharing properties.

This tendency towards a greater potential for risk sharing through capital gains seems unambiguously linked with the process of financial globalisation, a process that has accelerated markedly throughout the 1990s and early-2000s. We argue that their are conceptually two different levers through which financial globalisation may enhance risk sharing: first, a decline in home bias, i.e. a growing share of international security holdings in investor portfolios, and second, a deepening of financial markets, i.e. a growing potential to claim a country's future output through financial instruments.

A final outcome of our empirical analysis is that results usually hold best for industrial countries. For emerging market economies, we find only very limited evidence for risk sharing behaviour through capital gains on international portfolio holdings. Capital gains are small and do not react in any significant way to output shocks; also, their impact on consumption seems to be insignificant. The most straightforward explanation for this negative result would be that financial markets in emerging market economies, especially the equity securities market that we examine in this paper, are on average too small to act as channel for consumption risk sharing.

Finally, various extensions of our work are possible. One such extension would be to repeat the exercise for different types of asset holdings, in particular foreign direct investment and debt. This would allow to form a more complete picture of risk sharing through international capital markets, but such an exercise would run into significant data problems, given that reliable estimates of capital gains on these other asset categories are difficult to construct. Another avenue for further refinement would be to examine the behaviour of bilateral risk sharing and the role of bilateral security holdings therein. More broadly, the dataset we have constructed may be useful to examine a range of empirical questions on international capital gains, such as the asset price implications that have been examined by Gourinchas and Rey (2007a) for the US case.

References

[1] Artis, Michael and Mathias Hoffmann (2006), The Home Bias and Capital Income Flows between Countries and Regions, *CEPR Discussion Papers*, No. 5691.

[2] Ambler, Steve, Emanuela Cardia and Christian Zimmermann (2003), International Business Cycles: What Are the Facts?, *Journal of Monetary Economics*, Vol. 51, No. 2, pp. 257-276.

[3] Backus, David, Patrick Kehoe and Finn Kydland (1992), International Real Business Cycles, *Journal of Political Economy*, Vol. 100, 745-775.

[4] Backus, David, Patrick Kehoe and Finn Kydland (1995), International Cycles: Theory and Evidence, in T. Cooley (Ed.), *Frontiers of Business Cycle Research*, Princeton University Press, Princeton, pp. 331-356.

[5] Baxter; Marianne and Mario Crucini (1995), Business Cycles and the Asset Structure of Foreign Trade, *International Economic Review*, Vol. 36, No. 4, pp. 821-854.

[6] Bems, Rudolfs and Luca Dedola (2006), Current Account Reversals and Capital Markets Integration: The Adjustment of the US External Position Revisited, mimeo, European Central Bank.

[7] Benigno, Pierpaolo (2006), Are Valuation Effects Desirable from a Global Perspective?, *NBER Working Paper*, No. 12219.

[8] Cavallo, Michele and Cédric Tille (2006), Could Capital Gains Smooth a Current Account Rebalancing?, *Federal Reserve Bank of New York Staff Reports*, No. 237.

[9] Chari, V. V., Patrick J. Kehoe and Ellen McGrattan (2002), Can Sticky Prices Generate Volatile and Persistent Real Exchange Rates?, *Review of Economic Studies* 69, 633-63.

[10] Corsetti, Giancarlo, Luca Dedola and Sylvain Leduc (2007), International risk-sharing and the transmission of productivity shocks, *Review of Economic Studies* (forthcoming)

[11] Curcuru, Stephanie, Tomas Dvorak and Francis Warnock (2007), The Stability of Large External Imbalances: The Role of Returns Differentials, *NBER Working Paper*, No. 13074.

[12] Davis, Steven, Jeremy Nalewaik and Paul Willen (2001), On the Gains to International Trade in Risky Financial Assets, mimeo, Chicago Graduate School of Business.

[13] Fratzscher, Marcel and Jean Imbs (2007), Risk Sharing, Finance and Institutions in International Portfolios, *ECB Working Paper Series*, No. 826.

[14] French, Kenneth and James Poterba (1991), Investor diversification and international equity markets, *American Economic Review*, Vol. 81, No. 2, pp. 222-226.

[15] Giannone, Domenico and Lucrezia Reichlin (2006), Trends and Cycles in the Euro Area: How Much Heterogeneity and Should We Worry Aout It?, *ECB Working Paper Series*, No. 595.

[16] Gourinchas, Pierre-Olivier and Hélène Rey (2007a), International Financial Adjustment, *Journal of Political Economy*, forthcoming.

[17] Gourinchas, Pierre-Olivier and Hélène Rey (2007b), From World Banker to World Venture Capitalist: US External Adjustment and The Exorbitant Privilege, in *G7 Current Account Imbalances: Sustainability and Adjustment*, ed. by Richard Clarida.

[18] Gourinchas, Pierre-Olivier (2007), Valuation Effects and External Adjustment: A Review, prepared for the 2006 Annual Conference of the Central Bank of Chile.

[19] Hoffmann, Mathias and Caroline Schmidt (2007), Composition of Foreign Assets: The Valuation Effect and Monetary Policy, paper presented at the 2007 Conference of the European Economic Association, Budapest.

[20] Kollmann, Robert (1995), Consumption, Real Exchange Rates and the Structure of International Asset Markets, *Journal of lnternational Money and Finance*, Vol. 14, No. 2, pp. 191-211.

[21] Kose M. Ayhan, Eswar Prasad, Kenneth Rogoff and Shang-Jin Wei (2006), Financial Globalization: A Reappraisal, *IMF Working Paper* 06/189.

[22] Kose M. Ayhan, Eswar Prasad, Macro E. Terrones (2007), How does Financial Globalization Affect Risk Sharing?, *IZA Discussion Paper* No. 2903.

[23] Lane Philip R. (2001), Do International Investment Income Flows Smooth Consumption? *Weltwirtschaftliches Archiv*, No. 137, pp. 263-94.

[24] Lane, Philip R. and Gian Maria Milesi-Ferretti (2003), International Financial Integration, *International Monetary Fund Staff Papers* 50(S), 82-113.

[25] Lane, Philip R. and Gian Maria Milesi-Ferretti (2005), A Global Perspective on External Positions, Mimeo, Trinity College Dublin and International Monetary Fund.

[26] Lane, Philip R. and Gian Maria Milesi-Ferretti (2007), The External Wealth of Nations Mark II: Revised and extended estimates of foreign assets and liabilities, 1970 2004 *Journal of International Economics*, Vol. 73, Issue 2, pp. 223-250.

[27] Lane, Philip R. and Gian Maria Milesi-Ferretti (2008), Where Did All The Borrowing Go? A Forensic Analysis of the U.S. External Position, IIIS Discussion Paper No. 239.

[28] Lane, Philip R. and Jay Shambaugh (2007), Financial Exchange Rates and International Currency Exposures, *IIIS Discussion Paper* No. 229.

[29] Lewis, Karen (1996), What Can Explain the Apparent Lack of International Consumption Risk-Sharing?, *Journal of Political Economy*, 104, 267-267.

[30] Lewis, Karen (1999), Trying to Explain Home Bias in Equities and Consumption, *Journal of Economic Literature*, Vol. 37, No. 2, pp. 571-608.

[31] Meredith, Guy (2007), Debt Dynamics and Global Imbalances: Some Conventional Views Reconsidered, *IMF Working Papers*, No. 07/04, January.

[32] Obstfeld, Maurice (1994), Are Industrial-Country Consumption Risks Globally Diversified?, in L. Leiderman and A. Razin (Eds.), *Capital Mobility: The Impact of Consumption, Investment and Growth*, Cambridge University Press, New York, pp. 13-47.

[33] Obstfeld, Maurice (2004), External Adjustment, *Review of World Economics*, No. 140, pp. 541-568.

[34] Obstfeld, Maurice and Kenneth Rogoff (1996), Foundations of International Macroeconomics, The MIT Press, Cambridge and London.

[35] Obstfeld, Maurice and Kenneth Rogoff (2000), The Six Major Puzzles in International Macroeconomics: Is There a Common Cause?, *NBER Macroeconomics Annual 2000*, Vol. 15, No. 1, pp. 339-90.

[36] Ravn, Morten and Harald Uhlig (2002), On adjusting the Hodrick-Prescott filter for the frequency of observations, *Review of Economics and Statistics*, Vol. 84, No. 2, pp. 371-376.

[37] Schmitz, Martin (2007), Financial Markets and International Risk Sharing, *Institute for International Integration Studies Discussion Paper*, No. 233, Trinity College Dublin.

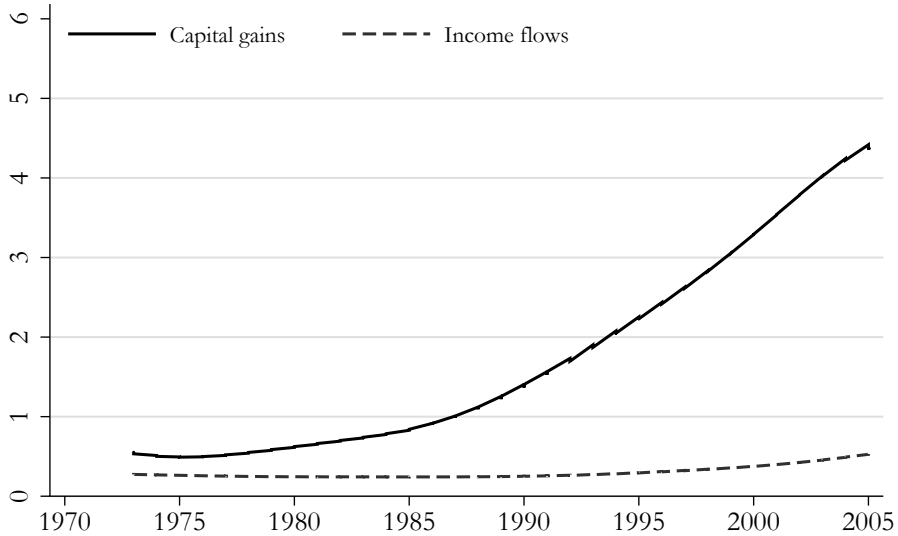
[38] Sørensen, Bent, Yi-Tsung Wu, Oved Yosha and Yu Zhu (2007), Home Bias and International Risk Sharing: Twin Puzzles Seperated at Birth, *Journal of International Money and Finance*, Vol. 26, No. 4, pp. 587-605.

[39] Stockman, Alan and Linda Tesar (1995), Tastes and Technology in a Two-Country Model of the Business Cycle: Explaining International Comovements, *The American Economic Review*, Vol. 85, No. 1, pp. 168-185.

Figure 1: Global portfolio equity holdings

Sources: Authors' calculations, International Financial Statistics, Lane and Milesi−Ferretti (2006) and Datastream

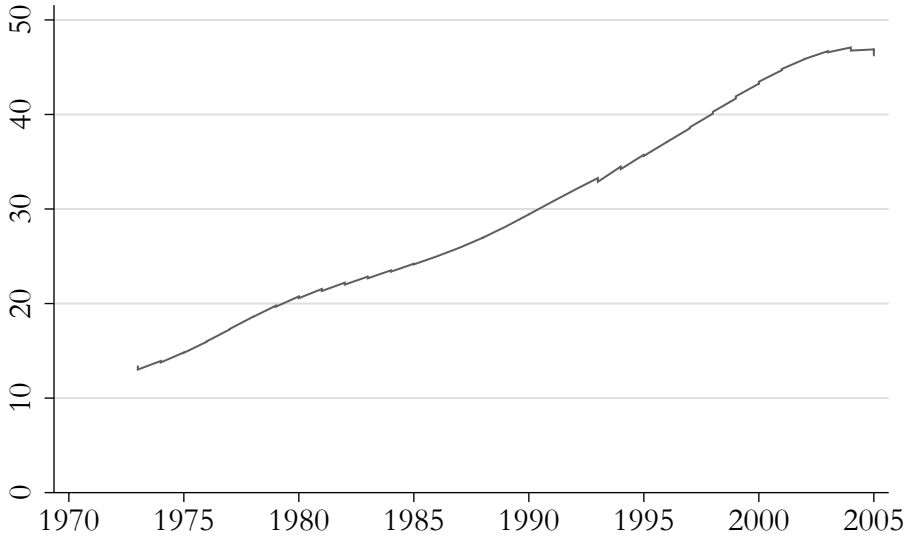
Figure 2: Net capital gains and net investment income flows on portfolio equity (as a percentage of GDP)



Sources: Authors' calculations, International Financial Statistics and Lane and Milesi−Ferretti (2006)
Note: Smoothed using Lowess−method with a bandwidth of 0.8.

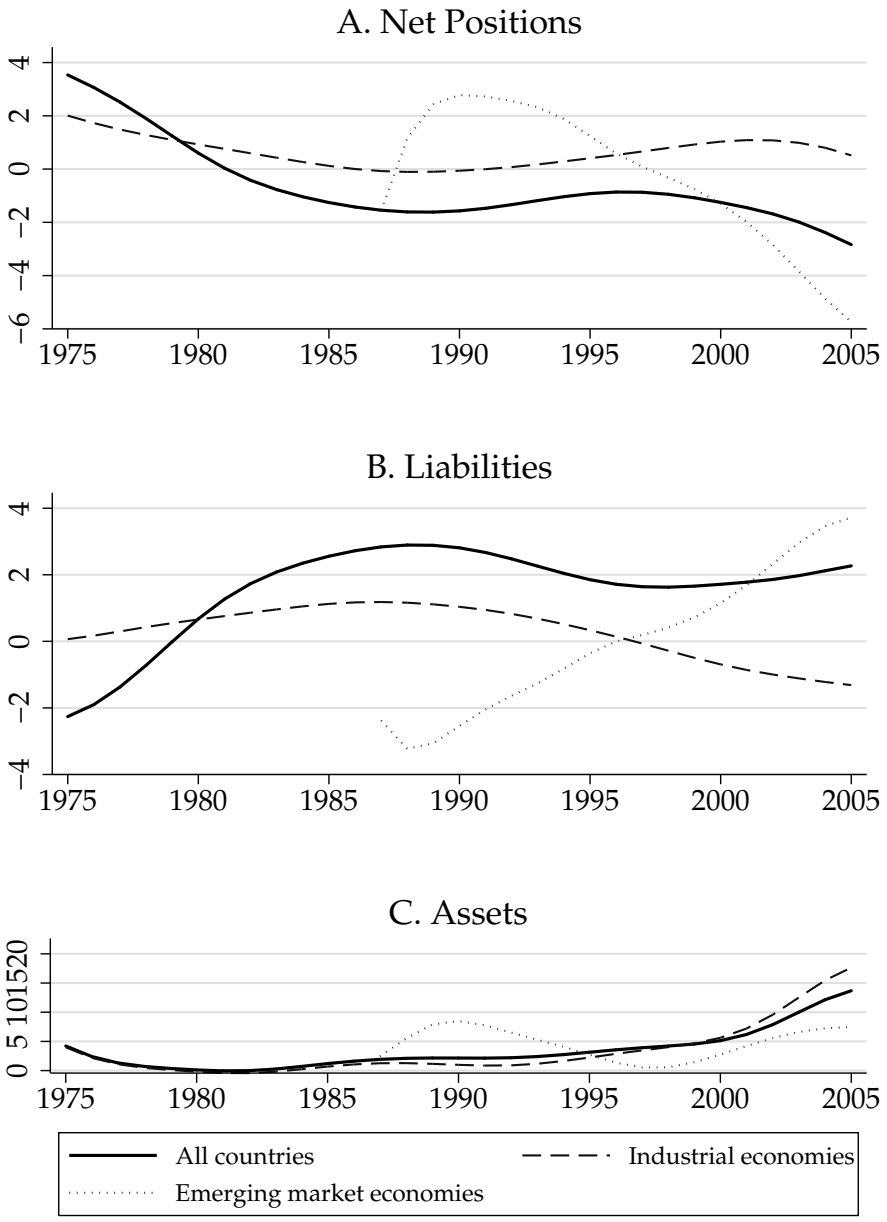
Figure 3: Net capital gains on international portfolio equity investments

(as a percentage of domestic capital gains)



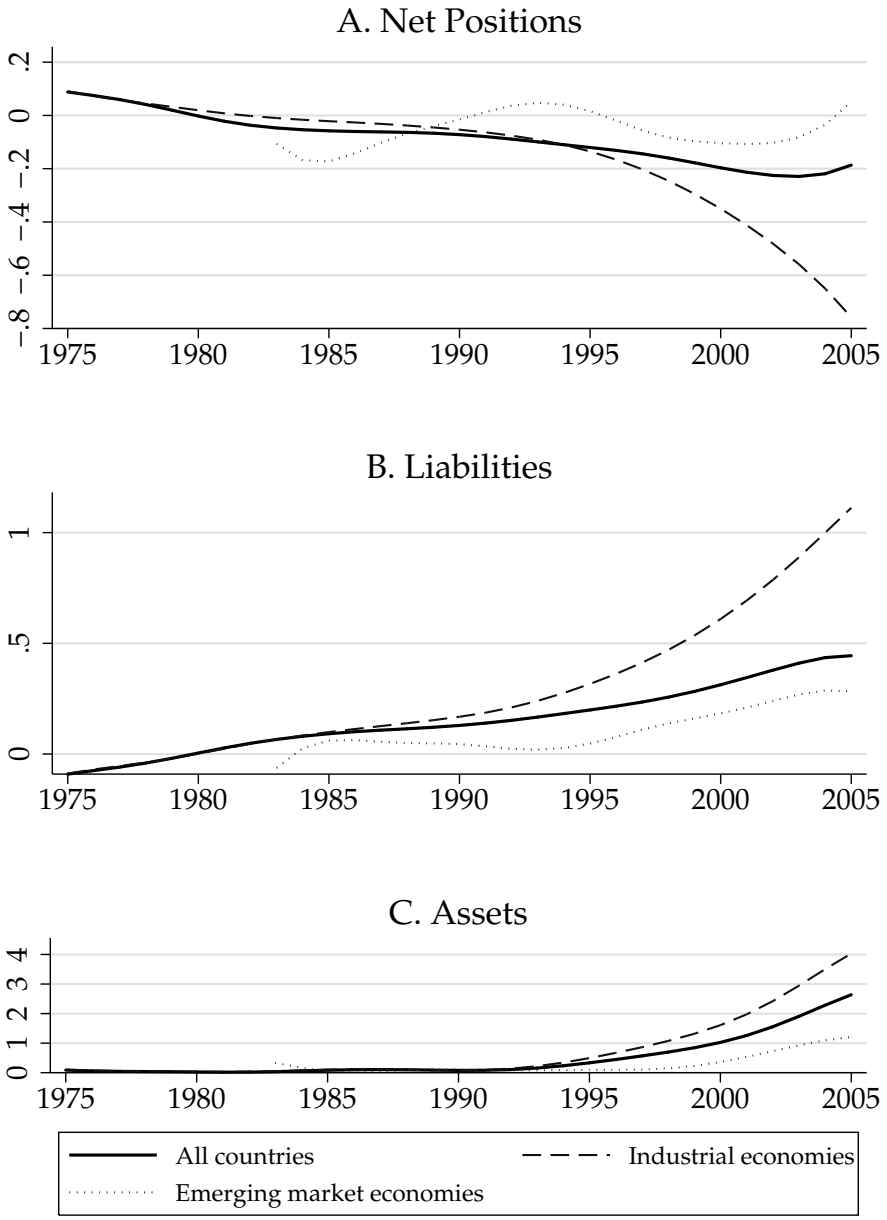
Sources: Authors' calculations, Datastream, International Financial Statistics and Lane and Milesi−Ferretti (2006)
Note: Smoothed using Lowess−method with a bandwidth of 0.8.

Figure 4: Cyclicality of implied rates of capital gains over time



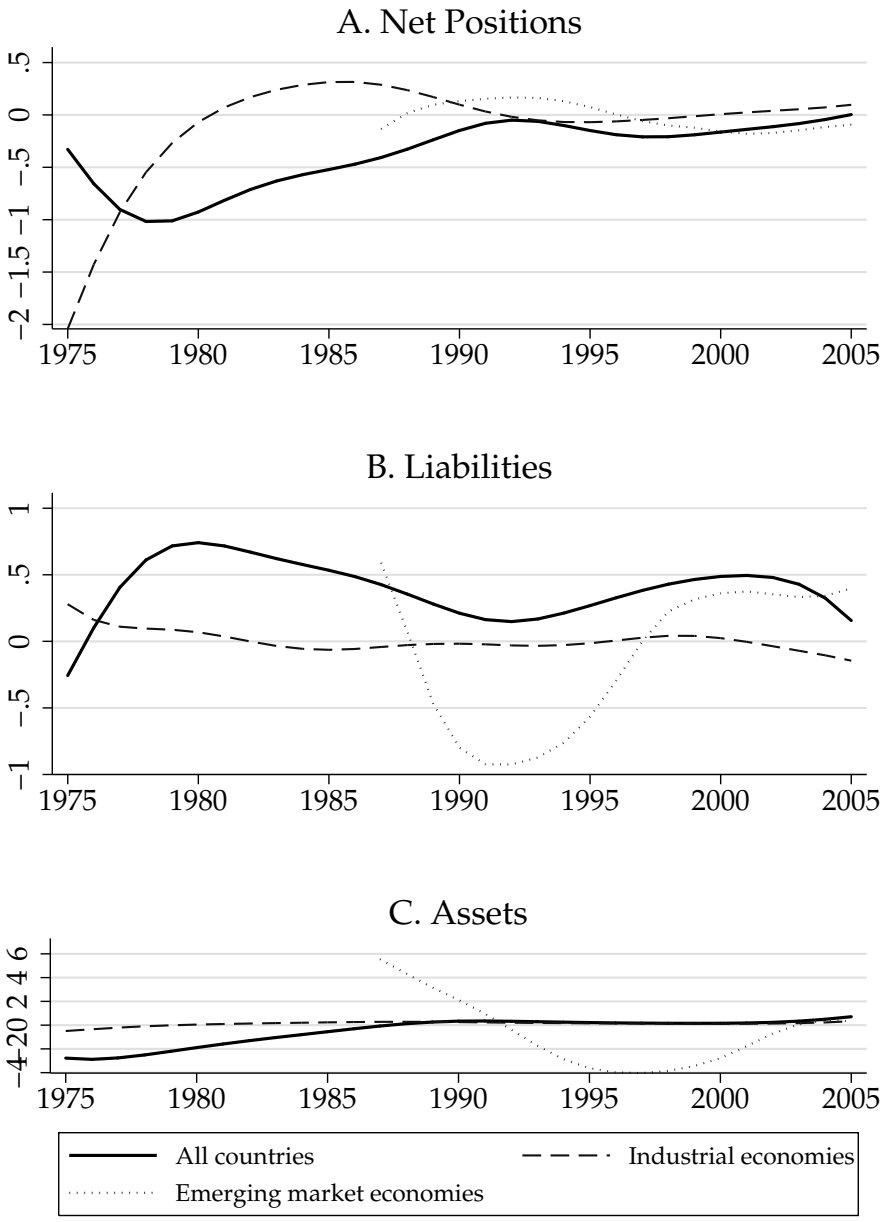
Notes: Smoothed using Lowess–method with a bandwidth of 0.8.
Implied real rates of capital gains used in these estimations.

Figure 5: Cyclicality of capital gains (scaled to GDP) over time



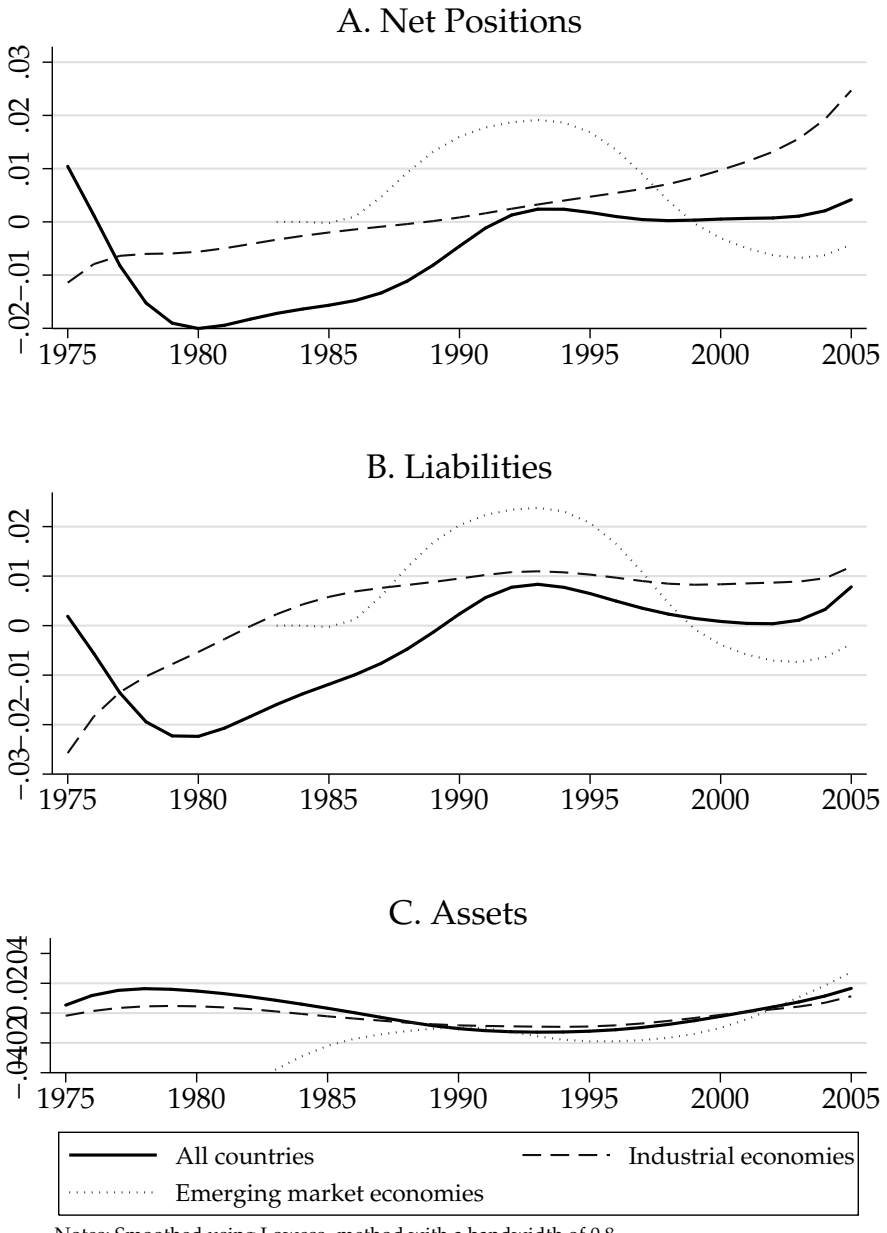
Notes: Smoothed using Lowess–method with a bandwidth of 0.8.
Capital gains scaled by GDP in these estimations.

Figure 6: Cyclicality of implied rates of investment income over time



Notes: Smoothed using Lowess−method with a bandwidth of 0.8.
Implied real yields of portfolio equity used in these estimations.

Figure 7: Cyclicality of investment income (scaled to GDP) over time



Notes: Smoothed using Lowess–method with a bandwidth of 0.8.
Investment income scaled by GDP in these estimations.

Table 1: International portfolio equity holdings, key characteristics by country

(Average values over the period 2001-2005)

	Total holdings		Capital gains (absolute value)			Income	Market	Home bias	
	Assets	Liabilities	Net	On assets	On liabilities	(net)	capitalisation	of residents	of foreigners
	(in percent of GDP)							*(indicator from 0 to 100)* [a]	
Industrial countries									
Australia	17.5	24.5	1.8	1.3	2.9	0.4	92.6	79.1	70.0
Austria	17.6	12.3	2.5	3.3	2.3	0.0	20.9	28.0	29.3
Canada	35.1	20.5	5.4	10.9	5.5	0.5	78.4	58.2	68.5
Finland	23.6	70.7	23.4	3.3	25.4	1.1	94.2	46.3	17.5
France	18.9	28.7	2.5	2.5	5.1	..	65.0	64.3	48.4
Germany	24.9	14.4	0.7	4.1	3.7	0.3	35.7	44.0	52.6
Iceland	36.6	6.0	4.9	3.6	1.8	0.2	..	..	..
Italy	22.3	11.0	1.0	2.4	2.2	0.3	39.1	53.9	67.7
Japan	6.7	14.2	2.3	1.1	3.1	0.1	66.7	87.2	73.7
Netherlands	66.7	67.8	5.0	11.6	10.9	0.7	97.9	28.3	18.2
New Zealand	17.0	10.5	2.5	2.4	1.0	0.3	35.4	59.4	68.1
Norway	31.4	10.9	2.3	2.9	2.2	..	41.3	44.8	67.9
Portugal	7.7	21.5	1.9	0.6	2.5	0.3	37.9	65.6	35.7
Spain	10.3	21.7	2.1	1.6	3.5	0.3	51.1	73.4	51.8
Sweden	48.0	32.4	4.4	8.0	11.4	0.2	79.5	48.8	54.1
Switzerland	94.3	131.6	8.3	14.9	22.6	0.3	213.5	44.8	29.4
United Kingdom	39.7	47.8	2.3	6.3	7.9	0.3	123.4	62.2	52.3
United States	18.9	16.1	1.3	3.5	2.3	0.2	100.7	67.3	63.1
Average (industrial)	29.9	32.1	4.2	4.7	6.6	0.3	74.9	56.3	50.2
Emerging market economies									
Argentina	8.1	1.2	1.8	2.3	0.0	0.0	10.4	50.5	85.9
Brazil	1.3	10.2	1.9	0.0	1.9	0.3	35.1	93.3	64.4
Chile	19.9	5.1	0.7	1.4	0.6	0.1	79.6	78.2	92.9
China	0.4	2.3	0.4	0.1	0.4	..	14.7	96.4	83.8
Czech Republic	3.4	6.7	0.7	0.8	1.1	0.1	19.5	77.8	60.1
Estonia	3.0	10.4	2.5	0.6	2.9	0.2	..	..	..
Hungary	0.5	8.3	1.4	0.1	1.8	0.1	21.6	95.0	57.9
India	0.1	6.4	..	..	1.0	0.3	28.9	99.1	71.6
Israel	6.4	22.6	4.8	0.8	6.0	0.2	41.8	73.1	42.9
Korea	1.3	20.2	1.7	0.2	4.5	0.2	41.7	93.6	48.9
Latvia	0.7	0.9	0.0	0.0	0.0	0.0	..	..	..
Lithuania	0.2	0.9	0.0	0.0	0.0	0.0	..	..	..
Peru	5.5	4.7	0.5	0.3	0.3	..	17.8	69.1	67.8
Philippines	1.4	4.9	0.8	0.3	1.1	0.0	26.4	93.1	78.9
Russia	0.0	12.8	4.1	0.0	4.3	0.3	35.8	99.4	57.7
Singapore	123.6	50.5	14.9	21.9	7.5	..	128.9	37.6	58.5
South Africa	27.8	21.3	3.1	3.7	2.4	0.1	82.1	66.9	72.3
Average (EMEs)	11.3	11.4	2.5	2.0	2.2	0.1	41.7	80.0	67.3
Average (All)	21.4	22.1	3.4	3.5	4.5	0.2	59.9	66.2	57.3

Notes: (a) Value of 0 indicates no home bias.

Table 2: Cyclicality of capital gains, income and returns on international portfolio holdings

(Estimated regression coefficients, dependent variables: implied real rates of return)

	Real GDP growth, cyclical component		
	Domestic	Rest of the world	Differential
	(1)	(2)	(1)-(2)
Expected sign	**+**	**+**	**–**
Capital gains, liabilities	1.70 *(0.64)***		
Capital gains, assets		3.30 *(0.91)***	
Capital gains, net			**-1.41** *(0.71)**
Income, liabilities	0.20 *(0.09)***		
Income, assets		-0.33 *(0.49)*	
Income, net			**-0.19** *(0.12)*
Total return, liabilities	1.76 *(0.79)***		
Total return, assets		3.78 *(1.31)* ***	
Total return, net			**-1.50** *(0.80))**

Notes: The dependent variables are the real rates of capital gains, investment income and total returns on foreign equity assets and liabilities, respectively. The explanatory variables are the cyclical component of the domestic real GDP growth rate (for regressions on liabilities), of the rest of the world real GDP growth rate (assets) and the differential between the two (net positions), respectively. See text for definitions of all variables and explanations on the expected signs. Estimation by least squares with AR(1) disturbances ((1) and (2)) and heteroskedasticity robust standard errors (in parentheses) (3), respectively, and involving country and time fixed effects (except for (2)). ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively. Time period: 1971-2005. Data availability varies by country. Full regression outputs are available upon request.

Table 3: Cyclicality of capital gains, income and returns on international portfolio holdings

(Estimated regression coefficients, dependent variables scaled by domestic GDP)

	Real GDP growth, cyclical component			Control variables	
	Domestic	Rest of the world	Differential	Time trend	Financial holdings
	(1)	(2)	(1)-(2)		
Expected sign	+	+	–		
Panel A: Without control variables					
Capital gains, liabilities	0.18 *(0.09)***				
Capital gains, assets		0.40 *(0.15)****			
Capital gains, net			**-0.15** *(0.05)****		
Income, liabilities	-0.01 *(0.00)***				
Income, assets		-0.01 *(0.01)*			
Income, net			**-0.00** *(0.00)*		
Total return, liabilities	0.13 *(0.21)*				
Total return, assets		0.56 *(0.22)* ***			
Total return, net			**-0.20** *(0.09)***		
Panel B: With time trend					
Capital gains, liabilities	0.18 *(0.09)***			- 0.001 *(0.000)*	
Capital gains, assets		0.42 *(0.15)****		0.001 *(0.000)***	
Capital gains, net			**-0.15** *(0.05)****	- 0.001 *(0.001)****	
Income, liabilities	-0.01 *(0.00)***			0.00 *(0.000)*	
Income, assets		-0.00 *(0.00)*		0.000 *(0.000)****	
Income, net			**-0.00** *(0.00)*	0.000 *(0.000)*	
Total return, liabilities	0.14 *(0.22)*			0.005 *(0.010)*	
Total return, assets		0.59 *(0.22)* ***		0.001 *(0.000)**	
Total return, net			**-0.20** *(0.09)****	- 0.002 *(0.000)****	
Panel C: With financial holdings					
Capital gains, liabilities	0.13 *(0.07)**				0.111 *(0.015)*****
Capital gains, assets		0.39 *(0.15)****			0.027 *(0.005)*****
Capital gains, net			**-0.14** *(0.05)****		-0.008 *(0.031)*
Income, liabilities	-0.00 *(0.00)*				-0.004 *(0.001)*****
Income, assets		-0.00 *(0.01)*			0.003 *(0.001)*****
Income, net			**-0.00** *(0.00)*		-0.002 *(0.001)****
Total return, liabilities	0.06 *(0.19)*				0.199 *(0.003)*****
Total return, assets		0.56 *(0.22)* ***			0.026 *(0.012)****
Total return, net			**-0.18** *(0.10)**		-0.011 *(0.029)*

Notes: The dependent variables are capital gains, investment income and returns on foreign equity assets and liabilities (scaled by nominal GDP), respectively. The explanatory variables are the cyclical component of the domestic real GDP growth rate (for regressions on liabilities), of the rest of the world real GDP growth rate (assets) and the differential between the two (net positions), respectively. Panel B includes a time trend, Financial holdings in Panel C is the ratio of total foreign portfolio equity assets and liabilities to GDP. See text for definitions of all variables and explanations on the expected signs. Estimation by least squares with AR(1) disturbances ((1) and (2)) and heteroskedasticity robust standard errors (in parentheses) (3), respectively, and involving country and time fixed effects (except for (2)). ***, **, * denote significance at the 1, 5 and 10 percent levels, respectively. Time period: 1971-2005. Data availability varies by country. Full regression outputs are available upon request.

Table 4: Cyclicality of capital gains, by country group and time period

(Estimated regression coefficients, dependent variables: implied real rates of return)

	1971-2005 Capital gains			1993 - 2005 Capital gains		
	Liabilities	**Assets**	**Net**	**Liabilities**	**Assets**	**Net**
Expected sign	+	+	-	+	+	-
World	1.70***	3.30***	-1.41*	1.22	6.22***	-1.84*
Industrial countries	0.31	3.00***	0.37	-0.64	7.30***	0.73
Euro area countries	2.02	3.47***	-1.40	0.18	8.52***	2.30
Emerging market economies	0.81	4.32*	-1.60	1.45	4.48	-2.05

Notes: Estimations as in Table 2. Full regression outputs are available upon request.

Table 5: Cyclicality of capital gains, by country group and time period

(Estimated regression coefficients, dependent variables scaled by domestic GDP)

	1971-2005 Capital gains			1993 - 2005 Capital gains		
	Liabilities	**Assets**	**Net**	**Liabilities**	**Assets**	**Net**
Expected sign	+	+	-	+	+	-
World	0.18**	0.40***	-0.15***	0.23	1.23***	-0.21***
Industrial countries	0.22	0.43***	-0.14*	0.53	1.81***	-0.49*
Euro area countries	0.14	0.37**	-0.25	0.7	1.76***	-1.24
Emerging market economies	0.20***	0.31	-0.08	0.19*	0.51	-0.08

Notes: Estimations as in Table 3. Full regression outputs are available upon request.

Table 6: Determinants of the cyclicality of capital gains

(Estimated regression coefficients)

	Real GDP growth	**Interaction terms with real GDP growth**			
		HB	*HB*^{W}	*MCAP*	*MCAP*^{W}
Capital gains, liabilities	1.39 *(0.35)***		-1.77 (0.49)***		
Capital gains, liabilities	1.02 *(0.36)***		-1.88 *(0.48)***	1.19 *(0.28)***	
Capital gains, assets	0.32 *(0.42)*	-0.93 *(0.46)***			
Capital gains, assets	0.41 *(0.49)*	-1.02 *(0.53)**			2.35 *(0.60)***
Capital gains, net	-0.92 *(0.37)***	0.15 *(0.22)*	0.91 *(0.71)*		
Capital gains, net	-0.78 *(0.40)**	0.10 *(0.21)*	0.97 *(0.73)*	-0.04 *(0.24)*	-0.33 *(0.34)*

Notes: Estimations as in Table 3, augmented with interaction terms of real GDP growth with home bias of the investing country (*HB*), home bias of the rest of the world (*HB*^{W}), domestic stock market capitalisation as a ratio to GDP (*MCAP*) and stock market capitalisation in the rest of the world (*MCAP*^{W}). Full regression outputs are available upon request.

Table 7: Estimates of consumption risk sharing, full time period

(Estimated regression coefficients)

	World (Full Sample)	Industrial Countries	Euro Area	Emerging Market Economies
A. Overall				
β	0.73	0.50	0.58	0.90
	(0.06)***	(0.06)***	(0.10)***	(0.07)***
Observations	660	473	211	187
R^2	0.50	0.39	0.52	0.70
B. Interaction with financial equity holdings				
β_1	0.73	0.58	0.65	0.89
	(0.07)***	(0.07)***	(0.11)***	(0.09)***
β_2	-0.01	-0.50	-0.63	0.05
	(0.15)	(0.13)***	(0.16)***	(0.15)
Observations	660	473	211	187
R^2	0.50	0.40	0.54	0.70
C. Interaction with cyclicality of net capital gains				
β_1	0.75	0.60	0.18	1.23
	(0.07)***	(0.08)***	(0.18)	(0.15)***
β_2	0.16	0.12	-0.57	1.09
	(0.04)***	(0.05)***	(0.23)**	(0.83)
Observations	660	473	211	187
R^2	0.49	0.52	0.76	0.66
D. Interaction with cyclicality of capital gains on foreign liabilities				
β_1	0.82	0.78	0.17	1.09
	(0.07)***	(0.09)***	(0.17)	(0.16)***
β_2	-0.09	-0.09	0.40	-0.45
	(0.03)***	(0.03)***	(0.18)**	(0.32)
Observations	660	473	211	187
R^2	0.71	0.74	0.91	0.71
E. Interaction with cyclicality of capital gains on foreign assets				
β_1	0.88	0.65	0.71	1.02
	(0.11)***	(0.10)***	(0.15)***	(0.06)***
β_2	-0.20	-0.14	-0.05	-0.28
	(0.05)***	(0.06)**	(0.23)	(0.16)*
Observations	660	473	211	187
R^2	0.50	0.45	0.66	0.81
F. Interaction with cyclicality of net investment income flows				
β_1	0.62	0.51	0.48	1.04
	(0.07)***	(0.08)***	(0.13)***	(0.15)***
β_2	0.97	1.12	1.27	2.86
	(0.50)*	(0.50)**	(0.85)	(3.69)
Observations	589	449	211	140
R^2	0.58	0.62	0.81	0.72
G. Interaction with cyclicality of net total returns				
β_1	0.58	0.47	0.52	1.34
	(0.12)***	(0.15)***	(0.14)***	(0.13)***
β_2	-0.02	-0.03	-0.02	0.76
	(0.03)	(0.03)	(0.03)	(0.30)**
Observations	589	449	211	140
R^2	0.77	0.78	0.96	0.78

Notes: The dependent variables is the cyclical component of consumption growth, ß and β_1 denote the coefficient on the cyclical component of output growth. Financial equity holdings is the ratio of total foreign portfolio equity assets and liabilities to GDP. β_2 denotes the coefficient on the country-by-country cyclicality coefficient of net capital gains, capital gains on liabilities, capital gains on assets, net investment income flows and net total returns on international portfolio equity investments (as ratios to GDP), respectively. See text for definitions of all variables. Estimation by least squares with heteroskedasticity robust standard errors (in parentheses) and involving time fixed effects. ***, ** ,* denote significance at the 1, 5 and 10 percent levels respectively. Time period: 1971-2005. Data availability varies by country. Full regression outputs are available upon request.

Table 8: Estimates of consumption risk sharing, subperiod 1993-2005

(Estimated regression coefficients)

	World (Full Sample)	Industrial Countries	Euro Area	Emerging Market Economies
A. Overall				
β	0.70	0.29	0.24	0.91
	(0.08)***	(0.09)***	(0.11)**	(0.08)***
Observations	386	214	102	148
R^2	0.46	0.28	0.50	0.70
B. Interaction with financial holdings				
β_1	0.68	0.41	0.40	0.89
	(0.09)***	(0.10)***	(0.13)***	(0.09)***
β_2	0.06	-0.32	-0.44	0.06
	(0.15)	(0.13)**	(0.16)***	(0.15)
Observations	386	214	102	148
R^2	0.47	0.29	0.53	0.70
C. Interaction with cyclicality of net capital gains				
β_1	0.64	0.30	0.27	1.05
	(0.15)***	(0.16)*	(0.32)	(0.15)***
β_2	0.05	0.02	0.02	0.21
	(0.03)*	(0.03)	(0.05)	(0.30)
Observations	362	214	102	148
R^2	0.59	0.66	0.84	0.75
D. Interaction with cyclicality of capital gains on foreign liabilities				
β_1	0.31	0.18	0.33	1.26
	(0.13)**	(0.15)	(0.30)	(0.14)***
β_2	0.01	0.02	-0.04	-0.35
	(0.02)	(0.02)	(0.08)	(0.10)***
Observations	362	214	102	148
R^2	0.61	0.64	0.88	0.78
E. Interaction with cyclicality of capital gains on foreign assets				
β_1	0.58	0.42	0.51	0.94
	(0.17)***	(0.16)**	(0.15)***	(0.11)***
β_2	0.04	-0.03	-0.02	0.00
	(0.02)*	(0.03)	(0.02)	(0.02)
Observations	362	214	102	148
R^2	0.70	0.34	0.87	0.97
F. Interaction with cyclicality of net investment income flows				
β_1	0.47	0.34	0.30	1.02
	(0.09)***	(0.12)***	(0.24)	(0.12)***
β_2	-0.91	-0.91	-0.51	9.06
	(0.90)	(0.89)	(1.94)	(2.02)***
Observations	316	202	102	114
R^2	0.47	0.52	0.65	0.57
G. Interaction with cyclicality of net total returns				
β_1	0.30	0.18	0.28	1.03
	(0.15)**	(0.18)	(0.26)	(0.20)***
β_2	0.03	0.02	0.03	0.25
	(0.03)	(0.03)	(0.05)	(0.32)
Observations	316	202	102	114
R^2	0.55	0.59	0.83	0.55

Notes: Estimations as in Table 7. Full regression outputs are available upon request.

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