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Workers' Remittances and International Risk-Sharing

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Abstract

One of the most important potential benefits from the process of international financial integration is the opportunity it offers for diversification of macroeconomic risks internationally. In turn, the cross-border diversification of portfolio holdings is widely considered to be the major driving force behind this process. The present paper offers a complement to this literature. It identifies workers' remittance flows to developing countries as an important channel through which the process of international risk-sharing might take place. Using a panel dataset that includes most developing countries during the period 1990-2000, this study demonstrates that countries which receive above-average levels of workers' remittances achieve higher degrees of international risk-sharing in consumption. Moreover, this effect is not uniform across different groups of developing countries, being the strongest in transition economies.

Keywords: International Risk-Sharing, Workers' Remittances, Consumption Smoothing

JEL classification: F22, F36, F41

1 Introduction

The process of international financial integration, which accelerated in the past two decades, can potentially bring numerous benefits to the world economy. One of the central benefits it offers to the residents of different countries is the possibility to diversify their macroeconomic risks internationally. Therefore, through the process of cross-border trade in assets, these countries can relax the link between domestic output growth and domestic consumption (income) growth up to the point when the latter will depend exclusively on the “world” output growth¹. This process, through which country-specific risks are diversified away across national borders, is known as international risk-sharing. Moreover, the finance literature usually associates it with the underlying trade in financial assets. Therefore, investment in an internationally-diversified portfolio is identified as the major channel through which the process of international risk-sharing takes place. Similarly, the deviation from the hypothesis of “perfect” or complete risk-sharing is associated with the tendency by investors to “over-invest” in domestic assets and thereby forego many diversification opportunities available through investment in foreign assets. This latter phenomenon is also known in the finance literature as “home equity (or bond) bias”. Since the bias in investment strategies seems to be the most obvious reason for the deviation from complete risk-sharing, many empirical studies investigate the relationship between the two.

Though the association between the two phenomena is very clear for the group of advanced economies, it might not be as important for the developing world. Therefore, this paper concentrates on an *alternative channel* through

¹Since this world output growth is the same for all countries, it implies that in the end all countries’ consumption growth rates will be equalized.

which one country can smooth consumption and diversify its idiosyncratic risks internationally. In particular, the focus in this empirical study is on workers' remittance flows to developing countries. The main objective is to find out what role workers' remittances play in international risk-sharing. Do countries that receive above average levels of remittance inflows achieve a significantly higher level of international risk-sharing?

The rest of this paper is organized as follows. Section 2 presents a brief literature review on some important studies on international risk-sharing and workers' remittances, respectively. It is followed by section 3 that deals with data issues, and section 4 which puts forward the empirical strategy. The estimation results are presented in section 5. Finally, section 6 gives some concluding remarks and suggestions for further research.

2 Literature Review

2.1 International Risk-Sharing

International portfolio diversification and international risk-sharing are closely interrelated, but by no means equivalent phenomena. The deviations from an internationally diversified portfolio are studied in the finance literature and are known as the "home (equity) bias", while the departures from complete consumption and income smoothing are known in international macroeconomics literature as the "international risk-sharing puzzle". Though these concepts are interrelated, the former does not always imply the latter (nor vice-versa). More concretely, Lewis (1999) argues that "home bias" may not necessarily lead to lower international risk-sharing if most of consumption and income smoothing is done through international borrowing and lending rather than portfolio holdings. Conversely, Baxter and Jermann

(1997) show that even complete international diversification of portfolio holdings does not directly imply smooth consumption and income streams. First, total equity holdings might represent a very small portion of global GDP, and second, they might not provide adequate hedging of returns to human capital.

Since the theoretical literature does not provide an unambiguous answer about the relationship between “equity home bias” and international risk-sharing, Sorensen et al. (2005) test it empirically using data for the OECD countries during the 1990s. The central issue that they investigate is whether countries with lower, or decreasing home bias during the period considered, have higher or increasing levels of international risk-sharing as well. They find that lower “home equity bias” indeed leads to more risk-sharing in consumption and income. This effect has an economic meaning as well: a one percentage point decrease in “home bias” leads to almost half of a percentage point increase in risk-sharing.

In an influential paper, Lewis (1999) undertakes a joint investigation of the “equity home bias” as referred to in the finance literature with the “consumption home bias” as discussed in the international macroeconomics literature. Although these two phenomena seem to be influenced by similar factors, they cannot be considered equivalent. Furthermore, she invokes the fallacy in the “casual intuition” that home bias in equities and risk-sharing in consumption are necessarily linked with each other. First, equity home bias is not a *sufficient* condition for consumption home bias. In particular, as long as countries can borrow and lend with each other, consumption growth rates can be perfectly correlated even if domestic residents do not hold foreign equity at all. Second, equity home bias is not a *necessary* condition for consumption home bias. Because parts of total domestic output

cannot be (are not) securitized and traded on the stock markets, perfect international portfolio diversification does not necessarily imply perfect international risk-sharing in consumption.

2.2 Workers' Remittances

Workers' remittances to developing countries have been steadily increasing in the past decades (see Figure 1). In the mid-1990s they overtook the total of private portfolio flows, thereby becoming the second most important source of foreign exchange for the developing countries (second only to FDI). Moreover, their importance as percentage of total GDP displays similar picture (see Figure 2). Unambiguously, workers' remittances have become major source of financing for many households in the developing world. Synchronously with their increasing trend, they began to capture the attention of an ever-increasing number of researchers and (international) organizations around the world.

One of the most recent contributions in this area is given in Chapter II of the World Economic Outlook prepared by the International Monetary Fund (April 2005). This analysis is threefold. First, IMF presents some stylized facts, demonstrating that workers' remittances constitute the second largest source of foreign capital for the developing world as a whole². Second, emphasis is put on the role of remittances in economic development. In this sense, they are shown to be associated with more investment in infrastructure and faster human capital accumulation. Finally, the report points out several characteristics, which make remittances especially important financing flows to developing countries. More precisely, workers' remittances are

²Moreover, for many countries (especially in the Caribbean region) workers' remittances are the largest source of foreign capital and foreign exchange, representing even more than 5% of GDP for some countries.

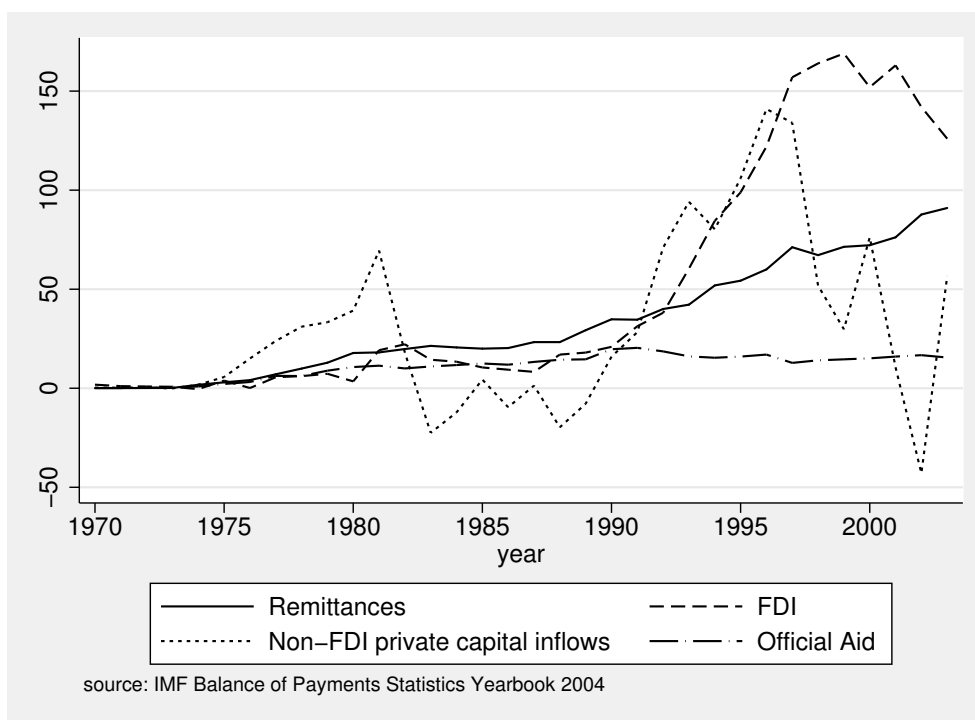


Figure 1: Capital Flows to Developing Countries (billions of US dollars)

the most stable source of external finance, do not display high levels of procyclicality (see Figure 3), and jump sharply after an economic (or financial) crisis hits the home recipient country³. In fact, these last three characteristics suggest that remittances might contribute to consumption smoothing, and improve the risk-sharing capacity of the recipient economy.

The important role that remittances play in relaxing the external constraints of many developing countries is also acknowledged in Ratha (2003), published as Chapter VII of the *Global Development Finance* (2003) by the World Bank. Besides documenting stability as a source of external funding, Ratha (2003) distinguishes between remittances intended for consumption

³Examples of economic crises followed by sharp increases in workers' remittance flows cited by the IMF include : Indonesia 1997, Ecuador 1999, and Argentina 2001.

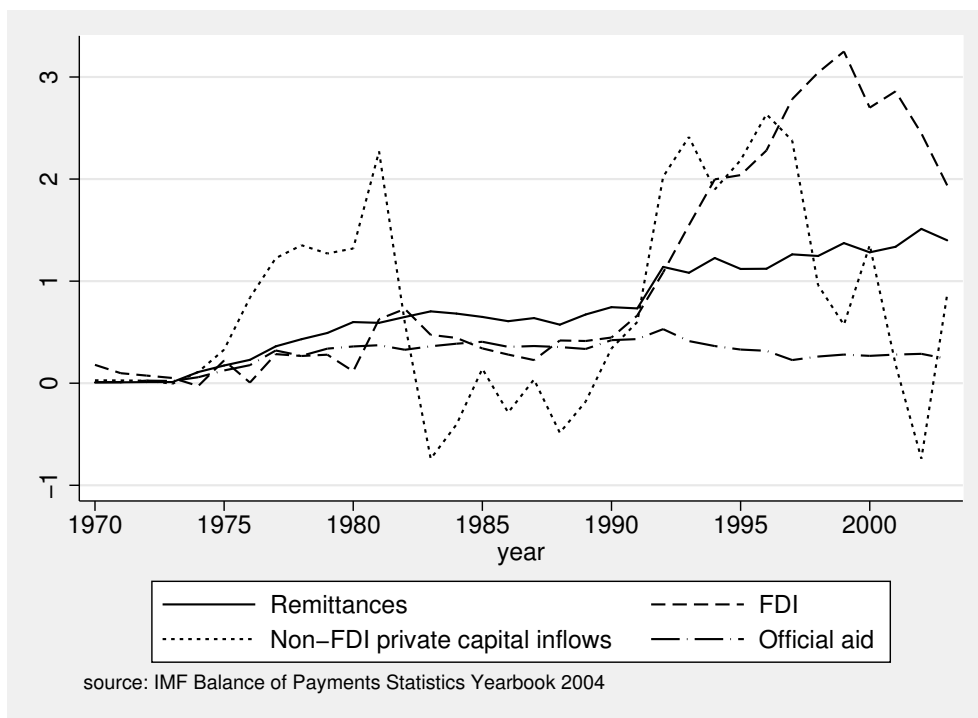


Figure 2: Capital Flows to Developing Countries (percent of GDP)

and remittances intended for investment⁴. Moreover, he argues that the former group should be less volatile than the latter. Additionally, he makes a distinction between different country groups. In particular, he demonstrates that poor countries with lower-than-median and middle income countries with higher-than-median growth rates receive relatively more remittances⁵.

Focusing on the macroeconomic nature of remittances, Buch and Kuckulenz (2004) find that they are mostly driven by market forces, though social and demographic considerations play an increasingly important role as well.

⁴This distinction is mainly based on the nature of the final recipients, the flows going to household being classified as remittances intended for consumption.

⁵The basic conclusion drawn from this observation is that remittances mainly serve for consumption purposes in the former and for investment purposes in the latter group.

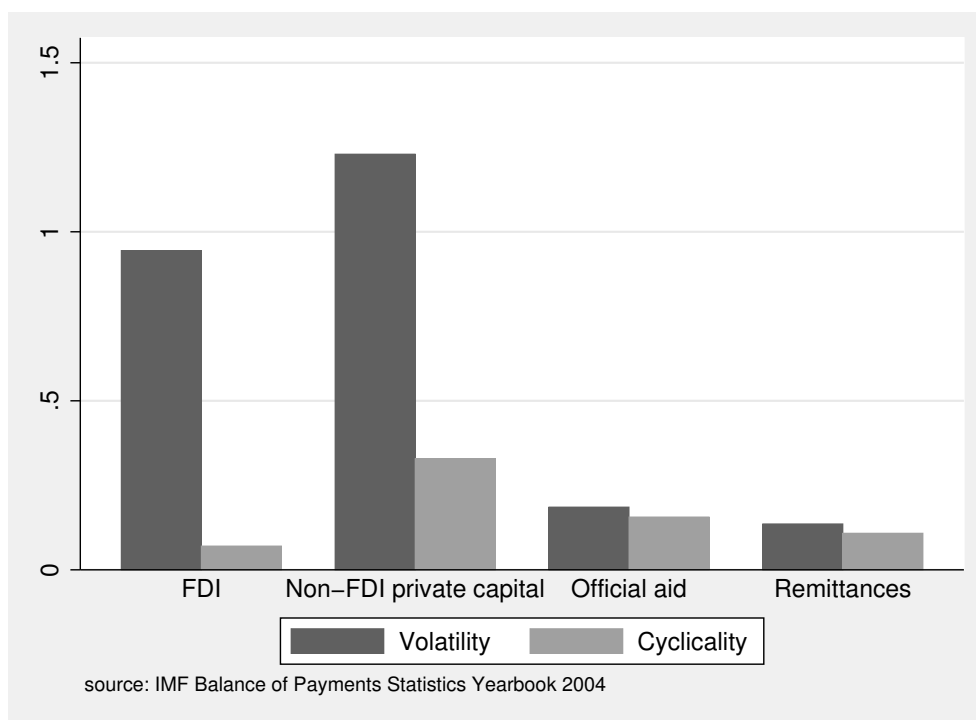


Figure 3: Volatility and Cyclicalty of Capital Flows

Moreover, they find that workers' remittances are positively correlated with official capital flows (which in turn are positively correlated with private capital flows), but uncorrelated with private capital flows. Finally, in a recent study Bugamelli and Paterno (2005) demonstrate that higher levels of remittances (as percentage of GDP) lead to lower probability of current account crisis.

3 Data

The empirical analysis is based on an unbalanced panel dataset that includes observations on 153 countries during the period 1960-2000⁶. Due to the considerable degree of heterogeneity in terms of countries included, and the availability of data, the panel is strongly unbalanced. Thus, the number of yearly observations per country varies between 2 and 41 in the largest dataset included in the calculations, and between 2 and 11 yearly observations in the dataset that only includes developing countries in the period 1990-2000. Moreover, various subsamples of developing countries are used in some of the estimations. Hence, the entire sample of 117 developing countries is divided into the following subsamples: more financially integrated countries (MFIs) (with 20 countries), less financially integrated countries (with 83 countries), and transition economies (with 14 countries)⁷.

There are two types of data used in the construction of the panel dataset: macroeconomic data and data on workers' remittances. In turn, they come from two different sources: the macroeconomic series are taken from the Penn World Table Version 6.1 and the data on remittances comes from the IMF Balance of Payments Statistics Yearbook⁸. The first group refers to the following series: real consumption per capita and real GDP per capita, both adjusted for PPP, which are standardly used in macroeconomic studies. For the purposes of this study, I calculate the yearly growth rates of these

⁶Due to the large number of missing observations for 14 countries, the final dataset is restricted to 139 countries in total.

⁷The classification of developing countries into the first two groups MFIs and LFIs is done by the IMF. The group of transition economies includes the former centrally-planned economies with the exception of the countries that belong to the Commonwealth of Independent States.

⁸I would like to thank Nicola Spatafora and Angela Espiritu from the IMF for providing me with the most recent dataset on workers' remittances.

two series for each country available and for the world as a whole. The growth rates for global GDP and global consumption are calculated as the unweighed average of the real GDP per capita growth rates for the set of industrial countries in the corresponding year⁹.

In general, data on remittances is inaccurate and unreliable. Moreover, it is not always comparable across countries because different sources (national agencies, central banks, statistical offices, international bodies, etc.) use different methodologies and variable definitions in their compilations¹⁰. In this respect, the Balance of Payments Statistics Yearbook by the IMF, used in this study, is generally acknowledged as the most complete and reliable database on workers' remittances available¹¹. Since there is not an unambiguous or universal definition of workers' remittances, various variables are used in the empirical literature. Generally, the Balance of Payments Statistics Yearbook reports three components that can be used for this purpose: compensation of employees, workers remittances, and migrants' transfers¹². The first two categories are registered with the current account, while the last category belongs to the capital account of the balance of payments¹³. More precisely, *compensation of employees* refers to "the wages, salaries, and other benefits earned by individuals for work that they performed in economies in which they are not residents", while *workers' remittances* "cover cur-

⁹The estimation results for different subsamples do not change significantly when "world" growth rates are calculated as unweighed averages of the growth rates for that particular subsample only.

¹⁰For more on the difficulties in cross-country comparisons for remittances data and the efforts recently made to improve its quality see de Luna Martinez (2005).

¹¹See Reinke and Patterson (2005) and the IMF Balance of Payments Manual (5th ed.) for more details on definitions and data-related issues.

¹²Some countries, it also includes entries registered under "current private transfers" that refer specifically to remittances.

¹³The definitions given here follow and Reinke and Patterson (2005).

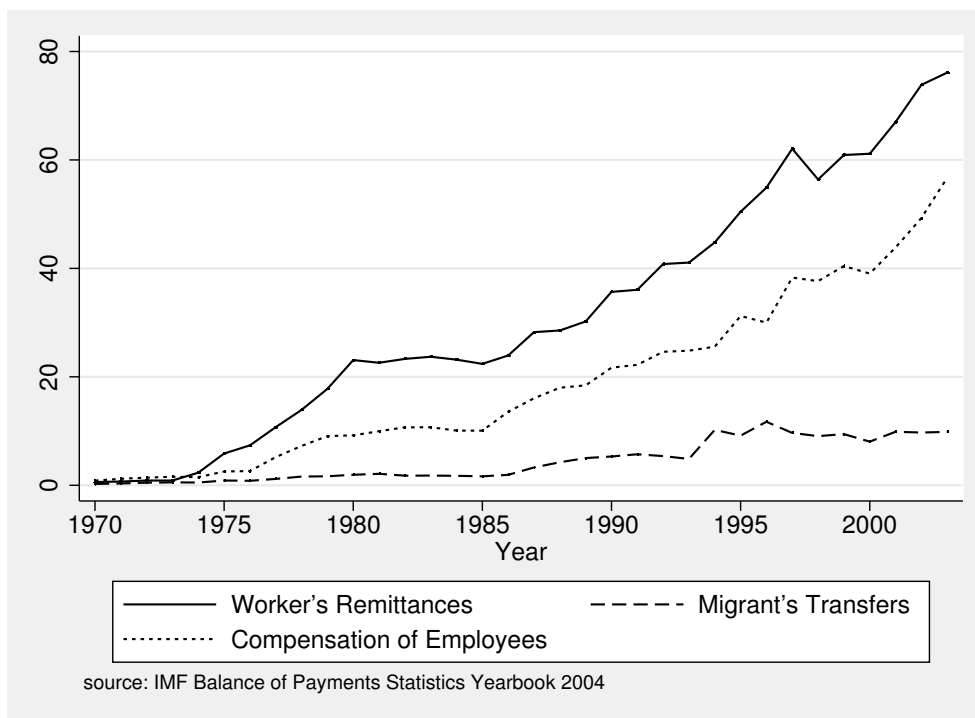


Figure 4: Remittances Components (billions of US dollars)

rent transfers by migrants who work and are considered residents of new economies (other than the transfers' final destination)". Therefore, the slight distinction between these two components is based on the time period that the migrant (remitter) is expected to stay in the new economy¹⁴. Finally, *migrants' transfers* refers to the flows of (financial) assets that are related to persons who migrate from one economy to another.

In this study remittances are defined as the sum of all three components. This choice can be justified on several grounds. First, economic theory

¹⁴By convention, migrants that stayed or are expected to stay in the new economy for more than one year are considered residents, and therefore, their transfers are included in the latter category. If the workers are expected to stay less than one year, then their transfers are treated as compensation of employees.

does not give clear guidelines about the choice of the appropriate series. Second, the distinctions among the three components are small (and one may argue arbitrary), and therefore the probability for misclassification of certain transfers is not negligible. Finally, though large differences exist among the three components, Figure 4 shows that there was an increasing trend in all of them during the past four decades.

An important point to note is that only gross data on remittances inflows has been used in the construction of workers' remittances indicators. There are at least three reasons why gross and not net (inflows minus outflows) might be more appropriate for this analysis. First, workers' remittances constitute an especially important source of external financing for the developing world, where countries are most often only recipients of these funds. Second, the data on remittance outflows is even more scarce, of worse quality, and less reliable than data on remittance inflows. Third, most countries report data either on inflows or on outflows, but not on both of them. Therefore, it would be very difficult to calculate precise and meaningful indicators for net remittance flows. One of the major disadvantages of this strategy is that the empirical analysis of remittance flows is limited to the set of developing countries.

4 Empirical Specification

There are two main issues that I investigate in this study. First, I present some measures of the degree of international risk-sharing in consumption for different groups of countries during the period 1960-2000. Second, I attempt to shed light on the major question of this paper: what is the role of workers' remittances in international risk-sharing?

In order to measure the degree of risk-sharing in consumption I estimate

the following type of panel regression equations¹⁵:

$$(\Delta \log C_{it} - \Delta \log C_t) = \alpha + \beta(\Delta \log GDP_{it} - \Delta \log GDP_t) + \epsilon_{it} \quad (1)$$

In this equation $\Delta \log C_{it}$ is the year-on-year growth rate of real consumption per capita for country i in year t , $\Delta \log C_t$ is the growth rate for “world” real consumption per capita, $\Delta \log GDP_{it}$ and $\Delta \log GDP_t$ are the corresponding terms for GDP, β measures the average co-movement of the countries’ idiosyncratic consumption growth with their idiosyncratic GDP growth during the entire time period, and ϵ is the error term.

The slope coefficient β deserves special attention because it measures the (average) deviation from perfect risk-sharing in consumption. In particular, the perfect international risk-sharing in consumption hypothesis states that if the countries manage to share completely the idiosyncratic risks that they face, then this coefficient should not be significantly different from zero. In a corresponding manner, one may argue that $100(1 - \beta)\%$ measures the degree of international risk-sharing in percentage terms.

A similar type of regressions is estimated to measure the effect of workers’ remittances in international risk-sharing. In particular, I estimate the following panel regressions:

$$(\Delta \log C_{it} - \Delta \log C_t) = \alpha + \psi(\Delta \log GDP_{it} - \Delta \log GDP_t) + \epsilon_{it} \quad (2)$$

where the slope coefficient is defined as follows:

$$\psi = \psi_0 + \psi_1(t - \bar{t}) + \psi_2 \log \left(\frac{R_{it}}{\bar{R}_t} \right) \quad (3)$$

\bar{t} is the middle year of the sample period (i.e. 1995 when the sample refers to the period 1990-2000), R_{it} is the ratio between total remittances received and GDP for country i in year t and \bar{R}_t is the average ratio between total

¹⁵The empirical specifications used in this study closely follow Sorensen et al. (2005).

remittances received and GDP in year t . Therefore, $t - \bar{t}$ can be thought of as a time trend, which captures the trend decline in consumption smoothing not directly caused by the increase in workers' remittances. Finally, the term $\log\left(\frac{R_{it}}{R_t}\right)$ measures the relative importance of the ratio total remittances received to GDP for certain country i in year t compared to its average value across countries in year t .

Defined in this way, each of the coefficients ψ_0 , ψ_1 and ψ_2 has very precise meaning. In particular, $1 - \psi_0$ measures the degree of international consumption risk-sharing achieved by country with the "average" ratio between remittances received and GDP during the middle year \bar{t} . By similar argument, the coefficient $-\psi_1$ gives the average year-on-year increase in consumption risk-sharing. If it is true that country-specific risks became better diversified internationally through time, then one will expect a negative sign for ψ_1 . Furthermore, $-\psi_2$ captures the impact of a higher than average ratio between total remittances received and GDP for a certain country on its ability to smooth idiosyncratic output shocks. Therefore, a significantly negative value for ψ_2 implies better risk-sharing for countries that receive above-average ratio of workers' remittances relative to GDP. Finally, the entire coefficient $1 - \psi = 1 - \psi_0 - \psi_1(t - \bar{t}) - \psi_2 \log\left(\frac{R_{it}}{R_t}\right)$ measures the amount of consumption risk-sharing achieved by country i in year t .

5 Results

The estimation results for the panel specification in equation 1 are given in Table 1. Similar type of equations is estimated for the whole sample and the subsamples of developing and industrial countries during the period 1960-2000. Moreover, each equation has been estimated with fixed effects (assuming non-zero correlation between the regressors and the country-specific part

Table 1: International Risk-Sharing 1960-2000

	Developing Countries		Industrial Countries	
	RE	FE	RE	FE
Constant	0.0013	0.0013	0.00067	0.00068
	(0.98)	(0.97)	(0.55)	(0.55)
Output	0.827	0.826	0.604	0.587
	(63.16)**	(61.30)**	(14.87)**	(13.93)**
Observations	3898	3898	875	875
Countries	121	121	22	22
R-squared		0.51		0.21

Absolute value of z statistics in parentheses

* significant at 5%; ** significant at 1%

of the error term) and with random effects panel data estimation techniques. As can be seen in Table 1, the results obtained using the two alternative estimation techniques do not differ a lot. Moreover, the Hausman test suggests that the difference between coefficients is not significantly different from zero, thereby suggesting that both estimation techniques yield valid results¹⁶.

Table 1 displays several important findings. First, in line with many previous studies the hypothesis of perfect risk-sharing in consumption is rejected for each (sub)sample of countries. Moreover, the results imply large differences across the two groups of countries. In particular, the group of developing countries achieves “relatively” less international risk-sharing com-

¹⁶The columns named RE and FE in the tables refer to random-effects and fixed-effects estimation results, respectively.

pared to the group of advanced economies. In fact, about 17.3% ($1 - 0.827$) of country-specific (output-specific) risks for the group of developing countries is shared internationally. Conversely, idiosyncratic consumption changes are much less dependent on idiosyncratic GDP changes in the group of advanced economies. If one performs similar calculations as done for the group of developing countries, the percentage of risks shared internationally is 40% $100(1 - 0.60)\%$ in the group of advanced countries.

Tables 2, 3 and 4 display estimation results for the non-linear specification given by equations 2 and 3. This non-linear specification is of central importance in this study as it shows the effect of workers' remittances on international consumption smoothing.

Table 2 presents results for the entire sample of developing countries during the period 1990-2000¹⁷. Three findings are worth mentioning. First, the slope coefficient of the idiosyncratic output growth term declines in each specification, indicating that the “average” international risk-sharing increases compared to the baseline specification (Table 1) and now lies in the range 21.7-26.2%¹⁸. However, it is still significantly different from zero at any conventional significance level. Moreover, the time trend has a significantly negative slope coefficient, meaning that risk-sharing improved gradually though time. The final and most important finding refers to the “remittances interaction term” which has negative value significant at the 5% significance level¹⁹. This suggests that countries that receive more than aver-

¹⁷The analysis is limited to the this time-period because the data on remittances for the period 1960-1990 is very scarce and available for a small number of countries only.

¹⁸The “average” refers to the country with an average ratio remittances received to GDP during the “middle” year, i.e. 1995 in this case.

¹⁹The results are not driven by non-stationarity of the variables. In fact, the Im, Pesaran, and Shin and Madala and Wu tests both reject the null hypothesis of unit-root at 1% significance level.

Table 2: International Risk-Sharing in Developing Countries 1990-2000

	RE	FE	RE	FE	RE	FE
Constant	-0.001 (0.23)	-0.001 (0.34)	0.003 (1.00)	0.002 (0.75)	0.003 (1.01)	0.002 (0.77)
Output	0.773 (29.27)**	0.754 (26.79)**	0.753 (21.89)**	0.742 (20.52)**	0.75 (21.20)**	0.738 (19.88)**
Time-trend			-0.032 (3.13)**	-0.025 (2.29)*	-0.032 (3.09)**	-0.025 (2.25)*
Remittances(m)					-0.025 (2.11)*	-0.025 (1.99)*
Remittances(t)			-0.024 (2.10)*	-0.024 (1.97)*		
Observations	1218	1218	997	997	997	997
Countries	121	121	117	117	117	117
R-squared		0.4		0.42		0.42

Absolute value of z statistics in parentheses

* significant at 5%; ** significant at 1%

age amount of workers' remittances per year (relative to their GDP) achieve a significantly higher degree of international risk-sharing in consumption²⁰.

The analysis goes one step further in Table 3 and Table 4. The entire set of developing countries is divided into three subgroups: more financially integrated (MFIs), less financially integrated (LFIs), and transition economies. The results are broadly similar to those for the entire set of de-

²⁰The middle two columns in Table 2 use an alternative definition for the remittances interaction term. Instead of average remittances received relative to average GDP, they use total remittances to total GDP. The results stay literally the same, however.

Table 3: Risk-Sharing in MFIs, LFIs, and Transition Economies 1990-2000

	MFI		LFI		Transition Economies	
	RE	FE	RE	FE	RE	FE
Constant	-0.001	-0.001	0.004	0.002	0.012	0.011
	(0.29)	(0.47)	(0.80)	(0.52)	(1.26)	(1.12)
Output	0.85	0.856	0.78	0.767	0.286	0.201
	(21.57)**	(21.48)**	(17.50)**	(16.39)**	(2.17)*	1.37
Time-trend	0.015	0.013	-0.046	-0.038	0.076	0.1
	(1.08)	(0.91)	(3.84)**	(2.98)**	(1.49)	(1.78)
Remittances(m)	-0.007	-0.003	-0.015	-0.016	-0.131	-0.15
	(0.36)	(0.16)	(1.09)	(1.05)	(2.99)**	(3.20)**
Observations	185	185	710	710	102	102
Countries	20	20	83	83	14	14
R-squared		0.75		0.43		0.32

Absolute value of z statistics in parentheses

* significant at 5%; ** significant at 1%

veloping countries. However, there are three changes that deserve particular attention. First, the time trend is not significant anymore for the MFIs and the transition economies (though it stays significantly negative for the LFIs). Second, although its sign stays negative, the remittances interaction term is not significantly different from zero for the MFIs and the LFIs. On the contrary, the impact of remittances on international risk-sharing seems to strengthen for the group of transition economies as its slope coefficient becomes even more significantly negative²¹. Finally, the slope coefficient ψ_0 in

²¹The null hypothesis that this slope coefficient is not significantly different from zero

Table 4: Risk-Sharing in MFIs, LFIs, and Transition Economies 1990-2000

	MFI		LFI		Transition Economies	
	RE	FE	RE	FE	RE	FE
Constant	-0.001 (0.30)	-0.001 (0.47)	0.004 (0.80)	0.002 (0.51)	0.011 (1.22)	0.01 (1.08)
Output	0.851 (21.53)**	0.857 (21.36)**	0.782 (18.07)**	0.77 (16.92)**	0.306 (2.39)*	0.224 (1.56)
Time-trend	0.015 (1.07)	0.013 (0.91)	-0.046 (3.86)**	-0.038 (3.00)**	0.074 (1.44)	0.097 (1.73)
Remittances(t)	-0.007 (0.38)	-0.004 (0.18)	-0.015 (1.07)	-0.016 (1.04)	-0.13 (2.98)**	-0.15 (3.19)**
Observations	185	185	710	710	102	102
Countries	20	20	83	83	14	14
R-squared		0.75		0.43		0.32

Absolute value of z statistics in parentheses

* significant at 5%; ** significant at 1%

front of the idiosyncratic output growth rate turns insignificant for the group of transition economies in the fixed-effects specification. This means that the null hypothesis of full international risk-sharing for the group of transition economies, once the time trend and the effect of workers' remittances is accounted for, cannot be rejected at conventional significance levels.

Finally, Table 4 reports estimation results from a specification similar to the one in Table 3, the sole difference being that an alternative definition can be rejected even at 1% significance level now. The corresponding significance level for the entire set of developing countries was 5%.

for the remittances indicator is used²². As can be seen from the Table, the results stay almost literally the same, meaning that the major conclusions with respect to the impact of workers' remittances are not sensitive to the specific definition of the remittances indicator.

6 Conclusion

During the past four decades, idiosyncratic consumption growth rates have been very strongly correlated with idiosyncratic output growth rates, thereby suggesting that a very small part of macroeconomic risks is actually shared internationally. In this sense, the results presented in this paper are in line with most other empirical studies on international risk-sharing that use macroeconomics data. Various explanations have been proposed for this apparent puzzle in international macroeconomics. In this respect, the reduction in equity home bias has been identified as a crucial channel through which risk-sharing across countries can be improved. This paper offered an alternative risk-sharing channel - workers' remittances sent to their home countries. Moreover, the empirical evidence gave strong support to this alternative channel. Indeed, developing countries with above average remittance receipts during the last decade of the previous century display significantly smaller deviation from the perfect risk-sharing hypothesis. Furthermore, the analysis showed that this effect is not equal for the three groups of developing countries. Clearly, transition economies achieved a reasonably high level of consumption risk-sharing, to a large extent thanks to the

²²As mentioned before, this indicator is defined as total remittances received relative to total GDP, instead of average remittances to average GDP as reported in Table 3. The main purpose is to see how *sensitive* the main results are to the exact definition of the remittances indicator.

“smoothing effect” of workers’ remittances they received.

Apart from presenting empirical evidence on an alternative risk-sharing channel, this study identified several questions that deserve further research. First, it is important to find out why the impact of workers’ remittances is so different across the three groups of developing countries. In turn, identifying the underlying reasons might give further insight into the broad institutional environment through which workers’ remittances arrive to their final beneficiaries. Finally, the increasing trend in remittance inflows might be accompanied by additional private (and/or official) capital flows to developing countries. Thereby, remittance inflows might fundamentally change the entire framework through which these countries diversify their macroeconomic risks.

References

- [1] Baxter, M. and U. J. Jermann (1997), “The International Diversification Puzzle is Worse Than You Think”, *American Economic Review*, 87, 170-180.
- [2] Buch, C. M., and A. Kuckulenz (2004), “Worker Remittances and Capital Flows to Developing Countries”, ZEW Discussion Paper 04-31.
- [3] Bugamelli, M. and F. Paterno (2005), “Do Workers’ Remittances Reduce the Probability of Current Account Reversals?”, World Bank Policy Research Working Paper 3766.
- [4] Heston, A., R. Summers, and B. Aten (2000), Penn World Table Version 6.1, Center for International Comparisons at the University of Pennsylvania (CICUP).
- [5] IMF (1993), *Balance of Payments Manual*, 5th edition, Washington.
- [6] IMF (2004), *Balance of Payments Statistics Yearbook*, Washington.
- [7] IMF (2005), “Two Current Issues Facing Developing Countries”, *World Economic Outlook*, Chapter II, April 2005.
- [8] Lewis, K. K. (1996), “What Can Explain the Apparent Lack of International Consumption Risk Sharing?”, *Journal of Political Economy*, 104, 267-297.
- [9] Lewis, K. K. (1999), “Trying to Explain Home Bias in Equities and Consumption”, *Journal of Economic Literature*, 37, 571-608.
- [10] de Luna Martinez, J. (2005), “Workers’ Remittances to Developing Countries: A Survey with Central Banks on Selected Public Policy Issues”, World Bank Policy Research Working Paper No. 3638.

- [11] Ratha, D. (2003), “Workers’ Remittances: An Important and Stable Source of External Development Finance”, in *Global Development Finance: Striving for Stability in Development Finance*, World Bank, 157-175.
- [12] Reinke, J. and N. Patterson (2005), “Remittances in the Balance of Payments Framework”, *mimeo*, International Technical Meeting on Measuring Remittances, World Bank and IMF, Washington.
- [13] Sorensen, B. E., Y.-T. Wu, O. Yosha, and Y. Zhu (2005), “Home Bias and International Risk-Sharing: Twin Puzzles Separated at Birth”, CEPR Discussion Paper No. 5113.