Does financial globalization promote risk sharing? ☆

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ABSTRACT

In theory, one of the main benefits of financial globalization is that it should allow for more efficient international risk sharing. In this paper, we provide an empirical evaluation of the patterns of risk sharing among different groups of countries and examine how international financial integration has affected the evolution of these patterns. Using a variety of empirical techniques, we conclude that there is at best a modest degree of international risk sharing, and certainly nowhere near the levels predicted by theory. In addition, only industrial countries have attained better risk sharing outcomes during the recent period of globalization. Developing countries have, by and large, been shut out of this benefit. Even emerging market economies, many of which have reduced capital controls and all of which have witnessed large increases in cross-border capital flows, have seen little change in their ability to share risk. We find that the composition of flows may help explain why emerging markets have not been able to realize this presumed benefit of financial globalization. In particular, our results suggest that portfolio debt, which had dominated the external liability stocks of most emerging markets until recently, is not conducive to risk sharing.

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1. Introduction

In theory, one of the main benefits of financial globalization is that it provides better opportunities for countries to smooth consumption growth in the face of country-specific fluctuations in output growth. With well-developed domestic financial markets, economic agents within a country can share risk amongst themselves. However, insuring against country-wide shocks requires openness to financial flows that would allow agents in different countries to pool their risks. Thus, financial globalization should generate welfare gains by reducing the volatility of aggregate consumption and also by delinking fluctuations in national consumption and output.

There is a substantial literature examining patterns of risk sharing among advanced industrial economies (some of the notable contributions include Obstfeld, 1994, 1995; Lewis, 1996, 1999; Sørensen and Yosha, 1998). The main conclusion of this literature is that the degree of risk sharing is rather limited even among advanced industrial economies, leaving a considerable amount of potential welfare gains unexploited. Recent work examining the evolution of risk sharing among these economies presents conflicting results. While some studies suggest that it has increased during the recent period of globalization (e.g., Sørensen et al., 2007; Artis and Hoffman, 2006a,b; Giannone and Reichlin, 2006), others have found little evidence of better risk sharing among industrial economies (see Moser et al., 2004; Bai and Zhang, 2005).

In contrast, the literature on risk sharing patterns for non-industrial economies is relatively sparse. Obstfeld (1994) and Lewis (1996, 1997) do include some of these countries in their analysis, but their samples (which end in 1988 and 1992, respectively) do not cover much of the recent wave of financial globalization that enveloped the emerging market economies starting in the mid-1980s. Given the relatively higher volatility of consumption fluctuations in these economies, and the higher potential welfare gains of stabilizing these fluctuations, understanding these economies' risk sharing patterns is of considerable interest.[1]

The objective of this paper is to study the impact of financial globalization on the degree of international consumption risk sharing for a large set of industrial and developing countries. In particular, we make three contributions to the empirical literature on international risk
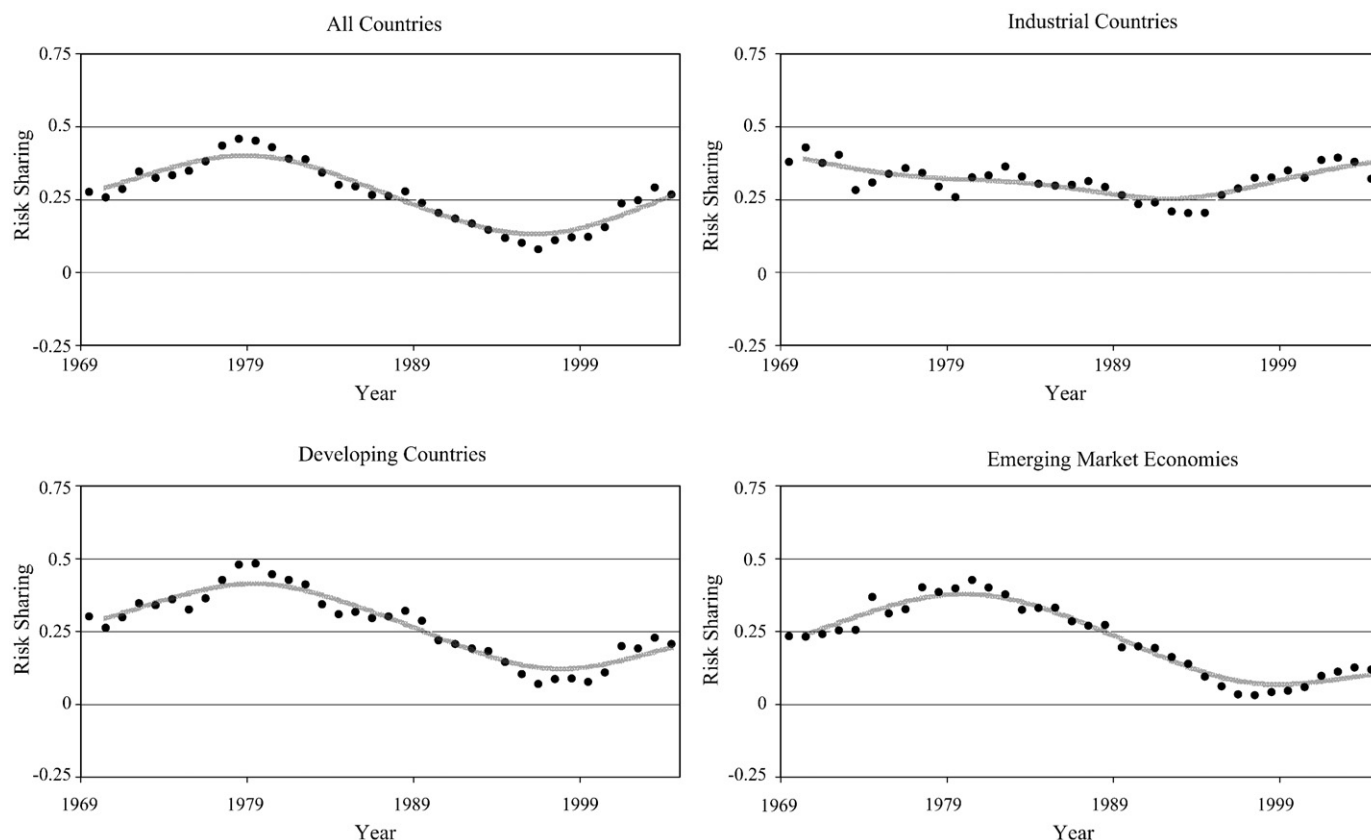
Fig. 1. Risk sharing-cross-section regressions.

sharing. First, we extend the analysis to a large group of emerging markets and other developing economies, and investigate the extent of risk sharing by these economies in a unified framework. Second, we examine changes over time in the degree of risk sharing across different groups of countries and attempt to relate those to changes in the degree of financial openness. Third, we provide a careful evaluation of alternative measures of risk sharing, drawn from different empirical approaches. In principle, many of these approaches are equivalent, but there are subtle differences that affect the results. Thus, our comprehensive evaluation of risk sharing patterns based on a range of measures provides a benchmark set of results that should be useful for further theoretical and empirical work in this area. Our analysis focuses on different de jure measures of financial integration; these measures capture the restrictions a country imposes on cross-border capital account transactions. We also examine the effects of changes in the magnitude and composition of actual financial flows.

Our main conclusion is that, notwithstanding the prediction of conventional theoretical models that financial globalization should foster increased international risk sharing, there is no evidence that this is true for developing countries. Even for the group of emerging market economies – which have opened up their capital accounts and become far more integrated into global markets than other developing countries – financial globalization has not helped improve the degree of risk sharing. In contrast, for industrial economies, there is some evidence that risk sharing has improved in the last decade and a half, a period during which there was a substantial increase in the volume of cross-border financial flows relative to the previous two decades.

Why are non-industrial countries unable to share risk more efficiently despite their increasing integration into global financial markets? One possibility is that these countries rely more on less stable capital such as bank loans and other forms of debt that may not allow for efficient risk sharing. Indeed, when we break up stocks of external assets and liabilities into different categories – FDI, portfolio equity, portfolio debt etc. – we find that the underlying composition of capital flows influences the ability of developing countries to share risk. In particular, external debt appears to hinder the ability of emerging market economies to share their consumption risk.

In Section 2, we present the main features of our dataset. In Section 3, we first derive a basic regression equation and then examine how the degree of risk sharing has changed over time using various approaches. In Section 4, we extend the regression model to evaluate the direct impact of financial globalization on the degree of risk sharing. In Section 5, we examine if the composition of flows could explain the inability of emerging markets to attain the risk sharing benefits of financial globalization. We conclude with a brief summary of our findings in Section 6.

2. Dataset

We examine patterns of international consumption risk sharing using a large dataset that includes industrial and developing countries. The basic data are from the Penn World Tables 6.2 (Heston et al., 2006) and the World Bank's World Development Indicators. Per capita real GDP, real private consumption, and real public consumption constitute the measures of national output, private consumption and government consumption, respectively. All data are in constant (2000) international prices.

We use different measures of de jure capital account openness to evaluate the impact of financial integration on risk sharing. Our benchmark de jure measure is the widely used one based on information from the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). We also use three other de jure measures to check the sensitivity of our results. The first is based on the dates of equity market liberalizations (Bekaert et al., 2005). Both the IMF and BHL measures are binary (zero or one) variables. The other two de jure measures are taken from the work of Chinn and Ito
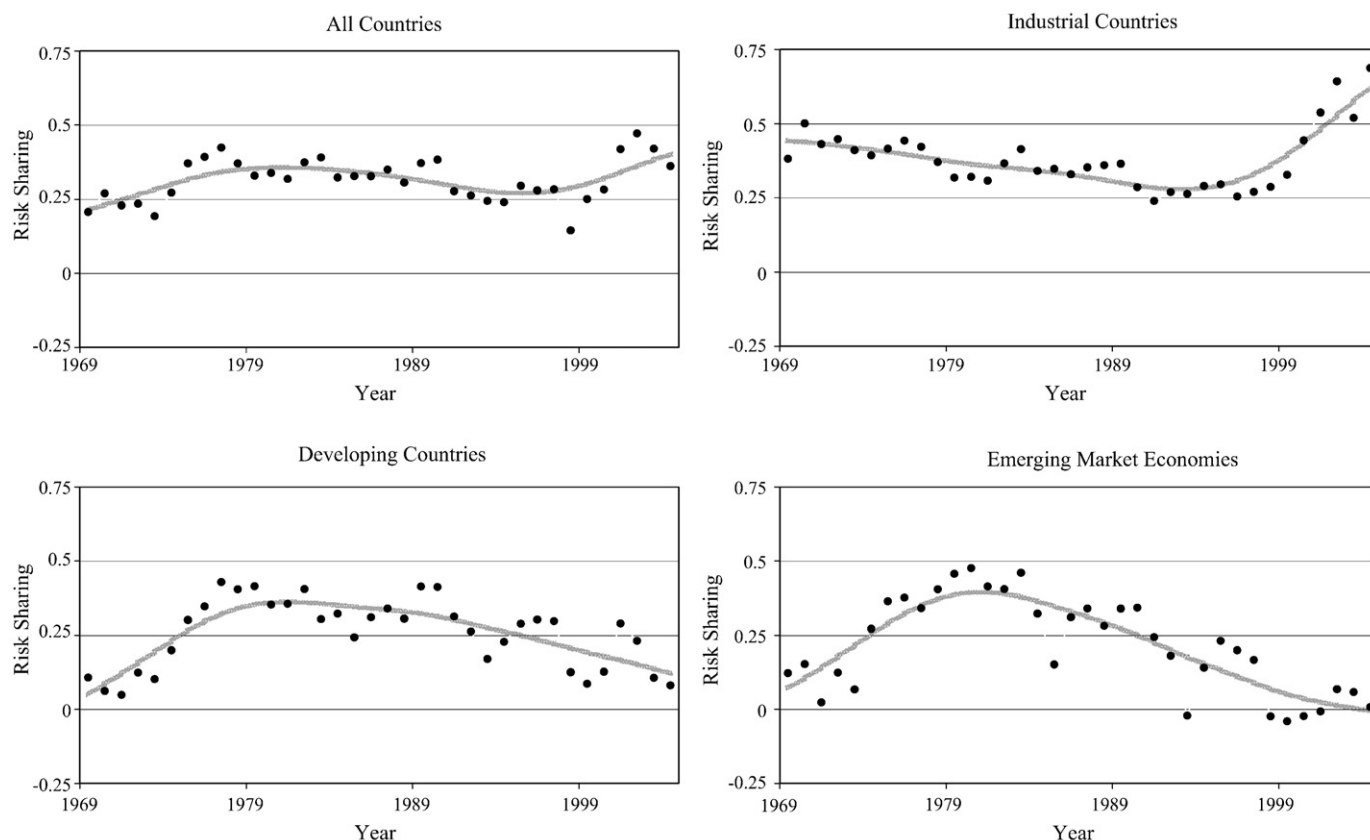
Fig. 2. Risk sharing-time-series regressions.

(2006) and Edwards (2005), respectively. These are continuous measures but are also largely derived from the IMF's AREAER publications.[2] We also examine the robustness of our results to using measures of de facto financial openness – gross stocks of external assets and liabilities as ratios to GDP – taken from the External Wealth of Nations Database (Lane and Milesi-Ferretti, 2006). These measures capture the outcomes of financial globalization rather than exogenous changes in the regime of capital controls. However, since the de jure measures are also imperfect indicators of the true degree of capital mobility, it is worth showing that our results do not hinge on the measure of financial integration.

Our dataset comprises annual data over the period 1960–2004 for 69 countries (see the Appendix for a list of countries). The size and country composition of the sample are dictated by data availability, with historical data on the measures of financial integration being a key constraint. The sample consists of 21 industrial and 48 developing countries. We divide developing countries into two coarse groups — 21 emerging market economies (EMEs) and 27 other developing countries.

For analyzing the effects of globalization on risk sharing, it is important to consider the modern era of globalization (1987–2004). There have been dramatic increases in the volumes of cross-border trade and financial flows during this period. In particular, private capital flows from industrialized economies to developing economies have increased dramatically since the mid-1980s, with most of these flows going to emerging market economies (see Kose et al., 2006a,b). This increase in trade and financial flows has been fueled by a series of trade and financial liberalization programs undertaken by these

economies since the mid-1980s. Roughly 30% of the countries in our sample had liberalized their trade regimes in 1986; by 2004, this share had risen to almost 85%. The share of countries with de jure open financial accounts rose from 20% to about 55% over this period. In light of these facts, we separately report results pertaining to the globalization period, 1987–2004, in addition to the full sample.

3. Evolution of consumption risk sharing

Conventional theoretical models in open economy macroeconomics and international finance yield clear predictions about the impact of financial integration on risk sharing. These predictions are mostly based on the dynamics of correlations between domestic consumption and output or between domestic consumption and world output/consumption. In Kose et al. (2007), we review these predictions in detail and examine whether they are supported by empirical evidence. For example, theoretical models with complete markets predict that the correlation of a country's consumption growth with the growth of world output (or, equivalently, world consumption) should be higher than its correlation with that country's output growth. However, we find that for most countries the correlation between domestic consumption and output is higher than the correlation between domestic consumption and world output. The gap between the two measures is much larger for emerging markets and other developing countries than for industrial countries.

Industrial countries in general appear to have higher correlations of consumption and output with the corresponding world aggregates; these correlations are typically much lower for developing countries. A particularly interesting result is that, for emerging market economies, these correlations with world aggregates have, if anything, declined slightly during the globalization period. This seems at odds with the notion that financial integration should have helped these

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[2] The Edwards measure includes additional country-specific information and also draws upon information from other indexes of financial liberalization. Cross-correlations across these four de jure measures are very high (see Schindler, forthcoming).
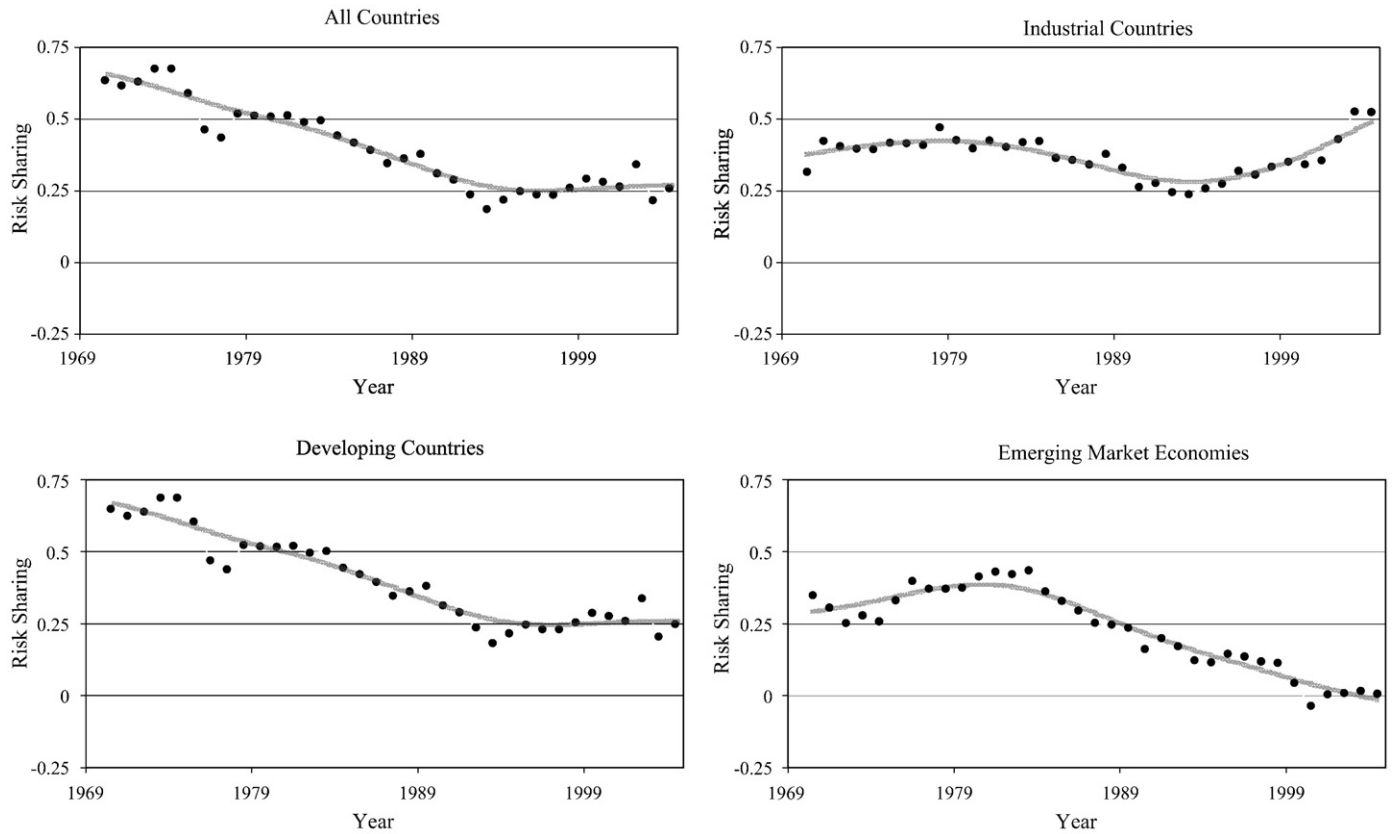
Fig. 3. Risk sharing-panel regressions.

economies, which have removed controls on international asset trade and received the bulk of capital flows to developing countries, to better share risk with the rest of the world.

Although the unconditional correlations presented in Kose et al. (2007) are useful in obtaining a preliminary assessment of the relevance of certain theoretical predictions about risk sharing, they have obvious limitations. We now turn to a more formal analysis of the roles played by factors such as common shocks and the increase in trade and financial linkages in explaining the extent of comovement of macroeconomic aggregates. In particular, we undertake a more rigorous test of the risk sharing implications of models with complete markets. In these types of models, the growth rates of discounted marginal utility between the periods t and $(t+1)$ are equal across countries as dictated by the first order conditions with respect to consumption:

$$\frac{U\prime(c_{it+1})}{U\prime(c_{it})} = \frac{U\prime(c_{jt+1})}{U\prime(c_{jt})} = \frac{\lambda_{t+1}}{\lambda_t} \tag{1}$$

where $U\prime$ denotes the derivative of the temporal utility function with respect to (per capita) consumption (c) in country i or j. λ is the respective Lagrange multiplier or the shadow price of consumption.[3] This equation implies that the difference between the growth of marginal utility of two countries (i and j) should not depend on any country-specific variables. A number of studies in the literature use

this equation to arrive at a basic risk sharing regression. Assuming that the functional form of the utility function is isoelastic, one can rewrite this equation as:

$$E(\Delta \log c_{it} - \Delta \log C_t | Z_{it}) = 0 \tag{2}$$

where Z represents a vector of factors specific to country i and C is the world (per capita) consumption. This yields the following regression specification:

$$\Delta \log c_{it} - \Delta \log C_t = bZ_{it} + \varepsilon_{it} \tag{3}$$

If there is perfect risk sharing, the difference between the consumption growth rates on the left hand side should be equal to zero, implying that the regression should yield a zero coefficient. Building on this implication of the complete markets model yields our basic risk sharing equation, which is similar to others in this literature[4]:

$$\Delta \log c_{it} - \Delta \log C_t = \text{constant} + \beta_t(\Delta \log y_{it} - \Delta \log Y_t) + \varepsilon_{it} \tag{4}$$

where c_{it} (y_{it}) denotes per capita consumption (GDP) of country i in year t, C_t (Y_t) is world per capita consumption (GDP). Growth rates of C_t and Y_t are, respectively, measures of aggregate (common) fluctuations in consumption and output. Since it is not possible to share the risk associated with common fluctuations, the common component of each variable is subtracted from the corresponding national variable.

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[3] This equation also has implications for cross-country correlations of consumption. The theoretical predictions mentioned earlier – that cross-country correlations of consumption should be equal to unity (or be very high) and cross-country correlations of consumption should be much higher than those of output – are derived from models utilizing similar first order conditions.

[4] For extended discussions of the derivation of this equation, see Obstfeld and Rogoff (2004, Chapter 5), Asdrubali et al. (1996), Sørensen and Yosha (1998) and Artis and Hoffman (2006a).
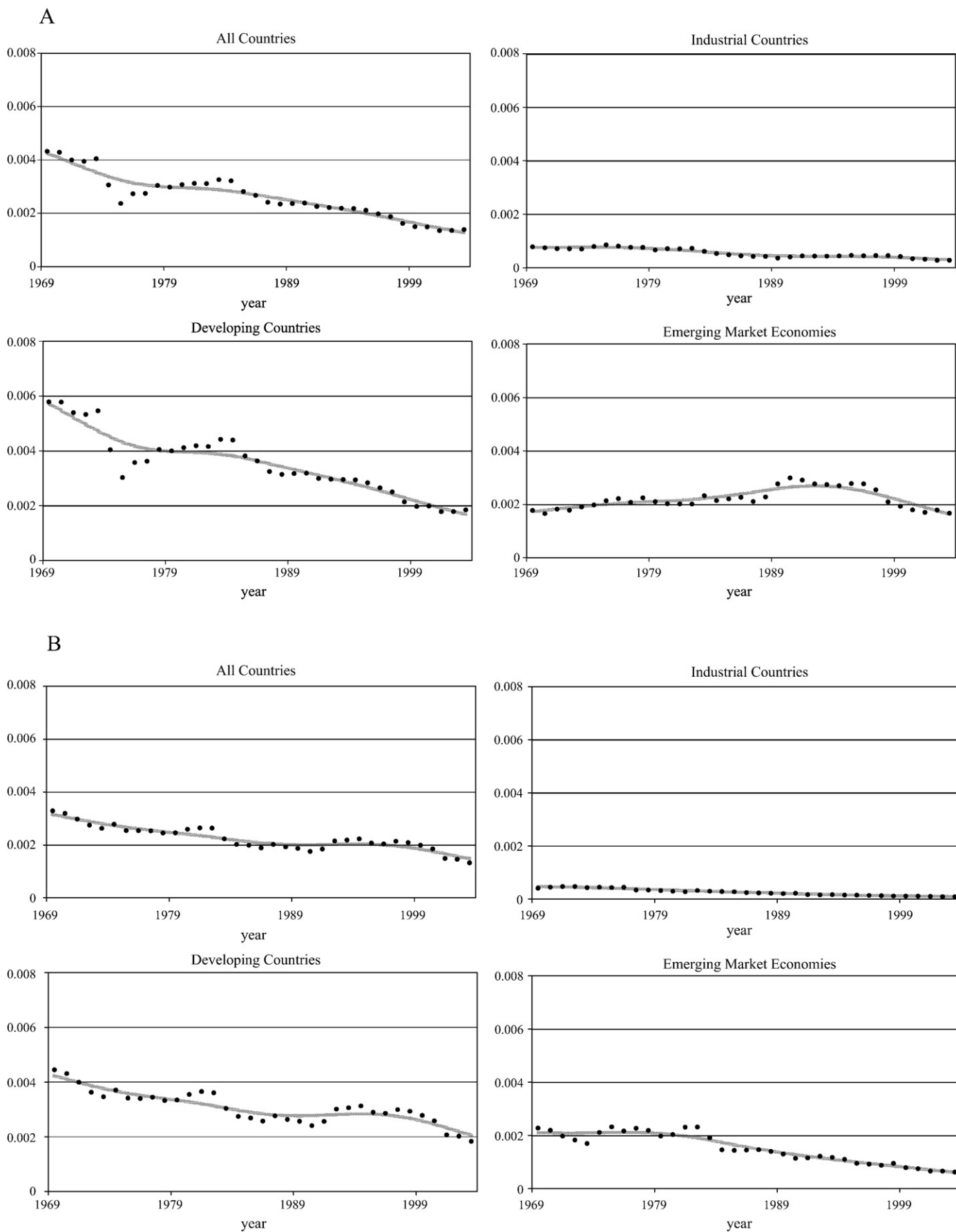
A

B

Fig. 4. A. Variance of output growth. B. Variance of residuals.

Table 1a
Risk sharing and financial integration (de facto and de jure measures, full period, 1960–2004).

	De jure				De facto		De jure — IMF		De jure — Edwards	
	IMF	BHL	Chinn–Ito	Edwards	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
I. All countries										
Output	0.679***	0.676***	0.656***	0.661***	0.591***	0.709***	0.760***	0.709***	0.757***	0.672***	0.702***
	[0.033]	[0.040]	[0.033]	[0.038]	[0.087]	[0.038]	[0.043]	[0.040]	[0.044]	[0.084]	[0.084]
Output × interaction[a]		−0.014	0.160***	−0.014	0.151			−0.040	−0.014	0.062	0.105
		[0.074]	[0.053]	[0.026]	[0.158]			[0.089]	[0.078]	[0.165]	[0.152]
Output × interaction[b]						0.057	−0.043	0.084	−0.038	0.036	−0.043
						[0.063]	[0.045]	[0.076]	[0.048]	[0.052]	[0.054]
R2-adjusted	0.473	0.471	0.477	0.471	0.478	0.528	0.533	0.528	0.530	0.529	0.537
N	2886	2493	2618	2226	2020	2261	2262	2228	2228	1984	1987
II. Industrial countries										
Output	0.652***	0.638***	0.633***	0.616***	0.564***	0.651***	0.646***	0.638***	0.639***	0.558***	0.569***
	[0.027]	[0.043]	[0.032]	[0.052]	[0.125]	[0.038]	[0.040]	[0.048]	[0.049]	[0.091]	[0.094]
Output × interaction[a]		0.026	0.043	0.036	0.106			0.058	0.059	0.133	0.101
		[0.047]	[0.041]	[0.025]	[0.147]			[0.042]	[0.042]	[0.102]	[0.113]
Output × interaction[b]						−0.001	0.004	−0.004	−0.005	−0.001	0.014
						[0.016]	[0.019]	[0.015]	[0.017]	[0.014]	[0.015]
R2-adjusted	0.620	0.607	0.632	0.595	0.608	0.617	0.617	0.618	0.618	0.636	0.636
N	882	758	798	673	624	697	697	673	673	613	613
III. Developing countries										
Output	0.693***	0.681***	0.664***	0.654***	0.597***	0.590***	0.775***	0.586***	0.772***	0.583***	0.745***
	[0.041]	[0.046]	[0.040]	[0.052]	[0.098]	[0.055]	[0.063]	[0.054]	[0.065]	[0.104]	[0.112]
Output × interaction		−0.005	0.214***	−0.026	0.120			−0.105	−0.048	−0.008	0.055
		[0.102]	[0.068]	[0.040]	[0.202]			[0.080]	[0.113]	[0.173]	[0.192]
Output × interaction[b]						0.551***	−0.034	0.617***	−0.024	0.582***	−0.048
						[0.134]	[0.074]	[0.129]	[0.076]	[0.164]	[0.077]
R2-adjusted	0.463	0.455	0.464	0.453	0.452	0.527	0.525	0.528	0.523	0.525	0.524
N	2004	1739	1817	1557	1397	1565	1568	1555	1557	1371	1373
IV. Emerging market economies[c]										
Output	0.826***	0.836***	0.792***	0.775***	0.838***	0.727***	0.680***	0.743***	0.697***	0.805***	0.723***
	[0.055]	[0.057]	[0.062]	[0.058]	[0.093]	[0.083]	[0.076]	[0.083]	[0.073]	[0.114]	[0.115]
Output × interaction[a]		−0.118	0.117	−0.079**	−0.069			−0.132	−0.113	−0.213	−0.085
		[0.108]	[0.077]	[0.028]	[0.192]			[0.090]	[0.099]	[0.187]	[0.165]
Output × interaction[b]						0.379***	0.210***	0.397**	0.214***	0.424**	0.191**
						[0.132]	[0.068]	[0.141]	[0.068]	[0.185]	[0.077]
R2-adjusted	0.627	0.625	0.626	0.649	0.639	0.686	0.680	0.688	0.682	0.685	0.678
N	874	766	791	695	616	682	680	682	680	598	596

Note: This table shows the results of panel regressions with yearly data. For details of the regression specification, see Section 4. The standard errors robust to heteroscedasticity and within-country serial correlation are in brackets. Regressions also include country fixed effects and year dummies. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. "Assets" and "Liabilities" refer to gross foreign assets and gross foreign liabilities relative to GDP.
  [a] De jure measure — either IMF, Bekaert–Harvey–Lundblad, Chinn–Ito or Edwards.
  [b] De facto measure — either assets or liabilities.
  [c] Emerging Market Economies are a part of the group of Developing Countries.

The difference between the national and common world component of each variable captures the idiosyncratic (country-specific) fluctuations in that variable (see Sørensen et al., 2007). The error term, ε_{it}, is assumed to follow a stationary process and captures errors in measuring consumption (see Obstfeld, 1994).

In a model with complete international financial markets and perfect risk sharing, the coefficient β_t, which captures the average degree of synchronization between countries' idiosyncratic consumption growth and GDP growth at time t, is equal to zero. Asdrubali et al. (1996) argue that this coefficient can be used to measure the degree of risk sharing. The smaller the extent of idiosyncratic comovement, β_t, the greater the degree of international risk sharing.

We analyze how the extent of international consumption risk sharing has evolved over time using three different approaches in order to fully exploit the cross-section and time-series dimensions of the data. Our first approach follows that of Sørensen et al. (2007) and involves year-by-year estimation of a cross-section regression of the country-specific component of consumption growth (measured as a deviation of domestic consumption growth from world consumption growth) on the country-specific component of output growth. The second approach is similar to the first one but, relying on the idea

advanced by Obstfeld (1995), involves running the same regression equation for each country over a given time period. The third approach is a combination of the first two as it involves estimation of the same underlying model in a panel framework.[5]

3.1. Cross-section regressions (year-by-year)

We estimate the basic risk sharing regression above for each year over the period 1960–2004 and trace the evolution of estimates of $(1 - \beta_t)$ in order to evaluate the changes in the extent of risk sharing over time. This variable should range from 0 (no risk sharing) to 1 (perfect risk sharing). Since the estimates of $(1 - \beta_t)$ fluctuate from year to year, we smooth them by computing their average over a 9-year rolling window.

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[5] We also experimented with regressions using levels rather than the growth rates of consumption and output (Artis and Hoffman, 2006b). The general message about the extent of risk sharing and its evolution was no different from that of the other approaches.

Table 1b
Risk sharing and financial integration (de facto and de jure measures, globalization period, 1987–2004).

		De jure				De facto		De jure — IMF		De jure — Edwards	
		IMF	BHL	Chinn–Ito	Edwards	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
I. All countries											
Output	0.860*** [0.046]	0.879*** [0.043]	0.848*** [0.051]	0.856*** [0.048]	0.924*** [0.076]	0.859*** [0.048]	0.928*** [0.054]	0.871*** [0.047]	0.936*** [0.050]	0.923*** [0.076]	0.980*** [0.072]
Output×interaction[a]		−0.074 [0.099]	0.008 [0.075]	−0.028 [0.031]	−0.143 [0.148]			−0.086 [0.100]	−0.062 [0.107]	−0.146 [0.153]	−0.118 [0.149]
Output×interaction[b]						0.003 [0.043]	−0.090* [0.047]	0.027 [0.045]	−0.080 [0.052]	0.007 [0.034]	−0.083 [0.057]
R^2-adjusted	0.606	0.607	0.619	0.608	0.620	0.605	0.598	0.607	0.598	0.620	0.613
N	1193	1188	925	1184	924	1191	1185	1186	1180	924	920
II. Industrial countries											
Output	0.661*** [0.026]	0.721*** [0.073]	0.662*** [0.030]	0.713*** [0.090]	0.964*** [0.284]	0.704*** [0.029]	0.716*** [0.031]	0.783*** [0.081]	0.794*** [0.081]	1.088*** [0.296]	1.107*** [0.300]
Output×interaction[a]		−0.064 [0.075]	… …	−0.022 [0.042]	−0.341 [0.317]			−0.101 [0.073]	−0.099 [0.074]	−0.456 [0.328]	−0.474 [0.334]
Output×interaction[b]						−0.037*** [0.012]	−0.041*** [0.012]	−0.028** [0.011]	−0.033*** [0.011]	−0.019 [0.012]	−0.018 [0.012]
R^2-adjusted	0.617	0.625	0.643	0.624	0.643	0.618	0.617	0.626	0.626	0.643	0.643
N	357	352	277	348	277	359	359	354	354	279	279
III. Developing countries											
Output	0.873*** [0.051]	0.878*** [0.046]	0.836*** [0.054]	0.869*** [0.057]	0.890*** [0.088]	0.761*** [0.066]	0.979*** [0.064]	0.763*** [0.065]	0.979*** [0.060]	0.836*** [0.108]	1.030*** [0.107]
Output×interaction[a]		−0.027 [0.123]	0.062 [0.082]	−0.010 [0.039]	−0.072 [0.192]			−0.087 [0.102]	−0.005 [0.127]	−0.104 [0.179]	−0.082 [0.186]
Output×interaction[b]						0.312** [0.132]	−0.120* [0.060]	0.357** [0.137]	−0.119* [0.062]	0.229 [0.185]	−0.152** [0.067]
R^2-adjusted	0.584	0.584	0.597	0.584	0.596	0.588	0.585	0.588	0.584	0.597	0.596
N	828	828	641	828	640	825	824	825	824	640	639
IV. Emerging market economies[c]											
Output	0.966*** [0.048]	0.984*** [0.050]	1.008*** [0.045]	0.938*** [0.047]	1.028*** [0.058]	0.890*** [0.069]	0.908*** [0.094]	0.895*** [0.068]	0.921*** [0.094]	0.987*** [0.086]	0.967*** [0.125]
Output×interaction[a]		−0.136 [0.093]	−0.062 [0.077]	−0.059** [0.025]	−0.119 [0.114]			−0.063 [0.116]	−0.141 [0.100]	−0.188 [0.120]	−0.084 [0.130]
Output×interaction[b]						0.196 [0.143]	0.065 [0.073]	0.210 [0.156]	0.071 [0.070]	0.178 [0.216]	0.049 [0.077]
R^2-adjusted	0.797	0.799	0.813	0.800	0.812	0.804	0.797	0.804	0.799	0.816	0.812
N	357	357	276	357	275	356	357	356	357	273	275

Note: This table shows the results of panel regressions with yearly data. For details of the regression specification, see Section 4. The standard errors robust to heteroscedasticity and within-country serial correlation are in brackets. Regressions also include country fixed effects and year dummies. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. "Assets" and "Liabilities" refer to gross foreign assets and gross foreign liabilities relative to GDP.

  [a] De jure measure — either IMF, Bekaert–Harvey–Lundblad, Chinn–Ito or Edwards.
  [b] De facto measure — either assets or liabilities.
  [c] Emerging Market Economies are a part of the group of Developing Countries.

Fig. 1 shows that, for the full sample, the extent of risk sharing appears to increase in the globalization period, but it is lower than the levels observed during the late 1970s. The degree of risk sharing is often higher among industrial countries than other country groups. Moreover, it rises modestly for the group of industrial countries during the late 1990s, but to a level that is not much above that seen in the 1970s. There is little evidence that the period of globalization has seen a marked increase in risk sharing capabilities of emerging markets and other developing countries.

3.2. Time-series regressions (for each country)

Next, we turn again to Eq. (4) but, rather than estimating it for each year, we estimate it for each country over rolling nine-year periods starting from 1960. This is similar to the regressions used by Obstfeld (1995), who estimates his models for each country for different periods and analyzes the changes in the relevant coefficients over time. In his set up, perfect risk sharing implies that, in a regression of the growth rate of domestic consumption on world consumption growth and national output growth, the coefficient on world consumption should be one and that on national output should be equal to zero. To be consistent with the basic risk sharing regression above, we focus only on the coefficient associated with consumption.[6] After running the regression for each country, we compute the median of β_t over the country sample for each period.

Fig. 2 presents the plots of the extent of consumption risk sharing, measured by the median of $(1-\beta_t)$, for the full sample and for each country group based on the time-series regressions. In other words, the extent of risk sharing in 1969 in each panel refers to the median of $(1-\beta_t)$ of the respective country group and β_t is the regression for country i over the period 1961–1969. For industrial countries, there is a steady and substantial increase in the degree of risk sharing during the globalization period. By contrast, both emerging market

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[6] When countries have different rates of time preference, this would be reflected in the constant term in the regression equation, but it has no impact on the main prediction of the complete markets model that cross-country correlations of fluctuations in the growth rates of consumption should be equal to one. Since the regression is estimated separately for each country, differences in average growth rates would also be picked up by the regression constant (intercept). Risk sharing is a relevant concept only in the context of short-term fluctuations, not permanent shocks or differences in trend growth.

economies and the group of developing countries experience a slight trend decline in the degree of risk sharing during the period of globalization.

3.3. Panel regressions

Our next approach combines the first two by estimating the standard regression model in a panel framework. In particular, we run the same regression based on Eq. (4) but estimate it over nine-year rolling panels. This allows us to utilize all the time-series and cross-sectional information available in the data. Fig. 3 presents plots of the extent of consumption risk sharing based on the panel regressions. The extent of risk sharing in 1969 is again equal to $(1 - \beta_t)$ and β_t is the coefficient from the panel regression covering the period 1961–1969. The patterns in these figures are broadly consistent with our earlier results. While industrial countries attain slightly better risk sharing outcomes during the period of globalization, neither emerging markets nor developing countries exhibit the same pattern.

We ran a battery of tests to check if there are statistically significant changes in the risk sharing coefficients across country groups and over time. The results indicate that the extent of risk sharing is significantly higher for industrial countries than for either emerging market or other developing economies over the past two decades. In addition, there is a significant increase in the extent of risk sharing from the period 1985–1994 to 1995–2004 for industrial countries alone.[7]

Another question related to the types of regressions we employ here is whether the results are driven by changes in idiosyncratic country-specific noise.[8] To explore this possibility, we check the evolution of the variance of idiosyncratic output fluctuations, $\Delta \log y_{it} - \Delta \log Y_t$, and the variance of the residual, ε_{it}, in our panel regressions. As presented in Fig. 4A and B, for the group of industrial countries, these variances appear to be quite stable. In contrast, for the other country groups, the variances are not as stable. These findings lend further support to our claim that the results about changes in the degree of risk sharing are significant only in the case of industrialized countries.[9]

There are two messages from the results in this section. First, industrial countries have attained improvements in risk sharing during the period of globalization. These results are consistent with the findings in Sørensen et al. (2007); our work extends their results to a larger set of countries and a longer temporal span of the data. We also employ a larger menu of regressions to analyze the robustness of our findings to different approaches. While the extent of risk sharing among industrial countries does improve during the period of globalization, we find that this is only a modest improvement relative to the 1970s.[10] Second, we find that emerging market economies and other developing economies have not registered any major changes during the period of globalization in terms of their ability to share idiosyncratic income risk.

Could measurement error in the consumption data for emerging markets be driving our puzzling results for this group of countries? It is unlikely that the temporal evolution of risk sharing patterns can be simply explained by measurement error. Indeed, if consumption is becoming better measured over time, it should be getting mechanically delinked from output, which would naturally drive up estimates of risk sharing. Another approach to dealing with measurement error is to look at income smoothing, on the logic that income (measured as

GNP or GNI) is better measured than consumption and reflects risk sharing via international financial flows. Sørensen et al. (2007) find that international financial flows have helped industrial countries to smooth their income since the early 1990s. Ultimately, however, it is smoothing of consumption rather than income that matters for welfare.

The temporal patterns we document in this section are suggestive, but do not directly address the question of whether financial globalization has played an important role in the evolution of the degree of risk sharing displayed by different country groups. So we now turn to a regression model that augments the standard risk sharing regression with an interaction variable in order to explicitly capture the effects of financial globalization.

4. Financial globalization and risk sharing

We now use panel regressions to directly examine the impact of financial globalization on the degree of risk sharing. In particular, we interact the idiosyncratic component of output with various measures of financial integration. That is, we estimate the following regression using panel data:

$$\Delta \log c_{it} - \Delta \log C_t = \text{constant} + \mu_t(\Delta \log y_{it} - \Delta \log Y_t) + \gamma_t' \text{FO}_{it}(\Delta \log y_{it} - \Delta \log Y_t) + \varepsilon_{it}$$
(5)

where FO_{it} is the set of measures of the degree of financial openness of country i. Parallel to the analysis in the previous section, the degree of risk sharing attained by country i is equal to $(1 - \mu_t - \gamma_t' \text{FO}_{it})$.[11] When an element of the coefficient vector of interaction terms, γ', is negative, it indicates that the greater the degree of financial integration associated with the respective measure of financial openness, the higher the amount of risk sharing achieved by a country. The panel regressions we employ include both country fixed effects and time effects.

In Tables 1a and 1b, we report the results for different country groups and also separately for the full sample (1960–2004) and the period of globalization (1987–2004). We focus on four de jure measures of financial openness (IMF, BHL, Chinn–Ito, and Edwards) and two de facto ones (gross stocks of assets and liabilities, both scaled by GDP). We experiment with each of these measures in turn and then consider various combinations of de jure and de facto measures in our regressions.

The first column of Table 1a shows the results of panel regressions without interaction terms associated with financial integration. The findings are broadly consistent with the results reported in the previous section. The extent of risk sharing appears to be slightly higher in industrial countries than in developing countries; it is lowest for the group of emerging market economies.

In the remaining columns of Table 1a, we first report results from regressions that include interaction terms with each of the de facto and de jure measures. In the final four columns, we report results from regressions that include interactions with one de facto and one de jure measure at a time. To keep the volume of these results manageable, we report results using the two de facto measures and only two of the de jure measures — IMF and Edwards. The results were similar when we used the other two de jure measures.

For the full sample period, virtually none of the interaction coefficients is significant with the expected sign for all countries and the group of industrial economies. The sole exception is the negative coefficient on the interaction with the Chinn–Ito measure for emerging markets, but this is not a robust result as it is limited to this one indicator. In fact, many of the coefficients on the interactions with the de facto measures are positive for emerging markets —

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[7] Detailed results from these tests are available from the authors.

[8] We would like to thank one of the referees for raising this point.

[9] These results suggest that changes over time in the variances of idiosyncratic output and the error term can potentially bias our estimates in the case of developing countries and emerging markets. Since we are making no claim that there are statistically significant changes in the degree of risk sharing for these groups of countries, we do not pursue this further.

[10] Sørensen (2006) argues that there may be more measurement error in the consumption data in the earlier period, which could explain this result.

[11] See Sørensen et al. (2007) for a similar model. We also estimated models allowing for time trends associated with the measures of financial integration, but the trends were not statistically significant.

Table 2
Risk sharing and financial integration (dissaggregated de facto measures and de jure measure).

A

	IMF measure										BHL measure									
	Full period					Globalization period					Full period					Globalization period				
	FDI	Equity	Debt	FDI + equity	FDI + equity	FDI	Equity	Debt	FDI equity	FDI + debt	FDI	Equity	Debt	FDI + equity	FDI + equity	FDI	Equity	Debt	FDI + equity	FDI debt
I. Industrial countries																				
Output	0.622***	0.641***	0.638***	0.642***	0.626***	0.770***	0.776***	0.765***	0.785***	0.779***	0.592***	0.612***	0.608***	0.612***	0.601***	0.698***	0.692***	0.694***	0.702***	0.708***
	[0.058]	[0.049]	[0.049]	[0.049]	[0.047]	[0.084]	[0.078]	[0.082]	[0.079]	[0.076]	[0.052]	[0.039]	[0.042]	[0.040]	[0.043]	[0.042]	[0.033]	[0.035]	[0.035]	[0.039]
Output × interaction[a]	0.031	−0.032*	−0.002	−0.013	−0.074	−0.074	−0.072***	−0.017	−0.047***	−0.174*	0.058	−0.026	0.004	−0.011	−0.052	−0.090	−0.074**	−0.019*	−0.051*	−0.191*
	[0.102]	[0.016]	[0.014]	[0.016]	[0.082]	[0.094]	[0.016]	[0.011]	[0.014]	[0.099]	[0.109]	[0.038]	[0.014]	[0.027]	[0.090]	[0.092]	[0.035]	[0.010]	[0.025]	[0.108]
Output × debt					0.039					0.070					0.031					0.063
					[0.051]					[0.059]					[0.050]					[0.057]
Output × de jure measure	0.058	0.048	0.057	0.044	0.058	−0.087	−0.096	−0.083	−0.098	−0.104	0.080**	0.077**	0.078**	0.075**	0.078***	...	...	...	...	...
	[0.047]	[0.044]	[0.043]	[0.042]	[0.042]	[0.073]	[0.075]	[0.076]	[0.073]	[0.071]	[0.033]	[0.035]	[0.027]	[0.035]	[0.027]	...	...	...	...	...
R2-adjusted	0.613	0.612	0.618	0.612	0.618	0.625	0.628	0.626	0.627	0.631	0.632	0.631	0.637	0.631	0.637	0.642	0.642	0.642	0.642	0.644
N	674	675	673	675	673	353	354	353	354	354	614	615	613	615	613	278	279	278	279	279
II. Emerging market economies																				
Output	0.727***	0.840***	0.726***	0.746***	0.661***	0.927***	1.000***	0.912***	0.961***	0.823***	0.693***	0.800***	0.694***	0.706***	0.639***	0.936***	1.006***	0.954***	0.988***	0.906***
	[0.062]	[0.057]	[0.070]	[0.060]	[0.076]	[0.069]	[0.053]	[0.085]	[0.064]	[0.081]	[0.067]	[0.066]	[0.079]	[0.069]	[0.094]	[0.082]	[0.050]	[0.088]	[0.067]	[0.116]
Output × interaction[a]	0.813***	1.086	0.169***	0.630***	0.380*	0.180	−0.433	0.074	0.022	0.032	0.861***	0.576	0.140***	0.551**	0.315	0.243	0.157	0.044	0.069	0.069
	[0.185]	[0.873]	[0.052]	[0.162]	[0.186]	[0.279]	[0.677]	[0.052]	[0.227]	[0.203]	[0.234]	[1.147]	[0.047]	[0.224]	[0.313]	[0.372]	[0.997]	[0.054]	[0.329]	[0.335]
Output × debt					0.164***					0.135***					0.151***					0.067
					[0.046]					[0.040]					[0.050]					[0.058]
Output × de jure measure	−0.074	−0.124	−0.115	−0.144	−0.137	−0.049	−0.118	−0.131	−0.039	−0.048	0.069	0.099	0.113	0.105	0.077	−0.058	−0.065	−0.044	−0.083	−0.056
	[0.090]	[0.100]	[0.100]	[0.106]	[0.101]	[0.117]	[0.099]	[0.099]	[0.099]	[0.121]	[0.078]	[0.086]	[0.069]	[0.083]	[0.074]	[0.087]	[0.084]	[0.081]	[0.079]	[0.081]
R2-adjusted	0.677	0.684	0.683	0.676	0.678	0.778	0.802	0.799	0.794	0.799	0.677	0.683	0.681	0.674	0.673	0.786	0.817	0.812	0.801	0.802
N	678	681	682	681	681	356	356	356	356	356	595	598	599	598	598	274	275	276	275	275

B

	Chinn–Ito measure										Edwards measure									
	Full period					Globalization period					Full period					Globalization period				
	FDI	Equity	Debt	FDI + equity	FDI + equity	FDI	Equity	Debt	FDI + equity	FDI + debt	FDI	Equity	Debt	FDI + equity	FDI + equity	FDI	Equity	Debt	FDI + equity	FDI + equity
I. Industrial countries																				
Output	0.619***	0.636***	0.634***	0.637***	0.618***	0.707***	0.703***	0.704***	0.712***	0.704***	0.592***	0.617***	0.608***	0.617***	0.600***	0.725***	0.729***	0.723***	0.734***	0.729***
	[0.057]	[0.049]	[0.048]	[0.049]	[0.049]	[0.037]	[0.026]	[0.031]	[0.028]	[0.040]	[0.057]	[0.046]	[0.047]	[0.047]	[0.049]	[0.046]	[0.037]	[0.039]	[0.039]	[0.043]
Output × interaction[a]	0.010	− 0.039*	− 0.005	− 0.019	− 0.088	− 0.089	− 0.081***	− 0.020*	− 0.054***	− 0.173*	0.065	− 0.020	0.005	− 0.007	− 0.055	− 0.022	− 0.042	− 0.004	− 0.027	− 0.181*
	[0.099]	[0.020]	[0.013]	[0.015]	[0.085]	[0.096]	[0.018]	[0.011]	[0.016]	[0.097]	[0.093]	[0.036]	[0.011]	[0.024]	[0.092]	[0.090]	[0.036]	[0.012]	[0.026]	[0.103]
Output × debt					0.043					0.065					0.034					0.070
					[0.052]					[0.057]					[0.049]					[0.055]
Output × de jure measure	0.085	0.073	0.084	0.069	0.093*	…	…	…	…	…	0.067	0.057	0.065	0.055	0.067	− 0.127*	− 0.120	− 0.125*	− 0.124*	− 0.095
	[0.055]	[0.059]	[0.053]	[0.056]	[0.052]	…	…	…	…	…	[0.044]	[0.050]	[0.039]	[0.048]	[0.040]	[0.066]	[0.070]	[0.072]	[0.070]	[0.067]
R2-adjusted	0.613	0.612	0.618	0.612	0.619	0.624	0.627	0.625	0.626	0.629	0.631	0.630	0.636	0.630	0.636	0.645	0.645	0.645	0.644	0.645
N	663	664	662	664	662	349	350	349	350	350	614	615	613	615	613	278	279	278	279	279
II. Emerging market economies																				
Output	0.739***	0.894***	0.773***	0.762***	0.719***	0.903***	1.019***	0.928***	1.003***	0.859***	0.650***	0.779***	0.673***	0.664***	0.623***	0.941***	1.001***	0.940***	1.000***	0.915***
	[0.069]	[0.072]	[0.078]	[0.069]	[0.080]	[0.124]	[0.076]	[0.105]	[0.083]	[0.096]	[0.094]	[0.099]	[0.109]	[0.093]	[0.114]	[0.093]	[0.069]	[0.122]	[0.074]	[0.134]
Output × interaction[a]	0.813***	1.143	0.166***	0.602***	0.357*	0.130	− 0.470	0.075	0.033	0.031	0.850***	1.052	0.140**	0.608**	0.381	0.167	0.012	0.050	− 0.006	0.018
	[0.181]	[0.909]	[0.047]	[0.153]	[0.175]	[0.270]	[0.684]	[0.057]	[0.231]	[0.188]	[0.249]	[1.112]	[0.059]	[0.217]	[0.296]	[0.367]	[0.887]	[0.064]	[0.301]	[0.313]
Output × debt					0.165***					0.131***					0.149**					0.066
					[0.043]					[0.043]					[0.058]					[0.066]
Output × de jure measure	− 0.029	− 0.099	− 0.087	− 0.044	− 0.106	0.027	− 0.040	− 0.041	− 0.061	− 0.049	0.084	0.051	0.069	0.083	0.038	− 0.050	− 0.049	− 0.028	− 0.084	− 0.057
	[0.062]	[0.076]	[0.073]	[0.068]	[0.064]	[0.125]	[0.087]	[0.084]	[0.087]	[0.082]	[0.086]	[0.101]	[0.092]	[0.091]	[0.091]	[0.094]	[0.081]	[0.091]	[0.083]	[0.090]
R2-adjusted	0.679	0.685	0.683	0.676	0.678	0.778	0.800	0.798	0.795	0.799	0.677	0.682	0.679	0.673	0.672	0.786	0.816	0.812	0.801	0.801
N	673	676	678	676	677	356	356	357	356	356	594	597	598	597	597	273	274	275	274	274

Note: This table shows the results of panel regressions with yearly data. For details of the regression specification, see Section 4. The standard errors robust to heteroscedasticity and within-country serial correlation are in brackets. Regressions also include country fixed effects and year dummies. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

[a] The interaction term is the de facto financial openness measure listed in each column.

implying a deterioration in risk sharing. In short, it is difficult to claim that financial globalization has had a beneficial effect on the amount of risk sharing around the world over the period 1960–2004.

The results look slightly more promising when we restrict our analysis to the period of globalization. The results in Table 1b indicate that higher levels of gross external assets and liabilities improve risk sharing for industrial countries and it is only for that group that the coefficients on the interaction terms with both of the de facto financial integration variables are generally significantly negative. The de jure measures are not associated with significant changes in the extent of risk sharing during the globalization period.[12] The statistically significant negative sign on the interaction with the stock of liabilities is preserved in regressions involving the full group of developing economies. However, in the case of emerging markets, financial integration appears to have no significant impact in the globalization period. These results are consistent with the stylized facts in Kose et al. (2007) that the risk sharing benefits of financial integration have accrued mainly to industrial countries over this period.

5. Why is there so little risk sharing?

The results that we have presented thus far suggest that the degree of international risk sharing is limited. Furthermore, only industrial countries seem to have attained clear benefits from financial integration in terms of improved risk sharing. Why is it that even emerging markets have not benefited much in this dimension, despite having liberalized their capital accounts and attained much higher levels of financial integration than other developing economies? In this section, we investigate the possibility that different types of capital flows may be more or less conducive to risk sharing, and emerging markets may just not be getting the "right" types of flows.[13]

To address the issue of whether specific types of financial flows (and corresponding stocks) are more conducive to attaining the risk sharing benefits of globalization, we now consider disaggregated measures of gross external assets and liabilities relative to GDP. In particular, we focus on stock measures (assets + liabilities) of foreign direct investment (FDI), Equity (portfolio equity), Debt (portfolio debt) and (FDI + Equity). We also examine the effects of (FDI + Equity) and Debt when we include them simultaneously. In all of our regressions, we control for de jure measures of financial integration as well. To make the coefficients comparable across regressions, we convert the Chinn–Ito and Edwards measures to 0–1 variables. We do this based on whether a country is below (0) or above (1) the median level of the respective de jure measure (within its country group) over a particular period. Our results in the previous section indicated sharp differences in risk sharing outcomes for industrial countries and emerging markets. Since these are the two groups of countries that have attained significant levels of de facto financial integration, we present results only for these two groups in order to conserve space.

The first panel of Table 2 present the results of panel regressions with these measures of the structure of external assets and liabilities and our benchmark IMF de jure measure for the full sample and

globalization periods. The results add to our previous findings by showing that particular forms of capital flows have not contributed to increased risk sharing during the full sample period. The only exception to this finding is equity in the case of industrial countries. In the case of emerging markets, the interaction coefficients associated with most forms of external capital are positive, suggesting that higher levels of de facto financial openness actually led to worse risk sharing outcomes for these economies. Of course, their levels of de facto integration were low during the pre-globalization period, so one should not make too much of these results.

The results for the globalization period are quite different. The interaction coefficients associated with Equity, (FDI + Equity) and (FDI + debt) are significantly negative for industrial countries, implying that higher de facto financial openness improves risk sharing outcomes. Interestingly, for emerging markets, neither stocks of FDI nor equity seem to help in sharing risk while debt stocks by themselves reduce the level of risk sharing during the globalization period.[14] Note that, despite these effects on risk sharing identified for particular forms of external capital stocks, the benchmark de jure measure of financial openness is not statistically significant in any of the specifications.

The remaining three panels of Table 2 repeat the same set of regressions with the BHL, Chinn–Ito and Edwards measures of de jure capital account openness, respectively. These results largely confirm our baseline findings. Different forms of capital flows do not appear to have a beneficial effect on the extent of risk sharing during the full sample period. In the globalization period, virtually all types of flows improve risk sharing outcomes for industrial countries. The de jure openness variables are rarely significant, except when we consider the Edwards measure. Based on this measure, it is de jure openness that has improved the degree of risk sharing attained by industrial countries. The Edwards measure is the most comprehensive of the de jure measures and includes country-specific information other than just formal capital account restrictions as reported to the IMF, which makes it a closer proxy for overall financial openness than the other de jure measures.

For emerging markets, the coefficients on the interaction with external debt stocks are positive, indicating an adverse effect on risk sharing, in all four regressions and statistically significant when de jure openness is proxied by the IMF or Chinn–Ito measures. Putting this result together with the fact that, until recently, debt liabilities dominated the external liability positions of emerging markets could explain why these economies have not attained the risk sharing benefits of financial globalization. However, it still leaves open the question of why the rising importance of FDI and portfolio equity stocks has not yet resulted in a marked improvement in risk sharing achieved by these economies.[15]

6. Conclusion

In this paper, we examined the implications of increased financial integration for the patterns of international risk sharing among different groups of countries using a variety of empirical approaches. First, we examined the evolution of the extent of risk sharing as measured by changes in the comovement between idiosyncratic components of the growth rates of consumption and output. The

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[12] Since most industrial countries undertook equity market liberalizations before the start of the globalization period, the BHL measure is unchanged over this period and drops out of the panel regression for this group of countries.

[13] Other theoretical explanations for the low degree of risk sharing include: the importance of non- traded goods and the prevalence of large preference shocks; the dearth of financial instruments for efficiently sharing macroeconomic risk (Heathcote and Perri, 2002); and large transaction costs associated with international trade of goods and assets (Obstfeld and Rogoff, 2001). Lewis (1996, 1999) finds that neither nonseparabilities between consumption and leisure, nor the inclusion of capital controls, nontradables and/or durable goods, accounts for imperfect risk sharing but she also reports that when she considers both nonseparabilities and certain types of controls, risk sharing cannot be rejected. Consistent with our findings, these studies suggest that, even after controlling for various factors, the risk sharing prediction of the standard models has often been rejected. For a survey of these explanations, see Kose et al. (2007).

[14] These results may be related to the empirical link between exposure to short-term debt and the likelihood of financial crises (see Rodrik and Velasco, 2000; Berg et al., 2004).

[15] Kose et al. (2006) report that the share of debt in gross stocks of foreign assets and liabilities has declined from 75% in 1980–84 to 59% in 2000–2004 in a group of 71 developed and developing countries. For emerging markets, the share of FDI and portfolio equity has risen from a total of 13% in 1980–84 to 37% in 2000–2004, while the share of debt has declined from 78% to 47% over the same period. In the process of accumulating massive foreign exchange reserves, emerging markets have recently been buying large quantities of industrial country government bonds; these may not be conducive to efficient international risk sharing.

results suggest that industrial countries share more of their idiosyncratic consumption risk through their integration with global capital markets than do emerging market economies. Moreover, industrial countries have been able to increase the extent of risk sharing in the globalization period while emerging market economies have not been able to attain any such benefits. Second, we directly analyzed the impact of integration with global financial markets on the extent of risk sharing a country is able to attain. We find only limited evidence suggesting that financial integration has helped improve risk sharing outcomes in industrial countries, and no evidence that it has done so for emerging markets.

These congruent results point to an interesting puzzle. Theory predicts that financial integration should allow countries to improve the extent of international risk sharing by diversifying their idiosyncratic income risk. Contrary to theoretical predictions, however, emerging market economies – which have eliminated various controls on capital account transactions and experienced a significant increase in international financial flows during the past two decades – have been unable to enjoy the risk sharing benefits of financial globalization. We examined whether the composition of external capital stocks could explain this puzzle, and found that, in general, FDI and portfolio equity stocks seem to improve risk sharing outcomes while debt stocks have the opposite effect. Only the latter result comes through strongly for emerging markets, however. De jure measures of financial integration generally have little effect on the degree of risk sharing during the period of globalization.

Our results suggest three avenues to be explored in future work. The puzzle we have identified in this paper might be related to a threshold effect in terms of how financial globalization improves risk sharing — only countries that are substantially integrated into global markets (in de facto terms) appear to attain these benefits. Indeed, Kose et al. (2003) document that the volatility of consumption growth relative to that of income growth, a crude alternative proxy for risk sharing, tends to increase at intermediate levels of financial integration, and then declines at higher levels of integration. This suggests that, in order to reap the risk sharing benefits of financial globalization, emerging markets and other developing countries need to become more integrated into global financial markets.

Another possibility is that, despite increased financial integration, there are other characteristics of certain countries – either structural features or policies – that preclude them from attaining improved risk sharing through financial integration. Our preliminary results indicate that this explanation does not work well (see Kose et al., 2007), but this hypothesis warrants a more careful investigation.

A third reason for the inability of emerging market economies to attain the presumed risk sharing benefits of financial integration is that capital flows to emerging market economies tend to be procyclical — they increase in good times and fall in bad times (see Kaminsky et al., 2004). The very feature of procyclicality might be preventing emerging markets from utilizing these flows to smooth their consumption fluctuations. Since flows to these economies are shifting away from debt – which tends to be more procyclical – to FDI and portfolio equity flows – which tend to be more stable – it is possible that the risk sharing benefits of international financial integration will become more apparent for emerging markets in the future.

Appendix. List of countries

The sample comprises 69 countries — 21 industrial and 48 developing.[16]

Industrial countries

Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), Denmark (DNK), Finland (FIN), France (FRA), Germany (DEU), Greece (GRC), Ireland (IRL), Italy (ITA), Japan (JPN), Netherlands (NLD), New Zealand (NZL), Norway (NOR), Portugal (PRT), Spain (ESP), Sweden (SWE), Switzerland (CHE), United Kingdom (GBR), and United States (USA).

Developing countries[17]

These countries are grouped into Emerging Markets (21) and Other Developing Countries (27).

Emerging Market Economies

Argentina (ARG), Brazil (BRA), Chile (CHL), China (CHN), Colombia (COL), Egypt (EGY), India (IND), Indonesia (IDN), Israel (ISR), Jordan (JOR), Korea (KOR), Malaysia (MYS), Mexico (MEX), Morocco (MAR), Pakistan (PAK), Peru (PER), Philippines (PHL), South Africa (ZAF), Thailand (THA), Turkey (TUR), and Venezuela (VEN).

Other Developing Countries

Algeria (DZA), Bolivia (BOL), Cameron (CMR), Costa Rica (CRI), Cote d'Ivoire (CIV), Dominican Republic (DOM), Ecuador (ECU), El Salvador (SLV), Fiji (FJI), Gabon (GAB), Ghana (GHA), Guatemala (GTM), Haiti (HTI), Honduras (HND), Iran (IRN), Jamaica (JAM), Mauritius (MUS), Nicaragua (NIC), Papua New Guinea (PNG), Paraguay (PRY), Senegal (SEN), Sri Lanka (LKA), Togo (TGO), Trinidad and Tobago (TTO), Tunisia (TUN), Uruguay (URY), and Zimbabwe (ZWE).

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[16] We excluded from the analysis small countries (those with population below 1 million), transition economies, major oil producers, and other countries with incomplete or clearly unreliable data.

[17] Hong Kong, Panama, and Singapore were excluded from the analysis because these countries are financial hubs and are therefore outliers in terms of standard measures of de facto financial integration.

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