How Does Financial Globalization Affect Risk-Sharing? Patterns and Channels

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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 a comprehensive evaluation of the patterns of risk sharing among different groups of countries and examine how international financial integration has affected the evolution of risk-sharing 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. The most interesting result is that even emerging market economies, which have witnessed large increases in cross-border capital flows, have seen little change in their ability to share risk. We find that neither the composition of flows nor country characteristics— including policies, institutions and financial market development—can explain why emerging markets have not been able to realize this presumed benefit of financial globalization.

I. Introduction

In theory, one of the main benefits of financial globalization is that it provides increased opportunities for countries to smooth consumption growth in the face of idiosyncratic fluctuations in income 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 efficiently. Thus, financial globalization should generate welfare gains by reducing the volatility of aggregate consumption and also, by delinking national consumption and income (see Kose, Prasad, Rogoff, and Wei, 2006).

There is a substantial literature examining patterns of risk sharing among advanced industrial economies (notable contributions include Obstfeld, 1994, 1995; Lewis, 1996, 1997; Sorenson 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 some conflicting results. While some studies suggest that it has increased during the recent period of globalization (e.g., Sorensen, Yosha, Wu and Shu, 2006; Artis and Hoffman, 2006; Giannone and Reichlin, 2006), others have found little evidence of better risk sharing among industrial economies (see Moser, Pointner, and Scharler, 2004; Bai and Zhang, 2005).

The literature on risk sharing patterns for non-industrial economies is relatively sparse. Obstfeld (1994) and Lewis (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 clearly 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

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[1] Recent research indeed finds that developing countries can enjoy large welfare gains from international risk sharing (see Pallage and Robe, 2003; Prasad, Kose, Rogoff and Wei, 2003).

international risk sharing. First, we extend the analysis to a large group of emerging markets and other developing economies, and investigate the extent of risk sharing in 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 changes to increased financial flows and other factors, including country characteristics. 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 main conclusion is that, notwithstanding the clear theoretical prediction that financial globalization should foster increased risk sharing across all countries, there is no evidence that this is true for developing countries. Even for the group of emerging market economies—which have become far more integrated into global markets than other developing countries—financial globalization has not improved the degree of risk sharing. For advanced industrial economies, there is indeed some evidence that risk sharing has improved in the last decade and a half. Our formal econometric analysis confirms that increased financial openness improves risk sharing among industrial economies, but this effect is absent for the other two groups of countries.

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 largely on less stable forms of financial flows such as bank loans and other forms of debt that may not allow for efficient risk sharing. However, when we break up capital inflows into different categories—FDI, portfolio equity, portfolio debt etc.—we find little evidence that the composition of flows makes much of a difference in terms of the ability of developing countries to share risk.

Another possibility is that the combination of domestic financial liberalization and international financial integration could generate phenomena such as consumption booms that can end badly, especially when they are financed by debt accumulation. The inefficient intermediation of foreign finance by underdeveloped financial systems that exist in many developing countries may be another reason. In our empirical work, we attempt to explore

the relationship between domestic financial development and financial integration in terms of risk sharing outcomes. We also look at whether other factors such as trade openness and institutional quality systematically affect risk sharing outcomes. None of these factors seems to be a major determinant of differences in the degree of risk sharing outcomes across different groups of countries (or of changes over time within specific groups of countries).

One interpretation of our results is that there is a threshold effect in terms of how financial globalization improves risk sharing, in that only countries that are substantially integrated into global markets (in de facto terms) appear to attain these benefits. Indeed, Kose, Prasad, and Terrones (2003) document that the volatility of consumption growth relative to that of income growth, a crude measure of risk-sharing, tends to *increase* at intermediate levels of financial integration.[2]

In section II, we present a survey of theoretical arguments linking increased financial integration to improvements in the degree of consumption risk sharing. In section III, we provide a summary of the rich empirical literature about the changes in the dynamics of risk sharing in response to the increase in international financial flows. Next, we discuss the main features of our dataset. This is followed in section V by a set of basic stylized facts concerning the evolution of correlations of output and consumption growth. In section VI, we examine how the degree of risk sharing has changed over time using various regression models. We then turn our attention to the direct impact of financial globalization on the degree of risk sharing using panel regressions in section VII. Next, we analyze the roles played by the composition of flows and certain country characteristics in explaining the inability of emerging markets in enjoying the risk sharing benefits of financial globalization in section VIII. We conclude with a brief summary of our findings in section IX.

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[2] This threshold effect may be related to the fact that emerging market countries seem more prone to financial crises, although there is little evidence that financial openness by itself is a proximate contributor to most of these crises (see Edwards, 2005; Glick, Guo and Hutchison, 2006).

II. International Consumption Risk Sharing in Theory

Theoretical models in open economy macroeconomics and international finance yield clear predictions about the impact of financial integration on risk sharing. These predictions are particularly helpful in assessing the extent of risk sharing observed in the data. We first summarize the predictions of theory about the impact of financial integration on the patterns of international consumption and output correlations. Since most of these theoretical predictions turn out not to be supported by the data, we then discuss some extensions of the basic models to account for the empirical facts. Next, we briefly survey theoretical predictions about the volatility of consumption and portfolio decisions considering that these involve different approaches to measuring the impact of financial globalization on international risk sharing.[3]

II.1. Theoretical Predictions Regarding Output and Consumption Correlations

Standard intertemporal open economy models yield predictions about the effects of financial integration on risk sharing, as measured by correlations of consumption. In particular, dynamic stochastic general equilibrium (DSGE) models have been able to generate more concrete quantitative predictions along these lines. These models predict that, in the absence of trade in goods and financial assets (the case of autarky), consumption should be perfectly or highly correlated with domestic output, depending on the formulation of the utility function and possibilities for intertemporal smoothing through investment (or storage technologies). Another prediction is that correlations of domestic consumption with world output would be less than unity provided that output is not perfectly correlated across countries (see Backus, Kehoe, and Kydland, 1995, and Pakko, 1998).[4] These predictions provide a benchmark for assessing the pattern of correlations in an environment with no economic (financial or trade) integration. The first set of stylized facts we present in the next section focuses on these predictions.

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[3] Some recent studies show how different manifestations of imperfect risk sharing could be closely related. For example, Sorenson, Yosha, Wu and Zhu (2006) emphasize the connection between the home bias puzzle and the imperfect consumption risk sharing puzzle.

[4] If consumption was the only argument in the utility function, the correlation between consumption and output would be equal to one. If the utility function included another argument, such as leisure, than the correlation would be less than one, but would still be very high.

In contrast with the case of autarky, in a scenario with complete markets that enable perfect risk sharing, it should be possible to decouple fluctuations in consumption from those of output, yielding lower correlations between domestic consumption and national output. Cross-country correlations of consumption growth rates would be predicted to be perfect or very high, depending on the formulation of the utility function in DSGE models with complete markets. Moreover, consumption fluctuations across countries would be more correlated than those of output. These models also predict that correlation of consumption growth with the growth of world output would be higher than that with domestic output (see Pakko, 1996).[5]

However, earlier studies document that the observed correlations of output and consumption are not compatible with the predictions of the DSGE models. For example, Backus, Kehoe, and Kydland (1992) study the risk sharing implications of a standard two-country DSGE model with exogenous productivity shocks. In the model, representative agents in each country are able to share risk internationally by diversifying their idiosyncratic income risk. The model predicts very high cross-country consumption correlations that are higher than those of output correlations. Contrary to these predictions, the data suggests that cross-country consumption correlations are rather low and, in most cases, are lower than output correlations, Backus, Kehoe, and Kydland (1992) refer to this apparent inconsistency as "the quantity anomaly".

II.2. Explaining Imperfect Risk Sharing in Theory

As we discuss in the next section, a number of empirical papers test the risk sharing implications of theory and show that they are mostly rejected by data. We briefly discuss some of the leading theoretical explanations for the low degree of risk sharing below.

● *Non-tradable and durable goods*. Non-traded goods and durable goods constitute a significant fraction of total consumption. Models with non-traded goods are able to produce lower predicted correlations even in the presence of perfect risk sharing, if they are

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[5] As discussed by Pakko (1996), some earlier studies also point to this last observation in different contexts. For example, Lucas (1982) provides a discussion about this observation. In a closed economy framework, Mace (1991) reports a similar finding, noting that there is a positive correlation between individual consumption and aggregate consumption.

augmented with large preference shocks (see Backus and Smith, 1993; Stockman and Tesar, 1995; Canova and Ubide, 1997). However, the empirical evidence supporting the relevance of large preference shocks in generating business cycles appears to be quite weak. The lumpiness of durables purchases, as opposed to the services derived from durables, may also make consumption expenditures more correlated with output even in an environment with risk sharing.

● *Market incompleteness*. International financial markets are incomplete as it is not possible to buy insurance against all future contingencies. The available range of instruments is in fact quite limited. Moreover, one could argue that since it is not possible to trade financial instruments on a broad measure of national output, it is normal to expect less than perfect consumption correlations across countries (see Shiller, 1993; Athanasoulis, Shiller, and van Wincoop, 1999). Models with incomplete asset markets are shown to be more successful in generating the rankings of cross-country consumption and output correlations, although these models also require some strong assumptions to match certain features of the data (see Baxter, 1995; Heathcote and Perri, 2001).

● *Transaction costs.* If transaction costs associated with international trade of goods and assets are large, it is possible that domestic residents may not find it beneficial to diversify risk. This could be another reason for the low consumption correlations in the data. Recent models with trade costs--such as transportation costs, tariffs and non-tariff barriers-- are able to produce relatively lower cross-country output and consumption correlations (see Obstfeld and Rogoff, 2001; Ravn and Mazzenga, 2004; Kose and Yi, 2006). Bai and Zhang (2005) argue, however, that trade transactions costs cannot by themselves account for imperfect risk sharing since the risk sharing benefits of financial integration could be realized only if international financial flows are much larger than their current levels.

II.3. Theoretical Predictions Regarding Consumption Volatility

Theory suggests that financial integration should reduce the volatility of consumption (relative to output or income). In particular, if output fluctuations are not perfectly correlated across countries, it is possible to show that trade in financial assets can be used to delink national consumption levels from the country-specific components of output fluctuations in a DSGE model with complete markets, which should make consumption growth less volatile

relative to income growth. From a time series perspective, increasing financial integration should lead to declining relative volatility of consumption growth.

Contrary to these predictions of theory, Kose, Prasad and Terrones (2003) document that the volatility of consumption growth relative to that of income growth increased for emerging market economies in the 1990s, even as these countries were becoming more financially integrated. These authors also find that increasing financial openness is associated with rising relative volatility of consumption only up to a threshold. Beyond a certain level of financial integration, an increase in integration reduces the relative volatility of consumption. In other words, the benefits of financial integration in terms of improved risk-sharing and consumption smoothing possibilities appear to accrue only beyond a threshold level of financial integration—the evidence suggests that it is almost entirely just industrial countries that are beyond this threshold level of integration.

A number of recent theoretical papers have attempted to explain the positive association between financial integration and the relative volatility of consumption growth. For instance, Levchenko (2005) and Leblebicioglu (2006) consider dynamic general equilibrium models where only some agents have access to international financial markets. In both models, financial integration leads to an increase in the volatility of aggregate consumption since agents with access to international financial markets stop participating in risk-sharing arrangements with those who do not have such access.[6]

II.4. Theoretical Predictions Regarding Portfolio Decisions

One of the main implications of finance theory is that investors in advanced countries should hold a much larger fraction of their wealth in foreign stock markets than observed in practice to fully utilize the risk sharing benefits of these markets (see Lewis, 1999). Contrary to the predictions of the theory, empirical evidence suggests that national portfolios of industrialized economies display a noticeable "equity home bias" as domestic investors hold most of their wealth in domestic assets even though they could get a higher return with a reduced portfolio risk through a higher degree of diversification across national stock markets. The extent of home bias is illustrated by the fact that more than 90 percent of

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[6] Other papers on this issue include Pintus (2004), Pisani (2005), Ventura (2006) and Evans and Hnatkovska (2006).

aggregate stock-market wealth is invested in domestic equities in the United States, Canada and Japan in the early 1990s and roughly 80 percent in the UK and Germany.[7]

As discussed extensively in Lewis (1999) and Obstfeld and Rogoff (2001), the equity home bias puzzle remains a major challenge in the international finance literature. Some recent papers analyze how labor income risk and non-traded goods could help resolve the home bias puzzle (see Baxter and Jermann, 1997; Pesenti and van Wincoop, 2002; and Heathcote and Perri, 2004). The composition of foreign assets in several advanced countries seems to be affected by geographical proximity, trade linkages and institutional considerations (see Tesar and Werner, 1995). Informational asymmetries could also lead to home bias as investors tend to trade a smaller volume of financial assets of distant countries/regions than that of domestic assets suggesting that informational asymmetries may be important in explaining the home bias puzzle (see Portes and Rey, 2005).

III. Empirical Studies on International Risk Sharing

There is a rich empirical literature studying various dimensions of international consumption risk sharing. We divide the studies in this literature into three categories. The first category includes studies focusing on the patterns of international correlations of output and consumption to determine the degree of consumption risk sharing. The second comprises studies that test the hypothesis of perfect risk sharing with the help of regression models. The third category includes studies that employ various regression models to measure the extent of risk sharing and to examine the impact of financial flows on the degree of risk sharing. Our paper is closely related to those in the last category, although our empirical work encompasses the first two approaches as well.

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[7] Koo, Stulz, and Warnock (2006), Baele, Pungulescu and Ter Horst (2006), and Sorenson, Yosha, Wu and Zhu (2006) provide some recent estimates about the extent of home bias, suggesting that there has been a decrease in the degree of home bias for several countries during the late 1990s.

III.1. Studies on the Patterns of Output and Consumption Correlations

Numerous studies have documented a variety of stylized facts associated with the patterns of comovement of output and consumption in order to examine the extent of risk sharing. These studies differ in terms of country coverage (developed versus developing), the correlations that they focus on (cross-country consumption correlations versus correlations of consumption with a global aggregate), and empirical techniques (simple correlations versus more sophisticated measures of comovement).[8] We briefly summarize some of the studies most relevant to our analysis.

Obstfeld (1994, 1995) documents the cross correlations of consumption and output growth rates between individual countries and the rest of the world using PWT data for a group of developed and developing countries over the period 1950-1988. He finds that correlations of consumption growth rates are lower than those for output for the majority of the countries. His results also indicate that there was an increase in these correlations after 1973 for most of the industrial countries in his sample. Obstfeld (1995) interprets this increase as an indication of increased international trade in financial assets after 1973.

Pakko (1998) studies cross-country consumption and output correlations using two different datasets, PWT and OECD. The former dataset covers the period 1950-1990, while the latter goes from 1955 to 1993. His findings indicate that there is mixed support for the result that cross-country output correlations are higher than consumption correlations since these statistics are sensitive to the dataset and to the detrending method used. His results also suggest that correlations between consumption and domestic output are generally higher than those between consumption and world output, contrary to the predictions of theory.

Ambler, Cardia, and Zimmermann (2004) undertake a comprehensive analysis of cross-country correlations over the period 1960-2000 using quarterly OECD data. They find that cross-country consumption correlations are quite low even in the period 1973-2000. Canova and Ravn (1997), using quarterly data for nine OECD countries for the period 1960-1990, find that consumption correlations are significantly different from unity in almost all country pairs. They also find that the correlations are sensitive to the method of detrending.

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[8] See Backus, Kehoe, and Kydland (1995) and Baxter (1995) for summaries of earlier papers analyzing certain features of business cycles.

Kose, Prasad, and Terrones (2003) employ annual data over the period 1960-1999 for a sample of 76 countries—21 industrial and 55 developing—to examine the correlations of output and consumption growth rates in each country with the growth rates of the composite measures of world output and consumption. They document that, on average, industrial countries have stronger output and consumption correlations with world aggregates than developing economies. They also report that consumption correlations are typically smaller than output correlations. For industrial countries, these correlations on average increase sharply in the 1970s and rise further in the 1990s. For developing countries, they appear to decline in the 1990s.[9]

Kose, Otrok, and Whiteman (2003) provide further empirical evidence about the extent of imperfect consumption risk sharing employing a dynamic factor model. Using the data for 60 developed and developing countries for the period 1960-1990, they find that the common factors--the world and regional factors--together account for a larger share of fluctuations in output growth than in consumption growth. This result implies that in most countries the country-specific factors play a more important role in explaining consumption movements than the world and regional factors.

Taken as a whole, the results of this vast literature indicate that the theoretical predictions regarding perfect risk sharing do not have much empirical support. First, empirical studies indicate that the correlations between the consumption paths of various countries are relatively low. Second, these correlations are lower than those of output. Third, correlations between consumption and domestic output are generally higher than those between consumption and world output.

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[9] Recent studies focusing on the time profile of cross-country correlations of output and consumption have been unable to reach a clear conclusion. For example, some of these studies document that there has been a decrease in these correlations among industrial countries (see Heathcote and Perri (2002), Olivei (2000), and Otto, Voss, and Willard (2001)). Others find that there has been no discernible change over time (see Doyle and Faust (2002), Helbling and Bayoumi (2002), and Stock and Watson (2003)). And a third group of studies documents that these correlations have become stronger over time (e.g., Kose, Prasad, and Terrones, 2003; Kose, Otrok, Whiteman, 2005; and Kose, Otrok, Prasad, 2006).

III.2. Studies on Tests of Perfect Risk Sharing

In addition to the basic stylized facts surveyed above, researchers have employed more rigorous methods to test the risk sharing implications of models with financial integration. These tests generally use some versions of reduced form solutions (or the first order conditions) of the models and focus on the links between various measures of domestic consumption and world consumption.[10]

Obstfeld (1995) examines the empirical links between domestic consumption growth and world consumption growth for the G7 economies. Based on the reduced form solutions of a simple endowment economy, he develops a test of the hypothesis of perfect consumption risk sharing. In particular, he runs a regression of the growth rate of domestic consumption on world consumption growth and national output growth. The model implies that the coefficient of world consumption should be one and that of national output should be equal to zero under perfect risk sharing. Using the PWT data, he studies two separate time periods, 1951-1972 and 1973-1988. His results suggest that that the hypothesis of perfect risk sharing is rejected in most cases during these periods.[11]

Lewis (1996, 1997) examines the roles played by nonseparabilities between tradables and nontradable leisure (or goods) and the restrictions on financial flows in explaining the lack of international risk sharing. In particular, she runs panel regressions of consumption growth on the growth rates of nontradable consumption, leisure, and idiosyncratic country factors. She finds that nonseparabilities between consumption and leisure, and the inclusion of nontradables and/or durable goods cannot explain imperfect risk sharing.

Lewis (1996) also analyzes the importance of restrictions on financial flows (capital controls) in explaining the limited international consumption risk sharing. In particular, she runs a regression of consumption growth on the domestic output growth interacted by the

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[10] Cochrane (1991) and Mace (1991) provide early examples of these types of tests using consumer level data and analyzing the extent of risk sharing between individual consumption and aggregate consumption.

[11] Canova and Ravn (1997) also test some basic implications of the theory utilizing the first order conditions of a simple representative agent economy. They show that monotonic transformations of aggregate consumption must be highly correlated across countries, even when preferences are time non-separable, when there are nonseparabilities across goods, when leisure choices are included, and when there are nontraded goods. They find that domestic consumption appears to be completely insured against idiosyncratic real, demographic, fiscal and monetary policy shocks, but it covaries with these variables over medium and long cycles.

measures of capital controls. She finds that while the tests of risk-sharing among countries with relatively loose capital controls are rejected, correlations between domestic consumption and output appear to be higher for countries with more restrictions. Her results suggest that nonseparabilities in utility between nondurable tradables and other components (nontradables and durables) are important in explaining the differences in the extent of risk sharing across countries with open and closed capital accounts.

III.3. Studies on the Channels and Extent of Risk Sharing

Although the empirical tests associated with the perfect risk sharing hypothesis discussed above have provided valuable information, they have been silent about the channels through which risk sharing takes place and about the extent of risk sharing. In a seminal paper, Asdrubali, Sørenson and Yosha (1996) develop a methodology that helps measure the extent of risk sharing achieved through different channels. In particular, they quantify the amount of risk sharing in the United States by decomposing the cross-sectional variance of gross state product data into various components representing different channels of risk sharing.[12] They find that roughly 40 percent of shocks to gross state product are insured by capital markets, 13 percent by the federal government, and 23 percent by credit markets. Sørenson and Yosha (1998) use the same methodology to analyze the patterns of international risk sharing among European Community and OECD countries. They document that approximately 40 percent of shocks to GDP are insured in both groups.[13]

Using the insights of Asdrubali, Sørenson and Yosha (1996), recent studies attempt to quantify the extent of international consumption risk sharing and how financial integration contributes to risk sharing over time. For example, Sørenson, Yosha, Wu and Zhu (2006) analyze the relationship between home bias and international risk sharing. Using data for countries, they document that the extent of international risk sharing has risen during the late 1990s while home bias in debt and equity holdings has declined. They analyze the temporal

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[12] Their paper is also related to the rich research program that has focused on the extent of risk sharing using the data of economic regions within a country (see Hess and van Wincoop, 2002). Evidence from this research indicates that intranational risk sharing is also imperfect but the degree of intranational risk sharing is greater than that of international one.

[13] Kalemli-Ozcan, Sørenson and Yosha (2006) study the evolution of risk sharing in the European Union using the same methodology. Kalemli-Ozcan, Sørenson and Yosha (2001a, 2001b) consider the empirical links between risk sharing and industrial specialization.

changes in the dynamics of income and consumption smoothing using cross-sectional and panel regressions. In particular, they estimate a cross-section regression of idiosyncratic GNP growth (the deviation of GNP growth from that of the OECD group) on idiosyncratic GDP growth (in each year) to trace the evolution of income smoothing over the period 1993-2003. They run similar regressions to study the changes in the extent of consumption risk sharing by regressing idiosyncratic consumption growth on idiosyncratic GDP growth. Both of these regressions point to an increase in the degree of income smoothing and consumption risk sharing in the late 1990s.

They also run panel regressions to evaluate the impact of increased financial integration on the extent of income smoothing and consumption risk sharing. In particular, they estimate a regression of idiosyncratic GNP (consumption) growth on idiosyncratic GDP growth interacted with a measure of financial openness to analyze how the degree of income smoothing (consumption risk sharing) has been changing over time in response to the increase in financial flows. They find that there is a positive association between foreign portfolio assets and the extent of income risk sharing. In addition, they document that FDI holdings and the degree of consumption risk sharing appear to be positively correlated.

Giannone and Recihlin (2006) study the risk sharing implications of European integration using regression models similar to the one in Sørenson, Yosha, Wu and Zhu (2006). Using the consumption and output data of the EU members, they document an increase in the extent of risk sharing among European countries during the early 1990s when financial integration in Europe started gaining momentum. Their results are stronger for longer horizons implying that the countries have used financial markets more effectively to insure against relatively more persistent shocks.

Artis and Hoffmann (2006a) examine the extent of consumption risk sharing among the OECD, EU, and EMU country groups in the 1980-2000 period using an approach similar to that of Sørenson, Yosha, Wu and Zhu (2006). Artis and Hoffman argue that, in order to capture the low-frequency comovement of output and consumption, the risk sharing regressions used by Sørenson et al. should be modified. In particular, they suggest employing regression models based on the levels of consumption and output rather than their growth

rates. They refer to the regression estimates based on the levels as measures of the extent of long-run consumption risk sharing.[14]

Contrary to the results in Sørenson et al., Artis and Hoffman (2006) claim that they cannot find any increase in the extent of risk sharing over time among the OECD, EU, and EMU country groups when they estimate cross-section regressions based on the growth rates of consumption and output. However, when they employ regressions based on the levels of the same variables, they are able to show a noticeable increase in international consumption risk sharing among all the country groups. Similar to the findings in Sørenson et al., they find that countries with higher degrees of financial integration (measured by the amount of international financial assets they trade) appear to share income risk to a greater extent.

Some studies focus on the regression framework used by Ostfeld (1994) to evaluate the extent of risk sharing over time. For example, Bai and Zhang (2005) run a regression of domestic consumption growth on world consumption growth and national output using data for 21 industrial and 19 developing countries for the periods 1973-1985 and 1986-1998. They find that there is no significant change in the regression coefficients over the two periods and conclude that the extent of risk sharing has been constant over these two periods. Moser, Pointner and Scharler (2003) run the same regression for 15 European Union countries and formally test the stability of regression coefficients over time to analyze the changes in the degree of risk sharing. They do not find any break points in the regression coefficients over the period 1960-2002. They interpret these results as indicating the absence of any improvement in the extent of risk sharing.

Another branch of the literature analyzes how international correlations of output and consumption have been affected by financial globalization. For example, Kose, Prasad, and Terrones (2003) employ various panel regression models to examine the factors that influence output and consumption correlations of individual country macroeconomic aggregates with the corresponding world aggregates. Their results indicate that actual gross capital flows—a measure of de facto financial integration—have no significant impact on output correlations. In the case of consumption correlations, they report even weaker

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[14] Artis and Hoffman (2006a, 2006b) and Becker and Hoffman (2003) provide details of the approach to measuring risk sharing in the long run.

findings. They conclude that there is little evidence that financial globalization has influenced consumption comovement across countries.[15]

IV. Dataset

We examine patterns of international consumption risk sharing using a large dataset that includes industrial as well as developing countries. The basic data are taken from the Penn World Tables (PWT; see Heston, Summers, and Aten, 2002 for a description of the dataset). Per capita real GDP, real private consumption, and real public consumption constitute the measures of national output, private consumption and government consumption. All data are in constant (1996) international prices. Since the PWT covers only the period 1960-2000, we extend the data through 2004 using the World Development Indicators (WDI). For the measures of financial integration, we rely on the External Wealth of Nations Database (Lane and Milesi-Ferretti, 2006). Data on institutional quality are based on the International Country Risk Guide and data on domestic credit to the private sector are from Beck et. al. (2000). We combine information from these different sources to construct a dataset comprising annual data over the period 1960–2004 for 72 countries.

Country Groups

We divide our sample of countries into two groups--industrial (21 countries) and developing (51 countries). The group of industrial countries corresponds to a sub-sample of the OECD economies for which data used in the empirical analysis are available. We further divide developing countries into two coarse groups—emerging market economies (EMEs) and other developing countries. There are 23 EMEs and 28 other developing economies in our sample. As we discuss in the next section, the EMEs account for a substantial fraction of net capital flows from industrial to developing countries in recent decades.[16]

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[15] Imbs (2006) uses a simultaneous equation approach to examine the impact of trade and financial flows on cross-country output and consumption correlations. His results suggest that the impact of financial flows on output correlations is larger than that on consumption correlations.

[16] This classification results in a set of EMEs that roughly corresponds to the group included in the MSCI emerging markets stock index.

Demarcation of Time Periods

It is essential to isolate the impact of common shocks from that of financial globalization in order to evaluate the effects of globalization on international consumption risk sharing. We consider the period from 1960 to 2004 as being composed of three distinct sub-periods. The first period, 1960-1972, corresponds to the Bretton Woods (BW) fixed exchange rate regime for the major industrial countries. This sub-period is characterized by the steady nature of growth and relatively mild business cycles around the world. The second period, 1973-1986, witnessed a set of common shocks associated with sharp fluctuations in the price of oil and contractionary monetary policy in major industrial economies. Of course, the first and second periods are also different because of the difference in exchange rate regime.[17] The third period, 1987-2004, represents the globalization period in which there were dramatic increases in the volumes of cross-border trade and financial flows.

From the perspective of understanding the effects of globalization on risk sharing, the third period is of the most interest. As documented by Kose, Prasad, Rogoff, and Wei (2006), private capital flows from industrialized economies to developing economies have increased dramatically since the mid-1980s, with the bulk of this increase going to the emerging market economies. This increase in trade and financial flows has been fueled by a series of trade and financial liberalization programs undertaken since the mid-1980s. Roughly 30 percent of the countries in our sample had liberalized their trade regimes in 1986; by 2004, this share had risen to almost 85 percent. The share of countries with open financial accounts rose from 20 percent to about 55 percent over this period.

V. Basic Stylized Facts: Correlations of Output and Consumption

We begin by providing a broad overview of the basic stylized facts about domestic and international correlations of the growth rates of output and consumption. We then study the temporal evolution of these correlations for evidence of whether the degree of risk sharing has changed as a result of rising financial linkages.

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[17] However, it is debatable whether (and how) the monetary regime affects the properties of business cycles in main macroeconomic aggregates. For example, Baxter and Stockman (1989), Baxter (1991), and Ahmed et. al. (1993) find that different exchange rate regimes do not result in significant changes in the behavior of the main macroeconomic aggregates. On the other hand, Gerlach (1988) concludes that the exchange rate regime does have an impact on the stylized business cycle facts.

The four theoretical predictions documented in section II guide us to the relevant correlations to examine. In a complete markets framework with perfect risk sharing: (i) domestic consumption is only weakly correlated (or uncorrelated) with national output; (ii) cross-country correlations of consumption are equal to unity (or are very high)[18]; (iii) cross-country correlations of consumption are much higher than those of output; and (iv) domestic consumption is more highly correlated with world consumption than with national output.

As countries become more integrated into global financial markets and effectively use them for risk sharing purposes, one would expect the differences between theoretical predictions and data to become smaller. To get at this issue, in addition to the correlations for the full sample (1960-2004), we examine the correlations in specific sub-periods and changes over time in different sets of correlations.

Correlations across Domestic Macroeconomic Aggregates

The first panel in Table 1 (column 2) shows the cross-sectional medians of the correlations of private, public, and total consumption growth with the growth rate of output for the full sample. For instance, we compute the relevant correlation for each country over the full sample and then report the cross-sectional median of those country-specific correlations in column 2. The medians of private consumption correlations with output appear to be quite high, between 0.6 and 0.7, for all country groups. The median correlation between private consumption and output is higher than that between public consumption and output in all country groups. Total consumption is more correlated with output than it is with private consumption in emerging markets. This is primarily driven by the high correlation between public consumption and output—probably a manifestation of procyclical fiscal policies employed in emerging market economies (Kaminsky, Reinhart and Vegh, 2004).

Correlations of private consumption with output are stable for the group of industrial countries over the three sub-periods (Panel 1). After the BW period, these correlations increase for emerging markets and decline for other developing countries. Between the

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[18] As we discussed earlier, in a complete markets model, cross-country consumption correlations would be unity if consumption were the only argument of the utility function. If another argument, such as leisure, nontraded goods, and preference shocks, was introduced into the utility function, the cross-country consumption correlation would be less than unity, but it would still be very high if markets were complete.

common shocks and globalization periods, however, there is little change in median correlations for any of the groups.[19] Public consumption is more correlated with output in developing countries than it is in industrial economies (Panel 2). These correlations have increased among industrial economies in the globalization period (relative to the earlier periods), while they remain quite stable in other country groups. The temporal evolution of correlations between total consumption and output is quite similar to that of correlations between private consumption and output (Panel 3).

To examine the evolution of these correlations in a more general manner, Figure 1 shows the median correlations of the growth rate of output with that of private consumption, public consumption and total consumption computed over a 9-year rolling window for each country group. These figures are consistent with the broad patterns described in Table 1, suggesting that the breakdown of the data into specific time periods is not driving the results. In the case of the correlations between private consumption and output, there appears to be an upward trend in emerging markets while they are generally stable over time among the industrial countries.

These results are suggestive of the low levels of international risk sharing, even during the period of globalization. Emerging market economies appear not to have been able to decouple the fluctuations in their private consumption from those in domestic output even though they have registered a significant increase in trade of international financial assets. Even among industrial economies, there appears to be limited change in the degree of comovement between domestic consumption and national output.

International Correlations

We now turn our attention to the correlations of output and consumption growth rates in each country with the growth rates of the composite measures of the respective world aggregates.[20] Table 2 shows that, on average, industrial countries have stronger correlations

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[19] We experimented with sub-periods with shorter lengths and computed means rather than medians of correlations. Neither of these had much impact on the findings reported here.

[20] The world aggregates are proxied, in this section, by the industrial country aggregates in per capita terms. These aggregates are the same across developing countries, including emerging market economies, but vary across industrial countries. In an attempt to control for the large size of some of these economies, the industrial aggregate for country i is calculated with data from the other industrial

with world aggregates than developing economies over the full sample (column 2). For industrial countries, output correlations increase sharply in the common shock period and rise further in the period of globalization. In the case of emerging markets and developing countries, these correlations have registered a slight decrease in the globalization period.

Contrary to the predictions of theory about perfect risk sharing environments, for all groups of countries the correlations of private consumption with world consumption are far less than unity and in most cases are quite low. Moreover, in an even more striking contrast with theoretical predictions, correlations of private consumption are lower than those of output for all country groups.

Have these correlations changed over time? Correlations of private consumption on average slightly increase in the globalization period for industrial countries, but they do not change much for the other groups. Most of the consumption correlations for developing countries hover around zero which could be an indication of persistent noise associated with measuring consumption in these countries. Correlations of public consumption exhibit similar patterns.

Figure 2 presents the median correlations of growth rates of output, private, public, and total consumption for the three groups of countries with the growth rates of corresponding world aggregates computed over a 9-year rolling window. These figures are generally in line with the patterns described earlier, suggesting that the split of the data in Table 2 into specific time periods has no substantial impact on the results. For industrial countries, there has been an increase in both output and private consumption correlations over time. The figures for emerging market countries show that these correlations have been declining over the period 1970-1990, but they have started to increase in the early 1990s.

Figure 3 provides a different view of the evolution of correlations and presents all of the correlations for a particular group of countries in one panel. In particular, these figures are helpful in understanding how the extent of the quantity problem has changed over time. Recall that the quantity problem refers to the inability of DSGE models to produce cross-country consumption correlations that are higher than those of output. Although this problem

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countries. The use of industrial aggregates as proxy of world aggregates is justified because most international financial flows are with these countries and, thus, risk sharing is more likely to be observed with this country group.

is quite apparent in both industrial countries and emerging markets, it has become more severe for the emerging market economies after the early 1990s as the gap between output and consumption correlations has begun to widen for this group.

Another implication of theory is that the correlation between domestic consumption and domestic output is lower than that between domestic consumption and world output. Is this the case in the data? Figure 4 shows the median correlations between growth rates of domestic consumption and output and between the growth rates of domestic consumption and world output computed over 9-year rolling windows for the period 1960-2004. These figures suggest that, contrary to the predictions of theory, the correlation between domestic consumption and output is typically higher than that between domestic consumption and world output. The gap between the two correlation measures is much wider in the case of emerging markets and other developing countries than for industrial economies.

In line with the results reported in earlier studies, these correlations paint a rather grim picture about the extent of consumption risk sharing observed in the data. While industrial countries appear to have higher correlations of consumption and output in the period of globalization, correlations for developing countries do not change much. A particularly interesting result is that, for emerging economies, the median consumption correlations do not increase much in the globalization period. This seems at odds with the notion that financial integration should have helped these economies, which have received the bulk of international capital flows to developing countries, to better share risk with the rest of the world.

The unconditional correlations presented in this section have helped obtain a preliminary assessment of the relevance of certain theoretical predictions about risk sharing, but 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.

VI. Evolution of Consumption Risk Sharing

We analyze how the extent of international consumption risk sharing has evolved over time using three different approaches. Our first approach closely follows that of Sorenson, Yosha, Wu and Zhu (2006) and involves year-by-year estimation of a cross-

section regression of the idiosyncratic component of consumption growth on the idiosyncratic component of output growth. The second approach is similar to the first one but, relying on the idea advanced by Ostfeld (1995), involves running the same regression equation for each country over a given time interval. The third approach is a combination of the first two as it involves the estimation of the same underlying model in a panel framework.[21]

As before, we present results separately for industrial countries and all developing countries, the two groups that span our sample of countries. Within the group of developing countries, however, we report results only for emerging market economies in order to keep the volume of results manageable and since that is the group of most interest to us for purposes of examining the effects of financial integration on risk sharing.

Cross-Section Regressions (Year-by-Year)

We estimate the following regression equation for each year for the full sample as well as for each country group:

$$\Delta \log c_{it} - \Delta \log C_t = \alpha + \beta_{ct}(\Delta \log y_{it} - \Delta \log Y_t) + \varepsilon_{it}$$

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). This is the standard risk sharing equation employed in several earlier studies (see Sørenson et al., 2006, and Artis and Hoffman, 2006a).[22] C_t and Y_t are, respectively, simple measures of aggregate (common) movements 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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[21] We also employed an approach that is borrowed from Artis and Hoffman (2006a) and utilizes a regression model based on the levels rather than the growth rates of idiosyncratic consumption and output. With this approach, the evolution of the coefficient estimates is rather smooth, but the general message about the extent of risk sharing and its evolution was no different from that ot the other three approaches. Therefore, we do not report those results here.

[22] For extended discussions of the derivation of this equation, see the discussions in Obstfeld and Rogoff (2004, Chapter 5), Asdrubali, Sørenson and Yosha (1996), Sørenson and Yosha (1998) and Artis and Hoffman (2006a).

The difference between the national and common component of macroeconomic variable captures the idiosyncratic (country-specific) fluctuations in that variable.

In a model with complete international financial markets and perfect risk sharing, the left hand side of the equation should be zero implying that the coefficient β_{ct} is equal to zero. Asdrubali, Sørenson and Yosha (1996) show how this coefficient could be useful in measuring the extent of risk sharing, which depends on the extent to which idiosyncratic consumption fluctuations are buffered against idiosyncratic GDP fluctuations. The average degree of synchronization between the countries' idiosyncratic consumption growth with their idiosyncratic GDP growth in year t is measured by the coefficient β_{ct}. The smaller the extent of idiosyncratic comovement, β_{ct}, the higher the extent of international risk sharing. Following Sørenson et al. (2006), we estimate this regression for each year over 1960-2004 and trace the evolution of the series of $(1- \beta_{ct})$ in order to evaluate the changes in the extent of risk sharing over time. This variable should typically range from 0 (no risk sharing) to 1 (perfect risk sharing).

Since the estimates of $(1- \beta_{ct})$ fluctuate considerably over time, we smooth them by computing their average over a 9-year rolling window.[23] Figure 5 presents our estimates for the extent of consumption risk sharing, measured by $(1- \beta_{ct})$, for the full sample and each country sub-sample. 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 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 an increase in risk sharing capabilities of emerging markets and other developing countries.

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[23] We also experimented with other smoothing methods such as estimations with a Normal kernel and a trend from the HP filter. These alternative methods did not affect our findings.

Time Series Regressions (For Each Country)

Next, we run the same regression, but rather than estimating it for each year, we estimate it for each country over nine year rolling periods starting from 1960. In other words, the regression equation takes the form of

$$\Delta \log c_{it} - \Delta \log C_t = \alpha + \beta_{cit}(\Delta \log y_{it} - \Delta \log Y_t) + \varepsilon_{it}$$

where β_{cit} is country-specific and varies over time. This is similar to the regressions used by Obstfeld (1995) in the sense that he estimated his models for each country for different periods and analyzed the changes in the relevant coefficients over time. After running the regression for each country, we compute the median of β_{cit} over the country sample for each period. Figure 6 presents the plots of the extent of consumption risk sharing, measured by the median of $(1 - \beta_{cit})$ for the full sample and for each country group. In other words, the extent of risk sharing in 1969 in each panel refers to the median of $(1 - \beta_{cit})$ of the respective country group and β_{cit} is the regression for country i over the period 1961-1969. For the full sample, there appears to be an increase in the degree of risk sharing during the 1990s, but the level in 2004 is in fact slightly lower than that observed in the early 1980s. Industrial countries share more of their idiosyncratic consumption risk than other country groups. These countries also appear to have been able to increase the extent of risk sharing during the period of globalization. By contrast, both emerging market economies and the group of developing countries experience a decline in the degree of risk sharing during the period of globalization.

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 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. Figure 7 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 $(1 - \beta_{ct})$ and β_{ct} is the coefficient from the panel regression covering the period 1961-1969. The patterns in these figures are broadly consistent with the earlier results we document. While industrial

countries attain better risk sharing during the period of globalization, neither emerging markets nor developing countries exhibit the same pattern.

The general message of this section is that industrial countries have attained improvements in risk sharing during the period of globalization although this is still not much of an improvement over the 1970s. 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. These temporal patterns 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.

VII. Financial Globalization and Risk Sharing

In this section, we use panel regression techniques to directly examine the impact of financial globalization on the degree of risk sharing. We first provide a brief discussion about how to measure the extent of a country's integration into international financial markets. We then present the results from our benchmark panel regressions using annual data. Next, we turn our attention to the relationship between financial globalization and risk sharing over different time horizons using data differenced at three and five year frequencies. In addition, we account for some potential endogeneity issues by employing dynamic panel regression models.

Measuring Financial Globalization

What is the relevant measure of financial integration for analyzing the dynamics of risk sharing? The measure typically used in the literature is a de jure indicator of capital account openness, based on compilations of the restrictions a country imposes on cross-border capital account transactions. However, as argued by Kose, Prasad, Rogoff and Wei (2006), de jure measures—no matter how sophisticated—cannot capture the enforcement and effectiveness of capital controls, and may therefore not be indicative of the true extent of financial integration. More importantly, a country's ability to share its consumption risk

hinges on its actual trade of financial assets with other countries, not simply its policy regime regarding international financial transactions. Hence, de facto measures of integration based on actual financial flows may be more relevant for examining the role of financial integration in driving risk sharing patterns. We use measures of gross stocks and flows of foreign assets and liabilities as alternative measures of financial openness.[24] These flow and stock measures are scaled by GDP.

Benchmark Results: Panel Regressions

To analyze the impact of financial integration on the extent of risk sharing, we interact the idiosyncratic component of output with various measures of financial integration. In particular, we estimate the following panel regression

$$\Delta \log c_{it} - \Delta \log C_t = \alpha + \mu(\Delta \log y_{it} - \Delta \log Y_t) + \gamma FO_i(\Delta \log y_{it} - \Delta \log Y_t) + \varepsilon_{it}$$

where FO_i measures the degree of financial openness of country i. Parallel to the analysis in the previous section, the average risk sharing enjoyed by country i in year t is equal to $(1 - \mu - \gamma FO_i)$.[25] When the interaction term, γ, is negative, it indicates that the greater the degree of financial integration, 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 Table 3, 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 measures of financial openness and experiment with each in turn: gross flows (the sum of inflows and outflows), gross stocks (the sum of stocks of assets and liabilities), stocks of assets, and stocks of liabilities.

The second and seventh columns of the table show the results of panel regressions without interaction terms associated with financial integration. The findings are broadly

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[24] We also experimented with several de jure measures. The results indicate that these measures do not have a significant effect on the degree of risk sharing.

[25] See Sørenson et al. (2006) for a similar model. We also estimated models controlling for potential time trends associated with the measures of financial integration, but none of these trends was statistically significant.

consistent with the results reported in the previous section. In particular, the extent of risk sharing appears to be slightly higher in industrial countries than in developing countries.

For the full sample period, none of the interaction coefficients is significantly negative except for the one associated with the flow measure of financial integration for all countries and the group of developing countries. In other words, it is difficult to claim that financial globalization has any noticeable effect on the amount of risk sharing around the world over the period 1960-2004. The results are quite similar even for the period of globalization. However, in the latter period, all of the interaction coefficients are negative and significant for the group of industrial countries. In the case of emerging markets, financial integration appears to have no significant impact on the extent of risk sharing, even in the globalization period. These results echo our findings in the previous section suggesting that the risk sharing benefits of financial integration have accrued only to industrial countries.

Based on the specifications we have estimated, it is possible to trace out the marginal effect on risk sharing of a change in the level of financial integration. Figure 8 shows the relationship between the degree of risk sharing and various measures of financial openness, along with a 95 percent confidence interval. The plots also show the distribution of the financial openness measures for the countries in the relevant samples. Since the coefficients on the interaction terms are negative for industrial countries (see Table 3), the slopes of the measures of risk sharing $(1-\mu-\gamma*FO)$ are of course positive. For instance, the point estimates indicate that a 10 percentage points of GDP increase in the flow measure of financial openness (which has a mean of 30 percent of GDP) would be associated with an increase of 0.007 in the level of risk sharing. By contrast, a similar increase in the stock measure of financial openness (which has a mean of 265 percent of GDP) would be associated with an increase of 0.002 in the level of risk sharing.

Risk Sharing at Different Horizons

We now turn to panel regressions using data at lower frequencies to see if the patterns of risk sharing differ significantly over different time horizons. We focus on three and five year (cumulative) growth rates to examine the impact on financial globalization on the degree of risk sharing in response to more persistent idiosyncratic changes in (shocks to) output and consumption (see Sørenson and Yosha, 1998).

Tables 4 and 5 present the results of regressions with three and five year differenced data, respectively. With three year differencing, there is no substantial change in our results for the full period. The interaction term based on the stock of liabilities is negative and significant for all countries and the group of developing economies. Financial integration, measured either by the stock of assets and liabilities relative to GDP or the stock of liabilities relative to GDP, helps improve the extent of risk sharing in the group of developing countries for the full period. During the globalization period, industrial countries are again able to derive the risk sharing benefits of increased financial integration. Every single measure of financial integration has a significant and negative interaction coefficient for this country group. For all countries and the developing country sub-sample, some measures of financial integration, including the total stock of assets and the stock of liabilities, appear to help increase the degree of risk sharing.

When we use five year differenced data, the impact of financial integration on the degree of risk sharing becomes stronger for industrial economies, both for the full sample period and the period of globalization. However, for emerging market economies, there is little evidence that financial integration improves risk sharing, even during the globalization period and even at low frequencies.

Figure 9 shows the marginal effects of financial integration on risk sharing based on the full sample of countries and the results using five-year differenced data. We show the plots only for the cases where the interaction coefficients are statistically significant. The point estimates indicate that a 10 percentage points of GDP increase in the flow measure of financial openness (which has a mean of 15 percent of GDP) would lead to an increase of 0.03 in the level of risk sharing. An increase of 10 percentage points of GDP in the stock measure of financial openness (which has a mean of 200 percent of GDP) would be associated with an increase of only 0.003 in the level of risk sharing.

VIII. 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, which have attained much higher levels of financial integration than other

developing economies, have been able to see few benefits in this dimension? In this section, we investigate two possibilities. One is 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. Another possibility is that, despite increased financial integration, there are other features of these countries—either structural features or policies—that preclude them from attaining improved risk sharing through financial integration.

VIII.1 Does the Composition of Flows and Stocks Matter?

Are specific types of financial assets more conducive to attaining the risk sharing benefits of globalization? To address this question, we now consider disaggregated measures of financial integration. In particular, we focus on the flow and stock measures of foreign direct investment (FDI), Equity, Debt, FDI plus Equity, FDI plus Debt, and Equity plus Debt.

Table 6 presents the results of benchmark panel regression with finer measures of financial integration for the full sample and globalization periods. For the full sample, the interaction coefficients associated with some flow measures, including Debt, FDI+Debt, and Equity+Debt, are negative and significant for all countries and the full group of developing countries. However, there is no significant effect of financial globalization for industrial economies. During the globalization period, on the other hand, virtually all types of flow and stock measures reflect the risk sharing benefits of financial integration for industrial economies. For emerging market economies, none of the flow or stock measures appears to yield improved risk sharing even during the period of globalization. These results are broadly consistent with our findings in the previous section.

We also examined these results for different flow and stock measures of integration over three- and five-year horizons. We do not report those results here, but note that, as in the results with the aggregate measures of financial integration, there is stronger evidence of risk sharing among industrial countries based on all of these measures. In sharp contrast, emerging market economies see none of the benefits of risk sharing even at low frequencies.

VIII.2 Do Certain Country Characteristics Affect Risk Sharing?

It is possible that the inability of emerging markets to attain improved risk sharing through financial integration is related to weaknesses in the domestic policy environment or

structural factors. We examine the role of three factors—trade openness (the sum of exports and imports to GDP), the level of financial sector development (crudely measured as the ratio of domestic credit to GDP), and a measure of institutional quality. Table 7 indicates that, over the full sample, higher trade openness and better institutional quality are, if anything, associated with less risk sharing among developing countries, including emerging markets. These results disappear, however, when we look at the globalization period. Regressions based on three- and five-year growth rates (not reported here) revealed similar patterns.

Finally, we combined these two possible explanations for weak risk sharing by running the regressions separately for each flow and stock measure of integration discussed in the previous sub-section, and including in those regressions interactions of those measures with the three country characteristics noted in the last paragraph (multiplied by the basic coefficient of interest—the one on output growth--to capture the marginal effect of the integration-financial development interaction). We just briefly summarize the main results here. Among industrial countries, we find that the interaction of financial integration with measures of domestic financial development does indeed improve risk sharing, but this effect is absent for developing countries and emerging market economies.

Interestingly, the one positive result we find is that trade integration combined with financial integration does in fact improve risk sharing for emerging market economies. In other words, financial integration seems to work in terms of delivering risk sharing benefits only when the economy is also open to trade flows. We intend to investigate this result more carefully in future work.

VIII. Conclusion

We examine the implications of increased financial integration for the patterns of international risk sharing among different groups of countries using three empirical approaches. First, we analyze some summary statistics on the correlations of growth rates of output and consumption of each country with their corresponding world aggregates. We document that, for industrial countries, these correlations increase during the period of globalization. In contrast, for emerging market economies, these correlations do not change much in this period. Second, we study the evolution of the extent of risk sharing which is measured by the changes in the comovement between idiosyncratic components of the

growth rates of consumption and output. The results suggest that industrial countries share more of their idiosyncratic consumption risk than emerging markets. Moreover, industrial countries have been able to increase the extent of risk sharing in the globalization period while emerging market economies experience a slight decline in the degree of risk sharing. Third, we examine the impact of international financial flows on the extent of risk sharing. We find that these flows help improve the risk sharing outcomes in industrial countries whereas they have no significant impact on the extent of risk sharing in emerging markets.

These congruent results from three empirical approaches point to an interesting puzzle. Theory predicts that financial integration should allow countries to improve the scope of international risk sharing by diversifying their idiosyncratic income risk. Contrary to the theoretical predictions, however, emerging market economies, that have 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 briefly examine whether the composition of capital flows and certain country characteristics could explain this puzzle, but our preliminary results suggest that neither of these appears to be important in improving the risk sharing outcomes for emerging markets.

As we discuss in introduction, this puzzle might also be related to a threshold effect associated with the degree of financial integration since industrial countries that are substantially integrated into global financial markets seem to enjoy the risk sharing benefits of financial globalization. This suggests that in order to reap the benefits of financial integration in terms of improved risk-sharing, developing countries need to be more integrated to the global financial markets.

Our future research will focus on the resolution of this puzzle. We will extend our analysis by providing a detailed account of threshold effects discussed in the previous section. In addition, we plan to explore some other potential reasons for the inability of emerging market economies in utilizing the risk sharing benefits of increased financial flows. For example, these flows are procyclical in most emerging market economies — they increase in good times and falls in bad times. The very feature of procyclicality might be preventing emerging market economies from utilizing these flows to smooth their consumption fluctuations. We plan to control for the impact of procyclicality on the extent of risk sharing in our future work.

We also plan to extend our analysis by studying the impact of financial flows on income smoothing in emerging markets. Sørenson et al. (2006) find that international financial flows help industrial countries to smooth their income in addition to their consumption. Our preliminary findings (not reported in this paper because of space constraints) suggest that emerging market economies have not been able to effectively use international financial flows for income risk sharing.

Any empirical study on the dynamics of consumption suffers from the well-documented problems associated with measuring consumption and ours is no exception. In fact, these problems might be more severe in the context of developing countries we are interested in. Studying the income dynamics is no panacea to this problem, but it can, at least, provide an alternative measure of the extent of risk sharing.

Lastly, we will undertake a detailed analysis of the roles played by nonseparabilities between tradables and nontradable leisure (or goods) and the restrictions on financial flows in explaining the lack of international risk sharing in emerging market economies. Our preliminary findings (not reported in this paper because of space constraints) indicate that these factors do not have a significant impact on the observed patterns of risk sharing in emerging markets.

References
[incomplete]

Artis, Michael J., and Mathias Hoffmann, 2004, "Financial Globalization, International Business Cycles and Consumption Risk Sharing," CEPR Discussion Paper No. 4697 (London: Centre for Economic Policy Research).

———, 2006a, "Declining Home Bias and the Increase in International Risk Sharing: Lessons from European Integration," (unpublished; Manchester: University of Manchester).

———, 2006b, "The Home Bias and Capital Income Flows Between Countries and Regions," CEPR Discussion Paper No. 5691 (London: Centre for Economic Policy Research).

Albuquerque, Rui, 2003, "The Composition of International Capital Flows: Risk Sharing Through Foreign Direct Investment," *Journal of International Economics,* Vol. 61, No. 2, pp. 353–83.

Asdrubali, Pierfederico, Bent E. Sorensen, and Oved Yosha, 1996, "Channels of Interstate Risk Sharing: United States 1963–90," *Quarterly Journal of Economics*, Vol. 111, No. 4, pp.1081–1110.

Backus, David, Patrick Kehoe, and Finn Kydland, 1992, "International Real Business Cycles," *Journal of Political Economy*, Vol. 100, No. 4, pp. 745–75.

———, 1995, "International Business Cycles: Theory and Evidence," in *Frontier of Business Cycle Research*, ed. by Thomas Cooley (Princeton: Princeton University Press), pp. 331–356.

Baxter, Marianne, and Mario Crucini, 1993, "Explaining Saving-Investment Correlations," *American Economic Review*, Vol. 83, No. 4, pp. 416–36.

———, 1995, "International Trade and Business Cycles," in *Handbook of International Economics Vol. III*, ed. by Gene Grossman and Kenneth Rogoff (Amsterdam: North-Holland).

———, and Urban J. Jermann, 1997, "The International Diversification Puzzle is Worse than You Think," *American Economic Review*, Vol. 87, No. 1 pp. 170–80.

Becker, Sascha O. and Mathias Hoffmann, 2006, "Intra- and International Risk-Sharing in the Short Run and the Long Run," *European Economic Review*, Vol. 50, No. 3, pp. 777–806.

Bekaert, Geert, Campbell R. Harvey,and Christian Lundblad, 2006 "Growth Volatility and Equity Market Liberalization," *Journal of International Money and Finance*, forthcoming.

Bordo, Michael D., and Thomas Helbling, 2003, "Have National Business Cycles Become More Synchronized?" NBER Working Paper No: 10130 (Cambridge, MA: National Bureau for Economic Research).

Broner, Fernando A., 2006, "Globalization and Risk Sharing," NBER Working Paper No. 12482 (Cambridge: National Bureau of Economic Research).

Buch, Claudia M., Jörg Döpke, and Christian Pierdzioch, 2005, "Financial Openness and Business Cycle Volatility," *Journal of International Money and Finance*, Vol. 24, pp. 744–65.

Cai, Fang, and Francis E. Warnock, 2004, "International Diversification at Home and Abroad," International Finance Discussion Papers No. 793 (Washington: Board of Governors of the Federal Reserve System).

Canova, Fabio, and Morten Ravn, 1996, "International Consumption Risk Sharing," *International Economic Review*, Vol. 37, No. 3, pp. 573–601.

Chinn, Menzie, and Hiro Ito, 2005, "What Matters for Financial Development? Capital Controls, Institutions and Interactions," (forthcoming), *Journal of Development Economics*.

Crucini, Mario, 1999, "On International and National Dimensions of Risk Sharing," *Review of Economics and Statistics*, Vol. 81, No. 1, pp. 73–84.

———, and Gregory D. Hess, 2000, "International and Intranational Risk Sharing," in *Intranational Macroeconomics*, ed. by Gregory D. Hess and Eric van Wincoop (New York: Cambridge University Press).

Del Negro, Marco, 2002, "Asymmetric Shocks Among U.S. States," *Journal of International Economics*, Vol. 56, No. 2, pp. 273–297.

Doyle, Brian M., and Jon Faust, 2005, "Breaks in Variability and Co-Movement of G-7 Economic Growth," *Review of Economics and Statistics*, Vol. 87, No. 4 (November), pp. 721-40.

Edwards, Sebastian, 2005, "Capital Controls, Sudden Stops and Current Account Reversals," NBER Working Paper No. 11170 (Cambridge: National Bureau of Economic Research).

Fuhrer, Jeffrey C., and Michael W. Klein, 1998, "Risky Habits: on Risk Sharing, Habit Formation, and the Interpretation of International Consumption Correlations," NBER Working Paper No. 6735 (Cambridge: National Bureau of Economic Research).

Glick, Reuven, Xueyan Guo, and Michael Hutchison, 2006, "Currency Crises, Capital Account Liberalization, and Selection Bias," forthcoming *Review of Economics and Statistics*.

Giannone, Domenico, and Lucrezia Reichlin, 2006, "Trends and Cycles in the Euro Area: How Much Heterogeneity and Should we Worry About It?" ECB Working Paper No. 595 (London: European Central Bank).

Heathcote, Jonathan, Perri, Fabrizio, 2002. Financial autarky and international business cycles. *Journal of Monetary Economics*, April 49 (3), 601– 628.

Heathcote, Jonathan and Fabrizio Perri, 2003, "Why Has the U.S. Economy Become Less Correlated With the Rest of the World?" *American Economic Review—Papers and Proceedings* 93, pp. 63–69.

Helbling, Thomas, and Tamim Bayoumi, 2003, "Are They All in the Same Boat? The 2000– 01 Growth Slowdown and the G-7 Business Cycle Linkages," *IMF Working Paper No. 03/46*.

Heston, Alan, Robert Summers, and Bettina Aten, 2002, PennWorld Table Version 6.1, Center for International Comparisons at the University of Pennsylvania (CICUP).

Imbs, Jean, 2004. Trade, finance, specialization, and synchronization. *Review of Economics and Statistics*, 785 August 86 (3), 723– 734.

Imbs, Jean, 2006, "The Real Effects of Financial Integration," *Journal of International Economics,* Vol. 68, No. 2 (March), pp. 296-324.

Jansen, W. Jos, and Ad C.J. Stokman, 2004. "Foreign Direct Investment and International Business Cycle Comovement," ECB Working Paper No. 401 (London: European Central Bank).

Kalemli-Ozcan, Sebnem, Bent E. Sørensen, and Oved Yosha, 2001a, "Risk Sharing and Industrial Specialization: Regional and International Evidence," *American Economic Review,* Vol. 93, No. 3, pp. 903–18.

Kalemli-Ozcan, Sebnem, Bent E. Sorensen and Oved Yosha, 2001b, "Economic Integration, Industrial Specialization and the Asymmetry of Macroeconomic Fluctuations," *Journal of International Economics*, Vol. 55, pp. 107–37.

Kang, Jun-Koo, and René M. Stulz, 1997, "Why Is There a Home Bias? An Analysis of Foreign Portfolio Equity Ownership in Japan," *Journal of Financial Economics*, Vol. 46, No. 1, pp. 3–28.

Kose, M. Ayhan, Eswar S. Prasad, and Marco E. Terrones, 2003a, "How Does Globalization Affect the Synchronization of Business Cycles?" *American Economic Review*, Vol. 93, No. 2, pp. 57–63.

———, 2003b, "Financial Integration and Macroeconomic Volatility," *IMF Staff Papers*, Vol. 50, No. 1 (Washington: International Monetary Fund).

Kose, M. Ayhan, Christopher Otrok, and Charles Whiteman, 2005, "Understanding the Evolution of World Business Cycles," IMF Working Paper No. 05/211.

Kose, M. Ayhan, Christopher Otrok, and Eswar S. Prasad, 2006, "Regionalization vs. Globalization: Explaining North-South Business Cycles", IMF Working Paper, forthcoming.

Kose, M. Ayhan, Eswar S. Prasad, Kenneth Rogoff and Shang-Jin Wei, 2006, Financial Globalization: A Reappraisal, IMF Working Paper 06/189.

Lane, Philip, 2000, "International Diversification and the Irish Economy," *Economic and Social Review*, Vol. 31, No. 1, pp. 37–54.

———, 2001, "Do International Investment Income Flows Smooth Income?" *Weltwirtschaftliches Archiv*, Vol. 137, pp. 714–36.

———, and Gian Maria Milesi-Ferretti, 2001, "The External Wealth of Nations: Measures of Foreign Assets and Liabilities for Industrial and Developing Nations," *Journal of International Economics,* Vol. 55, No. 2, pp. 263–94.

———, 2003, "International Financial Integration," *IMF Staff Papers*, Vol. 50 (Washington: International Monetary Fund), pp. 82–113.

———, 2006, "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004," IMF Working Paper 06/69 (Washington: International Monetary Fund).

Leblebicioglu, Asli, 2006, "Financial Integration, Credit Market Imperfections and Consumption Smoothing," Working Paper, North Carolina State University.

Levchenko, Andrei A., 2005, "Financial Liberalization and Consumption Volatility in Developing Countries," *IMF Staff Papers*, Vol. 52, No. 2 (Washington: International Monetary Fund).

Lewis, Karen K., 1995, "Puzzles in International Financial Markets," in *Handbook of International Economics*, ed. by K. Rogoff and G. Grossman (Amsterdam: North-Holland).

Lewis, Karen K., 1999, "Trying to Explain Home Bias in Equities and Consumption," *Journal of Economic Literature*, Vol. 37, June, 571–608.
———, 1996, "What Can Explain the Apparent Lack of International Consumption Risksharing?" *Journal of Political Economy*, Vol. 104, No. 2, pp. 267–297.

Mace, Barbara, 1991, "Full Insurance in the Presence of Aggregate Uncertainty," *Journal of Political Economy*, Vol. 99, pp. 928–56.

Mazzenga, Elisabetta, Ravn, Morton O., 2004. International business cycles: the quantitative role of transportation costs. *Journal of International Money and Finance* 23, 645–671 (August).

Mélitz, Jacques, and Frédéric Zumer, 1999, "Interregional and International Risk Sharing and Lessons for EMU," *Carnegie-Rochester Conference Series on Public Policy* 51, pp. 149–88.

Miniane, Jacques, 2004, "A New Set of Measures on Capital Account Restrictions," *IMF Staff Papers*, Vol. 51, No. 2 (Washington: International Monetary Fund), pp. 276–308.

Moser, Gabriel, Wolfgang Pointer, and Johann Scharler, 2004, "International Risk Sharing in Europe: Has Anything Changed?" in *The Economic Potential of a Larger Europe*, ed. by K. Liebscher, J Christl, P. Mooslechner, and D. Ritzberger-Grünwald (Northampton: Edward Elgar Publishing), pp. 260–75.

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

———, 1995, "International Capital Mobility in the 1990s," in *Understanding Interdependence*, ed. by P.B. Kenen (Princeton: Princeton University Press), pp. 201–261

———, 2001, "The Six Major Puzzles in International Macroeconomics Solved," *NBER Macroeconomics Annual 2000*, Vol. 15, No. 1, pp. 339–90.

———, 2004, *Foundations of International Macroeconomics* (Cambridge: MIT Press).

Pakko, M.R., 1998, "Characterizing Cross-Country Consumption Correlations," *Review of Economics and Statistics*, Vol. 80, No. 1, pp. 169–174.

Pallage, Stephane, and Michel Robe, 2003, "On the Welfare Cost of Economic Fluctuations in Developing Countries," *International Economic Review*, Vol. 44, No. 2, pp. 677–98.

Pesenti, Paolo, and Eric van Wincoop, 2002, "Can Nontradables Generate Substantial Home Bias?" *Journal of Money, Credit and Banking*, Vol. 34, pp. 25–50.

Portes, Richard, and Hélène Rey, 2005, "The Determinants of Cross Border Equity Flows," *Journal of International Economics*, Vol. 65, pp. 269–96.

Prasad, Eswar S., Kenneth Rogoff, Shang-Jin Wei, and M. Ayhan Kose, 2003, *Effects of Financial Globalization on Developing Countries: Some Empirical Evidence*, IMF Occasional Paper No. 220 (Washington: International Monetary Fund)..

Shiller, Robert, 1993, "Macro Markets: Creating Institutions for Managing Society's Largest Economic Risk," *Clarendon Lectures in Economics Series* (London: Oxford University Press).

Sorensen, Bent E., and Oved Yosha, 1998, "International Risk Sharing and European Monetary Unification," *Journal of International Economics*, Vol. 45, pp. 211–38.

———, Yi-Tsung Wu, And Yu Zhu , 2006, "Home Bias and International Risk Sharing: Twin Puzzles Separated at Birth," (unpublished; Houston, Texas: University of Houston).

Stock, James H. and Mark W. Watson, 2003. "Understanding Changes in International Business Cycles," NBER Working Paper No: 9859.

Stockman, Alan, and Linda Tesar, 1995, "Tastes and Technology in a Two-Country Model of the Business Cycle: Explaining International Comovements," *American Economic Review*, Vol. 85, No. 1, pp. 168–85.

Tesar, Linda, 1993, "International Risk Sharing," *Journal of International Economics*, Vol. 35, pp. 69–89.

———, and Ingrid Werner, 1995, "Home Bias and High Turnover," *Journal of International Money and Finance*, Vol. 14, pp. 467–92.

Townsend, Robert M., 1994, "Risk and Insurance in Village India," *Econometrica*, Vol. 62, No. 3, pp. 539–91.

van Wincoop, E., 1999, "How Big are Potential Welfare Gains from International Risk Sharing?" *Journal of International Economics*, Vol. 47, No. 1, pp. 109–135.

Table 1. Correlations of Growth Rates of Selected Variables with Output
(Median for each Group of Countries)

	Full Sample	Sub-Periods		
	1961-2004	BW	Common Shocks	Globalization
Private Consumption				
All Countries	0.69	0.71	0.67	0.67
	[0.02]***	[0.06]***	[0.04]***	[0.04]***
Industrial Countries	0.71	0.71	0.68	0.76
	[0.03]***	[0.10]***	[0.05]***	[0.06]***
Developing Countries	0.67	0.71	0.67	0.63
	[0.04]***	[0.08]***	[0.08]***	[0.07]***
Emerging Markets	0.69	0.56	0.78	0.79
	[0.07]***	[0.15]***	[0.16]***	[0.09]***
Government Consumption				
All Countries	0.31	0.29	0.28	0.32
	[0.05]***	[0.07]***	[0.06]***	[0.05]***
Industrial Countries	0.14	0.06	0.10	0.29
	[0.08]*	[0.15]	[0.09]	[0.18]
Developing Countries	0.35	0.36	0.45	0.33
	[0.06]***	[0.07]***	[0.07]***	[0.07]***
Emerging Markets	0.45	0.50	0.51	0.54
	[0.09]***	[0.12]***	[0.06]***	[0.11]***
Total consumption				
All Countries	0.70	0.72	0.70	0.71
	[0.03]***	[0.05]***	[0.04]***	[0.03]***
Industrial Countries	0.71	0.70	0.70	0.78
	[0.03]***	[0.12]***	[0.04]***	[0.04]***
Developing Countries	0.69	0.73	0.72	0.71
	[0.05]***	[0.05]***	[0.07]***	[0.05]***
Emerging Markets	0.82	0.72	0.81	0.90
	[0.07]***	[0.09]***	[0.11]***	[0.04]***

Note: Standard errors are in brackets. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 2. Correlations with World Aggregates [1]

(Median for each Group of Countries)

	Full Sample	Sub-Periods		
	1961-2004	BW	Common Shocks	Globalization
Output				
All Countries	0.26	0.12	0.28	0.12
	[0.03]***	[0.04]***	[0.06]***	[0.05]**
Industrial Countries	0.55	0.17	0.57	0.61
	[0.04]***	[0.13]	[0.08]***	[0.10]***
Developing Countries	0.18	0.11	0.18	0.05
	[0.04]***	[0.05]**	[0.07]**	[0.03]*
Emerging Markets	0.24	0.18	0.30	0.09
	[0.04]***	[0.04]***	[0.10]***	[0.05]*
Private Consumption				
All Countries	0.09	-0.03	0.04	0.00
	[0.03]***	[0.03]	[0.04]	[0.06]
Industrial Countries	0.28	0.09	0.08	0.17
	[0.06]***	[0.07]	[0.07]	[0.13]
Developing Countries	0.02	-0.08	0.02	-0.11
	[0.03]	[0.05]*	[0.06]	[0.05]**
Emerging Markets	0.02	-0.04	0.08	-0.11
	[0.04]	[0.10]	[0.10]	[0.10]
Government Consumption				
All Countries	0.15	0.03	0.15	-0.01
	[0.04]***	[0.04]	[0.05]***	[0.05]
Industrial Countries	0.50	0.06	0.40	0.51
	[0.05]***	[0.09]	[0.08]***	[0.16]***
Developing Countries	0.05	0.03	0.03	-0.09
	[0.03]	[0.06]	[0.06]	[0.04]**
Emerging Markets	0.08	-0.06	0.03	-0.09
	[0.04]**	[0.09]	[0.09]	[0.11]
Total consumption				
All Countries	0.12	0.08	0.18	0.02
	[0.04]***	[0.04]**	[0.07]**	[0.04]
Industrial Countries	0.46	0.11	0.41	0.44
	[0.05]***	[0.13]	[0.08]***	[0.11]***
Developing Countries	0.07	0.08	0.04	-0.07
	[0.02]***	[0.05]*	[0.06]	[0.05]
Emerging Markets	0.09	0.06	0.01	-0.11
	[0.04]**	[0.07]	[0.08]	[0.09]

Note: Standard errors are in brackets. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.
1/ World aggregates are calculated using industrial-country data.

Table 3. Risk Sharing -- Panel Regressions
(Yearly data)

	Private Consumption								
	Full Period					Globalization Period			
	Financial Openness (Flow)	Financial Openness (Stock)	Assets (Stock)	Liabilities (Stock)		Financial Openness (Flow)	Financial Openness (Stock)	Assets (Stock)	Liabilities (Stock)
I. All Countries									
Output	0.854***	0.865***	0.880***	0.844***	0.910***	0.867***	0.831***	0.929***	0.852***	1.020***
	[0.076]	[0.076]	[0.082]	[0.087]	[0.093]	[0.108]	[0.113]	[0.082]	[0.124]	[0.095]
Output x Interaction [1]	...	-0.040***	-0.034	-0.023	-0.083	...	-0.066***	-0.037	0.020	-0.130
	...	[0.013]	[0.032]	[0.030]	[0.084]	...	[0.018]	[0.046]	[0.036]	[0.112]
R2-Adjusted	0.356	0.350	0.329	0.326	0.330	0.284	0.275	0.285	0.283	0.291
N	3168	2744	2481	2474	2481	1296	1232	1293	1293	1293
II. Industrial Countries									
Output	0.662***	0.632***	0.622***	0.628***	0.614***	0.705***	0.720***	0.744***	0.741***	0.744***
	[0.045]	[0.039]	[0.048]	[0.047]	[0.051]	[0.065]	[0.076]	[0.084]	[0.082]	[0.087]
Output x Interaction [1]	...	0.029	0.008	0.008	0.023	...	-0.067*	-0.019**	-0.040**	-0.035*
	...	[0.026]	[0.008]	[0.016]	[0.018]	...	[0.034]	[0.009]	[0.018]	[0.019]
R2-Adjusted	0.457	0.477	0.445	0.445	0.446	0.462	0.462	0.464	0.465	0.463
N	924	824	732	732	732	378	375	378	378	378
III. Developing Countries									
Output	0.872***	0.891***	0.907***	0.863***	0.943***	0.884***	0.845***	0.950***	0.859***	1.055***
	[0.083]	[0.085]	[0.090]	[0.095]	[0.103]	[0.119]	[0.127]	[0.091]	[0.135]	[0.107]
Output x Interaction [1]	...	-0.037**	-0.039	-0.022	-0.096	...	-0.065**	-0.041	0.039	-0.145
	...	[0.017]	[0.038]	[0.035]	[0.092]	...	[0.024]	[0.058]	[0.041]	[0.124]
R2-Adjusted	0.356	0.349	0.331	0.328	0.333	0.280	0.267	0.280	0.279	0.288
N	2244	1920	1749	1742	1749	918	857	915	915	915
IV. Emerging Market Economies									
Output	0.935***	0.966***	0.868***	0.884***	0.836***	0.911***	0.912***	0.899***	0.905***	0.892***
	[0.085]	[0.092]	[0.088]	[0.088]	[0.086]	[0.031]	[0.031]	[0.038]	[0.034]	[0.045]
Output x Interaction [1]	...	-0.330	0.012	0.000	0.058	...	-0.141	0.006	0.009	0.017
	...	[0.254]	[0.014]	[0.023]	[0.047]	...	[0.158]	[0.009]	[0.014]	[0.024]
R2-Adjusted	0.476	0.459	0.443	0.443	0.444	0.560	0.554	0.559	0.559	0.559
N	1012	886	785	785	785	414	402	414	414	414

Note: Robust and clustered standard errors are in brackets. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Per capita consumption and output growth are deviations from their corresponding world aggregate calculated using data from industrial countries. Regressions also include fixed effects and year dummies.
1/ The interaction term is the de facto financial openness measure listed in each column.

Table 4. Risk Sharing -- Panel Regressions
(Three-year growth)

	Private Consumption									
	Full Period					*Globalization Period*				
	Financial Openness (Flow)	Financial Openness (Stock)	Assets (Stock)	Liabilities (Stock)		Financial Openness (Flow)	Financial Openness (Stock)	Assets (Stock)	Liabilities (Stock)	

I. All Countries

Output	0.897***	0.881***	0.959***	0.878***	0.975***	0.966***	0.900***	1.090***	0.973***	1.102***
	[0.064]	[0.073]	[0.067]	[0.069]	[0.064]	[0.091]	[0.098]	[0.093]	[0.093]	[0.086]
Output x Interaction [1]	...	-0.026	-0.062	-0.030	-0.106**	...	-0.058	-0.071**	-0.048	-0.107***
	...	[0.104]	[0.035]	[0.023]	[0.031]	...	[0.124]	[0.031]	[0.035]	[0.019]
R2-Adjusted	0.468	0.436	0.449	0.437	0.455	0.467	0.421	0.480	0.459	0.488
N	1008	905	849	847	849	432	405	429	429	429

II. Industrial Countries

Output	0.792***	0.775***	0.797***	0.798***	0.794***	0.782***	0.807***	0.823***	0.817***	0.830***
	[0.063]	[0.064]	[0.077]	[0.075]	[0.079]	[0.065]	[0.077]	[0.082]	[0.081]	[0.084]
Output x Interaction [1]	...	-0.017	-0.003	-0.008	-0.003	... -0.095***	-0.019**	-0.036**	-0.039**
	...	[0.033]	[0.008]	[0.015]	[0.017]	...	[0.030]	[0.008]	[0.016]	[0.015]
R2-Adjusted	0.592	0.596	0.582	0.582	0.581	0.595	0.599	0.598	0.598	0.598
N	294	275	251	251	251	126	125	126	126	126

III. Developing Countries

Output	0.906***	0.888***	0.981***	0.882***	0.989***	1.001***	0.920***	1.144***	0.997***	1.144***
	[0.071]	[0.086]	[0.074]	[0.077]	[0.071]	[0.105]	[0.117]	[0.108]	[0.107]	[0.099]
Output x Interaction [1]	...	0.128	-0.079*	-0.036	-0.117***	...	0.275	-0.085**	-0.047	-0.114***
	...	[0.390]	[0.037]	[0.041]	[0.026]	...	[0.599]	[0.033]	[0.062]	[0.018]
R2-Adjusted	0.459	0.423	0.440	0.425	0.446	0.460	0.407	0.475	0.449	0.482
N	714	630	598	596	598	306	280	303	303	303

IV. Emerging Market Economies

Output	0.871***	0.878***	0.842***	0.853***	0.830***	0.938***	0.932***	0.914***	0.923***	0.904***
	[0.063]	[0.065]	[0.081]	[0.075]	[0.094]	[0.072]	[0.074]	[0.089]	[0.082]	[0.101]
Output x Interaction [1]	...	0.364	0.017	0.023	0.043	...	0.808	0.015	0.025	0.032
	...	[0.273]	[0.019]	[0.031]	[0.054]	...	[0.495]	[0.019]	[0.032]	[0.049]
R2-Adjusted	0.484	0.443	0.471	0.471	0.471	0.548	0.544	0.545	0.545	0.545
N	322	291	269	269	269	138	134	138	138	138

Note: Robust and clustered standard errors are in brackets. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Per capita consumption and output growth are deviations from their corresponding world aggregate calculated using data from industrial countries. Regressions also include fixed effects and year dummies.
1/ The interaction term is the de facto financial openness measure listed in each column.

Table 5. Risk Sharing -- Panel Regressions
(Five-year growth)

	Private Consumption								
	Full Period					*Globalization Period*			
	Financial Openness (Flow)	Financial Openness (Stock)	Assets (Stock)	Liabilities (Stock)		Financial Openness (Flow)	Financial Openness (Stock)	Assets (Stock)	Liabilities (Stock)
I. All Countries									
Output	0.918***	0.909***	0.954***	0.904***	0.964***	0.918***	0.868***	0.996***	0.957***	0.989***
	[0.084]	[0.087]	[0.103]	[0.100]	[0.101]	[0.123]	[0.125]	[0.141]	[0.140]	[0.136]
Output x Interaction [1]	...	-0.165**	-0.031	-0.013	-0.052*	...	-0.302***	-0.034*	-0.062	-0.043***
	...	[0.056]	[0.023]	[0.032]	[0.025]	...	[0.102]	[0.018]	[0.059]	[0.016]
R2-Adjusted	0.512	0.493	0.489	0.483	0.492	0.505	0.475	0.504	0.500	0.503
N	576	529	497	496	497	288	269	285	285	285
II. Industrial Countries									
Output	0.864***	0.898***	0.928***	0.923***	0.933***	0.741***	0.870***	0.916***	0.895***	0.937***
	[0.058]	[0.066]	[0.080]	[0.080]	[0.080]	[0.091]	[0.089]	[0.092]	[0.090]	[0.094]
Output x Interaction [1]	...	-0.129***	-0.024***	-0.046***	-0.048***	...	-0.223***	-0.050***	-0.095***	-0.104***
	...	[0.020]	[0.006]	[0.011]	[0.012]	...	[0.021]	[0.006]	[0.011]	[0.012]
R2-Adjusted	0.668	0.678	0.651	0.651	0.651	0.571	0.658	0.658	0.657	0.656
N	168	161	147	147	147	84	83	84	84	84
III. Developing Countries									
Output	0.920***	0.907***	0.957***	0.888***	0.966***	0.937***	0.869***	0.992***	0.943***	0.995***
	[0.096]	[0.101]	[0.117]	[0.110]	[0.114]	[0.142]	[0.157]	[0.162]	[0.160]	[0.156]
Output x Interaction [1]	...	-0.217	-0.033	0.028	-0.053	...	-0.869	-0.026	-0.012	-0.036*
	...	[0.162]	[0.032]	[0.040]	[0.028]	...	[0.571]	[0.024]	[0.073]	[0.018]
R2-Adjusted	0.503	0.477	0.477	0.472	0.480	0.504	0.466	0.498	0.494	0.499
N	408	368	350	349	350	204	186	201	201	201
IV. Emerging Market Economies									
Output	0.871***	0.879***	0.792***	0.804***	0.775***	0.676***	0.683***	0.619***	0.656***	0.550***
	[0.132]	[0.150]	[0.154]	[0.153]	[0.161]	[0.141]	[0.149]	[0.133]	[0.141]	[0.124]
Output x Interaction [1]	...	-0.285	0.025	0.035	0.063	...	-1.146	0.030	0.026	0.110
	...	[0.494]	[0.023]	[0.042]	[0.052]	...	[1.062]	[0.028]	[0.059]	[0.068]
R2-Adjusted	0.531	0.502	0.517	0.517	0.518	0.538	0.539	0.538	0.534	0.545
N	184	171	158	158	158	92	89	92	92	92

Note: Robust and clustered standard errors are in brackets. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Per capita consumption and output growth are deviations from their corresponding world aggregate calculated using data from industrial countries. Regressions also include fixed effects and year dummies.
1/ The interaction term is the de facto financial openness measure listed in each column.

Table 6. Risk Sharing – Alternative Measures of Financial Integration. Panel Regressions
(Yearly data)

Private Consumption

Full Period

	Flows						Stocks					
	FDI	Equity	Debt	FDI + Equity	FDI + Debt	Equity + Debt	FDI	Equity	Debt	FDI + Equity	FDI + Debt	Equity + Debt
I. All Countries												
Output	0.858***	0.813***	0.839***	0.863***	0.864***	0.839***	0.783***	0.841***	0.889***	0.809***	0.879***	0.882***
	[0.079]	[0.080]	[0.075]	[0.077]	[0.076]	[0.074]	[0.085]	[0.081]	[0.081]	[0.083]	[0.081]	[0.088]
Output x Interaction [1]	0.321	0.187	-0.063***	0.045	-0.046***	-0.062***	0.235	-0.028	-0.058	0.122	-0.038	-0.048
	[0.829]	[0.247]	[0.019]	[0.237]	[0.015]	[0.018]	[0.164]	[0.061]	[0.045]	[0.090]	[0.037]	[0.070]
R2-Adjusted	0.348	0.325	0.330	0.348	0.350	0.331	0.328	0.327	0.329	0.328	0.327	0.328
N	2738	1884	2155	2740	2743	2191	2493	2477	2490	2477	2490	2474
Industrial Countries												
Output	0.633***	0.640***	0.666***	0.633***	0.633***	0.659***	0.636***	0.645***	0.620***	0.643***	0.618***	0.624***
	[0.041]	[0.029]	[0.037]	[0.039]	[0.040]	[0.034]	[0.057]	[0.048]	[0.049]	[0.050]	[0.050]	[0.047]
Output x Interaction [1]	0.134	0.353***	-0.039	0.053	0.035	-0.003	0.049	0.006	0.014	0.009	0.012	0.008
	[0.277]	[0.068]	[0.044]	[0.047]	[0.055]	[0.024]	[0.082]	[0.021]	[0.013]	[0.020]	[0.012]	[0.008]
R2-Adjusted	0.477	0.490	0.451	0.478	0.477	0.459	0.446	0.446	0.446	0.446	0.446	0.445
N	823	672	694	824	823	710	734	734	732	734	732	732
Developing Countries												
Output	0.883***	0.832***	0.856***	0.885***	0.891***	0.857***	0.800***	0.859***	0.913***	0.816***	0.904***	0.910***
	[0.088]	[0.090]	[0.082]	[0.087]	[0.085]	[0.082]	[0.095]	[0.090]	[0.089]	[0.093]	[0.089]	[0.100]
Output x Interaction [1]	0.471	0.265	-0.061***	0.346	-0.042**	-0.060***	0.250	0.090	-0.063	0.189	-0.043	-0.060
	[1.053]	[1.173]	[0.020]	[0.704]	[0.016]	[0.020]	[0.185]	[0.149]	[0.050]	[0.143]	[0.041]	[0.091]
R2-Adjusted	0.348	0.327	0.334	0.348	0.349	0.334	0.329	0.328	0.330	0.330	0.329	0.330
N	1915	1212	1461	1916	1920	1481	1759	1743	1758	1743	1758	1742
IV. Emerging Market Economies												
Output	0.958***	0.842***	0.890***	0.958***	0.960***	0.890***	0.876***	0.882***	0.862***	0.877***	0.863***	0.863***
	[0.099]	[0.065]	[0.090]	[0.096]	[0.091]	[0.089]	[0.074]	[0.082]	[0.091]	[0.077]	[0.085]	[0.091]
Output x Interaction [1]	-0.174	-0.513	-0.189	-0.151	-0.239	-0.210	0.042	0.040	0.023	0.027	0.018	0.022
	[0.807]	[0.700]	[0.273]	[0.528]	[0.300]	[0.276]	[0.076]	[0.102]	[0.020]	[0.045]	[0.016]	[0.019]
R2-Adjusted	0.458	0.441	0.458	0.458	0.458	0.456	0.443	0.443	0.443	0.443	0.443	0.443
N	885	569	685	885	886	694	786	786	785	786	785	785

Note: Robust and clustered standard errors are in brackets. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Per capita consumption and output growth are deviations from their corresponding world aggregate calculated using data from industrial countries. Regressions also include fixed effects and year dummys. 1/ The interaction term is the de facto financial openness measure listed in each column.

(Cont.) Table 6. Risk Sharing -- Alternative Measures of Financial Integration. Panel Regressions
(Yearly data)

Private Consumption

Globalization Period

	Flows						Stocks					
	FDI	Equity	Debt	FDI + Equity	FDI + Debt	Equity + Debt	FDI	Equity	Debt	FDI + Equity	FDI + Debt	Equity + Debt
I. All Countries												
Output	0.841***	0.828***	0.824***	0.837***	0.829***	0.825***	0.834***	0.867***	0.949***	0.852***	0.935***	0.942***
	[0.121]	[0.129]	[0.114]	[0.116]	[0.113]	[0.114]	[0.136]	[0.113]	[0.085]	[0.128]	[0.083]	[0.081]
Output x Interaction [1/]	-0.355	0.078	-0.077***	-0.149	-0.075***	-0.077***	0.095	-0.057	-0.067	0.030	-0.045	-0.058
	[0.801]	[0.335]	[0.024]	[0.232]	[0.022]	[0.023]	[0.131]	[0.088]	[0.082]	[0.071]	[0.061]	[0.068]
R2-Adjusted	0.271	0.291	0.280	0.271	0.275	0.280	0.284	0.283	0.287	0.283	0.286	0.287
N	1227	1080	1222	1227	1231	1226	1293	1293	1293	1293	1293	1293
Industrial Countries												
Output	0.726***	0.646***	0.729***	0.715***	0.734***	0.722***	0.742***	0.729***	0.742***	0.740***	0.745***	0.741***
	[0.082]	[0.050]	[0.083]	[0.071]	[0.086]	[0.077]	[0.099]	[0.075]	[0.086]	[0.081]	[0.088]	[0.082]
Output x Interaction [1/]	-0.489	0.350***	-0.224*	-0.120**	-0.191*	-0.113**	-0.108	-0.086***	-0.028*	-0.055**	-0.024	-0.022**
	[0.471]	[0.080]	[0.116]	[0.054]	[0.103]	[0.045]	[0.111]	[0.022]	[0.016]	[0.022]	[0.014]	[0.009]
R2-Adjusted	0.463	0.483	0.465	0.463	0.465	0.464	0.462	0.466	0.463	0.465	0.463	0.464
N	374	358	372	374	374	372	378	378	378	378	378	378
Developing Countries												
Output	0.856***	0.848***	0.839***	0.853***	0.843***	0.840***	0.847***	0.877***	0.971***	0.856***	0.955***	0.967***
	[0.134]	[0.145]	[0.128]	[0.133]	[0.127]	[0.128]	[0.148]	[0.126]	[0.095]	[0.143]	[0.092]	[0.094]
Output x Interaction [1/]	-0.362	-0.178	-0.075***	-0.202	-0.074***	-0.075***	0.108	0.071	-0.071	0.068	-0.048	-0.066
	[0.962]	[0.988]	[0.028]	[0.604]	[0.025]	[0.027]	[0.146]	[0.184]	[0.094]	[0.099]	[0.070]	[0.087]
R2-Adjusted	0.264	0.286	0.272	0.264	0.268	0.273	0.279	0.279	0.283	0.279	0.281	0.282
N	853	722	850	853	857	854	915	915	915	915	915	915
IV. Emerging Market Economies												
Output	0.923***	0.895***	0.904***	0.920***	0.911***	0.904***	0.915***	0.911***	0.889***	0.914***	0.896***	0.890***
	[0.033]	[0.035]	[0.031]	[0.032]	[0.031]	[0.030]	[0.032]	[0.031]	[0.040]	[0.032]	[0.038]	[0.039]
Output x Interaction [1/]	-0.470	-0.599	-0.034	-0.292	-0.159	-0.056	-0.014	0.005	0.017	-0.007	0.010	0.015
	[0.468]	[0.707]	[0.137]	[0.334]	[0.197]	[0.144]	[0.036]	[0.071]	[0.011]	[0.024]	[0.009]	[0.011]
R2-Adjusted	0.554	0.624	0.606	0.554	0.554	0.606	0.559	0.559	0.560	0.559	0.559	0.560
N	402	359	399	402	402	399	414	414	414	414	414	414

Note: Robust and clustered standard errors are in brackets. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Per capita consumption and output growth are deviations from their corresponding world aggregate calculated using data from industrial countries. Regressions also include fixed effects and year dummies. 1/ The interaction term is the de facto financial openness measure listed in each column.

Table 7. Country Characteristics and Risk Sharing
(Yearly data)

| | **Private Consumption** | | | | | |
| | *Full Period* | | | *Globalization Period* | | |
	Trade Openness	Credit	Institutional Quality	Trade Openness	Credit	Institutional Quality
I. All Countries						
Output	0.749***	0.787***	0.716***	0.938***	0.753***	1.057***
	[0.094]	[0.135]	[0.171]	[0.117]	[0.193]	[0.186]
Output x Interaction [1]	0.287**	0.155	1.941	-0.189	0.253	-2.230
	[0.115]	[0.200]	[1.685]	[0.139]	[0.236]	[1.407]
R2-Adjusted	0.356	0.338	0.369	0.285	0.281	0.291
N	3140	2826	3051	1296	1287	1257
II. Industrial Countries						
Output	0.606***	0.660***	0.720*	0.622***	0.920***	0.583
	[0.066]	[0.075]	[0.368]	[0.114]	[0.249]	[0.586]
Output x Interaction [1]	0.213	0.016	-0.347	0.271	-0.245	0.864
	[0.127]	[0.083]	[2.493]	[0.215]	[0.227]	[3.827]
R2-Adjusted	0.457	0.455	0.469	0.462	0.469	0.462
N	924	899	895	378	378	375
III. Developing Countries						
Output	0.771***	0.763***	0.616***	0.969***	0.729***	1.035***
	[0.107]	[0.147]	[0.178]	[0.130]	[0.202]	[0.193]
Output x Interaction [1]	0.271**	0.322	3.765**	-0.220	0.396	-1.865
	[0.123]	[0.239]	[1.821]	[0.147]	[0.268]	[2.007]
R2-Adjusted	0.357	0.341	0.373	0.280	0.279	0.284
N	2216	1927	2156	918	909	882
IV. Emerging Market Economies						
Output	0.820***	0.919***	0.576***	0.920***	0.862***	0.896***
	[0.099]	[0.118]	[0.124]	[0.047]	[0.046]	[0.115]
Output x Interaction [1]	0.256**	0.050	4.005***	-0.024	0.103	0.185
	[0.096]	[0.121]	[1.257]	[0.111]	[0.085]	[1.431]
R2-Adjusted	0.476	0.487	0.488	0.559	0.559	0.559
N	997	847	1012	414	410	414

Note: Robust and clustered standard errors are in brackets. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Per capita consumption and output growth are deviations from their corresponding world aggregate calculated using data from industrial countries. Regressions also include fixed effects and year dummies.
1/ The interaction term is the country characteristic listed in each column.

Figure 1. Comovement with National Output
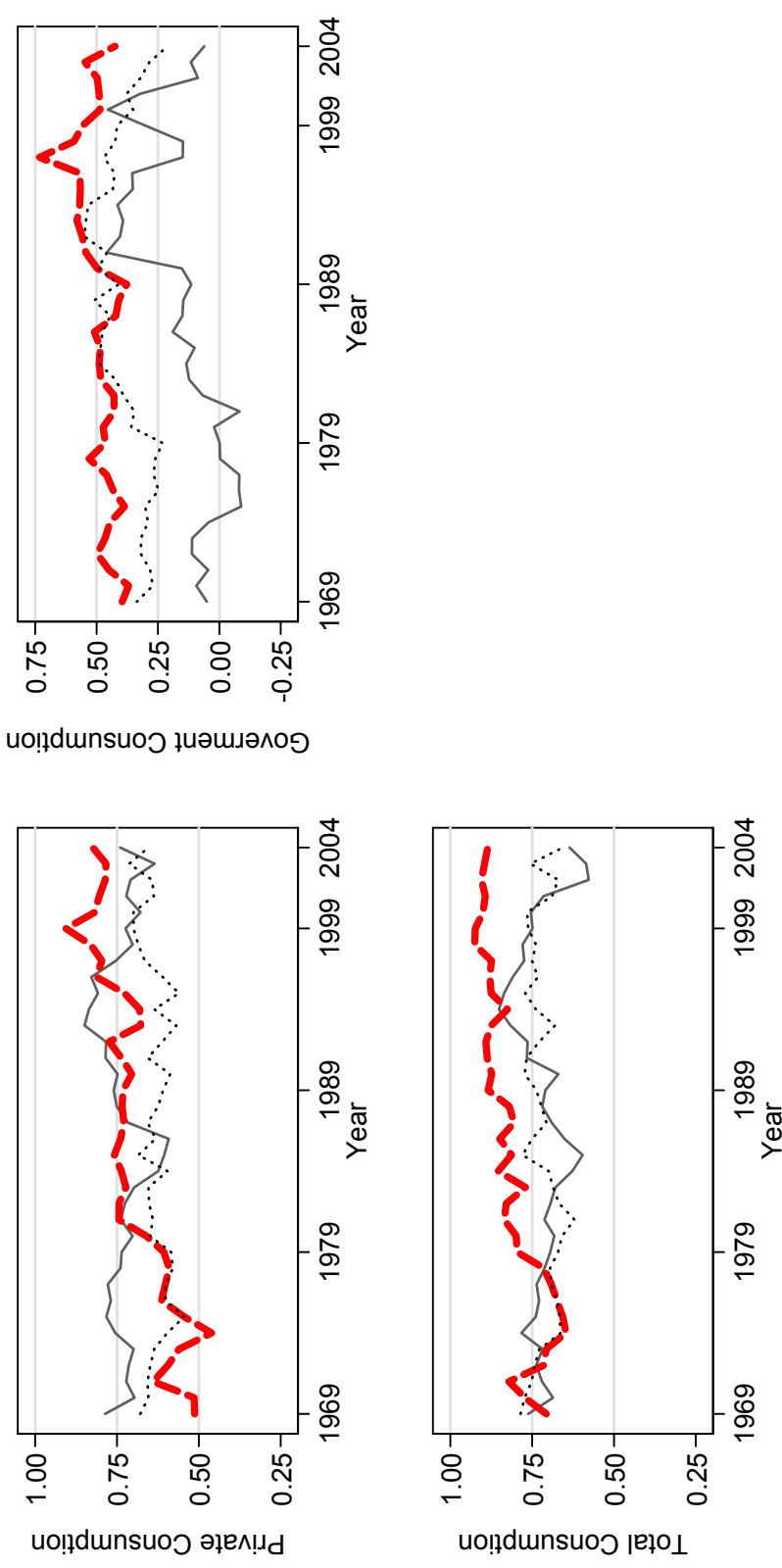
Solid line = Industrial Countries; Dotted line = Developing Countries; Dashed line = Emerging Markets.

*Notes: This plot shows average correlations of various measures of national consumption growth with national output growth.
Nine-year rolling window, medians for each group of countries.

Figure 2. Comovement with World Aggregates
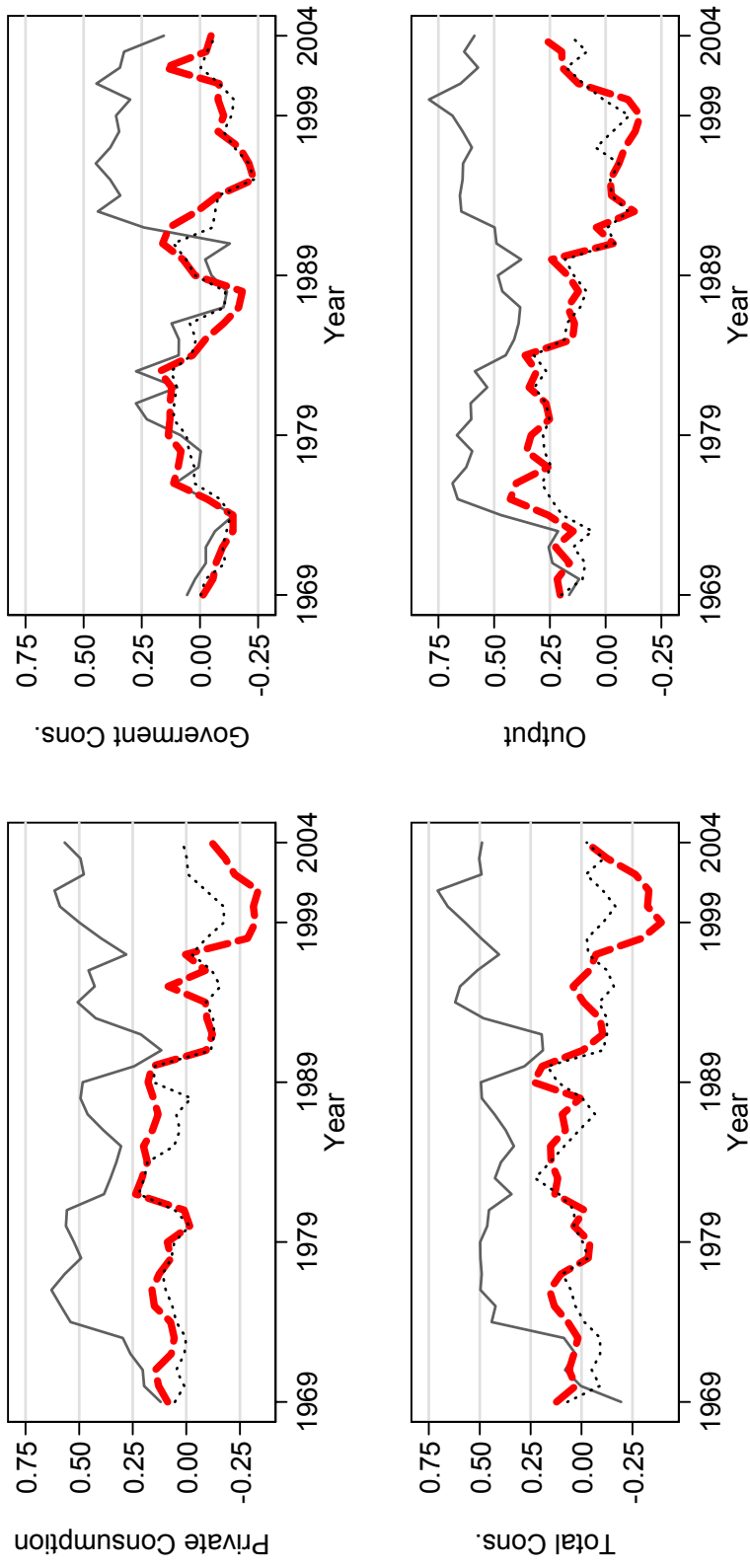
Solid line = Industrial Countries; Dotted line = Developing Countries; Dashed line = Emerging Markets.

*Notes: This plot shows average correlations of growth rates of various measures of national macroeconomic aggregates with the growth rates of corresponding world aggregates. Nine-year rolling window, medians for each group of countries. World aggregates are calculated using industrial-country data.

Figure 3. Comovement with World Aggregates
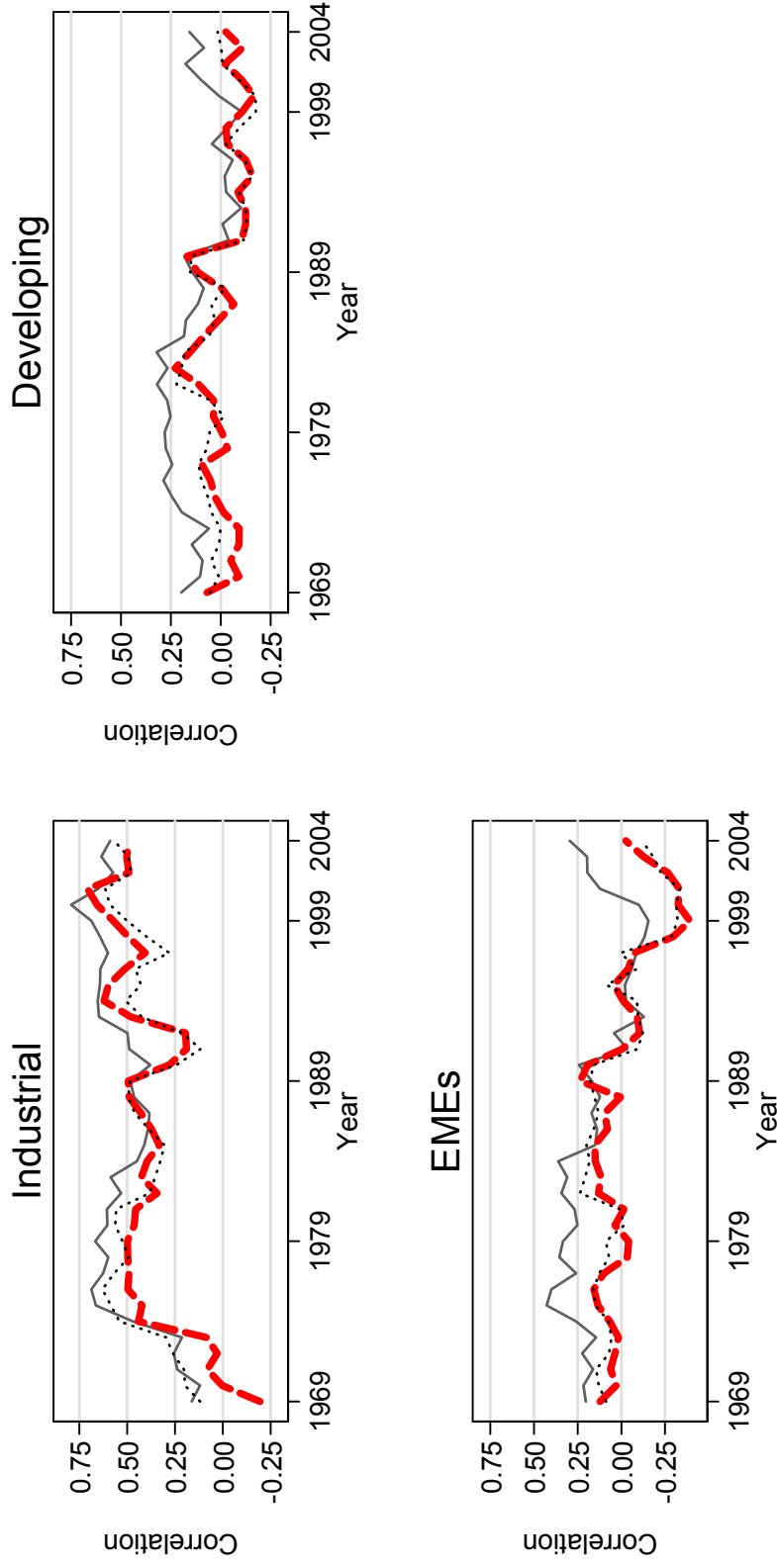
Solid line = Output; Dashed line = Total Consumption; Dotted line = Private Consumption

*Notes: Nine-year rolling window, medians for each group of countries . In a world with complete capital markets, Corr(y,Y) < Corr(c,C). World aggregates are calculated using industrial-country data.

Figure 4. Correlations of Output and Consumption
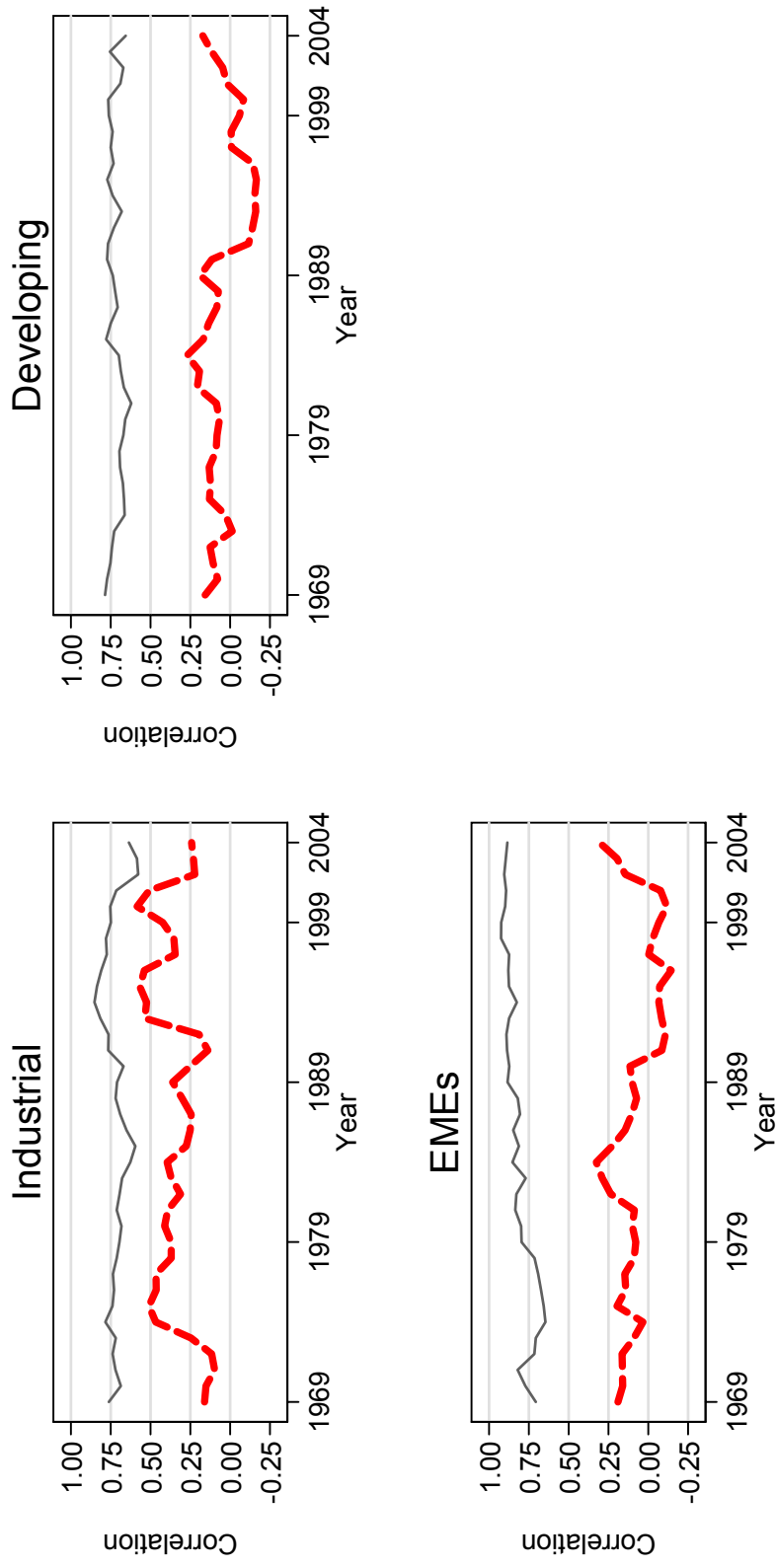

Solid line = Corr(c,y); Dashed line = Corr(c,Y)

*Notes: Nine-year rolling window, medians for each group of countries . In a world with complete capital markets, Corr(c,y) < Corr(c,Y)
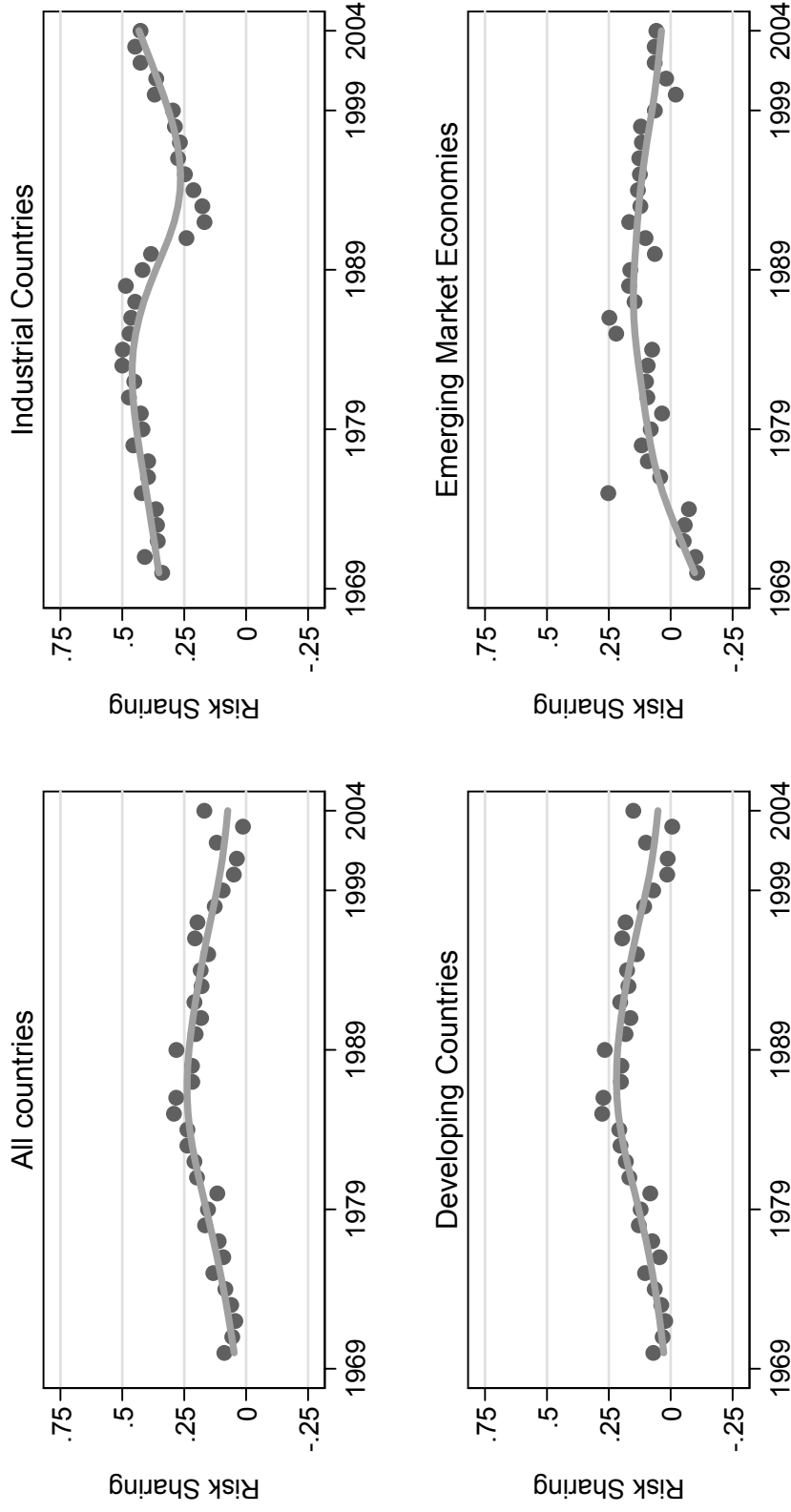
Figure 5. Risk Sharing--Cross-Section Regressions
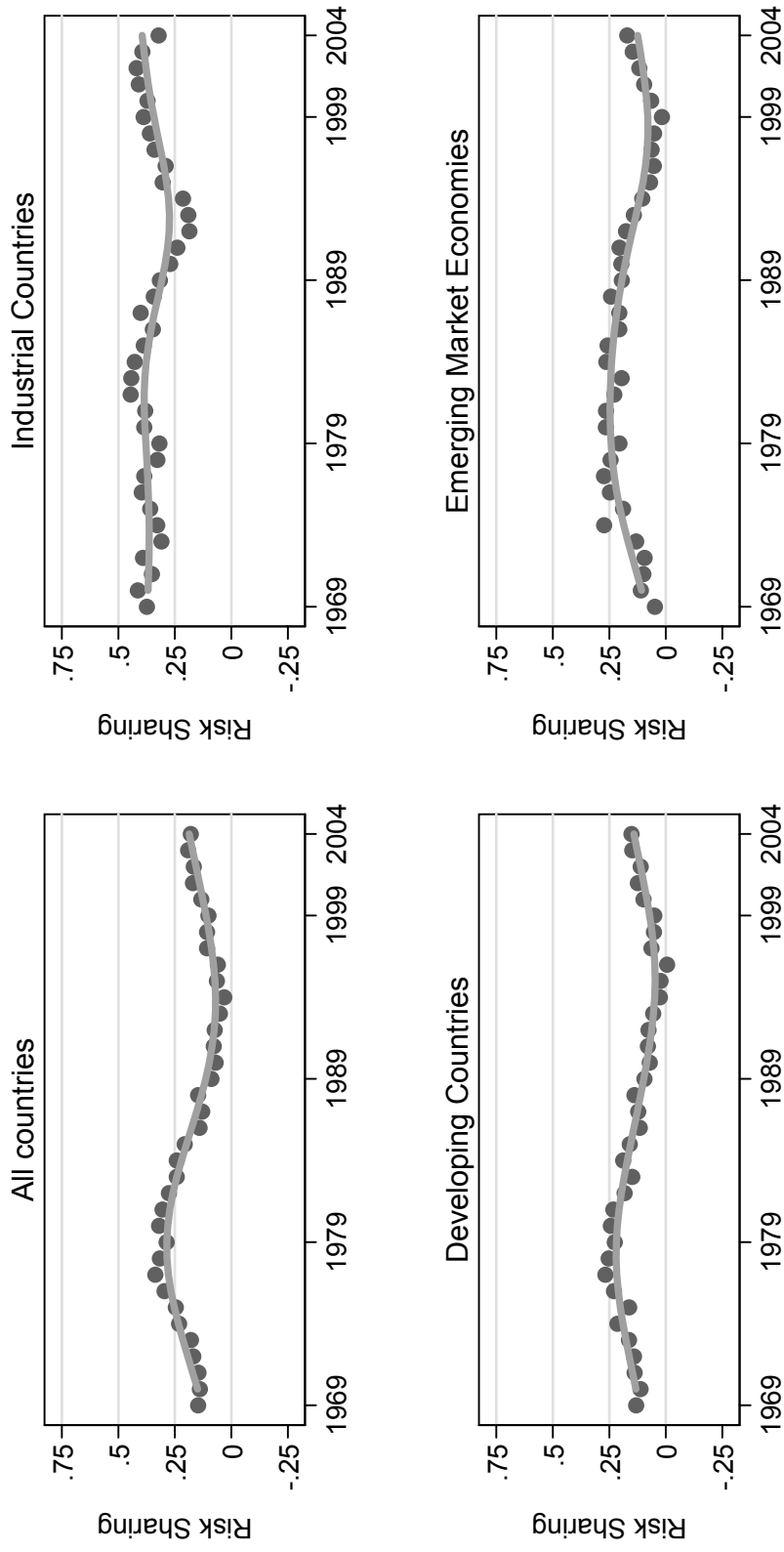
*Notes: World aggregates are calculated using industrial-country data. Nine-year rolling window, medians for each group of countries.

Figure 6. Risk Sharing--Time-Series Regressions
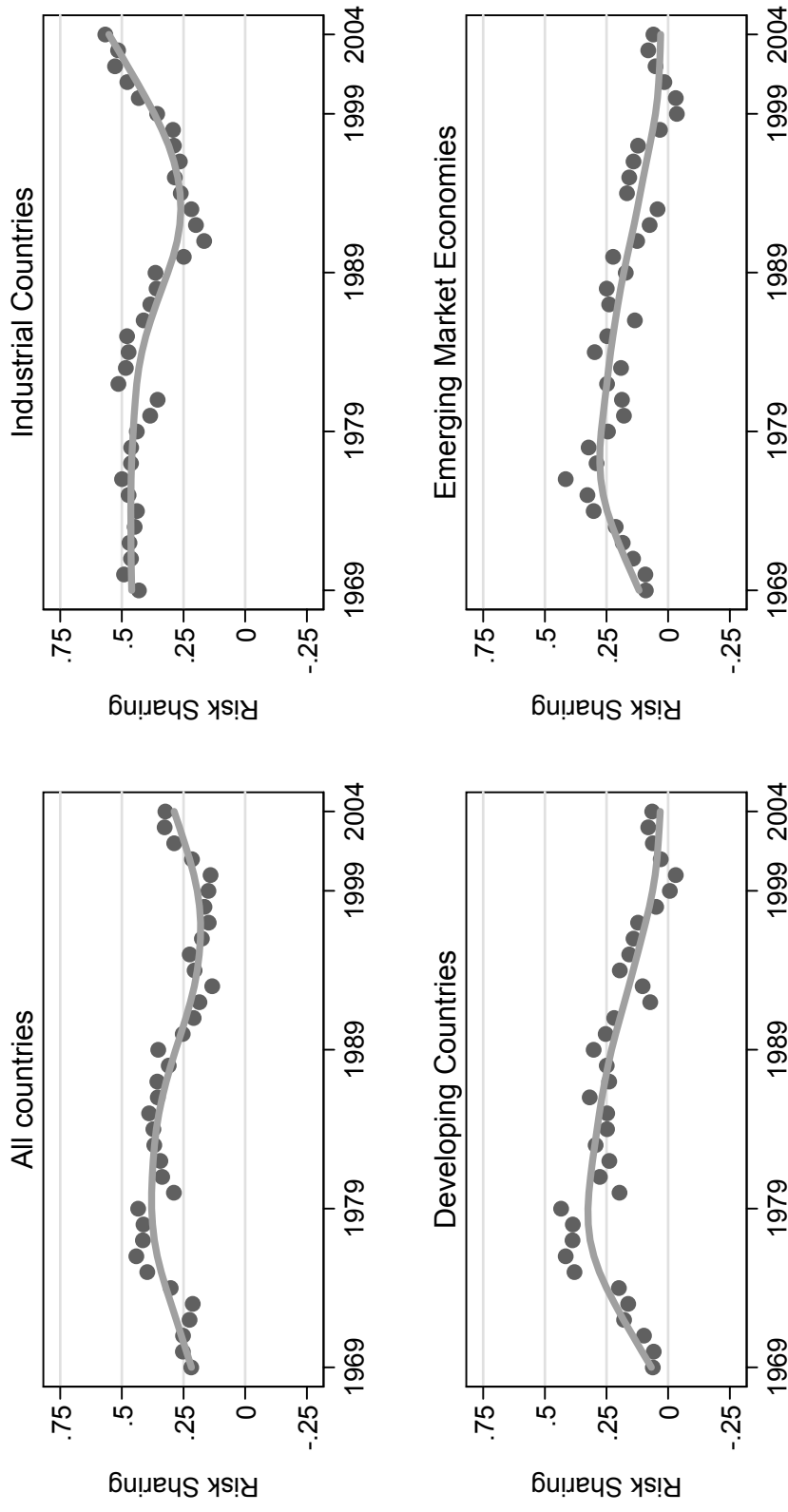
*Notes: World aggregates are calculated using industrial-country data. Nine-year rolling window, medians for each group of countries.
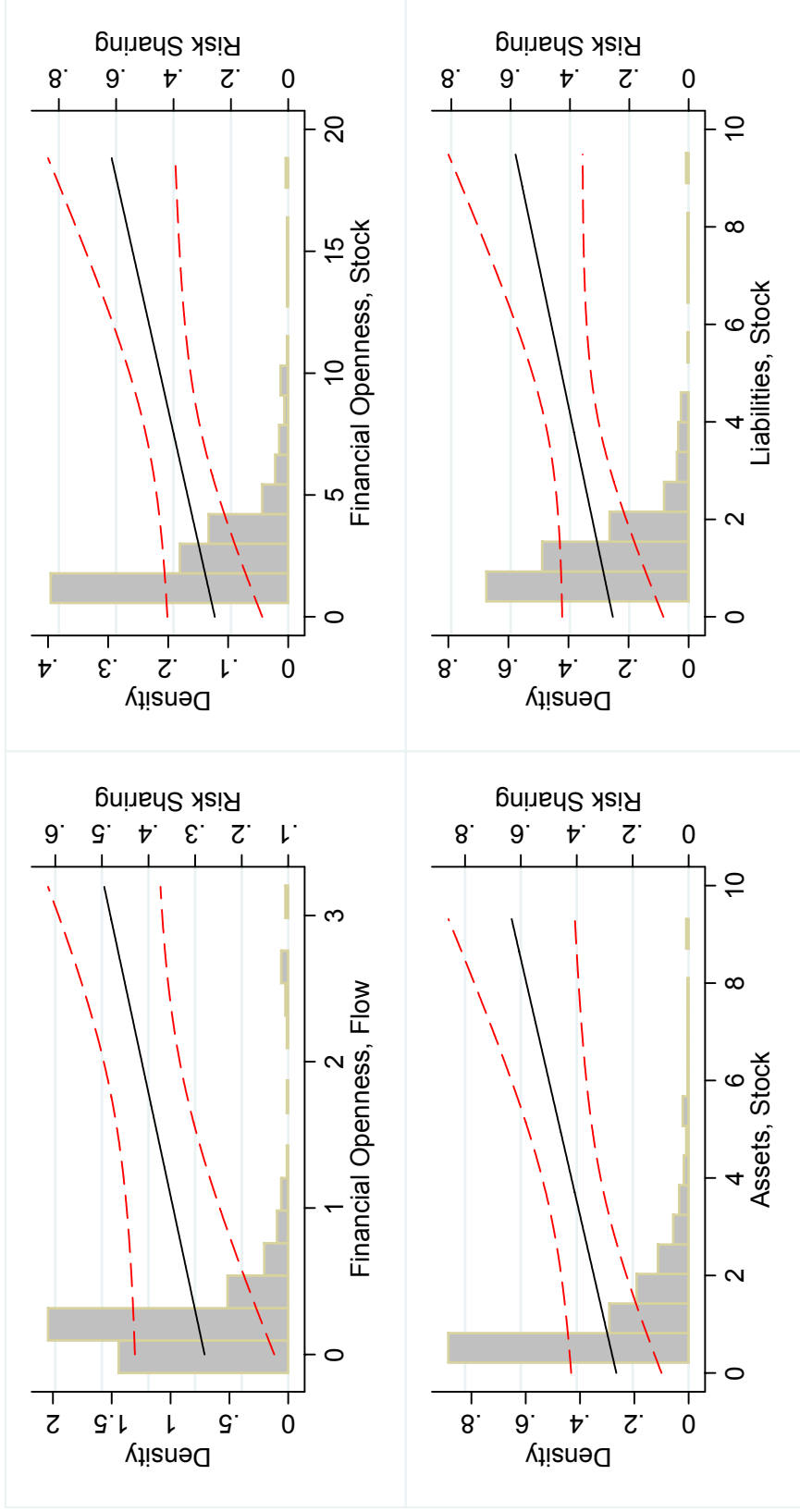
Figure 7. Risk Sharing--Panel Regressions

*Notes: World aggregates are calculated using industrial-country data. Nine-year rolling window, medians for each group of countries.

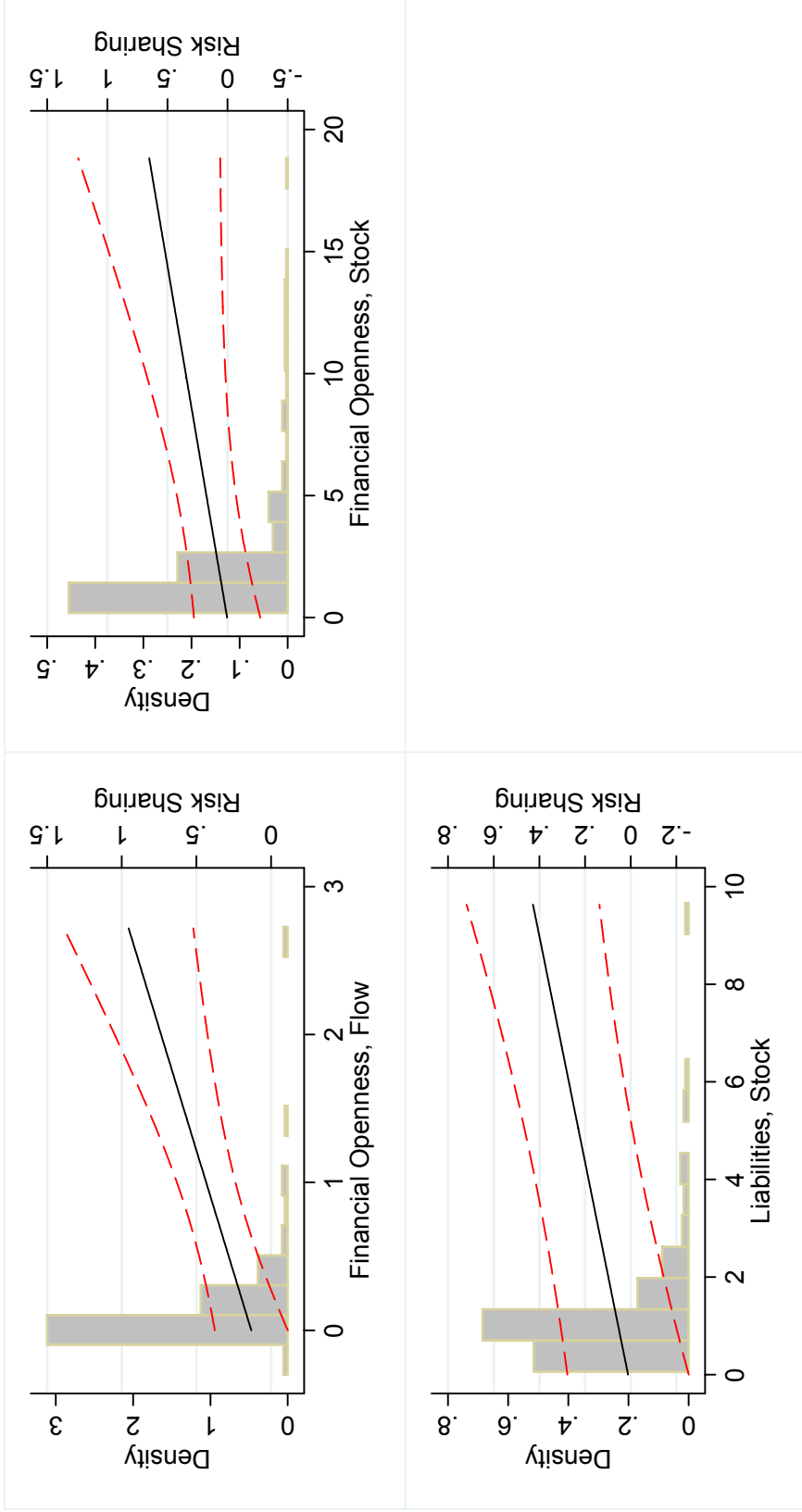Figure 8. Financial Integration and Risk Sharing

Industrial Countries. Marginal Effects*

*Based on Table 3; Industrial Countries; Globalization Period. Financial integration measures are divided by 100

Figure 9. Financial Integration and Risk Sharing

All Countries. Marginal Effects*

*Based on Table 5; All Countries; Globalization Period. Financial integration measures are divided by 100.