

# The Gains from International Risk-Sharing

BY KEITH SILL

**D**o residents of different countries trade financial assets to insure themselves against country-specific risks? In this article, Keith Sill examines the degree of such risk-sharing and whether there could be further gains from increased risk-sharing across borders.

Our economy has become increasingly global. We import and export more than ever before. Yet, three facts about international financial transactions, when taken together, pose a puzzle. First, financial capital moves freely across country borders, at least in the case of the developed countries. Returns on similar dollar-denominated assets in different countries are very close to each other — differences in returns have essentially been eliminated because some investors buy and sell assets internationally. Second, residents of most major industrialized countries hold most of their wealth in domestic assets, forgoing the benefits of diversifying their portfolios by including foreign assets. A fundamental tenet of finance

holds that portfolios should be diversified, and presumably, such diversification includes holding foreign stocks and bonds. Third, domestic saving is closely tied to domestic investment. However, if financial capital moves freely across borders, countries that want to invest more than they are saving domestically should be able to borrow from other countries to finance investment, while countries that have excess savings should be able to lend those savings to foreigners. This would mean domestic saving and investment wouldn't necessarily move together, but they are closely linked in the data.

These facts pose a puzzle because we would expect residents of different countries to trade goods, services, and financial assets in such a way as to insure themselves against country-specific risks that affect the amount of goods the country produces (output) and the amount of goods residents can buy (consumption). Insuring against risks is possible because countries' economies do not always move in sync: When one country is in a recession, another may be experiencing

an expansion. So shouldn't the residents of two such countries try to share some of the risk they each face individually, so that people in both countries can be better off?

In this article we will discuss some of the benefits that accrue to residents of a country when economic risk is shared with residents of other countries. We will examine some of the data on the extent of international risk-sharing in developed and developing countries. Those data suggest that the *amount* of international risk-sharing is rather small. This finding leads to another question: Are there significant unexploited gains from risk-sharing? Though the jury is still out, that seems unlikely for financially developed countries. However, for developing countries, it's more likely the case that there are substantial unexploited gains from international risk-sharing.

## RISK-SHARING AND THE BENEFITS OF PORTFOLIO DIVERSIFICATION

People prefer to have a relatively steady amount of consumption from year to year rather than wild swings. This preference for smoothing out fluctuations in consumption reveals itself in the pattern of household borrowing and saving. Households often borrow funds or reduce their savings when current resources are low in order to maintain their lifestyle.

Let's take a simple example. Suppose you can choose between consuming \$20,000 of goods a year for the next two years or consuming \$10,000 this year and \$30,000 next year. Most people prefer the first plan, in which the



Keith Sill is a senior economist in the Research Department of the Philadelphia Fed.

amount of consumption is constant over the two years. If a household were stuck with the second plan, it might borrow to increase its consumption today and repay that loan with its higher income in the second year. That way, the household could increase its consumption in the first year by forgoing some consumption in the second year.

What else can a household stuck with the second plan do? One possibility is to find another household with different consumption opportunities and trade with it. For example, another household may get \$30,000 worth of consumption in the first year and \$10,000 in the second. The two households could agree to pool their resources in each year and divide the total down the middle. That way, each household would get \$20,000 worth of consumption in both years.<sup>1</sup> Each household would be better off by agreeing to share the “risk” of fluctuating consumption with the other, thereby lowering, or in this case eliminating, consumption risk.

But the world is actually much more complicated because households face uncertainty about their future resources and typically make plans over long periods — indeed, over their lifetimes. How do households share risk in the real world? It’s much too time consuming and difficult to find other households with which mutually agreeable arrangements can be made and enforced. One alternative is to make such arrangements indirectly through financial markets, for example, by purchasing insurance. In addition, households can purchase stocks and bonds, which represent claims on the assets and revenue streams of businesses (and possibly governments, in the case

of bonds). By purchasing a stock or bond, investors are entitled to a share of those assets or revenues. And it’s all to the better if the payoff from households’ financial assets is high when their income is low. That allows households to smooth out fluctuations in the amount

**Households can lower some of the economic risk they face by holding a portfolio of stocks and bonds; however, the portfolio must be diversified.**

of goods and services they consume over time. In effect, households can lower some of the economic risk they face by holding a portfolio of stocks and bonds; however, the portfolio must be diversified.

Why is a diversified portfolio so important? Different businesses face different risks. For example, automobile manufacturers face much more business-cycle risk than do electric utility companies, since buying a new car involves discretionary spending on the part of a consumer whereas paying utility bills does not. It’s much more likely that, in a recession, households will forgo buying a new car than forgo the use of heating and telephone services. Similarly, firms that produce agricultural products or build houses are generally more sensitive to adverse weather conditions than are firms that produce steel and plastic. So, an autoworker who wants to diversify some of the income risk he faces may do well to purchase stocks and bonds of firms that typically do well when the auto sector is doing poorly. Likewise, an

agricultural worker may want to purchase a portfolio of assets that offset some of the bad-weather risk he faces.

In short, it is better not to keep all your eggs in one basket — as anyone who had heavily invested in technology stocks in 2000 can tell you. A simple exercise will help us see how valuable diversification can be.

We can measure the risk of holding a stock by the volatility of its return — how much the return varies from month to month. A statistical measure of this risk is the standard deviation, which quantifies the average variability of an asset’s return. The higher the standard deviation, the higher the average volatility of the return and the bigger the swings in the return.

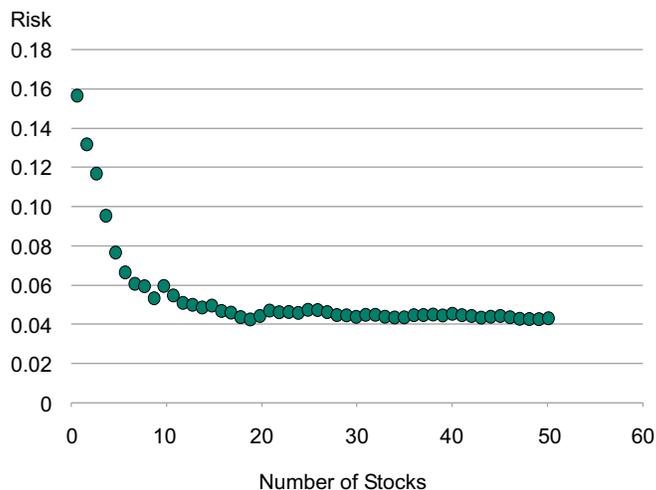
To see how the standard deviation (risk) of a portfolio of stocks declines as the number of stocks in the portfolio increases, let’s look at an experiment first undertaken by economist Eugene Fama in 1976. First, randomly select 50 stocks listed on the New York Stock Exchange (NYSE). Out of this sample, randomly choose one stock, and calculate the standard deviation of its return over a month. That number is a measure of the risk of a portfolio that consists of only that stock. Next, out of the remaining 49 stocks, randomly choose another stock. Combine that stock with the first stock chosen to form a two-stock portfolio. Calculate the standard deviation of that two-stock portfolio to quantify the portfolio’s risk. The risk of the two-stock portfolio should, on average, be lower than that of the one-stock portfolio. Next, randomly choose a third stock out of the remaining 48, add it to the two-stock portfolio to form a three-stock portfolio, and calculate its standard deviation. Proceed along these lines until the portfolio contains all 50 stocks.

We have calculated standard deviations in this manner using average monthly returns from 1995 to 1999

<sup>1</sup>For our purposes here, we’ve ignored discounting.

**FIGURE 1**

**Portfolio Diversification and Risk  
1995-1999**



(Figure 1). The figure shows that the risk associated with the portfolio declines fairly smoothly as the number of stocks in the portfolio increases. Notice, though, that once the portfolio has 10 to 15 stocks, adding more doesn't seem to decrease the risk of the portfolio much further. This remaining risk — the part not affected by holding more NYSE stocks — is called market risk.

Is there a way to lower portfolio risk even further? Only if we can lower the market risk. One way to lower market risk is to hold stocks not traded on the NYSE, in particular, stocks that trade on foreign markets, which represent claims on foreign assets.<sup>2</sup> Foreign economies generally do not move one-for-one with the U.S. economy. When the U.S. economy is in a recession, foreign economies might be

<sup>2</sup>Note, though, that many firms whose stocks are listed on the NYSE have extensive foreign operations. So, to some extent, a diversified portfolio of NYSE stocks already embodies some elements of international diversification.

in expansions and vice-versa. More generally, residents of other countries face different types of domestic risks — risks particular to those countries. Because every resident of a given country faces these same risks, they cannot be shared by trading with other domestic residents, that is, they cannot be diversified away by internal trade. So by trading financial assets with residents of other countries, households can share some of their domestic risk, thereby lowering the risk associated with fluctuations in consumption.

In a world where there is a lot of international risk-sharing, fluctuations in consumption across countries should be very similar, and investors' portfolios should include both domestic and foreign securities. Let's review some of the empirical evidence on these issues.

**HOW MUCH RISK-SHARING IS THERE ACROSS COUNTRIES?**

For international risk-sharing to occur, people must have the opportunity to trade in goods, services, and financial

capital across countries. If the costs of investing in foreign assets are too high — for example, if investors face barriers such as high transaction costs, tax and tariff payments, and certain types of capital controls — domestic investors will not find it profitable to do so. But when barriers to international capital flows are small, financial capital is mobile across countries, and international financial markets are said to be “open.” If international financial markets are open, we might expect that (1) investors would hold portfolios that are diversified internationally, (2) risk-sharing would allow fluctuations in consumption to be smoothed out relative to fluctuations in income, and (3) domestic saving would not be too closely tied to domestic investment, since residents of countries would be free to borrow from and lend to each other. Indeed, simple economic models of risk-sharing suggest that international economic data should confirm these predictions. However, as we will see, the data show there is less-than-perfect international risk-sharing. One reason, at least in the developed countries, might be that the benefits of undertaking further measures to reduce risk may not outweigh the costs.

**International Financial Flows.** It is difficult to get good, direct data on how freely financial capital flows across borders. Instead, we must look at indirect evidence on cross-border flows. If financial markets are open, dollar-denominated returns on nearly identical assets in different countries should be nearly the same. For example, the interest rate on large-dollar certificates of deposit sold in New York and

<sup>3</sup>Eurodollars are U.S. dollars deposited in foreign banks outside the United States or in foreign branches of U.S. banks. There is no exchange-rate risk in making these interest-rate comparisons across countries because the assets are denominated in a common currency.

the rate on London eurodollar deposits of the same maturity should be nearly identical.<sup>3</sup> Many empirical studies have examined these and other onshore-offshore interest rate differentials. Generally, the studies have found very close links between onshore and offshore money markets for financially developed countries such as the U.S., the U.K., France, Italy, Germany, and Japan.

Figure 2 plots the difference between the interest rate on a eurodollar deposit with a three-month maturity and the interest rate on a three-month U.S. certificate of deposit. Note how the interest rate differential between the two series has declined over time and is now, on average, very close to zero. This demonstrates that financial capital now flows quite freely between the U.S. and the London financial market.

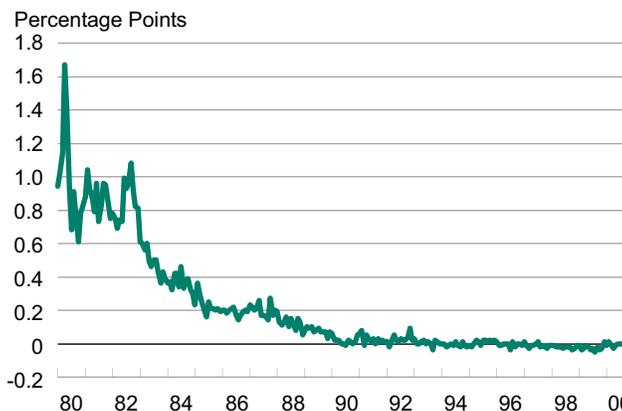
Similarly small differentials are found when economists analyze many of the world's developed financial markets.<sup>4</sup> However, financial markets in many other countries, especially less developed ones, are not as open. Thus, it is costly for their residents to share economic risks with investors in other countries.

**Cross-Border Portfolio Diversification.** In financially developed countries, where capital is mobile, one might assume that international risk-sharing would be present and investors' portfolios would be diversified internationally. However, economic research indicates that investor portfolios are not highly diversified internationally, especially those of investors in the United States and Japan. A 1991 study

<sup>4</sup>Partial surveys of these studies can be found in the article by Jeffrey Frankel and the 1986 article by Maurice Obstfeld. Obstfeld's 1994 study discusses more recent evidence on the financial openness of France, Italy, Germany, Japan, the United Kingdom, the U.S., Spain, Portugal, Ireland, and Greece.

**FIGURE 2**

**Onshore-Offshore Interest Differential**



by Kenneth French and James Poterba found that, at the end of 1989, the share of foreign equities in total equity holdings was 4 percent for residents of the United States, 2 percent for residents of Japan, and 18 percent for residents of the United Kingdom. A 1994 study by Linda Tesar and Ingrid Werner estimated that more than 96 percent of U.S. wealth was invested in U.S. equity in 1991. They also found that the fraction of the total U.S. stock market held by Germany, Canada, Japan, and the U.K. was below 12 percent in 1991, suggesting that residents of those countries were not as internationally diversified as we might expect. Marianne Baxter and Urban Jermann confirmed that, in 1991, over 95 percent of equities held by U.S. investors were those of U.S. corporations.

In a 1998 paper, Linda Tesar and Ingrid Werner provided more recent evidence on the lack of portfolio diversification internationally (Figure 3). The fact that equity holdings are disproportionately invested in domestic equities is called the *home equity bias*. The figure shows that home equity bias is smaller for the United Kingdom and

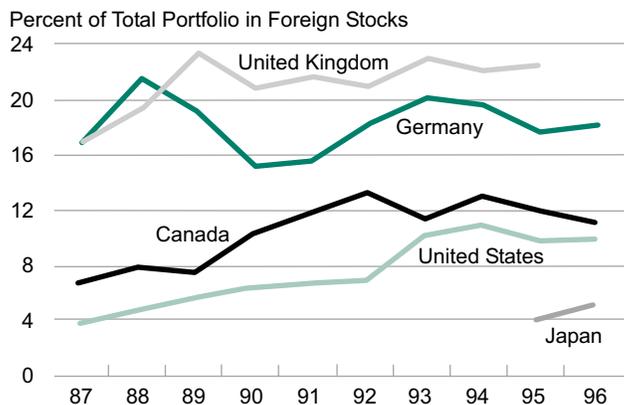
Germany than it is for Canada and the U.S. Home bias is greatest for Japan. Note that in each of the countries, the home equity bias has been getting smaller over time (that is, the percent of wealth invested in foreign assets is increasing). Nevertheless, even though this bias appears to have lessened over time, there is still not as much diversification as simple financial models suggest there should be.<sup>5</sup>

However, there are some problems with these measures of home equity bias. In particular, many large domestic firms have overseas operations, and some firms cross-list their securities on more than one market. Thus, to some extent, holding a well-diversified portfolio of U.S. stocks gives investors

<sup>5</sup>Simple models of portfolio choice suggest that optimal investment strategies involve holding a fraction of wealth in a risk-free asset and the remainder in the global market portfolio. On average, from 1980 to 1988, U.S. equities represented about 45 percent of total global market capitalization (Tesar 1995). Thus, the simple model predicts that U.S. residents should have a substantial fraction of their equity portfolios allocated to foreign stocks.

**FIGURE 3**

### Home Equity Bias 1987-1996\*



\*From Linda Tesar and Ingrid Werner, "The Internationalization of Securities Markets since the 1987 Crash," *Brookings-Wharton Papers on Financial Services*, Washington, DC, Brookings Institution, 1998, reprinted with permission.

exposure to international developments. Nevertheless, the consensus among researchers studying this issue is that residents of many countries show a home bias in their portfolio holdings.

**Fluctuations in Consumption Across Countries.** Let's focus on financially open countries where there are few barriers to international capital flows. Suppose further that asset markets are *complete*, which means that households can purchase securities that insure them against all possible risks to their consumption of goods and services.<sup>6</sup> If markets are complete and financial markets are open, people could help insure themselves against the

<sup>6</sup>In reality, of course, asset markets are not complete. For example, you cannot buy an insurance policy that pays off when you become unemployed. But we put that aside for the moment and concentrate on the idealized case of complete asset markets.

economic risks that lead to fluctuating consumption by purchasing assets from foreigners.

If residents of countries could insure themselves against the economic risks they face, the data on domestic consumption and output would show that consumption growth rates are more highly correlated across countries than are output growth rates. Why? Because people could use financial assets to, in effect, pool their incomes and then divide up the shared proceeds, much as in the simple example cited earlier. In effect, countries that might otherwise have low consumption and output in a year borrow from those that have high

<sup>7</sup>For the industrialized countries, domestic consumption fluctuates less than domestic output, so some risk-sharing is taking place, at least *within* countries. In this section we are concerned with cross-country comparisons, to get some information on the extent of risk-sharing *across* countries.

consumption and output in a year.<sup>7</sup>

How do the data stack up against this hypothesis? (See Table.) To simplify things, the table shows comparisons between consumption and output in individual countries and world consumption and output, which is used as a common benchmark, for the period 1973 to 1992. The table reports the *correlation* of individual-country consumption with world consumption and country output with world output.<sup>8</sup> If there is a lot of international risk-sharing and financial markets are nearly complete, the correlation between an individual country's consumption and world consumption should be much higher than the correlation between that country's output growth and world output growth.<sup>9</sup>

The table shows that consumption growth rates are not very highly correlated and that output growth rates are more highly correlated than consumption growth rates — not at all what the simple model of international risk-sharing predicts. Thus, despite the fact that, at least among developed countries, capital markets are well integrated and the barriers to trade are generally low, there does not seem to be as much international risk-sharing as we might expect.

<sup>8</sup>Correlation is a statistical measure of co-movement. The closer the correlation is to one, the more closely two series move together. When the correlation is positive, the series move together over time. That is, when one series is high, the other series tends to be high, and when one series is low, the other tends to be low. When the correlation is negative, the series move opposite to each other. When the correlation is zero, the series do not move together at all.

<sup>9</sup>In a world with complete risk-sharing, certain economic models predict the world supply of consumed goods should be allocated across countries approximately in proportion to their share of total world wealth. Therefore, consumption growth in each country should be identical to the growth rate of world consumption. See the 1995 article by Linda Tesar for details.

## TABLE

### International Consumption and Output Correlations 1973-1992

| Country                                 | Consumption Correlation <sup>a</sup> | Output Correlation <sup>a</sup> |
|---|--------------------------------------|---------------------------------|
| Canada                                  | 0.56                                 | 0.70                            |
| France                                  | 0.45                                 | 0.60                            |
| Germany                                 | 0.63                                 | 0.70                            |
| Italy                                   | 0.27                                 | 0.51                            |
| Japan                                   | 0.38                                 | 0.46                            |
| United Kingdom                          | 0.63                                 | 0.62                            |
| United States                           | 0.52                                 | 0.68                            |
| OECD average <sup>b,c</sup>             | 0.43                                 | 0.52                            |
| Developing country average <sup>b</sup> | -0.10                                | 0.05                            |

<sup>a</sup>Correlation between the annual change in the log of a country's real per capita consumption (output) and the annual change in the log of the rest of the world's per capita consumption (output) over 1973-92. The world is defined as the 35 benchmark countries in the Penn World Table Mark 5.6.

<sup>b</sup>Average correlations are population-weighted averages of individual country correlations.

<sup>c</sup>Excludes Mexico.

(Source: Maurice Obstfeld and Kenneth Rogoff. *Foundations of International Macroeconomics*, Cambridge, MA: MIT Press, 1996, Table 5.1, pg. 291; reprinted with permission)

**Domestic Saving and Investment.** Another way that households can smooth their consumption over time is by drawing down savings when income is low and increasing savings when income is high. For a country as a whole, domestic saving and investment provide a means whereby residents can insure themselves against some of the economic risks they face.

<sup>10</sup>Dissaving occurs when consumption exceeds income.

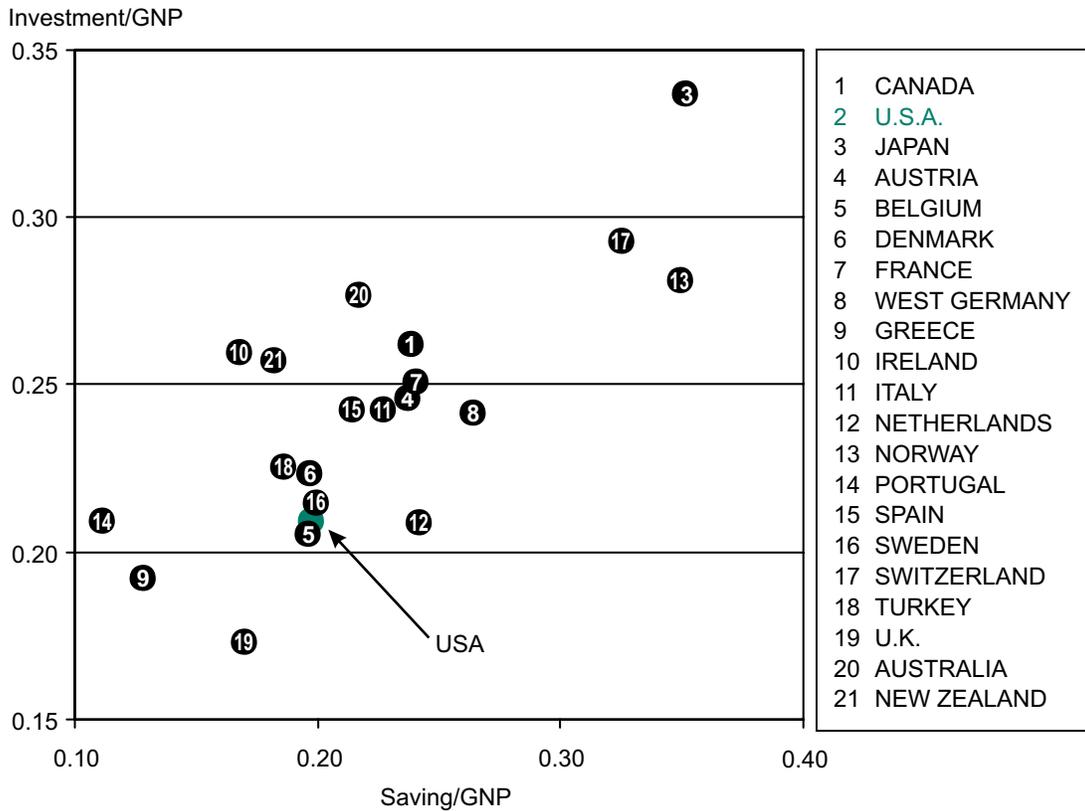
If a country could not engage in trade with any other country, domestic saving would have to equal domestic investment. Under such an economy, the only avenue available to residents for smoothing consumption would be saving and dissaving.<sup>10</sup> But access to international financial markets breaks the link between domestic saving and domestic investment, since savings can be imported to finance domestic investment or exported to find the highest return. Thus, domestic saving and investment need not move together over time if financial markets are open and capital is mobile.

In a very influential 1980 article, Martin Feldstein and Charles Horioka provided evidence that showed saving and investment were highly correlated across a wide sample of countries — not what we would expect if capital is internationally mobile (Figure 4). The figure, which provides some updated evidence on the Feldstein-Horioka puzzle, plots the 10-year average of savings and investment for a sample of 22 countries from 1981 through 1990. Each point represents the average saving rate and average investment rate for an individual country. If saving and investment were unrelated across countries, the points would be evenly scattered about the diagram, with no discernable pattern visible. Instead, the figure shows a clear positive relationship between saving and investment for these countries: When saving is high, investment is high; when saving is low, investment is low. This positive relationship between saving and investment is not what we would have expected in a world of open financial markets and mobile capital.

There is a vast literature in economics on the Feldstein-Horioka puzzle. Many studies have verified that saving and investment tend to be positively correlated both over time within a single country and at a point in time across countries. There is some evidence that the saving-investment correlation may be getting weaker over time as financial markets become more and more integrated. But the data also show that investment-savings correlations tend to be lower in developing countries than in industrialized countries, which is contrary to what we would expect if this correlation were a strong measure of capital's mobility internationally. Developing countries tend to have a low degree of international capital mobility, which suggests that domestic saving and investment should be highly correlated.

**FIGURE 4**

**Saving and Investment Rates for Selected Industrialized Countries 1981-1990**



Source: Author's calculations

**ARE THERE UNEXPLOITED GAINS FROM INTERNATIONAL RISK-SHARING?**

Economic theory suggests that there may be substantial gains from international risk-sharing. But the empirical evidence we reviewed above suggests that there isn't as much international risk-sharing going on as we might expect. Does that mean there are unexploited gains from international risk-sharing? In the case of the developed countries, many economists think not. For these countries, the gains from further international risk-sharing may be very small. But for developing countries,

which often do not have open financial markets, the gains from international risk-sharing may be substantial.

So why do the data *not* bear out the predictions of *simple* models of international risk-sharing? Because the world is complicated. In particular, our simple models do not fully account for three important factors.

For one thing, financial markets are not really complete.<sup>11</sup> You cannot buy insurance against all future events, such as becoming unemployed. The less complete financial markets are, the less correlation of consumption there will be across countries.

Another problem is that not all goods are traded. For example, there is

<sup>11</sup>The fact that consumption is not fully insured against country-specific shocks may be a reflection of incomplete asset markets rather than an inability or unwillingness to trade existing assets internationally. To examine this issue, economists have studied the extent of risk-sharing within countries — such as across states within the U.S. and across prefectures in Japan. Generally, the studies find that there is not complete risk-sharing within countries but that the extent of risk-sharing at the national level exceeds that at the international level. See the studies by Atkeson and Bayoumi (1992), Crucini (1999), and Obstfeld (1994).

no international trade in haircuts, fitness club memberships, Big Macs, or private and government services. Nontraded goods matter because you cannot smooth out the consumption of those goods by trading them with residents of other countries. Over time, consumption of traded goods will move in a similar fashion across countries, but consumption of nontraded goods will show dissimilar movements. The bigger the role nontraded goods play in total domestic consumption, the less cross-country correlation in total consumption we should see.

Third, transaction costs may prevent portfolios from being as internationally diversified as simple models of risk-sharing predict. Developed countries afford their residents ample opportunity to diversify risk by trading domestic assets. If transaction costs must be incurred in trading goods and assets with foreign countries, it may not be beneficial to domestic residents to try to exploit further gains from risk-sharing, even if the transaction costs are small. A number of economic studies have concluded that there is little in the way of unexploited gains to further risk-sharing among the developed countries.<sup>12</sup>

Linda Tesar's conclusions in her 1995 study are typical. She found that, for developed countries, the gains from international risk-sharing are usually less than one-half of 1 percent of the lifetime consumption of a typical household. Since these gains are so small, even small transaction costs for

---

<sup>12</sup>See the papers by Harold Cole and Maurice Obstfeld; Linda Tesar (1995); Enrique Mendoza; David Backus, Patrick Kehoe, and Finn Kydland (1992), and Obstfeld and Rogoff.

<sup>13</sup>In addition, individuals may not like the risks that international stocks entail, since they are likely to be less informed about such stocks.

international trade are enough to offset the gains. These conclusions are similar to those reached by Maurice Obstfeld and Kenneth Rogoff. They found that small transaction costs can help explain the perceived lack of international risk-sharing.<sup>13</sup>

In addition to these three factors, there are other channels through which households can share risk without using international financial markets: international trade in goods and services and domestic saving and investment.

**The bigger the role nontraded goods play in total domestic consumption, the less cross-country correlation in total consumption we should see.**

Trade in goods and services across countries can, to some extent, offset the need to diversify portfolios and share risk internationally. International trade in goods allows households to import goods when the benefits from consuming them are high, substituting in part for sharing risk by trading in international financial assets. This substitution can happen because a country's *terms of trade* may change in such a way as to offset bad output shocks.<sup>14</sup> If a country's terms of trade are high when domestic output is low, it is relatively inexpensive to import goods and thereby smooth consumption.

As we have seen, domestic investment offers some scope to smooth out fluctuations in consumption as well. Investment allows residents of a country to reallocate their consumption over

---

<sup>14</sup>A country's terms of trade can be defined as the price of exports relative to the price of imports.

time. By cutting back on consumption today and increasing saving and investment, more consumption can take place in the future. Similarly, by cutting back on saving and investment today, more consumption can be had today at the expense of future consumption. In this way, residents of a country can shift consumption from the present to the future and vice versa. The ability to adjust saving and investment to smooth out fluctuations in consumption lessens the need to use international financial markets to do the same.

Would countries experience large gains if there was more international risk-sharing? The answer to this question depends on the economic model being used. In a typical economic model, the gains to an average consumer of fully eliminating consumption risk are usually very small. For example, an influential study by Robert Lucas suggested that a typical consumer would be willing to pay only about \$80 a year to totally eliminate variability in consumption. Lucas's results are based on some special assumptions that have been challenged, but many of the models that economists have used to analyze gains from international risk-sharing have a structure very similar to the one Lucas used.

Thus, in these models, consumers aren't willing to pay much to eliminate variability in consumption. Models in which consumers care more about lowering consumption fluctuations would demonstrate bigger gains from risk-sharing.

There are conditions, however,

under which the gains from further international risk-sharing for large developed countries may be substantial. Suppose that domestic investment rises in response to expanded opportunities for diversification, so that domestic purchases of capital equipment rise as investors diversify portfolios internationally. Increased investment in capital goods leads to a greater increase in the capital stock than would otherwise be the case and may lead to faster long-run economic growth. Over time, the economy could experience a large increase in its standard of living because of the diversification opportunities presented by foreign markets.

In addition, although the aggregate gains to the economy of increased risk-sharing may be small, the benefits perceived by individuals within a society may be large. For example, avoiding taxes may motivate some individuals to trade in international financial markets in an effort to shelter income. Or the income variability faced by a typical household may be much larger than the variability of income in the economy as a whole. So some income groups in the economy may gain substantially from international diversification and risk-sharing.

For developing countries, the gains to further risk-sharing may be quite a bit larger than any gains developed countries might realize from increased international risk-sharing. First, developing countries contribute less to world output than developed countries, making it less likely that their domestic output would rise and fall with world output. Thus, more of their country-specific risk can be eliminated by trading assets with residents in the rest of the world. Second, developing countries' output is often much more variable than that of developed countries, which means the potential benefit from risk-sharing is greater, since there is more scope to reduce output volatility.



In sum, the precise magnitude of the gains from further international risk-sharing remains an open question. But it seems that developing countries are the most likely to be its strongest beneficiaries.

#### SUMMARY

Residents of a country might be better off if they could share some economic risks with residents of other

countries, who may face different economic risks. Sharing these risks allows residents of both countries to potentially smooth out the fluctuations in consumption they might otherwise face. However, the empirical evidence on the correlations between international consumption, the link between saving and investment, and portfolio diversification suggests that the extent of international risk-sharing is not as

great as we might at first suspect. Perhaps, the residents of developed countries have already shared about as much risk as it is worthwhile for them to do so. The costs of undertaking further measures to reduce risk may not be worthwhile.

For developing countries the benefits of international risk-sharing are likely to be substantial. Output and consumption in these countries tend to be very volatile from year to year. If

these countries can gain increased access to world financial markets, they would be able to substantially smooth fluctuations in their aggregate consumption. 

## REFERENCES

Atkeson, Andrew, and T. Bayoumi. "Do Private Capital Markets Insure Regional Risk? Evidence from the United States and Europe," University of Chicago Working Paper, 1992.

Backus, David, Patrick Kehoe, and Finn Kydland. "International Real Business Cycles," *Journal of Political Economy* 100 (1992), pp. 745-75.

Baxter, Marianne, and Urban Jermann. "The International Diversification Puzzle Is Worse Than You Think," *American Economic Review*, 87 (1997), pp. 170-91.

Cole, Harold, and Maurice Obstfeld. "Commodity Trade and International Risk Sharing," *Journal of Monetary Economics*, 28 (1991), pp. 3-24.

Crucini, Mario. "On International and National Dimensions of Risk Sharing," *Review of Economics and Statistics*, 81 (1999), pp. 73-84.

Fama, Eugene. *Foundations of Finance*. New York: Basic Books, 1976.

Feldstein, Martin, and Charles Horioka. "Domestic Savings and International Capital Flows," *Economic Journal*, 90 (1980), pp. 314-29.

Frankel, Jeffrey. "Quantifying International Capital Mobility in the 1980s," in *On Exchange Rates*. Cambridge, MA: MIT Press, 1993.

French, Kenneth, and James Poterba. "Investor Diversification and International Equity Markets," *American Economic Review*, 81 (1991), pp. 222-26.

Lucas, Robert E. Jr. *Models of Business Cycles*. Oxford, U.K.: Basil Blackwell, 1987.

Mendoza, Enrique. "The Terms of Trade, the Real Exchange Rate, and Economic Fluctuations," *International Economic Review*, 36 (1995), pp. 101-37.

Obstfeld, Maurice. "Capital Mobility in the World Economy: Theory and Measurement," *Carnegie-Rochester Conference Series on Public Policy*, 24 (1986), pp. 55-103.

Obstfeld, Maurice. "International Capital Mobility in the 1990s," in Peter B. Kenen, ed., *Understanding Interdependence: The Macroeconomics of the Open Economy*. Princeton, NJ: Princeton University Press, 1994.

Obstfeld, Maurice, and Kenneth Rogoff. "The Six Major Puzzles in International Macroeconomics: Is There a Common Cause?" NBER Working Paper 7777, 2000.

Tesar, Linda. "Evaluating the Gains from International Risksharing," *Carnegie-Rochester Conference Series on Public Policy*, 42 (1995), pp. 95-143.

Tesar, Linda, and Ingrid Werner. "International Equity Transactions and U.S. Portfolio Choice," NBER Working Paper 4611, 1994.

Tesar, Linda, and Ingrid Werner. "The Internationalization of Securities Markets Since the 1987 Crash," *Brookings-Wharton Papers on Financial Services*, Washington: Brookings Institution, 1998.