

Financial Globalization: Opportunity and Crisis

If a financier named Rip van Winkle had gone to sleep in the 1960s and awakened after 50 years, he would have been shocked by changes in both the nature and the scale of international financial activity. In the early 1960s, for example, most banking business was purely domestic, involving the currency and customers of the bank's home country. Five decades later, many banks were deriving a large share of their profits from international activities. To his surprise, Rip would have found that he could locate branches of Citibank in São Paulo, Brazil, and branches of Britain's National Westminster Bank in New York. He would also have discovered that it had long since become routine for a branch of an American bank located in London to accept a deposit denominated in Japanese yen from a Swedish corporation, or to lend Swiss francs to a Dutch manufacturer. Finally, he would have noticed much greater participation by nonbank financial institutions in international markets, and a huge expansion in the volume of international transactions.

The market in which residents of different countries trade assets is called the **international capital market**. The international capital market is not really a single market; it is instead a group of closely interconnected markets in which asset exchanges with some international dimension take place. International currency trades take place in the foreign exchange market, which is an important part of the international capital market. The main actors in the international capital market are the same as those in the foreign exchange market (Chapter 14): commercial banks, large corporations, nonbank financial institutions, central banks, and other government agencies. And, like the foreign exchange market, the international capital market's activities take place in a network of world financial centers linked by sophisticated communications systems. The assets traded in the international capital market, however, include different countries' stocks and bonds in addition to bank deposits denominated in their currencies.

This chapter discusses four main questions about the international capital market. First, how has this well-oiled global financial network enhanced countries' gains from international trade? Second, what has caused the rapid growth in international financial activity since the early 1960s? Third, what dangers are

posed by an integrated world capital market straddling national borders? And fourth, how can policy makers minimize problems raised by the global capital market without sharply reducing the benefits it provides?

LEARNING GOALS

After reading this chapter, you will be able to:

- Understand the economic function of international portfolio diversification.
- Explain factors leading to the explosive recent growth of international financial markets.
- Analyze problems in the regulation and supervision of international banks and nonbank financial institutions.
- Describe some different methods that have been used to measure the degree of international financial integration.
- Understand the factors leading to the worldwide financial crisis that started in 2007.
- Evaluate the performance of the international capital market in linking the economies of the industrial countries.

The International Capital Market and the Gains from Trade

In earlier chapters, the discussion of gains from international trade concentrated on exchanges involving goods and services. By providing a worldwide payments system that lowers transaction costs, banks active in the international capital market enlarge the trade gains that result from such exchanges. But most deals that take place in the international capital market are exchanges of assets between residents of different countries, for example, the exchange of a share of IBM stock for some British government bonds. Although such asset trades are sometimes derided as unproductive “speculation,” they do, in fact, lead to gains from trade that can make consumers everywhere better off.

Three Types of Gain from Trade

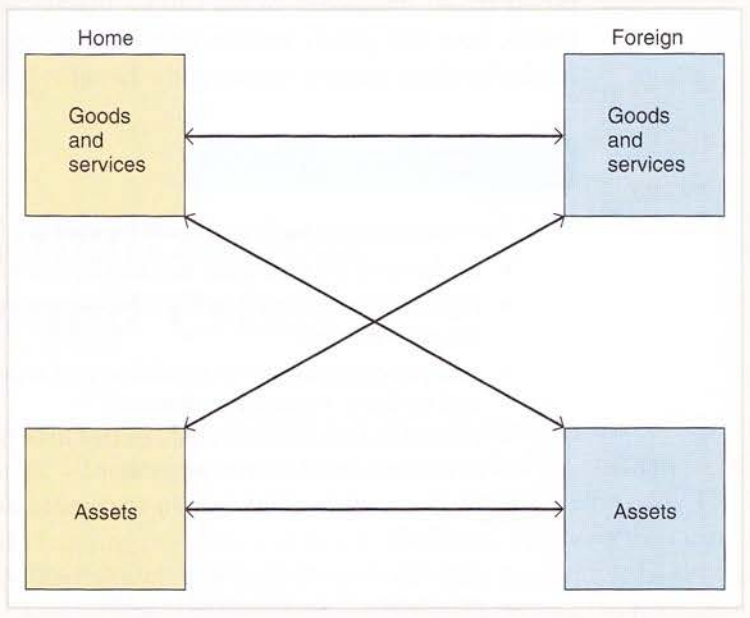
All transactions between the residents of different countries fall into one of three categories: trades of goods or services for goods or services, trades of goods or services for assets, and trades of assets for assets. At any moment, a country is generally carrying out trades in each of these categories. Figure 21-1 (which assumes that there are two countries, Home and Foreign) illustrates the three types of international transaction, each of which involves a different set of possible gains from trade.

So far in this book we have discussed two types of trade gain. Chapters 3 through 8 showed that countries can gain by concentrating on the production activities in which they are most efficient and using some of their output to pay for imports of other products from abroad. This type of trade gain involves the exchange of goods or services for other goods or services. The top horizontal arrow in Figure 21-1 shows exchanges of goods and services between Home and Foreign.

A second set of trade gains results from *intertemporal* trade, which is the exchange of goods and services for claims to future goods and services, that is, for assets (Chapters 6 and 19). When a developing country borrows abroad (that is, sells a bond to foreigners) so that it can import materials for a domestic investment project, it is engaging in

Figure 21-1**The Three Types of International Transaction**

Residents of different countries can trade goods and services for other goods and services, goods and services for assets (that is, for future goods and services), and assets for other assets. All three types of exchange lead to gains from trade.



intertemporal trade. The diagonal arrows in Figure 21-1 indicate trades of goods and services for assets. If Home has a current account deficit with Foreign, for example, it is a net exporter of assets to Foreign and a net importer of goods and services from Foreign.

The bottom horizontal arrow in Figure 21-1 represents the last category of international transaction, trades of assets for assets, such as the exchange of real estate located in France for U.S. Treasury bonds. In Table 13-2 on page 309, which shows the 2009 U.S. balance of payments accounts, you will see under the financial account both a \$140.5 billion purchase of foreign assets by U.S. residents and a \$305.7 billion purchase of U.S. assets by foreign residents. (The BEA reports only *net* trade in derivatives.) So while the United States could have financed its current account deficit simply by selling assets to foreigners and not buying any from them, U.S. and foreign residents also engaged in pure asset swapping. Due to effects of the 2007–2009 financial crisis, moreover, the 2009 financial flows are considerably depressed compared to their levels in the years up to 2007, which sometimes exceeded a trillion dollars annually! Such a large volume of trade in assets between countries occurs in part because international asset trades, like trades involving goods and services, can yield benefits to all the countries involved. As we shall see, however, there are other less beneficial motives for some international asset swaps.

Risk Aversion

When individuals select assets, an important factor in their decisions is the riskiness of each asset's return (Chapter 14). Other things equal, people dislike risk. Economists call this property of people's preferences **risk aversion**. Chapter 18 showed that risk-averse investors in foreign currency assets base their demand for a particular asset on its riskiness (as measured by a risk premium) in addition to its expected return.

An example will make the meaning of risk aversion clearer. Suppose you are offered a gamble in which you win \$1,000 half the time but lose \$1,000 half the time. Since you are as likely to win as to lose the \$1,000, the average payoff on this gamble—its *expected value*—is $\left(\frac{1}{2}\right) \times (\$1,000) + \left(\frac{1}{2}\right) \times (-\$1,000) = 0$. If you are risk averse, you will not take the gamble because, for you, the possibility of losing \$1,000 outweighs the possibility

that you will win, even though both outcomes are equally likely. Although some people (called risk lovers) enjoy taking risks and would take the gamble, there is much evidence that risk-averse behavior is the norm. For example, risk aversion helps explain the profitability of insurance companies, which sell policies that allow people to protect themselves or their families from the financial risks of theft, illness, and other mishaps.

If people are risk averse, they value a collection (or portfolio) of assets not only on the basis of its expected return but also on the basis of the riskiness of that return. Under risk aversion, for example, people may be willing to hold bonds denominated in several different currencies, even if the interest rates they offer are not linked by the interest parity condition, if the resulting portfolio of assets offers a desirable combination of return and risk. In general, a portfolio whose return fluctuates wildly from year to year is less desirable than one that offers the same average return with only mild year-to-year fluctuations. This observation is basic to understanding why countries exchange assets.

Portfolio Diversification as a Motive for International Asset Trade

International trade in assets can make both parties to the trade better off by allowing them to reduce the riskiness of the return on their wealth. Trade accomplishes this reduction in risk by allowing both parties to diversify their portfolios—to divide their wealth among a wide spectrum of assets and thus reduce the amount of money they have riding on each individual asset. The late economist James Tobin of Yale University, an originator of the theory of portfolio choice with risk aversion, once described the idea of **portfolio diversification** as “Don’t put all your eggs in one basket.” When an economy is opened to the international capital market, it can reduce the riskiness of its wealth by placing some of its “eggs” in additional foreign “baskets.” This reduction in risk is the basic motive for asset trade.

A simple two-country example illustrates how countries are made better off by trade in assets. Imagine that there are two countries, Home and Foreign, and that residents of each own only one asset, domestic land yielding an annual harvest of kiwi fruit.

The yield of the land is uncertain, however. Half of the time, Home’s land yields a harvest of 100 tons of kiwi fruit at the same time as Foreign’s land yields a harvest of 50 tons. The other half of the time, the outcomes are reversed: The Foreign harvest is 100 tons, but the Home harvest is only 50. On average, then, each country has a harvest of $(\frac{1}{2}) \times (100) + (\frac{1}{2}) \times (50) = 75$ tons of kiwi fruit, but its inhabitants never know whether the next year will bring feast or famine.

Now suppose the two countries can trade shares in the ownership of their respective assets. A Home owner of a 10 percent share in Foreign land, for example, receives 10 percent of the annual Foreign kiwi fruit harvest, and a Foreign owner of a 10 percent share in Home land is similarly entitled to 10 percent of the Home harvest. What happens if international trade in these two assets is allowed? Home residents will buy a 50 percent share of Foreign land, and they will pay for it by giving Foreign residents a 50 percent share in Home land.

To understand why this is the outcome, think about the returns to the Home and Foreign portfolios when both are equally divided between titles to Home and Foreign land. When times are good in Home (and therefore bad in Foreign), each country earns the same return on its portfolio: half of the Home harvest (100 tons of kiwi fruit) plus half of the Foreign harvest (50 tons of kiwi fruit), or 75 tons of fruit. In the opposite case—bad times in Home, good times in Foreign—each country *still* earns 75 tons of fruit. If the countries hold portfolios equally divided between the two assets, therefore, each country earns a *certain* return of 75 tons of fruit—the same as the average or expected harvest each faced before international asset trade was allowed.

Since the two available assets—Home and Foreign land—have the same return on average, any portfolio consisting of those assets yields an expected (or average) return of 75 tons

of fruit. People everywhere are risk averse, however, so all prefer to hold the fifty-fifty portfolio described above, which gives a sure return of 75 tons of fruit every year. After trade is opened, therefore, residents of the two counties will swap titles to land until the fifty-fifty outcome is reached. Because this trade eliminates the risk faced by both countries without changing average returns, both countries are clearly better off as a result of asset trade.

The above example is oversimplified because countries can never really eliminate *all* risk through international asset trade. (Unlike the model's world, the real world is a risky place even in the aggregate!) The example does demonstrate that countries can nonetheless *reduce* the riskiness of their wealth by diversifying their asset portfolios internationally. A major function of the international capital market is to make this diversification possible.¹

The Menu of International Assets: Debt versus Equity

International asset trades can be exchanges of many different types of assets. Among the many assets traded in the international capital market are bonds and deposits denominated in different currencies, shares of stock, and more complicated financial instruments such as stock or currency options. A purchase of foreign real estate and the direct acquisition of a factory in another country are other ways of diversifying abroad.

In thinking about asset trades, it is frequently useful to make a distinction between **debt instruments** and **equity instruments**. Bonds and bank deposits are debt instruments, since they specify that the issuer of the instrument must repay a fixed value (the sum of principal plus interest) regardless of economic circumstances. In contrast, a share of stock is an equity instrument: It is a claim to a firm's profits, rather than to a fixed payment, and its payoff will vary according to circumstances. Similarly, the kiwi fruit shares traded in our example are equity instruments. By choosing how to divide their portfolios between debt and equity instruments, individuals and nations can arrange to stay close to desired consumption and investment levels despite the different eventualities that could occur.

The dividing line between debt and equity is not a neat one in practice. Even if an instrument's money payout is the same in different states of the world, its *real* payout in a particular state will depend on national price levels and exchange rates. In addition, the payments that a given instrument promises to make may not occur in cases of bankruptcy, government seizure of foreign-owned assets, and so on. Assets like low-grade corporate bonds, which superficially appear to be debt, may in reality be like equity in offering payoffs that depend on the doubtful financial fortunes of the issuer. The same has turned out to be true of the debt of many developing countries, as we will see in Chapter 22.

International Banking and the International Capital Market

The Home-Foreign kiwi fruit example above portrayed an imaginary world with only two assets. Since the number of assets available in the real world is enormous, specialized institutions have sprung up to bring together buyers and sellers of assets located in different countries.

¹The Mathematical Postscript to this chapter develops a detailed model of international portfolio diversification. You may have noticed that in our example, countries could reduce risk through transactions other than the asset swap we have described. The high-output country could run a current account surplus and lend to the low-output country, for example, thereby partially evening out the cross-country consumption difference in every state of the world economy. The economic functions of intertemporal trades and of pure asset swaps thus can overlap. To some extent, trade over time can substitute for trade across states of nature, and vice versa, simply because different economic states of the world occur at different points in time. But, in general, the two types of trade are not perfect substitutes for each other.

The Structure of the International Capital Market

As we noted above, the main actors in the international capital market include commercial banks, corporations, nonbank financial institutions (such as insurance companies, money market funds, hedge funds, and pension funds), central banks, and other government agencies.

1. *Commercial banks.* Commercial banks are at the center of the international capital market, not only because they run the international payments mechanism but also because of the broad range of financial activities they undertake. Bank liabilities consist chiefly of deposits of various maturities, as well as short-term borrowing from other financial institutions, while their assets consist largely of loans (to corporations and governments), deposits at other banks (interbank deposits), and bonds. Multinational banks are also heavily involved in other types of asset transaction. For example, banks may *underwrite* issues of corporate stocks and bonds by agreeing, for a fee, to find buyers for those securities at a guaranteed price. One of the key facts about international banking is that banks are often free to pursue activities abroad that they would not be allowed to pursue in their home countries. This type of regulatory asymmetry has spurred the growth of international banking over the past 50 years.

2. *Corporations.* Corporations—particularly those with multinational operations such as Coca-Cola, IBM, Toyota, and Nike—routinely finance their investments by drawing on foreign sources of funds. To obtain these funds, corporations may sell shares of stock, which give owners an equity claim to the corporation's assets, or they may use debt finance. Debt finance often takes the form of borrowing from and through international banks or other institutional lenders; when longer-term borrowing is desired, firms may sell corporate debt instruments in the international capital market. Corporations frequently denominate their bonds in the currency of the financial center in which the bonds are being offered for sale. Increasingly, however, corporations have been pursuing novel denomination strategies that make their bonds attractive to a wider spectrum of potential buyers.

3. *Nonbank financial institutions.* Nonbank institutions such as insurance companies, pension funds, mutual funds, and hedge funds have become important players in the international capital market as they have moved into foreign assets to diversify their portfolios. Of particular importance are *investment banks* such as the Lazard Group, which are not banks at all but specialize in underwriting sales of stocks and bonds by corporations and (in some cases) governments. In 1933, U.S. commercial banks were barred from investment banking activity within the United States (and from most other domestic transactions involving corporate stocks and bonds), although the U.S. government eased these barriers in 1999. But U.S. commercial banks have long been allowed to participate in investment banking activities overseas, and such banks as Citigroup and J.P. Morgan Chase have competed vigorously with the more specialized investment banks.

4. *Central banks and other government agencies.* Central banks are routinely involved in the international financial markets through foreign exchange intervention. In addition, other government agencies frequently borrow abroad. Developing-country governments and state-owned enterprises have borrowed substantially from foreign commercial banks.

On any measure, the scale of transactions in the international capital market has grown much more quickly than world GDP since the early 1970s. One major factor in this development is that, starting with the industrial world, countries have progressively dismantled barriers to private capital flows across their borders.

An important reason for that development is related to exchange rate systems. According to the trilemma, the widespread adoption of flexible exchange rates since the early 1970s has allowed countries to reconcile open capital markets with domestic monetary autonomy. The individual member countries of the European economic and monetary union (Chapter 20) have followed a different route with respect to their mutual exchange rates. However, the euro floats against foreign currencies and the euro zone as a unit orients its monetary policy toward internal macroeconomic goals while permitting freedom of cross-border payments.

Offshore Banking and Offshore Currency Trading

One of the most pervasive features of today's commercial banking industry is that banking activities have become globalized as banks have branched out from their home countries into foreign financial centers. In 1960, only eight American banks had branches in foreign countries, but now hundreds have such branches. Similarly, the number of foreign bank offices in the United States has risen steadily.

The term **offshore banking** is used to describe the business that banks' foreign offices conduct outside of their home countries. Banks may conduct foreign business through any of three types of institutions:

1. An *agency* office located abroad, which arranges loans and transfers funds but does not accept deposits.
2. A *subsidiary* bank located abroad. A subsidiary of a foreign bank differs from a local bank only in that a foreign bank is the controlling owner. Subsidiaries are subject to the same regulations as local banks but are not subject to the regulations of the parent bank's country.
3. A foreign *branch*, which is simply an office of the home bank in another country. Branches carry out the same business as local banks and are usually subject to local *and* home banking regulations. Often, however, branches can take advantage of cross-border regulatory differences.

The growth of **offshore currency trading** has gone hand in hand with that of offshore banking. An offshore deposit is simply a bank deposit denominated in a currency other than that of the country in which the bank resides—for example, yen deposits in a London bank or dollar deposits in Zurich. Many of the deposits traded in the foreign exchange market are offshore deposits. Offshore currency deposits are usually referred to as **Eurocurrencies**, which is something of a misnomer since much Eurocurrency trading occurs in such non-European centers as Singapore and Hong Kong. Dollar deposits located outside the United States are called **Eurodollars**. Banks that accept deposits denominated in Eurocurrencies (including Eurodollars) are called **Eurobanks**. The advent of the new European currency, the euro, has made this terminology even more confusing!

One motivation for the rapid growth of offshore banking and currency trading has been the growth of international trade and the increasingly multinational nature of corporate activity. American firms engaged in international trade, for example, require overseas financial services, and American banks have naturally expanded their domestic business with these firms into foreign areas. By offering more rapid clearing of payments and the flexibility and trust established in previous dealings, American banks compete with the foreign banks that could also serve American customers. Eurocurrency trading is another natural outgrowth of expanding world trade in goods and services. British importers of American goods frequently need to hold dollar deposits, for example, and it is natural for banks based in London to woo these importers' business.

World trade growth alone, however, cannot explain the growth of international banking since the 1960s. Another factor is the banks' desire to escape domestic government

regulations on financial activity (and sometimes taxes) by shifting some of their operations abroad and into foreign currencies. A further factor is in part political: the desire by some depositors to hold currencies outside the jurisdictions of the countries that issue them. In recent years, the tendency for countries to open their financial markets to foreigners has allowed international banks to compete globally for new business.

The Growth of Eurocurrency Trading

The growth of Eurocurrency trading illustrates the importance of all these factors in the internationalization of banking.

Eurodollars were born in the late 1950s, a response to the needs generated by a growing volume of international trade. European firms involved in trade frequently wished to hold dollar balances or to borrow dollars. In many cases, banks located in the United States could have served these needs, but Europeans often found it cheaper and more convenient to deal with local banks familiar with their circumstances. As currencies other than the dollar became increasingly convertible after the late 1950s, offshore markets for them sprang up also.

While the convenience of dealing with local banks was a key factor inspiring the invention of Eurodollars, the growth of Eurodollar trading was encouraged at an early stage by both of the two other factors we have mentioned: official regulations and political concerns.

In 1957, at the height of a balance of payments crisis, the British government prohibited British banks from lending pounds to finance non-British trade. This lending had been a highly profitable business, and to avoid losing it, British banks began financing the same trade by attracting dollar deposits and lending dollars instead of pounds. Because stringent financial regulations prevented the British banks' nonsterling transactions from affecting Britain's domestic asset markets, the government was willing to take a *laissez-faire* attitude toward foreign currency activities. As a result, London became—and has remained—the leading center of Eurocurrency trading.

The political factor stimulating the Eurodollar market's early growth was a surprising one—the Cold War between the United States and the former Soviet Union. The Soviets feared the United States might confiscate dollars placed in American banks if the Cold War were to heat up. So instead, Soviet dollars were placed in European banks, which had the advantage of residing outside America's jurisdiction.

The Eurodollar system mushroomed in the 1960s as a result of new U.S. restrictions on capital outflows and U.S. banking regulations. As America's balance of payments weakened in the 1960s, the Kennedy and Johnson administrations imposed a series of measures to discourage American lending abroad. All of these measures increased the demand for Eurodollar loans by making it harder for would-be dollar borrowers located abroad to obtain the funds they wanted in the United States.

Federal Reserve regulations on U.S. banks also encouraged the creation of Eurodollars—and new Eurobanks—in the 1960s. The Fed's Regulation Q (enacted in 1933 and phased out after 1980) placed a ceiling on the interest rates U.S. banks could pay on time deposits. When U.S. monetary policy was tightened at the end of the 1960s to combat rising inflationary pressures (see Chapter 19), market interest rates were driven above the Regulation Q ceiling and American banks found it impossible to attract time deposits for relending. The banks got around the problem by borrowing funds from their European branches, which faced no restriction on the interest they could pay on Eurodollar deposits and were able to attract deposits from investors who might have placed their funds with U.S. banks in the absence of Regulation Q.

With the move to floating exchange rates in 1973, the United States and other countries began to dismantle controls on capital flows across their borders, removing an important

impetus to the growth of Eurocurrency markets in earlier years. But at that point, the political factor once again came into play in a big way. Arab members of OPEC accumulated vast wealth as a result of the oil shocks of 1973–1974 and 1979–1980 but were reluctant to place most of their money in American banks for fear of possible confiscation. Instead, these countries placed funds with Eurobanks. (In 1979, Iranian assets in U.S. banks and their European branches were frozen by President Carter in response to the taking of hostages at the American embassy in Teheran. A similar fate befell Iraq's U.S. assets after that country invaded neighboring Kuwait in 1990, and the assets of suspected terrorist organizations after the September 11, 2001, attacks on New York's World Trade Center and the Pentagon.)

The Importance of Regulatory Asymmetries

The history of Eurocurrencies shows how the growth of world trade, financial regulations, and political considerations all helped form the present system. The major factor behind the continuing profitability of Eurocurrency trading is, however, regulatory: In formulating bank regulations, governments in the main Eurocurrency centers discriminate between deposits denominated in the home currency and those denominated in others and between transactions with domestic customers and those with foreign customers. Domestic currency deposits generally are more heavily regulated as a way of maintaining control over the domestic money supply, while banks are given more freedom in their dealings in foreign currencies.

Regulatory asymmetries explain why those financial centers whose governments historically imposed the fewest restrictions on foreign currency banking became the main Eurocurrency centers. London is the leader in this respect, but it has been followed by Luxembourg, Bahrain, Hong Kong, and other countries that have competed for international banking business by lowering restrictions and taxes on foreign bank operations within their borders.

The Shadow Banking System

In recent decades, a major regulatory asymmetry has arisen between banks and what is often referred to as the **shadow banking system**. Nowadays, numerous financial institutions provide payment and credit services similar to those that banks provide. U.S. money market mutual funds, for example, provide check-writing services to customers and also are major players in providing credit to firms (through commercial paper markets) and in lending dollars to banks outside the United States. Investment banks also have provided credit to other entities while offering payment services. The shadow banking system even has included investment conduits that are sponsored by banks but are supposedly independent of the banks' own balance sheets. However, shadow banks have usually been minimally regulated compared to banks.

Why has this been the case? Historically, monetary policy makers have viewed banks as the prime focus of concern because of their centrality to the payments system and to the implementation of monetary policy. But the shadow banking system has grown dramatically. Total shadow banking sector assets are difficult to measure precisely, but in the United States today, they are probably comparable to the assets of the traditional banking sector.

Moreover, shadow banks are closely intertwined with banks as both creditors and borrowers. As a result, the stability of the shadow banking network cannot easily be divorced from that of the banks: If a shadow bank gets into trouble, so may the banks that have loaned it money. This became painfully clear during the 2007–2009 global financial crisis, as we shall see later in this chapter. We now turn to a discussion of

banking regulation, but readers should be aware that banks are only one category of player in the international financial markets and that banks' fortunes are likely to depend on those of other players.

Regulating International Banking

Many observers believe that the free-wheeling nature of global banking activity up until now left the world financial system vulnerable to bank failure on a massive scale. The financial crisis of 2007–2009, which we will discuss below, supports that belief. What measures had governments taken prior to 2007 to reduce banking risk?

The Problem of Bank Failure

A bank fails when it is unable to meet its obligations to its depositors and other creditors. Banks use borrowed funds to make loans and to purchase other assets, but some of a bank's borrowers may find themselves unable to repay their loans, or the bank's assets may decline in value for some other reason. When this happens, the bank might be unable to repay its short-term liabilities, including deposits, which are largely payable on demand.

A peculiar feature of banking is that a bank's financial health depends on depositors' confidence in the value of its assets. If depositors come to believe that many of the bank's assets have declined in value, each has an incentive to withdraw his or her funds and place them in a different bank. A bank faced with the wholesale loss of deposits is likely to close its doors, even if the asset side of its balance sheet is fundamentally sound. The reason is that many bank assets are illiquid and cannot be sold quickly to meet deposit obligations without substantial loss to the bank. If an atmosphere of financial panic develops, therefore, bank failure may not be limited to banks that have mismanaged their assets. It is in the interest of each depositor to withdraw his or her money from a bank if all other depositors are doing the same, even when the bank's assets are basically sound.

Bank failures obviously inflict serious financial harm on individual depositors who lose their money. But beyond these individual losses, bank failure can harm the economy's macroeconomic stability. One bank's problems may easily spread to sounder banks if they are suspected of having lent to the bank that is in trouble. Such a general loss of confidence in banks undermines the credit and payments system on which the economy runs. A rash of bank failures can bring a drastic reduction in the banking system's ability to finance investment, consumer-durable expenditure, and home purchases, thus reducing aggregate demand and throwing the economy into a slump. There is strong evidence that the string of U.S. bank closings in the early 1930s helped start and worsen the Great Depression, and financial panic certainly worsened the severe worldwide recession that began in 2007.²

Because the potential consequences of a banking collapse are so harmful, governments attempt to prevent bank failures through extensive regulation of their domestic banking systems. Well-managed banks themselves take precautions against failure even in the absence of regulation, but the costs of failure extend far beyond the bank's owners. Thus, some banks, taking into account their own self-interest but ignoring the costs of bank failure for society, might be led to shoulder a level of risk greater than what is socially optimal. In addition, even banks with cautious investment strategies may fail if rumors of financial trouble begin circulating. Many of the precautionary bank regulation measures

²For an evaluation of the 1930s, see Ben S. Bernanke, "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression," Chapter 2 in his *Essays on the Great Depression* (Princeton, NJ: Princeton University Press, 2000).

taken by governments today are a direct result of their countries' experiences during the Great Depression.

In most countries, an extensive "safety net" has been set up to reduce the risk of bank failure. The main safeguards are:

1. *Deposit insurance.* One legacy of the Great Depression of the 1930s is deposit insurance. In the United States, the Federal Deposit Insurance Corporation (FDIC) insures bank depositors against losses of up to a current limit of \$250,000. Banks are required to make contributions to the FDIC to cover the cost of this insurance. FDIC insurance discourages "runs" on banks because small depositors, knowing their losses will be made good by the government, no longer have an incentive to withdraw their money just because others are doing so. Since 1989, the FDIC has also provided insurance for deposits with savings and loan (S&L) associations.³ The absence of government insurance is one reason for the comparatively light regulation of banks' offshore operations as well as of the shadow banking system.
2. *Reserve requirements.* Reserve requirements are one possible tool of monetary policy, influencing the relation between the monetary base and monetary aggregates. At the same time, reserve requirements force the bank to hold a portion of its assets in a liquid form that is easily mobilized to meet sudden deposit outflows. In the United States, banks tend to hold reserves in excess of required reserves, so reserve requirements are not important.
3. *Capital requirements and asset restrictions.* The difference between a bank's assets and its liabilities, equal to the bank's net worth, is also called its *bank capital*. Bank capital is the equity that the bank's shareholders acquire when they buy the bank's stock, and since it equals the portion of the bank's assets that is *not* owed to depositors or other creditors, it gives the bank an extra margin of safety in case some of its assets go bad. U.S. bank regulators set minimum required levels of bank capital to reduce the system's vulnerability to failure. Other rules prevent banks from holding assets that are "too risky," such as common stocks, whose prices tend to be volatile. Banks must also deal with rules against lending too large a fraction of their assets to a single private customer or to a single foreign government borrower.
4. *Bank examination.* Government supervisors have the right to examine a bank's books to ensure compliance with bank capital standards and other regulations. Banks may be forced to sell assets that the examiner deems too risky or to adjust their balance sheets by writing off loans the examiner thinks will not be repaid. In some countries the central bank is the main bank supervisor, while in others a separate financial supervision authority handles that job.
5. *Lender of last resort facilities.* Banks can borrow from the central bank's discount window or from other facilities the central bank may make available. While lending to banks is a tool of monetary management, the central bank can also use discounting to prevent bank panics. Since a central bank has the ability to create currency, it can lend to banks facing massive deposit outflows as much as they need to satisfy their depositors' claims. When the central bank acts in this way, it is acting as a **lender of last resort (LLR)** to the bank. Indeed, the Federal Reserve was set up in 1913 precisely as

³ Holders of deposits over \$250,000 still have an incentive to run if they suspect trouble, of course. When rumors began circulating in May 1984 that the Continental Illinois National Bank had made a large number of bad loans, the bank began rapidly to lose its large, uninsured deposits. As part of its rescue effort, the FDIC extended its insurance coverage to all of Continental Illinois's deposits, regardless of size. This and later episodes have convinced people that the FDIC is following a "too-big-to-fail" policy of fully protecting all depositors at the largest banks. Officially, however, FDIC insurance still applies automatically only up to the \$250,000 limit.

a safeguard against financial panic. When depositors know the central bank is standing by as the LLR, they have more confidence in the bank's ability to withstand a panic and are therefore less likely to run if financial trouble looms. The administration of LLR facilities is complex, however. If banks think the central bank will *always* bail them out, they will take excessive risks. So the central bank must make access to its LLR services conditional on sound management. To decide when banks in trouble have not brought it on themselves through unwise risk taking, the LLR should ideally be closely involved in the bank examination process.

6. *Government-organized bailouts.* Failing all else, the central bank or fiscal authorities may organize the purchase of a failing bank by healthier institutions, sometimes throwing their own money into the deal as a sweetener. In this case, bankruptcy is avoided thanks to the government's intervention as a crisis manager, but perhaps at public expense.

The U.S. commercial bank safety net worked reasonably well until the late 1980s, but as a result of deregulation, the 1990–1991 recession, and a sharp fall in commercial property values, bank closings rose dramatically and the FDIC insurance fund was depleted. Like the United States, other countries that deregulated domestic banking in the 1980s—including Japan, the Scandinavian countries, the United Kingdom, and Switzerland—faced serious problems a decade later. Many overhauled their systems of banking safeguards as a result, but as we shall see, those safeguards were not nearly sufficient to prevent the financial crisis of 2007–2009.

Case Study

Moral Hazard

The banking safeguards listed above fall into two categories: facilities for emergency financial support to banks or their customers, and curbs on unwise risk taking by banks.

It is important to realize that these two types of safeguard are complements, not substitutes. An expectation of LLR support or a government-organized bailout package in case of problems may cause banks to extend excessively risky loans, and to provision inadequately for investment losses. Deposit insurance will reassure depositors that they need not monitor the bank management's decisions; and without the threat of a bank run to discipline them, bank managers will pursue riskier strategies on the margin, including maintaining an inadequate capital cushion and holding insufficient cash.

The possibility that you will take less care to prevent an accident if you are insured against it is called **moral hazard**. Domestic bank supervision and balance-sheet restrictions are necessary to limit the moral hazard resulting from deposit insurance and access to the lender of last resort, which otherwise would lead banks to make excessively risky loans and inadequate provision for their possible failure.

The FDIC limit of \$250,000 on the size of insured deposits is meant to limit moral hazard by encouraging big depositors, and other bank creditors including interbank lenders, to monitor the actions of bank managers. In principle, those big depositors could take their business elsewhere if their bank appears to be taking unwise risks. The problem is that some banks have become so big in global markets, and so interconnected with other banks and shadow banks, that their failure might set off a chain reaction that throws the entire financial system into crisis. When a

financial institution is *systemically important*—that is, “too big to fail” or “too interconnected to fail”—its managers and creditors expect that the government will have no choice but to support it in case it gets into trouble.

The resulting moral hazard sets off a vicious circle: Because the institution is perceived to be under the umbrella of government support, it can borrow cheaply and engage in risky strategies that (while times are good) yield high returns. The resulting profits allow the institution to become even bigger and more interconnected, leading to more profits, more growth, and more moral hazard. The entire financial system becomes less stable as a result.

For this reason, economists are increasingly in favor of curbs on the size of financial firms, despite the possible sacrifice of scale efficiencies. As former Federal Reserve Chairman Alan Greenspan put it, “If they’re too big to fail, they’re too big.”

As we shall see, the problem of moral hazard is central to understanding both the 2007–2009 global financial crisis and the measures being proposed to avoid future crises. Another important element in that crisis, however, was the globalized nature of banking.

Difficulties in Regulating International Banking

Banking regulations of the type used in the United States and other countries become even less effective in an international environment where banks can shift their business among different regulatory jurisdictions. A good way to see why an international banking system is harder to regulate than a national system is to look at how the effectiveness of the U.S. safeguards just described is reduced as a result of offshore banking activities.

1. Deposit insurance is essentially absent in international banking. National deposit insurance systems may protect domestic and foreign depositors alike, but the amount of insurance available is invariably too small to cover the size of the deposits that are usual in international banking. In particular, interbank deposits are unprotected.

2. The absence of overseas reserve requirements was historically a major factor in the growth of Eurocurrency trading. While Eurobanks derived a competitive advantage from escaping the required reserve tax, there was a social cost in terms of the reduced stability of the banking system. No country could solve the problem single-handedly by imposing reserve requirements on its own banks’ overseas branches. Concerted international action was blocked, however, by the political and technical difficulty of agreeing on an internationally uniform set of regulations and by the reluctance of some countries to drive banking business away by tightening regulations. Nowadays, reserve requirements are less important in many countries. In part this is because governments simply realized the requirements’ futility in a world of globalized banking.

3. and 4. Bank examination to enforce capital requirements and asset restrictions becomes more difficult in an international setting. National bank regulators usually monitor the balance sheets of domestic banks and their foreign branches on a consolidated basis. But they are less strict in keeping track of banks’ foreign subsidiaries and affiliates, which are in theory more tenuously tied to the parent bank but whose financial fortunes may well affect the parent’s solvency. Banks have often

The Simple Algebra of Moral Hazard

The moral hazard that results from a combination of perceived government guarantees and weak regulation of the guaranteed institution has helped fuel excessively speculative investment in many economies. To see how it works, imagine that there is a potential investment—say, a large real estate development—that will cost \$70 million up front. If all goes well, the project will yield a return of \$100 million; but there is only a one-third chance of this, and a two-thirds chance that the investment will yield only \$25 million. The expected payoff, then, is only $(1/3 \times \$100 \text{ million}) + (2/3 \times \$25 \text{ million}) = \$50 \text{ million}$, which is far below the \$70 million up-front cost. Ordinarily, this investment simply would never be made.

Government bailout guarantees change the result, however. Suppose that a real estate developer is able to *borrow* the entire \$70 million, because he can convince

lenders that the government will protect them if his project fails and he cannot repay. Then from his point of view, he has a one-third chance of making \$30 million (= \$100 million - \$70 million). Otherwise he simply walks away from the project. It's heads he wins, tails the taxpayers lose.

The preceding example may seem extreme, but this kind of logic has led to financial disasters in many countries. The 2007–2009 financial crisis is the most recent example—and the most costly one to date—but it has many precedents. In the 1980s, the U.S. savings and loan industry was granted what amounted to privilege without responsibility: government guarantees on deposits, without close regulation of risk taking. The eventual bill to U.S. taxpayers was \$150 billion. Similar mishandling of the financial sector led to large bank losses in the 1990s in industrial countries as diverse as Sweden and Japan, as we noted earlier.

been able to take advantage of this laxity by shifting risky business that home regulators might question to regulatory jurisdictions where fewer questions are asked. Further, it is often unclear which group of regulators would ideally be responsible for monitoring a given bank's assets. Suppose the London subsidiary of an Italian bank deals primarily in Eurodollars. Should the subsidiary's assets be the concern of British, Italian, or American regulators?

5. There is uncertainty over which central bank, if any, is responsible for providing LLR assistance in international banking. The problem is similar to the one that arises in allocating responsibility for bank supervision. Let's return to the example of the London subsidiary of an Italian bank. Should the Fed bear responsibility for saving the subsidiary from a sudden drain of dollar deposits? Should the Bank of England step in? Or should the European Central Bank bear the ultimate responsibility? When central banks provide LLR assistance, they increase their domestic money supplies and may compromise domestic macroeconomic objectives. In an international setting, a central bank may also be providing resources to a bank located abroad whose behavior it is not equipped to monitor. Central banks are therefore reluctant to extend the coverage of their LLR responsibilities.

6. When a bank has assets and liabilities in many countries, several governments may have to share operational and financial responsibility for a rescue. The resulting uncertainties can slow down or even impede the rescue operation.

International Regulatory Cooperation

The internationalization of banking has weakened national safeguards against banking collapse, but at the same time it has made the need for effective safeguards more urgent. Offshore banking involves a tremendous volume of interbank deposits—roughly 80 percent of all Eurocurrency deposits, for example, are owned by private banks. A high level of

interbank depositing implies that problems affecting a single bank could be highly contagious and spread quickly to banks with which it is thought to do business. Through this ripple effect, a localized disturbance could, conceivably, set off a banking panic on a global scale. In the early 1970s, the new regime of floating exchange rates presented a new source of disturbance: a large, unexpected exchange rate change that might wipe out the capital of an exposed bank.

In response to this threat, central bank heads from 11 industrialized countries in 1974 set up a group called the **Basel Committee**, whose job is to achieve “a better coordination of the surveillance exercised by national authorities over the international banking system....” (The group got its name from Basel, Switzerland, the home of the central bankers’ meeting place, the Bank for International Settlements.) The Basel Committee remains the major forum for cooperation among bank regulators from different countries.

In 1975, the Basel Committee reached an agreement, called the Concordat, which allocates responsibility for supervising multinational banking establishments between parent and host countries. In addition, the Concordat calls for the sharing of information about banks by parent and host regulators and for “the granting of permission for inspections by or on behalf of parent authorities on the territory of the host authority.”⁴ In further work, the Basel Committee has located loopholes in the supervision of multinational banks and brought these to the attention of national authorities. The Basel Committee has recommended, for example, that regulatory agencies monitor the assets of banks’ foreign subsidiaries as well as of their branches. In 1988, the Basel Committee suggested a minimally prudent level of bank capital (generally speaking, 8 percent of assets) and a system for measuring capital. These guidelines, widely adopted throughout the world, have become known as Basel I. The committee revised the Basel I framework in 2004, issuing a new set of rules for bank capital known as Basel II.

A major change in international financial relations has been the rapidly growing importance of new **emerging markets** as sources and destinations for private capital flows. Emerging markets are the capital markets of poorer, developing countries that have liberalized their financial systems to allow private asset trade with foreigners. Countries such as Brazil, Mexico, Indonesia, and Thailand were all major recipients of private capital inflows from the industrial world after 1990.

Emerging market financial institutions have, however, often proven to be weak. This vulnerability contributed to the emerging markets’ severe financial crisis of 1997–1999 (Chapter 22). Among other problems, developing countries tend to lack experience in bank regulation, have looser prudential and accounting standards than developed countries, and have been more prone to offer domestic banks implicit guarantees that they will be bailed out if they get into trouble.

Thus, the need to extend internationally accepted “best practice” regulatory standards to emerging market countries became a priority for the Basel Committee. In September 1997, the Committee issued its *Core Principles for Effective Banking Supervision*, worked out in cooperation with representatives from many developing countries. That document sets out 25 principles deemed to describe the minimum necessary requirements for effective bank supervision, covering licensing of banks, supervision methods, reporting requirements for banks, and cross-border banking. The core principles were revised in 2006. The Basel Committee and the IMF were monitoring the international implementation of the revised *Core Principles* and Basel II when the global financial crisis erupted in

⁴The Concordat was summarized in these terms by W. P. Cooke of the Bank of England, then chairman of the Basel Committee, in “Developments in Co-operation among Banking Supervisory Authorities,” *Bank of England Quarterly Bulletin* 21 (June 1981), pp. 238–244.

August 2007. The crisis revealed weaknesses in Basel II that led the Basel Committee to agree on a new framework, Basel III, late in 2010. No doubt further sequels will follow.

The international activities of nonbank financial institutions are another potential trouble spot. The failure of a major actor in the shadow banking system, like the failure of a bank, could seriously disrupt national payments and credit networks. Increasing **securitization** (in which bank assets are repackaged in readily marketable forms and sold off) and trade in options and other derivative securities have made it harder for regulators to get an accurate picture of global financial flows by examining bank balance sheets alone. Indeed, as we shall see, securitization and derivatives were at the heart of the 2007–2009 crisis. As a result, the need for authorities to collect and pool data on internationally active nonbanks has become acute. The near-collapse of the global hedge fund Long-Term Capital Management (LTCM) in September 1998 is an example of the nightmare that haunted global regulators' sleep before the most recent financial crisis. The Fed, acting as a crisis manager, was able to prevent a possibly devastating collapse of LTCM by pressuring its major creditors to continue lending. But the world economy was not so lucky a decade later. The next Case Study covers both episodes.

Case Study

Two Episodes of Market Turmoil: LTCM and the Global Financial Crisis of 2007–2009

Formed in 1994, Long-Term Capital Management (LTCM) was a well-known and successful hedge fund that numbered two winners of the economics Nobel Prize among its partners. Readers of the financial press therefore were shocked to learn on September 23, 1998, that LTCM was at the brink of failure and had been taken over by a consortium of major financial institutions. The reasons LTCM ran into problems, and the fears that led the Federal Reserve Bank of New York to organize its takeover, illustrate how the activities of unregulated nonbank financial institutions can make the entire international financial system more fragile, and even vulnerable to collapse.

Long Term Capital Management specialized in trades involving similar securities that differed slightly in yields due to their liquidity or risk characteristics. Since the yield spreads generally amounted to only a small fraction of a percentage point, the trade would have to be very, very large to generate much profit. Where did the necessary money come from?

LTCM's reputation for financial wizardry and its initially favorable track record gave it access to many big lenders willing to provide huge sums for such trades. LTCM traded across countries and currencies. The firm amassed a huge global portfolio of assets and liabilities, the difference between the two representing capital invested by the firm's partners and customers. LTCM's capital at the start of 1998 was \$4.8 billion, but at the same time, it was involved in financial contracts totaling almost \$1.3 *trillion*. Although its massive positions generated high profits when things went right for LTCM, the possibility of correspondingly huge losses was also there, provided that enough of LTCM's assets fell in value while the prices of assets they had promised to deliver to creditors rose. LTCM's analysis of historical data suggested that such an event was extremely improbable.

In August and September 1998, however, the extremely improbable event happened. A debt default by Russia in August sparked what the International Monetary Fund has

called “a period of turmoil in mature markets that is virtually without precedent in the absence of a major inflationary or economic shock.”⁵ The assets of LTCM plummeted in value, and the value of its liabilities soared as frightened financial market participants around the world scrambled for safety and liquidity. Since LTCM now appeared very risky, its funding sources dried up and it had to dig into its capital to repay loans and provide additional collateral to its creditors.

With LTCM’s capital down to a “paltry” \$600 million, the Federal Reserve Bank of New York organized a rescue. Fourteen major American and European financial institutions, most of them creditors, agreed to provide the firm with \$3.6 billion in new capital in return for a claim to 90 percent of LTCM’s profits *and* control over all its important decisions. Most of the institutions participating in the consortium would have made large immediate losses if LTCM had failed, as it certainly would have in the absence of a coordinated rescue effort. However, even the news that LTCM had been saved from disaster was enough to spook markets further. Only much later did a semblance of calm return to world asset markets.

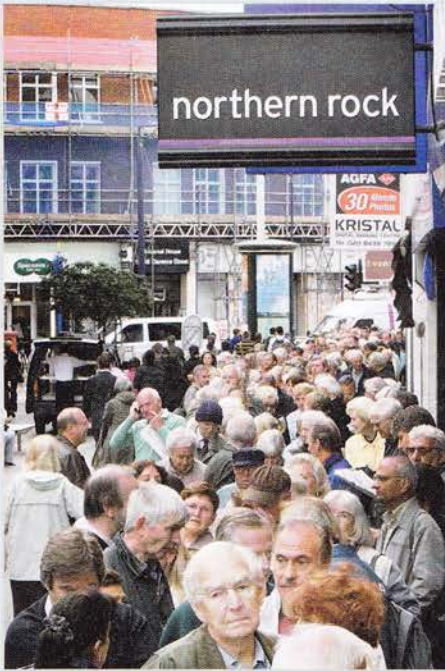
Why did the New York Fed step in to organize a rescue for LTCM rather than simply let the troubled fund fail? The Fed feared that an LTCM failure could provoke financial panic on a global scale, leading to a cascade of bank failures around the world at a time when Asia and Latin America were already facing a steep economic slowdown. If LTCM had failed, financial panic could have arisen through several channels: Banks that had lent money to LTCM could have become targets for bank runs. Moreover, a rapid move by LTCM to sell its relatively illiquid investments (to meet creditors’ demands for repayment) would have driven their prices down steeply, pushing global interest rates up and calling into question the solvency of the many other financial institutions with portfolios similar to LTCM’s. In contrast, the strategy adopted by the Fed gave LTCM time to unwind its positions gradually without creating a selling panic.

Critics charged that the Fed’s action would encourage moral hazard and plant the seeds of future crises. The Fed countered that it did not use its LLR powers to bail out LTCM and that no public funds were injected into the ailing fund. Instead, major creditors were “bailed in” by being asked to put more of their money at risk to keep LTCM afloat. The additional risks they were forced to take—as well as the costs to the LTCM partners, who had lost their wealth and their control over the fund—should be adequate deterrents to moral hazard, in the Fed’s view. Nonetheless, in the wake of the incident, there were numerous calls for government regulation of hedge funds such as LTCM.

No such measures were taken, however, and the hedge fund industry expanded over the years, with many funds turning handsome profits for their managers and investors. Securitization, and the sale of securitized assets of all kinds across borders, expanded as well. But in August 2007 another “period of turmoil in mature markets,” again “unaccompanied by a major inflationary or economic shock,” erupted. The underlying problems were far more pervasive than in 1998, and government attempts at crisis management were far less effective.⁶

⁵ See *World Economic Outlook and International Capital Markets: Interim Assessment*. (Washington, D.C.: International Monetary Fund December 1998), p. 36.

⁶ For useful accounts of the crisis, see Markus Brunnermeier, “Deciphering the Liquidity and Credit Crunch of 2007–2008,” *Journal of Economic Perspectives* 23 (Winter 2009), pp. 77–100; Gary B. Gorton, *Slapped in the Face by the Invisible Hand: The Panic of 2007* (New York: Oxford University Press, 2010); and Chapter 9 in Frederic S. Mishkin, *The Economics of Money, Banking, and Financial Markets*, 9th edition (Boston: Addison-Wesley, 2010).



This global meltdown had a seemingly unlikely source: the U.S. mortgage market. Over the course of the mid-2000s, with U.S. interest rates very low and U.S. home prices bubbling upward (recall Chapter 19), mortgage lenders had extended loans to borrowers with shaky credit. In many cases, the borrowers planned to hold the homes only for brief periods, selling them later for a profit. Many people borrowed at low, temporary “teaser” rates of interest, when in fact they lacked the financial means to meet mortgage payments if interest rates were to rise. And then U.S. interest rates started moving up as the Federal Reserve gradually tightened monetary policy to ward off inflation. U.S. housing prices started to decline in 2006.

The total amount of shaky, “subprime” U.S. mortgage loans was not very big compared to total U.S. financial wealth. However, the subprime loans were securitized quickly and sold off by the original lenders, often bundled with other assets. This factor made it very hard to know exactly which investors were exposed to subprime default risk. In addition, banks throughout the world, but especially in the United States and Europe, were avid

buyers of securitized subprime-related assets, in some cases setting up—outside of the reach of regulators—opaque, off-balance-sheet vehicles for that purpose. As defaults on subprime mortgages began to grow in 2007, lenders became more aware of the risks they faced, and pulled back from markets. No one could tell who was exposed to subprime risk, or how vulnerable he or she was. Borrowing costs rose, and many participants in financial markets, including hedge funds using trading models similar to LTCM’s, were forced to sell assets to get cash. A number of the derivative assets being offered for sale were so poorly understood by the markets that potential buyers could not value them.

During the week of August 9, 2007, central banks provided markets with the most extensive liquidity support since the September 11, 2001, terrorist attacks. On August 9, a major French bank, BNP Paribas, disclosed that three of its investment funds faced potential trouble due to subprime-related investments. Credit markets went into panic, with interbank interest rates rising above central bank target rates around the world. Banks feared that other banks would go under and be unable to repay, and fearing an inability to obtain interbank funding themselves, they all hoarded cash. The European Central Bank stepped in as lender of last resort to the European interbank market, and the Fed followed suit in the United States, announcing that it would accept mortgage-backed securities as collateral for loans to banks. Stock markets fell everywhere.

The Bank of England held back from intervening as the Fed and ECB had, arguing that to do so would promote moral hazard. Britain, however, had only a limited deposit insurance program. When depositors became aware that a British bank called Northern Rock was facing serious funding problems, they rushed to withdraw deposits. It was the first run on a British bank since 1866. The lines of anxious depositors disappeared only after Britain’s chancellor of the exchequer announced,



in a dramatic move, that the government would guarantee the value of all bank deposits in the country. Shortly afterward, the Bank of England, under intense pressure from the British financial industry, overcame its scruples about moral hazard and expanded its liquidity-support operations, as the Fed and ECB had earlier done. The U.S. economy slipped into recession late in 2007, pushed by the disappearance of credit and a collapsing housing market.

More trouble lay ahead. In March 2008 institutional lenders refused to roll over their short-term credits to the fifth largest investment bank, Bear Stearns, which had extensive subprime-related investments. Even though Bear Stearns was not a bank, it effectively suffered a run by its lenders. In a hastily organized rescue, the Fed bought \$30 billion of Bear's "toxic" assets in order to persuade the bank J.P. Morgan Chase to buy Bear at a fire-sale price. The Fed was heavily criticized for not wiping out Bear's shareholders (to deter moral hazard) and for putting taxpayer money at risk.

But even after this bailout, financial stability did not return. Foreclosures on delinquent U.S. mortgages were mounting, home prices were still heading downward, and yet banks and shadow banks retained on their books toxic assets that were difficult to value or sell. Against this background the U.S. government took control of the two giant privately owned but government-sponsored mortgage intermediaries, Fannie Mae and Freddie Mac.

The investment bank Lehman Brothers filed for bankruptcy on September 15, 2008, after frantic but unsuccessful efforts by the U.S. Treasury and the Fed to find a buyer. There is still controversy about the legal standing of the U.S. authorities to have prevented the collapse; surely they were still smarting from the criticism over Bear, and hoping that the Lehman fallout could be contained. But the situation quickly spun out of control. What happened was precisely the scenario the Fed had feared when it had intervened to rescue LTCM in 1998.

A day after Lehman's filing, the giant insurance firm American International Group (AIG, with over \$1 trillion in assets) suffered a run. Apparently without the approval of senior management, traders for the firm had issued \$400 billion in derivatives called credit default swaps (CDS), which are insurance policies against nonrepayment of loans (including loans made to Lehman, as well as mortgage-backed securities). With the world financial system in a state of meltdown, those CDS looked increasingly likely to be triggered, yet AIG lacked the funds to cover them. The Fed stepped in immediately with an \$85 billion loan, and ultimately the U.S. government loaned AIG billions more.

In the same month, money market mutual funds (some with claims on Lehman) suffered a run and had their liabilities guaranteed by the U.S. Treasury; Washington Mutual Bank (the sixth largest in the United States) failed; ailing Wachovia (the fourth largest bank) and investment bank Merrill Lynch were bought by Wells Fargo Bank and Bank of America, respectively; the last two independent U.S. investment banks, Goldman Sachs and Morgan Stanley, became bank-holding companies subject to Fed supervision but with access to the Fed's lending facilities; interbank lending spreads



over Treasury bill rates reached historic levels; and world stock markets swooned. The U.S. Congress, after much debate, passed a bill allocating \$700 billion to buy troubled assets from banks, in hopes that this would allow them to resume normal lending—but the funds were not, in the end, used for that purpose. The crisis spread to Europe, where a number of financial institutions failed and EU governments issued blanket deposit guarantees to head off bank runs. In addition, a number of countries guaranteed interbank loans. But by this time, the economic downturn had gone global, with devastating effects on output and employment throughout the world.

Limited space prevents a detailed review of the many financial, fiscal, and unconventional monetary policies that central banks and governments undertook to end the global economy's seeming free fall in late 2008 and the first part of 2009.⁷ (The box below explores one aspect of the policy response that is especially relevant to inter-

national monetary economics.) With housing markets remaining depressed in the industrial countries, however, recovery of financial and household-sector balance sheets was slow, and so was the recovery in aggregate demand.

Much discussion has focused on reform of national financial systems and the international system. In 2010 the U.S. Congress passed the Dodd-Frank act, which, among other things, empowers the government to regulate nonbank financial institutions deemed “systemically important” (such as Lehman or AIG) and also allows the government to take over those firms in much the same way that the FDIC takes over and resolves failing banks.⁸ In 2010 the Basel Committee proposed a tougher set of capital standards and regulatory safeguards for international banks (Basel III), but these were weakened by financial-industry lobbying and are due to be phased in over several years.

Many observers fear that the pervasive bailouts of the recent crisis have set the stage for the next crisis. Not surprisingly, the policy debate rages on because the trade-off between financial stability and moral hazard is inevitable. Any action by government to reduce the systemic risk inherent in financial markets will also reduce the risks that private operators perceive, and thereby encourage excessive gambling. Unfortunately, it has proven difficult to devise regulatory measures that clever financial innovators cannot eventually work their way around. Meanwhile, voters, themselves struggling in the recession, resented the large sums governments spent on financial bailouts and displayed a level of anger toward the financial industry not seen since the Great Depression.

⁷ A readable account of Fed policies during the crisis is David Wessel, *In Fed We Trust: Ben Bernanke's War on the Great Panic* (New York: Crown Business, 2009).

⁸ See Mishkin, *op. cit.*, pp. 256f.

Foreign Exchange Instability and Central Bank Swap Lines

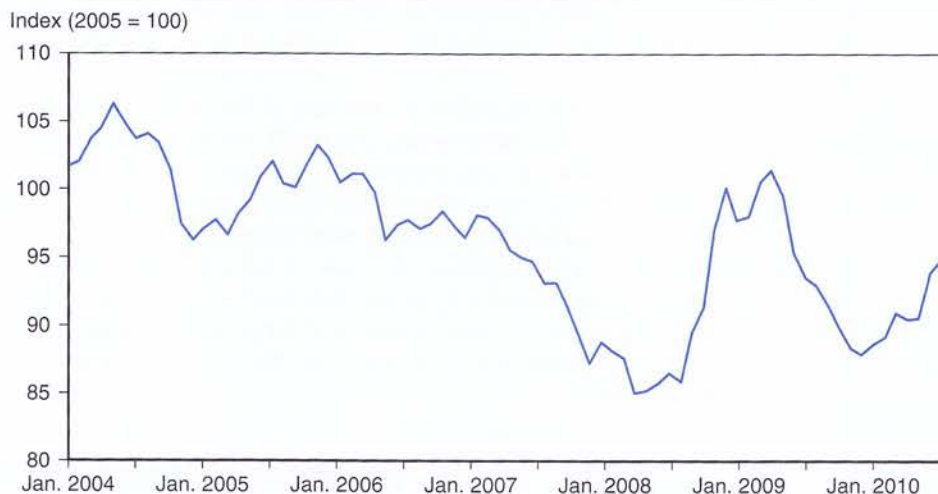
Traditionally, the lender of last resort provides liquidity in its own currency, which it can print freely. The crisis of 2007–2009 made clear, however, that in the modern world of globalized finance, banks may need liquidity in currencies other than that of their home central bank. One area in which central banks innovated during the crisis was in making such support readily available to foreign central banks. In effect, the Federal Reserve, which pioneered this approach, became a *global* LLR for U.S. dollars.

Why was this necessary? The need was a spillover effect of the disruption in U.S. credit markets, particularly interbank markets. In the years leading up to the crisis, European banks had invested heavily in U.S. mortgage-backed securities (MBS). One motivation was *regulatory arbitrage*. These securities were bundled by their issuers so that they would pay off except in circumstances where mortgage defaults were extremely widespread—essentially, a severe housing market collapse affecting all regions of the United States. Because rating agencies deemed such an event highly improbable, they gave the MBS their highest ratings.

Under the Basel capital guidelines, however, banks were required to hold relatively less capital against such seemingly bullet-proof assets. So European banks piled into MBS and related securities both because of their (slightly) higher returns and because they could thereby borrow and lend on slimmer capital bases. The European banks did not, however, wish to bear the currency risk of holding these dollar-denominated claims. Lacking an ability to obtain dollars through retail deposits, they borrowed short-term dollars in wholesale markets (from U.S. banks and money market funds) to finance their purchases of U.S. asset-backed securities.

Then the crisis hit. European banks did not want to sell their now-toxic U.S. assets at a loss (even if they had been able to), so they needed to borrow dollars to repay their short-term loans and maintain their hedged positions in dollars. Some, but not all, were able to borrow from the Fed through U.S. affiliates. Furthermore, the Fed was closed during European morning trading.

The ECB could print euros and lend them to banks, but it could not print U.S. dollars. European banks thus tried to swap the borrowed euros into dollars (selling them in the spot market for dollars and



Nominal Effective Exchange Rate Index of the Dollar, January 2004–June 2010

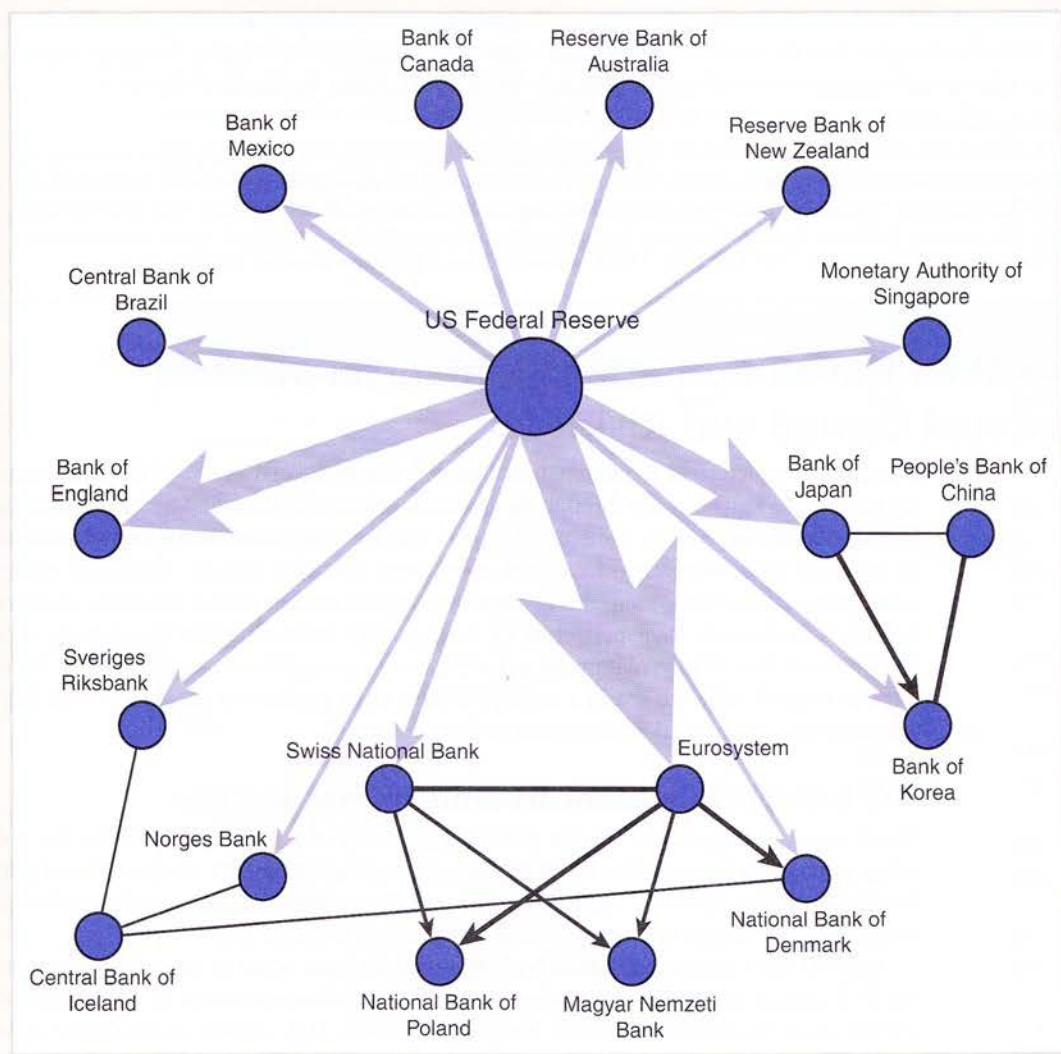
The dollar appreciated dramatically after the Lehman Brothers bankruptcy in September 2008.

Source: Board of Governors of the Federal Reserve System.

buying them back with forward dollars in the forward market). Under *covered* interest parity (Chapter 14), this complicated operation has the same cost as a straight loan of dollars. But covered interest parity was breaking down because banks did not want to lend dollars to each other. Swaps of euros into dollars thus yielded too few spot dollars and too few forward euros. In particular, this dollar shortage led to a tendency for the dollar to strengthen in the spot market.

The Fed's swap lines, initially extended to the ECB and the Swiss National Bank (SNB) in December 2007, were intended to remedy the shortage and prevent disorderly conditions in foreign exchange markets. The lines allowed the ECB and SNB to borrow dollars directly from the Fed and lend them to domestic banks in need.

But the dollar shortage became much more severe after the Lehman collapse in September 2008. The



Network of Central Bank Swap Lines during the Crisis of 2007–2009

Light arrows show loans of dollars, dark arrows loans of other currencies. An arrow's direction shows the direction of lending, when known. Arrow thickness is proportional to the size of the swap line or, when the line was unlimited, to the amount lent.

Source: McGuire and von Peter, *ibid.*, from <http://www.bis.org/publ/work291.pdf>

figure above shows the sharp dollar appreciation in that period, which also reflects international investors' view of U.S. Treasury securities as a "safe haven" asset. The Fed extended the swaps to a wider set of central banks, including some in emerging countries (Brazil, Mexico, Korea, and Singapore), and made the swap lines unlimited for several industrial-country central banks (including the ECB and SNB), thus fully outsourcing its LLR function. Ultimately the Fed lent hundreds of billions of dollars in this way.*

Central banks other than the Fed likewise extended swap lines in their currencies, though typically these

were more limited in scope than the Fed's. The figure on page 607 illustrates the remarkable network of swap lines that emerged.

The Fed wound down its swap lines in February 2010 but reactivated some when the Greek debt crisis erupted shortly afterward and interbank markets again became jittery (Chapter 20). Recent experience clearly shows the need for global lenders of last resort in different currencies, but it is doubtful that national central banks will or can play this role on a permanent basis. One possibility is to assign that function to the IMF, which saw its lending resources triple as world governments responded to the crisis.

*For further discussion, see Maurice Obstfeld, Jay C. Shambaugh, and Alan M. Taylor, "Financial Instability, Reserves, and Central Bank Swap Lines in the Panic of 2008," *American Economic Review* 99 (May 2009), pp. 480–486; Patrick McGuire and Götz von Peter, "The US Dollar Shortage in Global Banking and the International Policy Response," BIS Working Papers No. 291, October 2009; and Linda S. Goldberg, Craig Kennedy, and Jason Miu, "Central Bank Dollar Swap Lines and Overseas Dollar Funding Costs," Working Paper 15763, National Bureau of Economic Research, February 2010.

How Well Have International Financial Markets Allocated Capital and Risk?

The present structure of the international capital market involves risks of financial instability that can be reduced only through the close cooperation of bank and financial supervisors in many countries. But the same profit motive that leads multinational financial institutions to innovate their way around national regulations can also provide important gains for consumers. As we have seen, the international capital market allows residents of different countries to diversify their portfolios by trading risky assets. Further, by ensuring a rapid international flow of information about investment opportunities around the world, the market can help allocate the world's savings to their most productive uses. How well has the international capital market performed in these respects?

The Extent of International Portfolio Diversification

Since accurate data on the overall portfolio positions of a country's residents are sometimes impossible to assemble, it can be difficult to gauge the extent of international portfolio diversification by direct observation. Nonetheless, some U.S. data can be used to get a rough idea of changes in international diversification in recent years.

In 1970, the foreign assets held by U.S. residents were equal in value to 6.2 percent of the U.S. capital stock. Foreign claims on the United States amounted to 4.0 percent of its capital stock (including residential housing). By 2008, U.S.-owned assets abroad equaled about 56 percent of U.S. capital, while foreign assets in the United States had risen to about 66 percent of U.S. capital.

These percentages are much larger than those in 1970 but still seem too small. With full international portfolio diversification, we would expect them to reflect the size of the U.S. economy relative to that of the rest of the world. Thus, in a fully diversified world economy, something like 80 percent of the U.S. capital stock would be owned by foreigners, while U.S. residents' claims on foreigners would equal around 80 percent of the value of the U.S. capital stock. Moreover, the numbers in the previous paragraph describe total foreign assets, stocks and bonds alike, not just stocks, which alone represent claims on capital. What makes the

apparently incomplete extent of international equity portfolio diversification even more puzzling is the presumption most economists would make that the potential gains from diversification are large. An influential study by the French financial economist Bruno Solnik, for example, estimated that a U.S. investor holding only American stocks could more than halve the riskiness of her portfolio by further diversification into stocks from European countries.⁹

The data do show, however, that international asset trade has increased substantially as a result of the growth of the international capital market. Further, international asset holdings are large in absolute terms. At the end of 2009, for example, U.S. claims on foreigners were equal to about 129 percent of the U.S. GNP in that year, while foreign claims on the United States were about 148 percent of U.S. GNP. (Recall Figure 13-3, page 315.) Stock exchanges around the world have established closer communication links, and companies are showing an increasing readiness to sell shares on foreign exchanges. The seemingly incomplete extent of international equity diversification attained so far, however, is not necessarily a strong indictment of the world capital market. The market has certainly contributed to a stunning rise in asset trade in recent decades. Further, the U.S. experience is not necessarily typical. Table 21-1 illustrates the trend over two decades for a sample of industrial countries, showing the countries' gross foreign assets and liabilities as percentages of their GDPs. The United Kingdom, already the world's financial center in the early 1980s, was deeply engaged

TABLE 21-1 Gross Foreign Assets and Liabilities of Selected Industrial Countries, 1983–2007 (percent of GDP)

		1983	1993	2007
Australia				
	Assets	13	33	96
	Liabilities	52	89	162
France				
	Assets	40	69	296
	Liabilities	45	78	285
Germany				
	Assets	38	66	219
	Liabilities	31	55	193
Italy				
	Assets	23	43	130
	Liabilities	27	54	151
Netherlands				
	Assets	94	150	486
	Liabilities	73	134	486
United Kingdom				
	Assets	152	208	456
	Liabilities	136	203	476
United States				
	Assets	29	45	131
	Liabilities	25	49	148

Source: Philip R. Lane and Gian Maria Milesi-Ferretti, "The External Wealth of Nations, Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004," *Journal of International Economics* 73 (November 2007), pp. 223–250. The table's 2007 figures come from the updated data reported on Philip Lane's home page, <http://www.philiplane.org/EWN.html>.

⁹ See Solnik, "Why Not Diversify Internationally Rather Than Domestically?" *Financial Analysts Journal* (July–August 1974), pp. 48–54.

in international financial markets then and is even more so now. A small country such as the Netherlands tends to have a high level of foreign assets and liabilities, while all countries in the euro zone (including the Netherlands) have increased their gross foreign investment positions since 1993 as a result of European capital market unification. The same trend is evident, albeit more mildly, for Australia and the United States. Even some emerging markets have begun to engage in significant asset swapping.

The welfare significance of these numbers is far from clear. To the extent that they represent greater diversification of risks, they point to a more stable world economy. But it is also possible that they mainly represent risky borrowing, as when a bank in the U.K. borrows short-term funds to invest in illiquid and risky securities abroad. Thus, even though these data show that the volume of international asset transactions has increased enormously over the past decades, they also remind us that there is no foolproof measure of the socially optimal extent of foreign investment.

The Extent of Intertemporal Trade

An alternative way of evaluating the performance of the world capital market was suggested by economists Martin Feldstein and Charles Horioka. Feldstein and Horioka pointed out that a smoothly working international capital market allows countries' domestic investment rates to diverge widely from their saving rates. In such an idealized world, saving seeks out its most productive uses worldwide, regardless of their location; at the same time, domestic investment is not limited by national saving because a global pool of funds is available to finance it.

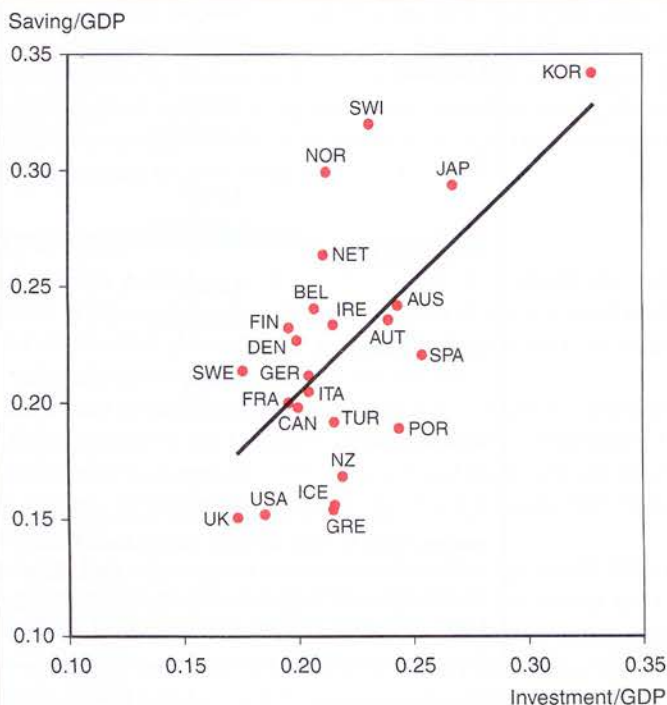
For many countries, however, differences between national saving and domestic investment rates (that is, current account balances) have not been large since World War II: Countries with high saving rates over long periods also have usually had high investment rates, as Figure 21-2

Figure 21-2

Saving and Investment Rates for 24 Countries, 1990–2007 Averages

OECD countries' saving and investment ratios to output tend to be positively related. The straight regression line in the graph represents a statistician's best guess of the level of the saving ratio, conditional on the investment ratio, in this country sample.

Source: World Bank, *World Development Indicators*.



illustrates. Feldstein and Horioka concluded from this evidence that cross-border capital mobility is low, in the sense that most of any sustained increase in national saving will lead to increased capital accumulation at home. The world capital market, according to this view, does not do a good job of helping countries reap the long-run gains of intertemporal trade.¹⁰

The main problem with the Feldstein-Horioka argument is that it is impossible to gauge whether the extent of intertemporal trade is deficient without knowing if there are unexploited trade gains, and knowing this requires more knowledge about actual economies than we generally have. For example, a country's saving and investment may usually move together simply because the factors that generate a high saving rate (such as rapid economic growth) also generate a high investment rate. In such cases, the country's gain from intertemporal trade may simply be small. An alternative explanation of high saving-investment correlations is that governments have tried to manage macroeconomic policy to avoid large current account imbalances. In any case, events appear to be overtaking this particular debate. For industrialized countries, the empirical regularity noted by Feldstein and Horioka seems to have weakened recently in the face of the high external imbalances of the United States, Japan, Switzerland, and some of the euro zone countries.

Onshore-Offshore Interest Differentials

A quite different barometer of the international capital market's performance is the relationship between onshore and offshore interest rates on similar assets denominated in the same currency. If the world capital market is doing its job of communicating information about global investment opportunities, these interest rates should move closely together and not differ too greatly. Large interest rate differences would be strong evidence of unrealized gains from trade.

Figure 21-3 shows data since the end of 1990 on the interest rate difference between two comparable bank liabilities, three-month dollar deposits in London and three-month certificates of deposit issued in the United States. These data are imperfect because the interest rates compared are not measured at precisely the same moment. Nonetheless, they provide no indication of any large unexploited gains in normal times. The pattern of onshore-offshore interest differences is similar for other industrial countries.

The London-U.S. differential does begin to creep up with the outbreak of global financial turbulence in August 2007, and it reaches a peak in October 2008, the month after the Lehman Brothers collapse. Evidently, investors perceived that the dollar deposits of U.S. banks would be backstopped by the U.S. Treasury and Federal Reserve, but that dollar deposits in London might not receive the same protection.

The Efficiency of the Foreign Exchange Market

The foreign exchange market is a central component of the international capital market, and the exchange rates it sets help determine the profitability of international transactions of all types. Exchange rates therefore communicate important economic signals to households and firms engaged in international trade and investment. If these signals do not reflect all available information about market opportunities, a misallocation of resources will result. Studies of the foreign exchange market's use of available information are therefore potentially important in judging whether the international capital market is sending the right signals to markets. We examine three types of tests: tests based on interest parity, tests based on modeling risk premiums, and tests for excessive exchange rate volatility.

¹⁰ See Martin Feldstein and Charles Horioka, "Domestic Savings and International Capital Flows," *Economic Journal* 90 (June 1980), pp. 314–329.



Figure 21-3

Comparing Onshore and Offshore Interest Rates for the Dollar

The difference between the London and U.S. interest rates on dollar deposits is usually very close to zero, but it spiked up sharply in the fall of 2008 as the investment bank Lehman Brothers collapsed.

Source: Board of Governors of the Federal Reserve System, monthly data.

Studies Based on Interest Parity The interest parity condition that was the basis of the discussion of exchange rate determination in Chapter 14 has also been used to study whether market exchange rates incorporate all available information. Recall that interest parity holds when the interest difference between deposits denominated in two different currencies is the market's forecast of the percentage by which the exchange rate between those currencies will change. More formally, if R_t is the date t interest rate on home currency deposits, R_t^* is the interest rate on foreign currency deposits, E_t is the exchange rate (defined as the home currency price of foreign currency), and E_{t+1}^e is the exchange rate that market participants expect when the deposits paying interest R_t and R_t^* mature, the interest parity condition is

$$R_t - R_t^* = (E_{t+1}^e - E_t)/E_t \quad (21-1)$$

Equation (21-1) implies a simple way to test whether the foreign exchange market is doing a good job of using current information to forecast exchange rates. Since the interest difference, $R_t - R_t^*$, is the market's forecast, a comparison of this *predicted* exchange rate change with the *actual* exchange rate change that subsequently occurs indicates the market's skill in forecasting.¹¹

¹¹Most studies of exchange market efficiency study how the forward exchange rate premium does as a predictor of subsequent spot exchange rate changes. That procedure is equivalent to the one we are following if the covered interest parity condition holds, so that the interest difference $R_t - R_t^*$ equals the forward premium (see the appendix to Chapter 14). As noted in Chapter 14, there is strong evidence that covered interest parity holds when the interest rates being compared apply to deposits in the same financial center—for example, London Eurocurrency rates.

Statistical studies of the relationship between interest rate differences and later depreciation rates show that the interest difference has been a very bad predictor, in the sense that it has failed to catch any of the large swings in exchange rates. We noted this failure in Chapter 14's discussion of the carry trade. Even worse, as we noted there, the interest difference has, on average, failed to predict correctly the *direction* in which the spot exchange rate would change. If the interest rate difference were a poor but unbiased predictor, we could argue that the market is setting the exchange rate according to interest parity and doing the best job possible in a rapidly changing world where prediction is inherently difficult. The finding of bias, however, seems at odds with that interpretation of the data.

The interest parity condition also furnishes a test of a second implication of the hypothesis that the market uses all available information in setting exchange rates. Suppose that E_{t+1} is the actual future exchange rate people are trying to guess; then the forecast error they make in predicting future depreciation, u_{t+1} , can be expressed as actual minus expected depreciation:

$$u_{t+1} = (E_{t+1} - E_t)/E_t - (E_{t+1}^e - E_t)/E_t. \quad (21-2)$$

If the market is making use of all available information, its forecast error, u_{t+1} , should be statistically unrelated to data known to the market on date t , when expectations were formed. In other words, there should be no opportunity for the market to exploit known data to reduce its later forecast errors.

Under interest parity, this hypothesis can be tested by writing u_{t+1} as actual currency depreciation less the international interest difference:

$$u_{t+1} = (E_{t+1} - E_t)/E_t - (R_t - R_t^*). \quad (21-3)$$

Statistical methods can be used to examine whether u_{t+1} is predictable, on average, on the basis of past information. A number of researchers have found that forecast errors, when defined as above, *can* be predicted. For example, past forecast errors, which are widely known, are useful in predicting future errors.¹²

The Role of Risk Premiums One explanation of the research results described above is that the foreign exchange market simply ignores easily available information in setting exchange rates. Such a finding would throw doubt on the international capital market's ability to communicate appropriate price signals. Before jumping to this conclusion, however, recall that when people are risk averse, the interest parity condition may *not* be a complete account of how exchange rates are determined. If, instead, bonds denominated in different currencies are *imperfect* substitutes for investors, the international interest rate difference equals expected currency depreciation *plus* a risk premium, ρ_t :

$$R_t - R_t^* = (E_{t+1}^e - E_t)/E_t + \rho_t \quad (21-4)$$

(see Chapter 18). In this case, the interest difference is not necessarily the market's forecast of future depreciation. Thus, under imperfect asset substitutability, the empirical results just discussed cannot be used to draw inferences about the foreign exchange market's efficiency in processing information.

¹²For further discussion, see Robert E. Cumby and Maurice Obstfeld, "International Interest Rate and Price Level Linkages Under Flexible Exchange Rates: A Review of Recent Evidence," in John F. O. Bilson and Richard C. Marston, eds., *Exchange Rate Theory and Practice* (Chicago: University of Chicago Press, 1984), pp. 121–151; and Lars Peter Hansen and Robert J. Hodrick, "Forward Exchange Rates as Optimal Predictors of Future Spot Rates: An Econometric Analysis," *Journal of Political Economy* 88 (October 1980), pp. 829–853.

Because people's expectations are inherently unobservable, there is no simple way to decide between equation (21-4) and the interest parity condition, which is the special case that occurs when p_t is always zero. Several econometric studies have attempted to explain departures from interest parity on the basis of particular theories of the risk premium, but none has been entirely successful.¹³

The mixed empirical record leaves the following two possibilities: Either risk premiums are important in exchange rate determination, or the foreign exchange market has been ignoring the opportunity to profit from easily available information. The second alternative seems unlikely in light of foreign exchange traders' powerful incentives to make profits. The first alternative, however, awaits solid statistical confirmation. It is certainly not supported by the evidence reviewed in Chapter 18, which suggests that sterilized foreign exchange intervention has not been an effective tool for exchange rate management. More sophisticated theories show, however, that sterilized intervention may be powerless even under imperfect asset substitutability. Thus, a finding that sterilized intervention is ineffective does not necessarily imply that risk premiums are absent. Another possibility, raised in Chapter 14's Case Study on the carry trade, is one of expected large but infrequent reversals in currency trends that standard statistical techniques are ill-equipped to detect.

Tests for Excessive Volatility One of the most worrisome findings is that statistical forecasting models of exchange rates based on standard "fundamental" variables like money supplies, government deficits, and output perform badly—even when *actual* (rather than predicted) values of future fundamentals are used to form exchange rate forecasts! Indeed, in a famous study, Richard A. Meese of Barclays Global Investors and Kenneth Rogoff of Harvard University showed that a naive, "random walk" model, which simply takes today's exchange rate as the best guess of tomorrow's, performs better. Some have viewed this finding as evidence that exchange rates have a life of their own, unrelated to the macroeconomic determinants we have emphasized in our models. More recent research has confirmed, however, that while the random walk outperforms more sophisticated models for forecasts up to a year away, the models seem to do better at horizons longer than a year and have explanatory power for long-run exchange rate movements.¹⁴

An additional line of research on the foreign exchange market examines whether exchange rates have been excessively volatile, perhaps because the foreign exchange market "overreacts" to events. A finding of excessive volatility would prove that the foreign exchange market is sending confusing signals to traders and investors who base their decisions on exchange rates. But how volatile must an exchange rate be before its volatility becomes excessive? As we saw in Chapter 14, exchange rates *should* be volatile, because to send the correct price signals, they must move swiftly in response to economic news. Exchange rates are generally less volatile than stock prices. It is still possible, though, that exchange rates are substantially more volatile than the underlying factors that move

¹³For useful surveys, see Charles Engel, "The Forward Discount Anomaly and the Risk Premium: A Survey of Recent Evidence," *Journal of Empirical Finance* 3 (1996), pp. 123–192; and Karen Lewis, "Puzzles in International Finance," in Gene M. Grossman and Kenneth Rogoff, eds., *Handbook of International Economics*, Vol. 3 (Amsterdam: North-Holland, 1996).

¹⁴The original Meese-Rogoff study is "Empirical Exchange Rate Models of the Seventies: Do They Fit Out of Sample?" *Journal of International Economics* 14 (February 1983), pp. 3–24. On longer-run forecasts, see Menzie D. Chinn and Richard A. Meese, "Banking on Currency Forecasts: How Predictable Is Change in Money?" *Journal of International Economics* 38 (February 1995), pp. 161–178; and Nelson C. Mark, "Exchange Rates and Fundamentals: Evidence on Long-Horizon Predictability," *American Economic Review* 85 (March 1995), pp. 201–218.

them—such as money supplies, national outputs, and fiscal variables. Attempts to compare exchange rates' volatility with those of their underlying determinants have, however, produced inconclusive results. A basic problem underlying tests for excessive volatility is the impossibility of quantifying exactly all the variables that convey relevant news about the economic future. For example, how does one attach a number to a political assassination attempt, a major bank failure, or a terrorist attack?

The Bottom Line The ambiguous evidence on the foreign exchange market's performance warrants an open-minded view. A judgment that the market is doing its job well would support a *laissez-faire* attitude by governments and a continuation of the present trend toward increased cross-border financial integration in the industrial world. A judgment of market failure, on the other hand, might imply a need for increased foreign exchange intervention by central banks and a reversal of the global trend toward external financial liberalization. The stakes are high, and more research and experience are needed before a firm conclusion can be reached.

SUMMARY

1. When people are *risk averse*, countries can gain through the exchange of risky assets. The gains from trade take the form of a reduction in the riskiness of each country's consumption. International *portfolio diversification* can be carried out through the exchange of *debt instruments* or *equity instruments*.
2. The *international capital market* is the market in which residents of different countries trade assets. One of its important components is the foreign exchange market. Banks are at the center of the international capital market, and many operate offshore, that is, outside the countries where their head offices are based.
3. Regulatory and political factors have encouraged *offshore banking*. The same factors have encouraged *offshore currency trading*, that is, trade in bank deposits denominated in currencies of countries other than the one in which the bank is located. Such *Eurocurrency* trading received a major stimulus from the absence of reserve requirements on deposits in *Eurobanks*.
4. Creation of a Eurocurrency deposit does not occur because that currency leaves its country of origin; rather, all that is required is that a Eurobank accept a deposit liability denominated in the currency. Eurocurrencies therefore pose no threat to central banks' control over their domestic monetary bases, and fears that *Eurodollars*, for example, will some day come "flooding into" the United States are misplaced.
5. Offshore banking is largely unprotected by the safeguards that national governments have imposed to prevent domestic bank failures. In addition, the opportunity that banks have to shift operations offshore has undermined the effectiveness of national bank supervision. Since 1974, the *Basel Committee* of industrial-country bank supervisors has worked to enhance regulatory cooperation in the international area, releasing a third generation of proposed prudential regulations (Basel III) in 2010. There is still uncertainty, however, about a central bank's obligations as an international *lender of last resort*. That uncertainty may reflect an attempt by international authorities to reduce *moral hazard*. The trend toward securitization has increased the need for international cooperation in monitoring and regulating nonbank financial institutions. So has the rise of *emerging markets* and of large *shadow banking systems*. Gaps in the global financial safety net became evident during the global financial crisis of 2007–2009.
6. The losses caused by financial crises must be evaluated against the gains that international capital markets potentially offer. The international capital market has contributed

to an increase in international portfolio diversification since 1970, but the extent of diversification still appears incomplete compared with what economic theory would predict. Similarly, some observers have claimed that the extent of intertemporal trade, as measured by countries' current account balances, has been too small. Such claims are hard to evaluate without more detailed information about the functioning of the world economy than is yet available. Less ambiguous evidence comes from international interest rate comparisons, and this evidence points to a well-functioning market (apart from rare periods of international financial crisis). Rates of return on similar deposits issued in the major financial centers are normally quite close.

7. The foreign exchange market's record in communicating appropriate price signals to international traders and investors is mixed. Tests based on the interest parity condition of Chapter 14 seem to suggest that the market ignores readily available information in setting exchange rates; but because the interest parity theory ignores risk aversion and the resulting risk premiums, the theory may be an oversimplification of reality. Attempts to model risk factors empirically have not, however, been very successful. Tests of excessive exchange rate volatility also yield a mixed verdict on the foreign exchange market's performance. None of this is good news for those who favor a pure laissez-faire approach to financial globalization.

KEY TERMS

Basel Committee, p. 600
debt instrument, p. 590
emerging markets, p. 600
equity instrument, p. 590
Eurobank, p. 592
Eurocurrencies, p. 592

Eurodollar, p. 592
international capital market,
p. 586
lender of last resort (LLR),
p. 596
moral hazard, p. 597

offshore banking, p. 592
offshore currency trading, p. 592
portfolio diversification, p. 589
risk aversion, p. 588
securitization, p. 601
shadow banking system, p. 594

PROBLEMS



1. Which portfolio is better diversified, one that contains stock in a dental supply company and a candy company or one that contains stock in a dental supply company and a dairy product company?
2. Imagine a world of two countries in which the only causes of fluctuations in stock prices are unexpected shifts in monetary policies. Under which exchange rate regime would the gains from international asset trade be greater, fixed or floating?
3. The text points out that covered interest parity holds quite closely for deposits of differing currency denominations issued in a single financial center. Why might covered interest parity fail to hold when deposits issued in *different* financial centers are compared?
4. When a U.S. bank accepts a deposit from one of its foreign branches, that deposit is subject to the Fed's reserve requirements. Similarly, Fed reserve requirements are imposed on any loan from a U.S. bank's foreign branch to a U.S. resident, or on any asset purchase by the branch bank from its U.S. parent. What do you think is the rationale for these regulations?
5. The Swiss economist Alexander Swoboda has argued that the Eurodollar market's early growth was fueled by the desire of banks outside the United States to appropriate some of the revenue the United States was collecting as issuer of the principal reserve

- currency. (This argument is made in *The Euro-Dollar Market: An Interpretation*, Princeton Essays in International Finance 64, International Finance Section, Department of Economics, Princeton University, February 1968.) Do you agree with Swoboda's interpretation?
6. After the developing-country debt crisis began in 1982 (see the next chapter), U.S. bank regulators imposed tighter supervisory restrictions on the lending policies of American banks and their subsidiaries. Over the 1980s, the share of U.S. banks in London banking activity declined. Can you suggest a connection between these two developments?
 7. Why might growing securitization make it harder for bank supervisors to keep track of risks to the financial system?
 8. Return to the example in the text of the two countries that produce random amounts of kiwi fruit and can trade claims on that fruit. Suppose the two countries also produce raspberries that spoil if shipped between countries and therefore are nontradable. How do you think this would affect the ratio of international asset trade to GNP for Home and Foreign?
 9. Sometimes it is claimed that the international equality of *real* interest rates is the most accurate barometer of international financial integration. Do you agree? Why or why not?
 10. If you look at data on the website of the Bureau of Economic Analysis, you will see that between the end of 2003 and the end of 2007, the net foreign debt of the United States rose by far less than the sum of its current account deficits over those years. At the same time, the dollar depreciated. What is the connection? (Hint: The United States borrows mostly in dollars but has substantial foreign currency assets.)
 11. In interpreting ratios such as those in Table 21-1, one must be cautious about drawing the conclusion that diversification is rising as rapidly as the reported numbers rise. Suppose a Brazilian buys a U.S. international equity fund, which places its clients' money in Brazil's stock market. What happens to Brazilian and U.S. gross foreign assets and liabilities? What happens to Brazilian and U.S. international diversification?

FURTHER READINGS

- Markus K. Brunnermeier, Andrew Crockett, Charles A. E. Goodhart, Avinash Persaud, and Hyun Song Shin. *The Fundamental Principles of Financial Regulation*. London: Centre for Economic Policy Research, 2009. Comprehensive review of regulatory approaches to financial crisis prevention.
- Ralph C. Bryant. *Turbulent Waters: Cross-Border Finance and International Governance*. Washington, D.C.: Brookings Institution, 2003. A review of the growth and regulation of the international capital market, with emphasis on the interdependence of different governments' regulatory decisions.
- Barry Eichengreen. "International Financial Regulation After the Crisis." *Daedalus* (Fall 2010), pp. 107–114. Description and critique of the current institutional framework for global cooperation in regulating international finance.
- Stanley Fischer. "On the Need for an International Lender of Last Resort." *Journal of Economic Perspectives* 13 (Fall 1999): 85–104. Focuses on the IMF's ability to function as an international LLR.
- Charles A. E. Goodhart. "Myths about the Lender of Last Resort." *International Finance* 2 (November 1999), pp. 339–360. Clear discussion of the theory and practice of the LLR function.
- Charles P. Kindleberger and Robert Aliber. *Manias, Panics, and Crashes: A History of Financial Crises*, 5th edition. New York: John Wiley & Sons, 2005. An historical review of international financial crises from the 17th century to the present day.

- Richard M. Levich. "Is the Foreign Exchange Market Efficient?" *Oxford Review of Economic Policy* 5 (1989), pp. 40–60. Valuable survey of research on the efficiency of the foreign exchange market.
- Haim Levy and Marshall Sarnat. "International Portfolio Diversification," in Richard J. Herring, ed. *Managing Foreign Exchange Risk*. Cambridge, U.K.: Cambridge University Press, 1983, pp. 115–142. A nice exposition of the logic of international asset diversification.
- Nelson C. Mark. *International Macroeconomics and Finance*. Oxford: Blackwell Publishers, 2001. Chapter 6 discusses the efficiency of the foreign exchange market.
- Warren D. McClam. "Financial Fragility and Instability: Monetary Authorities as Borrowers and Lenders of Last Resort," in Charles P. Kindleberger and Jean-Pierre Laffargue, eds. *Financial Crises: Theory, History, and Policy*. Cambridge, U.K.: Cambridge University Press, 1982, pp. 256–291. Historical overview of instability in the international capital market.
- Maurice Obstfeld. "The Global Capital Market: Benefactor or Menace?" *Journal of Economic Perspectives* 12 (Fall 1998), pp. 9–30. Overview of the functions, operations, and implications for national sovereignty of the international capital market.
- Maurice Obstfeld and Kenneth Rogoff. "Global Imbalances and the Financial Crisis: Products of Common Causes," in Reuven Glick and Mark Spiegel, eds. *Asia and the Global Financial Crisis*. San Francisco, CA: Federal Reserve Bank of San Francisco, 2010. An analysis of the links between global financial flows and the financial crisis of 2007–2009.
- Carmen Reinhart and Kenneth Rogoff. *This Time Is Different: Eight Centuries of Financial Folly*. Princeton, NJ: Princeton University Press, 2009. Data-based historical overview of the precedents and effects of financial crises around the world.
- Nouriel Roubini and Stephen Mihm. *Crisis Economics: A Crash Course in the Future of Finance*. New York: Penguin Press, 2010. Studies the anatomy of financial crises and possible remedies.
- Garry J. Schinasi. *Safeguarding Financial Stability: Theory and Practice*. Washington, D.C.: International Monetary Fund, 2006. Thorough overview of financial stability threats in a context of globalized financial markets.
- Daniel K. Tarullo. *Banking on Basel: The Future of International Financial Regulation*. Washington, D.C.: Peterson Institute for International Economics, 2008. Critical assessment of the Basel II framework.



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