INTERNATIONAL MONETARY SYSTEMS: AN HISTORICAL OVERVIEW

A single country can use monetary, fiscal, and exchange rate policies to change the levels of employment and production within its borders. Although this analysis usually assumes that macroeconomic conditions in the rest of the world are not affected by the actions of the country we are studying, that assumption is not, in general, a valid one: Any change in the home country's real exchange rate automatically implies an opposite change in foreign real exchange rates, and any shift in overall domestic spending is likely to change domestic demand for foreign goods. Unless the home country is insignificantly small, developments within its borders affect macroeconomic conditions abroad and therefore complicate the task of foreign policy makers.

The inherent interdependence of open national economies has sometimes made it more difficult for governments to achieve such policy goals as full employment and price level stability. The channels of interdependence depend, in turn, on the monetary, financial, and exchange rate arrangements that countries adopt—a set of institutions called the *international monetary system*. This chapter examines how the international monetary system influenced macroeconomic policy making and performance during four periods: the gold standard era (1870–1914), the interwar period (1918–1939), the post–World War II years during which exchange rates were fixed under the Bretton Woods agreement (1946–1973), and the recent period of widespread reliance on floating exchange rates (1973–present). As we shall see, alternative international monetary arrangements have posed different trade-offs for macroeconomic policy.

In an open economy, macroeconomic policy has two basic goals, internal balance (full employment with price stability) and external balance (avoiding excessive imbalances in international payments). Because a country cannot alter its international payments position without automatically causing an opposite change of equal magnitude in the payments position of the rest of the world, one country's pursuit of its macroeconomic goals inevitably influences how well other countries attain their goals. The goal of external balance therefore offers a

clear illustration of how policy actions taken abroad may change an economy's position relative to the position its government prefers.

Throughout the period since 1870, with its various international currency arrangements, how did countries try to attain internal and external balance, and how successful were they? Why did different international monetary systems prevail at different times? Did policy makers worry about the foreign repercussions of their actions, or did each adopt nationalistic measures that were self-defeating for the world economy as a whole? The answers to these questions depend on the international monetary system in effect at the time.

LEARNING GOALS

After reading this chapter, you will be able to:

- Explain how the goals of internal and external balance motivate economic policy makers in open economies.
- Understand the monetary trilemma that policy makers in open economies inevitably face and how alternative international monetary systems address the trilemma in different ways.
- Describe the structure of the international gold standard that linked countries' exchange rates and policies prior to World War I and the role of the Great Depression of the 1930s in ending efforts to restore the pre-1914 world monetary order.
- Discuss how the post–World War II Bretton Woods system of globally fixed exchange rates was designed to combine exchange rate stability with limited autonomy of national macroeconomic policies.
- Explain how the Bretton Woods system collapsed in 1973 and why many economists at the time favored an international financial system such as the current one based on floating dollar exchange rates.
- Summarize how the monetary and fiscal policies of a large country such as the United States are transmitted abroad under floating exchange rates.
- Discuss how the world economy has performed in recent years and what lessons the post-1973 experience teaches about the need for international policy coordination.

Macroeconomic Policy Goals in an Open Economy

In open economies, policy makers are motivated by the goals of internal and external balance. Simply defined, **internal balance** requires the full employment of a country's resources and domestic price level stability. **External balance** is attained when a country's current account is neither so deeply in deficit that the country may be unable to repay its foreign debts in the future nor so strongly in surplus that foreigners are put in that position.

In practice, neither of these definitions captures the full range of potential policy concerns. Along with full employment and stability of the overall price level, for example, policy makers may have a particular domestic distribution of income as an additional internal target. Depending on exchange rate arrangements or other factors, policy makers may worry about swings in balance of payments accounts other than the current account. To make matters even more complicated, the line between external and

internal goals can be fuzzy. How should one classify an employment target for export industries, for example, when export growth influences the economy's ability to repay its foreign debts?

The simple definitions of internal and external balance given previously, however, capture the goals that most policy makers share regardless of the particular economic environment. We therefore organize our analysis around these definitions and discuss possible additional aspects of internal and external balance when they are relevant.

Internal Balance: Full Employment and Price Level Stability

When a country's productive resources are fully employed and its price level is stable, the country is in internal balance. The waste and hardship that occur when resources are underemployed is clear. If a country's economy is "overheated" and resources are *over*employed, however, waste of a different (though probably less harmful) kind occurs. For example, workers on overtime might prefer to work less and enjoy leisure, but their contracts require them to put in longer hours during periods of high demand. Machines worked more intensely than usual will tend to suffer more frequent breakdowns and to depreciate more quickly.

Under- and overemployment also lead to general price level movements that reduce the economy's efficiency by making the real value of the monetary unit less certain and thus a less useful guide for economic decisions. Since domestic wages and prices rise when the demands for labor and output exceed full-employment levels and fall in the opposite case, the government must prevent substantial movements in aggregate demand relative to its full-employment level to maintain a stable, predictable price level.

Inflation or deflation can occur even under conditions of full employment, of course, if the expectations of workers and firms about future monetary policy lead to an upward or downward wage-price spiral. Such a spiral can continue, however, only if the central bank fulfills expectations through continuing injections or withdrawals of money.

One particularly disruptive result of an unstable price level is its effect on the real value of loan contracts. Because loans tend to be denominated in the monetary unit, unexpected price level changes cause income to be redistributed between creditors and debtors. A sudden increase in the U.S. price level, for example, makes those with dollar debts better off, since the money they owe to lenders is now worth less in terms of goods and services. At the same time, the price level increase makes creditors worse off. Because such accidental income redistribution can cause considerable distress to those who are hurt, governments have another reason to maintain price level stability.[1]

Theoretically, a perfectly predictable trend of rising or falling prices would not be too costly, since everyone would be able to calculate easily the real value of money at any point in the future. But in the real world, there appears to be no such thing as a predictable inflation rate. Indeed, experience shows that the unpredictability of the general price level is magnified tremendously in periods of rapid price level change. The costs of inflation have been most apparent in the postwar period in countries such as Argentina, Brazil, Serbia, and Zimbabwe, where astronomical price level increases

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[1]The situation is somewhat different when the government itself is a major debtor in domestic currency. In such cases, a surprise inflation that reduces the real value of government debt may be a convenient way of taxing the public. This method of taxation was quite common in developing countries in the past, but elsewhere it has generally been applied with reluctance and in extreme situations (for example, during or just after wars). A policy of trying to surprise the public with inflation undermines the government's credibility and, through the Fisher effect, worsens the terms on which the government can borrow in the future.

caused the domestic currencies practically to stop functioning as units of account or stores of value.

To avoid price level instability, therefore, the government must prevent large fluctuations in output, which are also undesirable in themselves. In addition, it must avoid inflation and deflation by ensuring that the money supply does not grow too quickly or too slowly.

External Balance: The Optimal Level of the Current Account

The notion of external balance is more difficult to define than internal balance because there are no unambiguous benchmarks like "full employment" or "stable prices" to apply to an economy's external transactions. Whether an economy's trade with the outside world poses macroeconomic problems depends on several factors, including the economy's particular circumstances, conditions in the outside world, and the institutional arrangements governing its economic relations with foreign countries. A country committed to fixing its exchange rate against a foreign currency, for example, may well adopt a different definition of external balance than a country whose currency floats.

International economics textbooks often identify external balance with balance in a country's current account. While this definition is appropriate in some circumstances, it is not appropriate as a general rule. A country with a current account deficit is borrowing resources from the rest of the world that it will have to repay in the future. This situation is not necessarily undesirable, however. For example, the country's opportunities for investing the borrowed resources may be attractive relative to the opportunities available in the rest of the world. In this case, paying back loans from foreigners poses no problem because a profitable investment will generate a return high enough to cover the interest and principal on those loans. Similarly, a current account surplus may pose no problem if domestic savings are being invested more profitably abroad than they would be at home.

More generally, we may think of current account imbalances as providing another example of how countries gain from trade. The trade involved is what we have called *intertemporal trade*, that is, the trade of consumption over time. Just as countries with differing abilities to produce goods at a single point in time gain from concentrating their production on what they do best and trading, countries can gain from concentrating the world's investment in those economies best able to turn current output into future output. Countries with weak investment opportunities should invest little at home and channel their savings into more productive investment activity abroad. Put another way, countries where investment is relatively unproductive should be net exporters of currently available output (and thus have current account surpluses), while countries where investment is relatively productive should be net importers of current output (and have current account deficits). To pay off their foreign debts when the investments mature, the latter countries export output to the former countries and thereby complete the exchange of present output for future output.

Other considerations may also justify an unbalanced current account. A country where output drops temporarily (for example, because of an unusually bad crop failure) may wish to borrow from foreigners to avoid the sharp temporary fall in its consumption that would otherwise occur. In the absence of this borrowing, the price of present output in terms of future output would be higher in the low-output country than abroad, so the intertemporal trade that eliminates this price difference leads to mutual gains.

Insisting that all countries be in current account equilibrium makes no allowance for these important gains from trade over time. Thus, no realistic policy maker

would want to adopt a balanced current account as a policy target appropriate in all circumstances.

At a given point, however, policy makers generally adopt *some* current account target as an objective, and this target defines their external balance goal. While the target level of the current account is generally not zero, governments usually try to avoid extremely large external surpluses or deficits unless they have clear evidence that large imbalances are justified by potential intertemporal trade gains. Governments are cautious because the exact current account balance that maximizes the gains from intertemporal trade is difficult if not impossible to figure out. In addition, this optimal current account balance can change unpredictably over time as conditions in the domestic and global economies change. Current account balances that are very wide of the mark can, however, cause serious problems.

Problems with Excessive Current Account Deficits Why do governments prefer to avoid current account deficits that are too large? As noted, a current account deficit (which means that the economy is borrowing from abroad) may pose no problem if the borrowed funds are channeled into productive domestic investment projects that pay for themselves with the revenue they generate in the future. Sometimes, however, large current account deficits represent temporarily high consumption resulting from misguided government policies or some other malfunction in the economy. At other times, the investment projects that draw on foreign funds may be badly planned and based on overoptimistic expectations about future profitability. In such cases, the government might wish to reduce the current account deficit immediately rather than face problems in repaying debts to foreigners later. In particular, a large current account deficit caused by an expansionary fiscal policy that does not simultaneously make domestic investment opportunities more profitable may signal a need for the government to restore external balance by changing its economic course. Every open economy faces an **intertemporal budget constraint** that limits its spending over time to levels that allow it to pay the interest and principal on its foreign debts. A more realistic version of the budget constraint is derived in the following box on New Zealand's foreign borrowing and debt.

At times, the external target is imposed from abroad rather than chosen by the domestic government. When countries begin to have trouble meeting their payments on past foreign loans, foreign creditors become reluctant to lend them new funds and may even demand immediate repayment of the earlier loans. Economists refer to such an event as a **sudden stop** in foreign lending. In such cases, the home government may have to take severe action to reduce the country's desired borrowing from foreigners to feasible levels, as well as to repay maturing loans that foreigners are unwilling to renew. A large current account deficit can undermine foreign investors' confidence and contribute to a sudden stop. In the event of a sudden stop, moreover, the larger the initial deficit, the larger and more painful the fall in domestic spending that is needed to make the economy live strictly within its means.

Problems with Excessive Current Account Surpluses An excessive current account surplus poses problems that are different from those posed by deficits. A surplus in the current account implies that a country is accumulating assets located abroad. Why are growing domestic claims to foreign wealth ever a problem? One potential reason stems from the fact that, for a given level of national saving, an increased current account surplus implies lower investment in domestic plant and equipment. (This follows from

CAN A COUNTRY BORROW FOREVER? THE CASE OF NEW ZEALAND

The small Pacific country of New Zealand (with a population of about 4.5 million) has run current account deficits every year for many years, as far back as the country's official statistics reach. As a result, its net debt to foreign lenders stands at around 70 percent of its national output. Yet lenders continue to extend credit and seem not to worry about repayment (in contrast to many cases that we will study later on). Is it possible for an indebted country to borrow year after year without going broke? Perhaps surprisingly the answer is yes—if it does not borrow too much.

To understand why, we have to think about a country's budget constraint when it can borrow and lend over a long horizon.[2] (Our analysis will also underline why the *IIP* is so important.) Let's continue to let *IIP* stand for a country's net foreign wealth (claims on foreigners less liabilities), and let *GDP* denote its gross domestic product or production within the country's borders. Let r stand for the (constant) interest rate the country both earns on wealth held abroad and pays on its liabilities to foreigners.[3] If we assume for simplicity that gross national product Y is the sum of GDP and net foreign investment income, $Y = GDP + rIIP$, then we can express the current account in any year t as

$$CA_t = IIP_{t+1} - IIP_t = Y_t - (C_t + I_t + G_t)$$
$$= rIIP_t + GDP_t - (C_t + I_t + G_t).$$

(Think of IIP_{t+1} as net foreign wealth at the *end* of year t. The preceding relationship is not quite accurate because of price gains and losses on net foreign liabilities that are not captured in the national income and product accounts. We say more about this at the end.)

Define net exports, the (possibly negative) difference between what a country produces domestically and what it demands, as $NX_t = GDP_t - (C_t + I_t + G_t)$. (Net exports are sometimes referred to as the "balance of trade.") Then we can rewrite the preceding current account equation as

$$IIP_{t+1} = (1 + r)IIP_t + NX_t.$$

Now we have to resort to some simple, but devious, algebra. Imagine that in the last equation we are starting out in some year labeled $t = 0$ and that there is a year T far in the future at which everyone's debts have to be repaid, so that $IIP_T = 0$. We will apply the preceding equation for the *IIP* successively for years 1, 2, 3, and all the way through T. To start off, notice that the preceding equation can be manipulated to become

$$IIP_0 = -\frac{1}{1 + r}NX_0 + \frac{1}{1 + r}IIP_1.$$

But a similar relationship to this last one holds true with IIP_1 on the left-hand side and IIP_2 and NX_1 on the right. If we substitute this in for IIP_1 above, we get

$$IIP_0 = -\frac{1}{1 + r}NX_0 - \frac{1}{(1 + r)^2}NX_1$$

$$+ \frac{1}{(1 + r)^2}IIP_2.$$

Of course, we can continue to make these substitutions until we reach $IIP_T = 0$ (the point at which all debts have been fully repaid). The

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[2] Our discussion is more general because it allows for many time periods (not just two) and for a starting nonzero *IIP*.

[3] A simple interpretation of the model is to imagine that all foreign assets and liabilities are bonds denominated in a single global currency, where r is the *nominal* interest rate measured in the global currency. In practice, however, the nominal rates of return on foreign assets and liabilities can differ, and can be somewhat unpredictable, as we discuss further below.

resulting equation is the economy's *intertemporal budget constraint*:

$$IIP_0 = -\frac{1}{1+r}NX_0 - \frac{1}{(1+r)^2}NX_1$$
$$-\frac{1}{(1+r)^3}NX_2 - \cdots - \frac{1}{(1+r)^T}NX_{T-1}.$$

If the country has an initially positive *IIP* (foreign assets in excess of liabilities), this intertemporal constraint states that the country can run a stream of net export deficits in the future ($NX < 0$), provided the *present discounted value* of those deficits is not greater than the economy's initial net claims on foreigners. On the other hand, if initially $IIP < 0$, the economy must have future surpluses of net exports sufficient to repay its net debt to foreigners (with interest, which is why future net exports are discounted by r, and discounted more heavily the farther in the future they occur). So an indebted country such as New Zealand definitely cannot have *net export* or *trade balance* deficits forever. At some point the country must produce more goods and services than it absorbs in order to repay what it owes. Otherwise, it is perpetually borrowing more to repay what it owes—a strategy that must eventually collapse when the country runs out of fresh lenders (and probably long before then).[4]

But what about the current account balance, which equals net exports *plus* the negative flow of net interest payments implied by the country's negative *IIP*? Perhaps surprisingly, it turns out that this sum need *never* be positive for the country to remain creditworthy.

To see why, it is helpful to rewrite the preceding intertemporal budget constraint in terms of *ratios* to nominal output (nominal GDP), $iip = IIP/GDP$ and $nx = NX/GDP$. Assume that nominal GDP grows at a constant annual rate g that is below r—meaning that $GDP_t = (1 + g) GDP_{t-1}$. Then after dividing the intertemporal budget constraint by GDP in year 0, we can see that

$$iip_0 = \frac{IIP_0}{GDP_0} = -\frac{1}{1+r}\frac{NX_0}{GDP_0} - \frac{1}{(1+r)^2}\frac{NX_1}{GDP_1}$$
$$\frac{GDP_1}{GDP_0} - \cdots - \frac{1}{(1+r)^T}\frac{NX_{T-1}}{GDP_{T-1}}\frac{GDP_{T-1}}{GDP_0}$$
$$= -\frac{1}{1+r}nx_0 - \frac{1+g}{(1+r)^2}nx_1 - \frac{(1+g)^2}{(1+r)^3}nx_2$$
$$- \cdots - \frac{(1+g)^{T-2}}{(1+r)^T}nx_{T-1}.$$

Let's now apply this version of the country's budget constraint, which we simplify by assuming that the country's time horizon is very long, making the constraint approximately the same as the infinite-summation expression:

$$iip_0 = -\frac{1}{1+g}\sum_{t=1}^{\infty}\left(\frac{1+g}{1+r}\right)^t nx_{t-1}.$$

To illustrate how a country can easily run a perpetual current account deficit, let us ask what *constant* level of net exports $\overline{nx}$ will allow the country to respect this budget constraint. We find this constant net export level by substituting $\overline{nx}$ into the previous equation and simplifying using the summation formula for a geometric series,[5]

$$iip_0 = -\frac{1}{1+g}\sum_{t=1}^{\infty}\left(\frac{1+g}{1+r}\right)^t \overline{nx} = \frac{-\overline{nx}}{r-g}.$$

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[4]Strategies based on always repaying old creditors with money borrowed from new creditors—as opposed to repayment with genuine investment earnings—are known as *Ponzi schemes*. Charles Ponzi (1882–1949) promised gullible Massachusetts investors he could double their money in 90 days, but when he had to pay out to them, he did so with funds supplied by new investors. U.S. authorities arrested Ponzi in 1920 after the fraudulent nature of his business model came to light. More recently, financier Bernard Madoff ran a much bigger Ponzi scheme for many years.
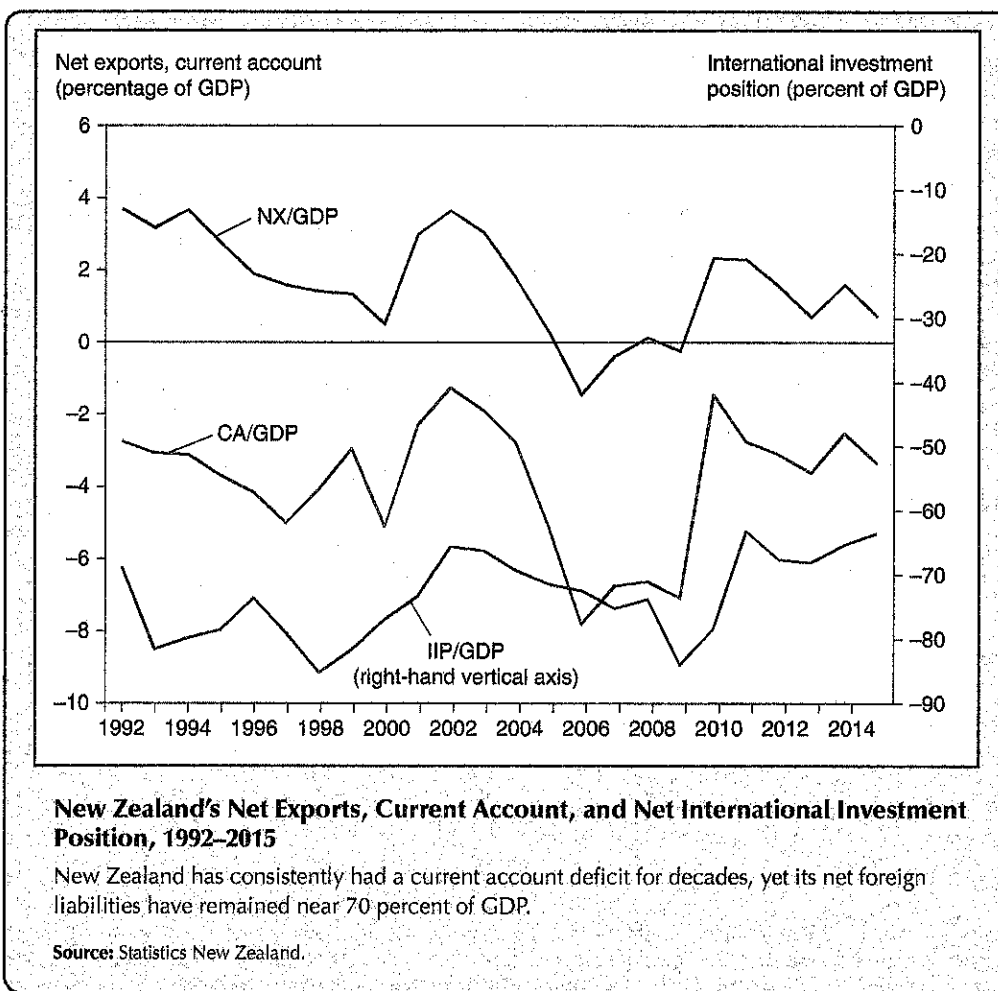
[5]Recall from your high school pre-calculus course that if x is a number less than 1 in absolute value, then $x + x^2 + x^3 + \cdots = \frac{x}{1-x}$. In the present example, $x = \frac{1+g}{1+r} < 1$.

This solution implies net exports of $\overline{nx} = -(r - g)iip_0$. For example, if iip_0 is negative—the country is a net debtor—then $\overline{nx}$ will need to be positive and, by construction, it is just big enough for the country to repay its debt over time.

What level of the current account balance does this imply, though? The country's current account balance in the initial year $t = 0$ (expressed as a fraction of its GDP) is equal to $ca_0 = r(iip_0) + \overline{nx} = r(iip_0) - (r - g)iip_0 = g(iip_0)$. For a debtor country such as New Zealand, the initial current account is therefore in deficit. An important further implication of this current account

level, however, is that the IIP ratio to GDP will remain constant forever at the level $\overline{iip} = iip_0$, so that the current account will also remain constant at $g(\overline{iip})$: This current account level is just enough to keep the ratio of net foreign assets or debt to nominal GDP constant, given that nominal GDP is growing at the rate g.[6] Thus, if the ratio of net exports to GDP is held constant at the right value, a country with an initial net foreign debt will perpetually run deficits in its current account, while still maintaining a constant ratio of net foreign liabilities to national output.

Net exports, current account (percentage of GDP)

International investment position (percent of GDP)

New Zealand's Net Exports, Current Account, and Net International Investment Position, 1992–2015

New Zealand has consistently had a current account deficit for decades, yet its net foreign liabilities have remained near 70 percent of GDP.

Source: Statistics New Zealand.

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[6]Thus, if nominal GDP grows by 5 percent per year, the current account will raise net foreign assets or debt by 5 percent as well, leaving the ratio constant. Problem 8 at the end of this chapter asks you to verify this algebraically.

The accompanying figure shows New Zealand data on net exports and the current account (left-hand vertical axis) and the *IIP* (right-hand vertical axis), all expressed as percentages of GDP. In recent history, as you can see, New Zealand has had a negative current account balance every year, yet its *IIP*-to-GDP ratio has remained roughly constant at −70 percent of GDP. How has this been possible? Because the average growth rate of New Zealand's nominal GDP was 5 percent for 1992–2015, our previous formula suggests that at an interest rate of $r = 6$ percent per year, the *IIP*-to-GDP ratio will remain constant if on average New Zealand has an annual net export surplus equal to

$$\overline{nx} = -(r - g)iip_0 = (.06 - .05) \times (.7)$$

$$= .01 \times .7 = 0.007,$$

or 0.7 percent of GDP. But this number is safely below the average ratio of New Zealand's net exports to its GDP over the 1992–2015 period shown in the figure, which was 1.7 percent.[7]

Can we *independently* confirm that the rate of return on New Zealand's *IIP* was around 6 percent per year over this period? Such estimates are not easy to make because we would need detailed data on the country's foreign liabilities and investments and their rates of return. We can get a partial answer—partial because it ignores capital gains and losses on foreign assets and liabilities—by looking at New Zealand's balance of international investment income, reckoned as a fraction of the *IIP*. Over 1992–2015, New Zealand paid out on average net interest and dividends equal to 7.8 percent of its net foreign debt. This is higher than the 6 percent rate that stabilizes the *IIP* relative to GDP.

Should we be worried? There are several reasons not to be in this case. One possibility is that interest inflows to New Zealand are underestimated in the official data, due to the standard underreporting problem. In addition, New Zealand's gross foreign liabilities consist largely of bank debt, denominated in New Zealand (or "kiwi") dollars, while its gross foreign assets include substantial stock shares, plus other assets denominated in foreign currencies. Even though the kiwi has appreciated since 1992 (from about 55 to 72 U.S. cents per kiwi dollar), global stock markets have done very well over that period; for example, the Standard and Poor's 500 index of U.S. stock prices has risen roughly fivefold. Such gains on foreign assets have likely helped to reduce the average annual *total* cost of New Zealand's negative *IIP* closer to 6 percent. Finally, recall that New Zealand's average ratio of net exports to GDP has been comfortably above the 0.7 percent level that stabilizes its negative net wealth debt ratio when $r = 6$ percent per year. All in all, therefore, the country would appear to be safely servicing its foreign debts.

the national income identity, $S = CA + I$, which says that total domestic saving, S, is divided between foreign asset accumulation, CA, and domestic investment, I.) Several factors might lead policy makers to prefer that domestic saving be devoted to higher levels of domestic investment and lower levels of foreign investment. First, the returns on domestic capital may be easier to tax than those on assets located abroad. Second, an addition to the home capital stock may reduce domestic unemployment and therefore lead to higher national income than an equal addition to foreign assets. Finally, domestic investment by one firm may have beneficial technological spillover effects on other domestic producers that the investing firm does not capture.

If a large home current account surplus reflects excessive external borrowing by foreigners, the home country may in the future find itself unable to collect the money it is owed. Put another way, the home country may lose part of its foreign wealth if foreigners find they have borrowed more than they can repay. In contrast, nonrepayment of a

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[7]The average current account deficit implied by this calculation is rather large: $g(iip_0) = .05 \times .7 = 3.5$ percent of GDP annually.

loan between domestic residents leads to a redistribution of national wealth within the home country but causes no change in the level of national wealth.[8] Excessive current account surpluses may also be inconvenient for political reasons. Countries with large surpluses can become targets for discriminatory import barriers imposed by trading partners with external deficits. Japan has been in this position in the past, and China's surpluses inspire the most visible protectionist threats today. To avoid such damaging restrictions, surplus countries may try to keep their surpluses from becoming too large.

Summary The goal of external balance is a level of the current account that allows the most important gains from trade over time to be realized without risking the problems discussed previously. Because governments do not know this current account level exactly, they may try to avoid large deficits or surpluses unless there is clear evidence of large gains from intertemporal trade.

There is a fundamental asymmetry, however, between the pressures pushing deficit and surplus countries to adjust their external imbalances downward. While big deficits that continue too long may be forcibly eliminated by a sudden stop in lending, there is unlikely to be a sudden stop in borrowing countries' willingness to absorb funds that are supplied by foreigners! Thus, the adjustment pressures that confront deficit countries are generally much stronger than those facing surplus countries.

Classifying Monetary Systems: The Open-Economy Monetary Trilemma

The world economy has evolved through a variety of international monetary systems since the 19th century. A simple insight from the models we studied in the last part of this text will prove very helpful in understanding the key differences between these systems as well as the economic, political, and social factors that lead countries to adopt one system rather than another. The insight we will rely on is that policy makers in an open economy face an inescapable **monetary trilemma** in choosing the currency arrangements that best enable them to attain their internal and external balance goals.

A country that fixes its currency's exchange rate while allowing free international capital movements gives up control over domestic monetary policy. This sacrifice illustrates the impossibility of a country's having more than two items from the following list:

1. Exchange rate stability.
2. Monetary policy oriented toward domestic goals.
3. Freedom of international capital movements.

Because this list contains properties of an international monetary system that most economists would regard as desirable in themselves, the need to choose only two is a trilemma for policy regimes. It is a *tri*lemma rather than a *di*lemma because the available options are three: 1 and 2, 1 and 3, or 2 and 3.

As we have seen, countries with fixed exchange rates that allow free cross-border capital mobility sacrifice item 2 above, a domestically oriented monetary policy. On the other hand, if a country with a fixed exchange rate restricts international financial flows so that the interest parity condition, $R = R^*$, does not need to hold true (thereby

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[8]This fact was pointed out by John Maynard Keynes in "Foreign Investment and National Advantage," *The Nation and Athenaeum* 35 (1924), pp. 584–587.

FIGURE 1

The Monetary Trilemma for Open Economies

The vertices of the triangle show three features that policy makers in open economies would prefer their monetary system to achieve. Unfortunately, at most two can coexist. Each of the three policy regime labels along the triangle's edges (floating exchange rate, fixed exchange rate, financial controls) is consistent with the two goals that it lies between in the diagram.
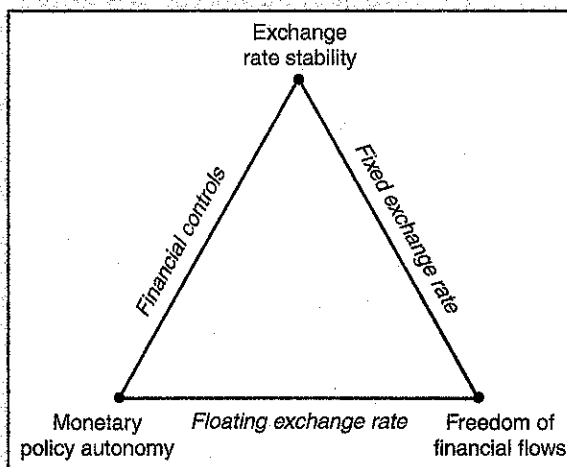
sacrificing item 3 above), it is still able to change the home interest rate so as to influence the domestic economy (thereby preserving item 2). In this way, for example, the country might be able to reduce domestic overheating (getting closer to internal balance by raising the interest rate) without causing a fall in its exports (preventing a potential departure from external balance due to an appreciation of its currency). Finally, a country that has a floating exchange rate (and thus gives up item 1 above) can use monetary policy to steer the economy even though financial flows across its borders are free. But the exchange rate might become quite unpredictable as a result, complicating the economic planning of importers and exporters.

Figure 1 shows the preceding three desirable properties of an international monetary regime schematically as the vertices of a triangle. Only two can be reached simultaneously. Each edge of the triangle represents a policy regime consistent with the two properties shown at the edge's end points.

Of course, the trilemma does not imply that intermediate regimes are impossible, only that they will require the policy maker to trade off between different objectives. For example, more aggressive monetary intervention to manage the exchange rate can reduce exchange rate volatility, but only at the cost of reducing the ability of monetary policy to pursue targets other than the exchange rate. Similarly, a partial opening of the financial account will allow some cross-border borrowing and lending. At the same time, however, fixing the exchange rate in the face of domestic interest rate changes will require larger volumes of intervention, and potentially larger drains on foreign exchange reserves, than would be needed if cross-border financial transactions were entirely prohibited. The central bank's ability to guarantee exchange rate stability (by avoiding devaluations and crises) will therefore decline.

International Macroeconomic Policy under the Gold Standard, 1870–1914

The gold standard period between 1870 and 1914 was based on ideas about international macroeconomic policy very different from those that have formed the basis of international monetary arrangements since World War II. Nevertheless, the period

warrants attention because subsequent attempts to reform the international monetary system on the basis of fixed exchange rates can be viewed as attempts to build on the strengths of the gold standard while avoiding its weaknesses. This section looks at how the gold standard functioned in practice before World War I and examines how well it enabled countries to attain goals of internal and external balance.

Origins of the Gold Standard

The gold standard had its origin in the use of gold coins as a medium of exchange, unit of account, and store of value. While gold has played these roles since ancient times, the gold standard as a legal institution dates from 1819, when the British Parliament repealed long-standing restrictions on the export of gold coins and bullion from Britain.

Later in the 19th century, the United States, Germany, Japan, and other countries also adopted the gold standard. At the time, Britain was the world's leading economic power, and other nations hoped to achieve similar economic success by following British precedent. Given Britain's preeminence in international trade and the advanced development of its financial institutions and industry, London naturally became the center of the international monetary system built on the gold standard.

External Balance under the Gold Standard

Under the gold standard, the primary responsibility of a central bank was to fix the exchange rate between its currency and gold. To maintain this official gold price, the central bank needed an adequate stock of gold reserves. Policy makers therefore viewed external balance not in terms of a current account target, but as a situation in which the central bank was neither gaining gold from abroad nor (much more worrisome) losing gold to foreigners at too rapid a rate.

Central banks tried to avoid sharp fluctuations in the *balance of payments*, the difference between the current plus capital account balances and the balance of net nonreserve financial flows abroad. Because international reserves took the form of gold during this period, the surplus or deficit in the balance of payments had to be financed by gold shipments between central banks.[9] To avoid large gold movements, central banks adopted policies that pushed the balance of payments toward zero. A country is said to be in **balance of payments equilibrium** when the sum of its current and capital accounts, less the nonreserve component of net financial flows abroad, equals zero, so that the current plus capital account balance is financed entirely by private international lending without official reserve movements.

Many governments took a laissez-faire attitude toward the current account. Britain's current account surplus between 1870 and World War I averaged 5.2 percent of its GNP, a figure that is remarkably high by post-1945 standards. Several borrowing countries, however, did experience difficulty at one time or another in paying their foreign debts. Perhaps because Britain was the world's leading exporter of international economic theory as well as of capital during these years, the economic writing of the gold standard era places little emphasis on problems of current account adjustment.

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[9]In reality, central banks had begun to hold foreign currencies in their reserves even before 1914. (The pound sterling was the leading reserve currency.)

The Price-Specie-Flow Mechanism

The gold standard contains some powerful automatic mechanisms that contribute to the simultaneous achievement of balance of payments equilibrium by all countries. The most important of these, the **price-specie-flow mechanism,** was recognized by the 18th century (when precious metals were referred to as "specie"). In 1752, David Hume, the Scottish philosopher, described the price-specie-flow mechanism as follows:

> Suppose four-fifths of all the money in Great Britain to be annihilated in one night, and the nation reduced to the same condition, with regard to specie, as in the reigns of the Harrys and the Edwards, what would be the consequence? Must not the price of all labour and commodities sink in proportion, and everything be sold as cheap as they were in those ages? What nation could then dispute with us in any foreign market, or pretend to navigate or to sell manufactures at the same price, which to us would afford sufficient profit? In how little time, therefore, must this bring back the money which we had lost, and raise us to the level of all the neighbouring nations? Where, after we have arrived, we immediately lose the advantage of the cheapness of labour and commodities; and the farther flowing in of money is stopped by our fulness and repletion.
>
> Again, suppose that all the money in Great Britain were multiplied fivefold in a night, must not the contrary effect follow? Must not all labour and commodities rise to such an exorbitant height, that no neighbouring nations could afford to buy from us; while their commodities, on the other hand, became comparatively so cheap, that, in spite of all the laws which could be formed, they would run in upon us, and our money flow out; till we fall to a level with foreigners, and lose that great superiority of riches which had laid us under such disadvantages?[10]

It is easy to translate Hume's description of the price-specie-flow mechanism into more modern terms. Suppose Britain's current plus capital account surplus is greater than its nonreserve financial account balance. Because foreigners' net imports from Britain are not being financed entirely by British loans, the shortfall must be matched by flows of international reserves—that is, of gold—into Britain. These gold flows automatically reduce foreign money supplies and swell Britain's money supply, pushing foreign prices downward and British prices upward. (Notice that Hume fully understood that price levels and money supplies move proportionally in the long run.)

The simultaneous rise in British prices and fall in foreign prices—a real appreciation of the pound, given the fixed exchange rate—reduces foreign demand for British goods and services and at the same time increases British demand for foreign goods and services. These demand shifts work in the direction of reducing Britain's current account surplus and reducing the foreign current account deficit. Eventually, therefore, reserve movements stop and all countries reach balance of payments equilibrium. The same process also works in reverse, eliminating an initial situation of foreign surplus and British deficit.

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[10]Hume, "Of the Balance of Trade," reprinted (in abridged form) in Barry Eichengreen and Marc Flandreau, eds., *The Gold Standard in Theory and History* (London: Routledge, 1997), pp. 33–43.

The Gold Standard "Rules of the Game": Myth and Reality

In theory, the price-specie-flow mechanism could operate automatically. But the reactions of central banks to gold flows across their borders furnished another potential mechanism to help restore balance of payments equilibrium. Central banks that were persistently losing gold faced the risk of becoming unable to meet their obligations to redeem currency notes. They were therefore motivated to sell domestic assets when gold was being lost, pushing domestic interest rates upward and attracting inflows of funds from abroad. Central banks gaining gold had much weaker incentives to eliminate their own imports of the metal. The main incentive was the greater profitability of interest-bearing domestic assets compared with "barren" gold. A central bank that was accumulating gold might be tempted to purchase domestic assets, thereby lowering home interest rates, increasing financial outflows, and driving gold abroad.

These domestic credit measures, if undertaken by central banks, reinforced the price-specie-flow mechanism by pushing all countries toward balance of payments equilibrium. After World War I, the practices of selling domestic assets in the face of a deficit and buying domestic assets in the face of a surplus came to be known as the gold standard "rules of the game"—a phrase reportedly coined by Keynes. Because such measures speeded the movement of all countries toward their external balance goals, they increased the efficiency of the automatic adjustment processes inherent in the gold standard.

Later research has shown that the supposed "rules of the game" of the gold standard were frequently violated before 1914. As noted, the incentives to obey the rules applied with greater force to deficit than to surplus countries, so in practice it was the deficit countries that bore the burden of bringing the payments balances of *all* countries into equilibrium. By not always taking action to reduce gold inflows, the surplus countries worsened a problem of international policy coordination inherent in the system: Deficit countries competing for a limited supply of gold reserves might adopt overly contractionary monetary policies that harmed employment while doing little to improve their reserve positions.

In fact, countries often reversed the rules and *sterilized* gold flows, that is, sold domestic assets when foreign reserves were rising and bought domestic assets as foreign reserves fell. Government interference with private gold exports also undermined the system. The picture of smooth and automatic balance of payments adjustment before World War I therefore did not always match reality. Governments sometimes ignored both the "rules of the game" and the effects of their actions on other countries.[11]

Internal Balance under the Gold Standard

By fixing the prices of currencies in terms of gold, the gold standard aimed to limit monetary growth in the world economy and thus to ensure stability in world price levels. While price levels within gold standard countries did not rise as much between 1870 and 1914 as over the period after World War II, national price levels moved unpredictably over shorter horizons as periods of inflation and deflation

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[11]An influential modern study of central bank practices under the gold standard is Arthur I. Bloomfield, *Monetary Policy under the International Gold Standard: 1880–1914* (New York: Federal Reserve Bank of New York, 1959).

followed each other. The gold standard's mixed record on price stability reflected a problem: change in the relative prices of gold and other commodities.

In addition, the gold standard does not seem to have done much to ensure full employment. The U.S. unemployment rate, for example, averaged 6.8 percent between 1890 and 1913, whereas it averaged around 5.7 percent between 1948 and 2010.[12]

A fundamental cause of short-term internal instability under the pre-1914 gold standard was the subordination of economic policy to external objectives. Before World War I, governments had not assumed responsibility for maintaining internal balance as fully as they did after World War II. In the United States, the resulting economic distress led to political opposition to the gold standard, as the Case Study that follows explains. In terms of the monetary policy trilemma discussed above, the gold standard allowed high degrees of exchange rate stability and international financial capital mobility, but did not allow monetary policy to pursue internal policy goals. These priorities were consistent with the limited political power at the time of those most vulnerable to unemployment.

The importance of internal policy objectives increased after World War II as a result of the worldwide economic instability of the interwar years, 1918–1939. And the unpalatable internal consequences of attempts to restore the gold standard after 1918 helped mold the thinking of the architects of the fixed exchange rate system adopted after 1945. To understand how the post–World War II international monetary system tried to reconcile the goals of internal and external balance, we therefore must examine the economic events of the period between the two world wars.
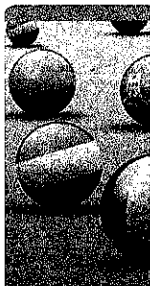
CASE STUDY

The Political Economy of Exchange Rate Regimes: Conflict over America's Monetary Standard during the 1890s

The United States had a bimetallic monetary standard until the Civil War, with both silver and gold in circulation. Once war broke out, the country moved to a paper currency (called the "greenback") and a floating exchange rate, but in 1879 a pure gold standard (and a fixed exchange rate against other gold-standard currencies such as the British pound sterling) was adopted.

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[12]Data on price levels are given by Cooper, and data for U.S. unemployment are adapted from the same source. Caution should be used in comparing gold standard and post–World War II unemployment data because the methods used to assemble the earlier data were much cruder. A critical study of pre-1930 U.S. unemployment data is Christina D. Romer, "Spurious Volatility in Historical Unemployment Data," *Journal of Political Economy* 94 (February 1986), pp. 1–37.

World gold supplies had increased sharply after the 1849 discoveries in California, but the 1879 return of the dollar to gold at the pre–Civil War parity required deflation in the United States. Furthermore, a global shortage of gold generated continuing downward pressure on price levels long after the American restoration of gold. By 1896, the U.S. price level was about 40 percent below its 1869 level. Economic distress was widespread and became especially severe after a banking panic in 1893. Farmers, who saw the prices of agricultural products plummet more quickly even than the general price level, were especially hard hit.

In the 1890s, a broad Populist coalition of U.S. farmers, miners, and others pressed for revival of the bimetallic silver-gold system that had prevailed before the Civil War. They desired a return to the old 16:1 relative mint parity for gold and silver, but by the early 1890s, the market price of gold in terms of silver had risen to around 30. The Populists foresaw that the monetization of silver at 16:1 would lead to an increase in the silver money stock, and possibly a reversal of deflation, as people used gold dollars to buy silver cheaply on the market and then took it to the mint for coining. These developments would have had several advantages from the standpoint of farmers and their allies, such as undoing the adverse terms of trade trends of the previous decades and reducing the real values of farmers' mortgage debts. Western silver mine owners, in particular, were wildly enthusiastic. On the other side, eastern financiers viewed "sound money"—that is, gold and gold alone—as essential for achieving more complete American integration into world markets.

The silver movement reached its high tide in 1896 when the Democratic Party nominated William Jennings Bryan to run for president after a stem-winding convention speech in which he famously proclaimed, "Thou shalt not crucify mankind upon a cross of gold." But by then, new gold discoveries in South Africa, Alaska, and elsewhere were starting to reverse previous deflationary trends across the world, defusing silver as a political issue. Bryan lost the elections of 1896 and 1900 to Republican William McKinley, and in March 1900 Congress passed the Gold Standard Act, which definitively placed the dollar on an exclusive basis of gold.

Modern readers of L. Frank Baum's classic 1900 children's book *The Wonderful Wizard of Oz* usually don't realize that the story of Dorothy, Toto, and their friends is an allegorical rendition of the U.S. political struggle over gold. The yellow brick road represents the false promise of gold, the name "Oz" is a reference to an ounce (oz.) of gold, and Dorothy's silver slippers—changed to ruby slippers in the well-known Hollywood color-film version—offer the true way home to the heavily indebted farming state of Kansas.[13]

Although farming debt is often mentioned as a prime factor in the 1890s silver agitation, Harvard political scientist Jeffry Frieden shows that a more relevant factor was the desire of farming and mining interests to raise the prices of their

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[13]An informative and amusing account is Hugh Rockoff, "The 'Wizard of Oz' as a Monetary Allegory," *Journal of Political Economy* 98 (August 1990), pp. 739–760.

products relative to nontraded goods.[14] Manufacturers, who competed with imports, had been able to obtain tariff protection as a counterweight to deflation. As a group, they therefore had little interest in changing the currency standard. Because the United States was nearly exclusively an exporter of primary products, import tariffs would have been ineffective in helping farmers and miners. A depreciation of the U.S. dollar, however, promised to raise the dollar prices of primary products relative to the prices of nontradables. Through a careful statistical analysis of congressional voting on bills related to the monetary system, Frieden shows that legislative support for silver was unrelated to debt levels but was indeed highly correlated with state employment in agriculture and mining.

The Interwar Years, 1918–1939

Governments effectively suspended the gold standard during World War I and financed part of their massive military expenditures by printing money. Further, labor forces and productive capacity were reduced sharply through war losses. As a result, price levels were higher everywhere at the war's conclusion in 1918.

Several countries experienced runaway inflation as their governments attempted to aid the reconstruction process through public expenditures. These governments financed their purchases simply by printing the money they needed, as they sometimes had during the war. The result was a sharp rise in money supplies and price levels.

The Fleeting Return to Gold

The United States returned to gold in 1919. In 1922, at a conference in Genoa, Italy, a group of countries including Britain, France, Italy, and Japan agreed on a program calling for a general return to the gold standard and cooperation among central banks in attaining external and internal objectives. Realizing that gold supplies might be inadequate to meet central banks' demands for international reserves, the Genoa Conference sanctioned a partial gold *exchange* standard in which smaller countries could hold as reserves the currencies of several large countries whose own international reserves would consist entirely of gold.

In 1925, Britain returned to the gold standard by pegging the pound to gold at the prewar price. Chancellor of the Exchequer Winston Churchill advocated returning to the old parity on the grounds that any deviation from the prewar price would undermine world confidence in the stability of Britain's financial institutions, which had played the leading role in international finance during the gold standard era. Though Britain's price level had been falling since the war, in 1925 it was still higher than in the days of the prewar gold standard. To return the pound price of gold to its prewar level, the Bank of England was therefore forced to follow contractionary monetary policies that contributed to severe unemployment.

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[14]See "Monetary Populism in Nineteenth-Century America: An Open Economy Interpretation," *Journal of Economic History* 57 (June 1997), pp. 367–395.

British stagnation in the 1920s accelerated London's decline as the world's leading financial center. Britain's economic weakening proved problematic for the stability of the restored gold standard. In line with the recommendations of the Genoa Conference, many countries held international reserves in the form of deposits in London. Britain's gold reserves were limited, however, and the country's persistent stagnation did little to inspire confidence in its ability to meet its foreign obligations. The onset of the Great Depression in 1929 was shortly followed by bank failures throughout the world. Britain left gold in 1931 when foreign holders of sterling (including several central banks) lost confidence in Britain's promise to maintain its currency's value and began converting their sterling to gold.

International Economic Disintegration

As the depression continued, many countries renounced the gold standard and allowed their currencies to float in the foreign exchange market. In the face of growing unemployment, a resolution of the trilemma in favor of fixed exchange rates became difficult to maintain. The United States left gold in 1933 but returned in 1934, having raised the dollar price of gold from $20.67 to $35 per ounce. Countries that clung to the gold standard without devaluing their currencies suffered most during the Great Depression. Indeed, recent research places much of the blame for the depression's worldwide propagation on the gold standard itself (see the Case Study on the next page).

Major economic harm resulted from restrictions on international trade and payments, which proliferated as countries attempted to discourage imports and keep aggregate demand bottled up at home. The Smoot-Hawley tariff imposed by the United States in 1930 was intended to protect American jobs, but it had a damaging effect on employment abroad. The foreign response involved retaliatory trade restrictions and preferential trading agreements among groups of countries. World trade collapsed dramatically. A measure that raises domestic welfare is called a *beggar-thy-neighbor policy* when it benefits the home country at the cost of worsening economic conditions abroad. However, everyone is hurt when countries *simultaneously* adopt beggar-thy-neighbor policies.

Uncertainty about government policies led to sharp reserve movements for countries with pegged exchange rates and sharp exchange rate movements for those with floating rates. Many countries imposed prohibitions on private financial account transactions to limit these effects of foreign exchange market developments. This was another way of addressing the trilemma. Trade barriers and deflation in the industrial economies of America and Europe led to widespread repudiations of private international debts, particularly by Latin American countries, whose export markets were disappearing. Governments in western Europe repudiated their debts to the United States and Britain incurred because of World War I. In short, the world economy disintegrated into increasingly autarkic (that is, self-sufficient) national units in the early 1930s.

In the face of the Great Depression, most countries resolved the choice between external and internal balance by curtailing their trading links with the rest of the world and eliminating, by government decree, the possibility of any significant external imbalance. By reducing the gains from trade, that approach imposed high costs on the world economy and contributed to the slow recovery from depression, which in many countries was still incomplete in 1939. All countries would have been better off in a world with freer international trade, provided international cooperation had helped each country preserve its external balance and financial stability without sacrificing internal policy goals. It was this realization that inspired the blueprint for the postwar international monetary system, the **Bretton Woods agreement.**

| CASE STUDY | The International Gold Standard and the Great Depression |

One of the most striking features of the decade-long Great Depression that started in 1929 was its global nature. Rather than being confined to the United States and its main trading partners, the downturn spread rapidly and forcefully to Europe, Latin America, and elsewhere. What explains the Great Depression's nearly universal scope? Recent scholarship shows that the international gold standard played a central role in starting, deepening, and spreading the 20th century's greatest economic crisis.[15]

In 1929, most market economies were once again on the gold standard. At the time, however, the United States, attempting to slow its overheated economy through monetary contraction, and France, having just ended an inflationary period and returned to gold, faced large financial inflows. Through the resulting balance of payments surpluses, both countries were absorbing the world's monetary gold at a startling rate. (By 1932, the two countries alone held more than 70 percent of it!) Other countries on the gold standard had no choice but to engage in domestic asset sales and raise interest rates if they wished to conserve their dwindling gold stocks. The resulting worldwide monetary contraction, combined with the shock waves from the October 1929 New York stock market crash, sent the world into deep recession.

A cascade of bank failures around the world only accelerated the global economy's downward spiral. The gold standard again was a key culprit. Many countries desired to safeguard their gold reserves in order to be able to remain on the gold standard. This desire often discouraged their central banks from providing troubled private banks with the loans that might have allowed the banks to stay in business. After all, any cash provided to banks by their home central banks would have increased potential private claims to the government's precious gold holdings.[16]

Perhaps the clearest evidence of the gold standard's role is the contrasting behavior of output and the price level in countries that left the gold standard relatively early, such as Britain, and those that chose a different response to the

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[15]Important contributions to this research include Ehsan U. Choudhri and Levis A. Kochin, "The Exchange Rate and the International Transmission of Business Cycle Disturbances: Some Evidence from the Great Depression," *Journal of Money, Credit, and Banking* 12 (1980), pp. 565–574; Peter Temin, *Lessons from the Great Depression* (Cambridge, MA: MIT Press, 1989); and Barry Eichengreen, *Golden Fetters: The Gold Standard and the Great Depression, 1919–1939* (New York: Oxford University Press, 1992). A concise and lucid summary is Ben S. Bernanke, "The World on a Cross of Gold: A Review of 'Golden Fetters: The Gold Standard and the Great Depression, 1919–1939,'" *Journal of Monetary Economics* 31 (April 1993), pp. 251–267.

[16]Chang-Tai Hsieh and Christina D. Romer argue that the fear of being forced off gold cannot explain the U.S. Federal Reserve's unwillingness to expand the money supply in the early 1930s. See "Was the Federal Reserve Constrained by the Gold Standard During the Great Depression? Evidence from the 1932 Open Market Purchase Program," *Journal of Economic History* 66 (March 2006), pp. 140–176.

trilemma and instead stubbornly hung on. Countries that abandoned the gold standard freed themselves to adopt more expansionary monetary policies that limited (or prevented) both domestic deflation and output contraction. The countries with the biggest deflations and output contractions over the years 1929–1935 included France, Switzerland, Belgium, the Netherlands, and Poland, all of which stayed on the gold standard until 1936.

The Bretton Woods System and the International Monetary Fund

In July 1944, representatives of 44 countries meeting in Bretton Woods, New Hampshire, drafted and signed the Articles of Agreement of the **International Monetary Fund (IMF)**. Remembering the disastrous economic events of the interwar period, statesmen in the Allied countries hoped to design an international monetary system that would foster full employment and price stability while allowing individual countries to attain external balance without restrictions on international trade.[17]

The system set up by the Bretton Woods agreement called for fixed exchange rates against the U.S. dollar and an unvarying dollar price of gold—$35 an ounce. Member countries held their official international reserves largely in the form of gold or dollar assets and had the right to sell dollars to the Federal Reserve for gold at the official price. The system was thus a gold exchange standard, with the dollar as its principal reserve currency. The dollar was the "Nth currency" in terms of which the $N - 1$ exchange rates of the system were defined. The United States itself intervened only rarely in the foreign exchange market. Usually, the $N - 1$ foreign central banks intervened when necessary to fix the system's $N - 1$ exchange rates, while the United States was responsible in theory for fixing the dollar price of gold.

Goals and Structure of the IMF

The IMF Articles of Agreement, through a mixture of discipline and flexibility, hoped to avoid a repetition of the turbulent interwar experience.

The major discipline on monetary management was the requirement that exchange rates be fixed to the dollar, which, in turn, was tied to gold. If a central bank other than the Federal Reserve pursued excessive monetary expansion, it would lose international reserves and eventually become unable to maintain the fixed dollar exchange rate of its currency. Since high U.S. monetary growth would lead to dollar accumulation by foreign central banks, the Fed itself was constrained in its monetary policies by its obligation to redeem those dollars for gold. The official gold price of $35 an ounce served

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[17]The same conference set up a second institution, the World Bank, whose goals were to help the belligerents rebuild their shattered economies and to help the former colonial territories develop and modernize theirs. In 1947, the General Agreement on Tariffs and Trade (GATT) was inaugurated as a forum for the multilateral reduction of trade barriers. The GATT was meant as a prelude to the creation of an International Trade Organization (ITO), whose goals in the trade area would parallel those of the IMF in the financial area. Unfortunately, the ITO was doomed by the failures of Congress and Britain's Parliament to ratify its charter. In the 1990s, the GATT became the current World Trade Organization (WTO).

as a further brake on American monetary policy, since that price would be pushed upward if too many dollars were created.

Fixed exchange rates were viewed as more than a device for imposing monetary discipline on the system, however. Rightly or wrongly, the interwar experience had convinced the IMF's architects that floating exchange rates were a cause of speculative instability and were harmful to international trade.

The interwar experience had shown also that national governments would not be willing to maintain both free trade and fixed exchange rates at the price of long-term domestic unemployment. After the experience of the Great Depression, governments were widely viewed as responsible for maintaining full employment. The IMF agreement therefore tried to incorporate sufficient flexibility to allow countries to attain external balance in an orderly fashion without sacrificing internal objectives or predictable exchange rates.

Two major features of the IMF Articles of Agreement helped promote this flexibility in external adjustment. First, members of the IMF contributed their currencies and gold to form a pool of financial resources that the IMF could lend to countries in need. Second, although exchange rates against the dollar were fixed, these parities could be adjusted with the agreement of the IMF. Such devaluations and revaluations were supposed to be infrequent and carried out only in cases of an economy in *fundamental disequilibrium.* Although the IMF's Articles did not define "fundamental disequilibrium," the term was intended to cover countries that suffered permanent adverse shifts in the demand for their products, so that without devaluation, the countries would face long periods of unemployment and external deficits. The flexibility of an adjustable exchange rate was not available, however, to the "Nth currency" of the Bretton Woods system, the U.S. dollar.

How did the Bretton Woods system resolve the trilemma? In essence, the system was based on the presumption that movements of private financial capital could be restricted, allowing some degree of independence for domestically oriented monetary policies. The new system thus was diametrically opposed to the gold standard's subordination of monetary policy to external considerations such as freedom of financial flows. After the experience of high interwar unemployment, the architects of the Bretton Woods system hoped to ensure that countries would not be forced to adopt contractionary monetary policies for balance of payments reasons in the face of an economic downturn.

Supporting this emphasis on high employment, restrictions on cross-border financial flows would allow "orderly" exchange rate changes in situations of persistent imbalance. In theory, policy makers would be able to change exchange rates in a deliberate fashion, without the pressure of massive speculative attacks. As we shall see, however, while this approach worked well initially, the very success of the Bretton Woods system in rebuilding international trade made it progressively harder for policy makers to avoid speculative attacks as the years passed.

Convertibility and the Expansion of Private Financial Flows

Just as the general acceptability of national currency eliminates the costs of barter within a single economy, the use of national currencies in international trade makes the world economy function more efficiently. To promote efficient multilateral trade, the IMF Articles of Agreement urged members to make their national currencies convertible as soon as possible. A **convertible currency** is one that may be freely exchanged for foreign currencies. The U.S. and Canadian dollars became convertible in 1945. This meant, for example, that a Canadian resident who acquired U.S. dollars could use them to make purchases in the United States, could sell them in the foreign exchange market for Canadian dollars, or could sell them to the Bank of Canada, which then

had the right to sell them to the Federal Reserve (at the fixed dollar/gold exchange rate) in return for gold. General *in*convertibility would make international trade extremely difficult. A French citizen might be unwilling to sell goods to a German in return for inconvertible German marks because these marks would then be usable only subject to restrictions imposed by the German government. With no market in inconvertible French francs, the German would be unable to obtain French currency to pay for the French goods. The only way of trading would therefore be through barter, the direct exchange of goods for goods. Most countries in Europe did not restore convertibility until the end of 1958, with Japan following in 1964.

The early convertibility of the U.S. dollar, together with its special position in the Bretton Woods system and the economic and political dominance of the United States, helped to make the dollar the postwar world's key currency. Because dollars were freely convertible, much international trade tended to be invoiced in dollars, and importers and exporters held dollar balances for transactions. In effect, the dollar became an international money—a universal medium of exchange, unit of account, and store of value. Central banks naturally found it advantageous to hold their international reserves in the form of interest-bearing dollar assets.

The restoration of convertibility in Europe in 1958 gradually began to change the nature of policy makers' external constraints. As foreign exchange trading expanded, financial markets in different countries became more tightly integrated—an important step toward the creation of today's worldwide foreign exchange market. With growing opportunities to move funds across borders, national interest rates became more closely linked, and the speed with which policy changes might cause a country to lose or gain international reserves increased. After 1958, and increasingly over the next 15 years, central banks had to be attentive to foreign financial conditions or take the risk that sudden reserve losses might leave them without the resources needed to peg exchange rates. Faced with a sudden rise in foreign interest rates, for example, a central bank would be forced to sell domestic assets and raise the domestic interest rate to hold its international reserves steady.

The restoration of convertibility did not result in immediate and complete international financial integration. On the contrary, most countries continued to maintain restrictions on financial account transactions, a practice that the IMF explicitly allowed. But the opportunities for *disguised* capital flows increased dramatically. For example, importers within a country could effectively purchase foreign assets by accelerating payments to foreign suppliers relative to actual shipments of goods; they could effectively borrow from foreign suppliers by delaying payments. These trade practices—known, respectively, as "leads" and "lags"—provided two of the many ways through which official barriers to private capital movements could be evaded. Even though the condition of international interest rate equality did not hold exactly, the links among countries' interest rates tightened as the Bretton Woods system matured. The Bretton Woods resolution of the trilemma was gradually coming undone.

Speculative Capital Flows and Crises

Current account deficits and surpluses took on added significance under the new conditions of increasingly mobile private financial flows. A country with a large and persistent current account deficit might be suspected of being in "fundamental disequilibrium" under the IMF Articles of Agreement, and thus ripe for a currency devaluation. Suspicion of an impending devaluation could, in turn, spark a balance of payments crisis.

Anyone holding pound deposits during a devaluation of the pound, for example, would suffer a loss, since the foreign currency value of pound assets would decrease suddenly by the amount of the exchange rate change. If Britain had a current account deficit, therefore, holders of pounds would become nervous and shift their wealth into other currencies. To hold the pound's exchange rate against the dollar pegged, the Bank of England (Britain's central bank) would have to buy pounds and supply the foreign assets that market participants wished to hold. This loss of foreign reserves, if large enough, might force devaluation by leaving the Bank of England without enough reserves to prop up the exchange rate.

Similarly, countries with large current account surpluses might be viewed by the market as candidates for revaluation. In this case, their central banks would find themselves swamped with official reserves, the result of selling the home currency in the foreign exchange market to keep the currency from appreciating. A country in this position would face the problem of having its money supply grow uncontrollably, a development that could push the price level up and upset internal balance. Governments thus became increasingly reluctant to contemplate exchange rate realignments, fearing the resulting speculative attacks.

Balance of payments crises nonetheless became increasingly frequent and violent throughout the 1960s and early 1970s. A record British trade balance deficit in early 1964 led to a period of intermittent speculation against the pound that complicated British policy making until November 1967, when the pound was finally devalued. France devalued its franc and Germany revalued its mark in 1969 after similar speculative attacks, in which France faced speculative financial outflows and Germany faced speculative financial inflows. (The two countries still had their own currencies at that time.) These crises became so massive by the early 1970s that they eventually brought down the Bretton Woods structure of fixed exchange rates. The possibility of a balance of payments crisis therefore lent increased importance to the external goal of a current account target. Even current account imbalances justified by differing international investment opportunities or caused by purely temporary factors might have fueled market suspicions of an impending parity change. In this environment, policy makers had additional incentives to avoid sharp current account changes.

Analyzing Policy Options for Reaching Internal and External Balance

How were individual countries able to reach internal and external balance under the rules of the Bretton Woods system? A simple diagram will help you to visualize the available policy options. (The problem of the United States under the Bretton Woods system was somewhat different, as we describe later.) In line with the approximate conditions later in the Bretton Woods system, we will assume a high degree of financial capital mobility across borders, so that the domestic interest rate cannot be set independently of the exchange rate.

Our diagrammatic framework actually is applicable whether the exchange rate is fixed, as under the Bretton Woods system, or flexible. Figure 2 shows how a country's position with respect to its internal and external goals depends on the level of its exchange rate, E, and the level of domestic spending; and that position is not necessarily restricted by the exchange rate regime. Throughout, E is the domestic currency price of the foreign currency (the dollar under Bretton Woods). The analysis applies to the short run because the home and foreign price levels (P and P^*, respectively) are assumed to be fixed.

Maintaining Internal Balance

First consider internal balance, which requires that aggregate demand equal the full-employment level of output, Y^f.[18]

Recall that aggregate demand for domestic output is the sum of consumption, C, investment, I, government purchases, G, and the current account, CA. Of this sum, total domestic spending, also called domestic *absorption*, is denoted by $A = C + I + G$. (Of course, some of this overall domestic spending falls on imports, and therefore does not contribute to the aggregate demand for domestic output, whereas foreign demand for our exports adds to that aggregate demand.) We can express the current account surplus as a decreasing function of disposable income and an increasing function of the real exchange rate, EP^*/P. However, because import spending rises as total domestic spending A rises, we can similarly express the current account as a decreasing function of spending and an increasing function of the real exchange rate, $CA(EP^*/P, A)$. Under this new notation, the condition of internal balance (full-employment output equals aggregate demand) is therefore

$$Y^f = C + I + G + CA(EP^*/P, A) = A + CA(EP^*/P, A). \qquad (1)$$

Equation (1) suggests the policy tools that affect aggregate demand and, therefore, output, in the short run. The government can directly influence total spending A through fiscal policy, for example. Fiscal expansion (a rise in G or a fall in T) stimulates aggregate demand and causes output to rise, even though a fraction of the additional spending goes toward import purchases. Similarly, a devaluation of the currency (a rise in E) makes domestic goods and services cheaper relative to those sold abroad and thereby increases demand and output. The policy maker can hold output steady at its full employment level, Y^f, through fiscal policy or exchange rate changes.

Notice that monetary policy is not a policy tool under fixed exchange rates. This is because an attempt by the central bank to alter the money supply by buying or selling domestic assets will cause an offsetting change in foreign reserves, leaving the domestic money supply unchanged. If we were interpreting the diagram to apply to a situation of floating exchange rates, however, we would think of monetary policy as potentially bringing about exchange rate changes consistent with a position of internal and external balance.

The II schedule in Figure 2 shows combinations of exchange rates and domestic spending that hold output constant at Y^f and thus maintain internal balance. The schedule is downward sloping because currency devaluation (a rise in E) and higher domestic absorption both tend to raise output. To hold output constant, a *revaluation* of the currency (which reduces aggregate demand) must therefore be matched by higher domestic spending (which increases aggregate output demand). Schedule II shows precisely how domestic spending must change as E changes to maintain full employment. To the right of II, spending is higher than needed for full employment, so the economy's productive factors are overemployed. To the left of II, spending is too low, and there is unemployment.

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[18]We will assume the domestic price level is stable at full employment, but if P^* is unstable because of foreign inflation, for example, full employment alone will not guarantee price stability under a fixed exchange rate. This complex problem is considered when we examine worldwide inflation under fixed exchange rates.

FIGURE 2

Internal Balance (II), External Balance (XX), and the "Four Zones of Economic Discomfort"

The diagram shows what different levels of the exchange rate, E, and overall domestic spending, A, imply for employment and the current account. Along II, output is at its full-employment level, Y^f. Along XX, the current account is at its target level, X.
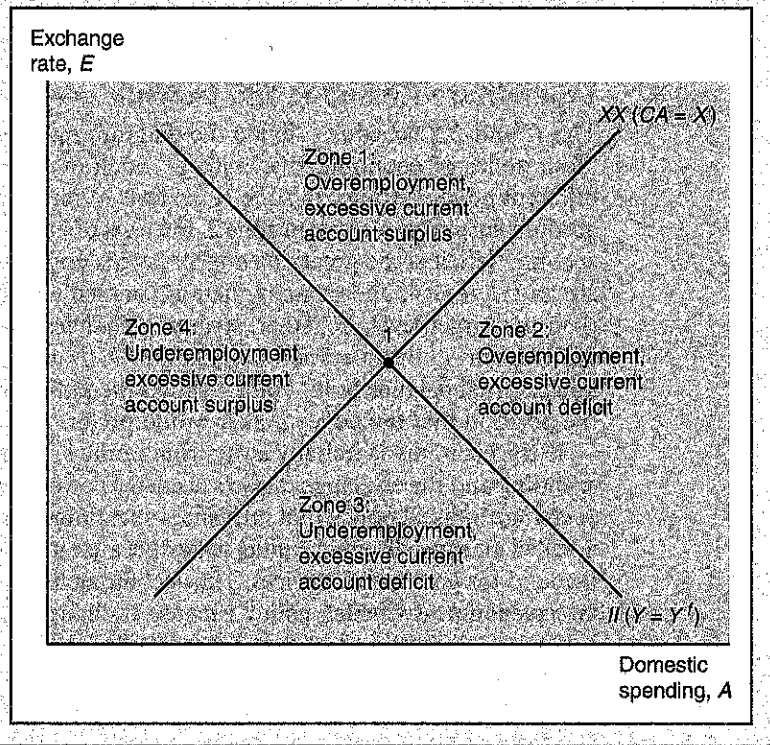
Maintaining External Balance

We have seen how domestic spending and exchange rate changes influence output and thus help the government achieve its internal goal of full employment. How do these variables affect the economy's external balance? To answer this question, assume the government has a target value, X, for the current account surplus. The goal of external balance requires the government to manage domestic spending (perhaps through fiscal policy) and the exchange rate so that the equation

$$CA(EP^*/P, A) = X \qquad (2)$$

is satisfied.

Given P and P^*, a rise in E makes domestic goods cheaper and improves the current account. A rise in domestic spending, A, however, has the opposite effect on the current account, because it causes imports to rise. To maintain its current account at X as it devalues the currency (that is, as it raises E), the government must enact policies that raise domestic spending. Figure 2 therefore shows that the XX schedule, along which external balance holds, is positively sloped. The XX schedule shows the amount of additional spending that will hold the current account surplus at X as the currency is devalued by a given amount. Since a rise in E raises net exports, the current account is

in surplus, relative to its target level X, above XX. Similarly, below XX the current account is in deficit relative to its target level.[19]

Expenditure-Changing and Expenditure-Switching Policies

The II and XX schedules divide the diagram into four regions, sometimes called the "four zones of economic discomfort." Each of these zones represents the effects of different policy settings. In zone 1, the level of employment is too high and the current account surplus too great; in zone 2, the level of employment is too high but the current account deficit is too great; in zone 3, there is underemployment and an excessive deficit; and in zone 4, underemployment is coupled with a current account surplus greater than the target level. Together, spending changes and exchange rate policy can place the economy at the intersection of II and XX (point 1), the point at which both internal and external balance hold. Point 1 shows the policy setting that places the economy in the position that the policy maker would prefer.

If the economy is initially away from point 1, appropriate adjustments in domestic spending and the exchange rate are needed to bring about internal and external balance. A change in fiscal policy that influences spending so as to move the economy to point 1 is called an **expenditure-changing policy** because it alters the *level* of the economy's total demand for goods and services. The accompanying exchange rate adjustment is called an **expenditure-switching policy** because it changes the *direction* of demand, shifting it between domestic output and imports. In general, both expenditure changing and expenditure switching are needed to reach internal and external balance. Apart from monetary policy, fiscal policy is the main government lever for pushing total domestic expenditure up or down.

Under the Bretton Woods rules, exchange rate changes (expenditure-switching policy) were supposed to be infrequent. This left fiscal policy as the main policy tool for moving the economy toward internal and external balance. But as Figure 2 shows, one instrument, fiscal policy, is generally insufficient to attain the two goals of internal and external balance. Only if the economy had been displaced horizontally from point 1 would fiscal policy be able to do the job alone. In addition, fiscal policy is an unwieldy tool, since it often cannot be implemented without legislative approval. Another drawback is that a fiscal expansion, for example, might have to be reversed after some time if it leads to chronic government budget deficits.

As a result of the exchange rate's inflexibility during the Bretton Woods period, policy makers sometimes found themselves in difficult situations. With the spending level and exchange rate indicated by point 2 in Figure 3, there is underemployment and an excessive current account deficit. Only the combination of devaluation and spending expansion indicated in the figure moves the economy to internal and external balance

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[19]Since the central bank does not affect the economy when it raises its foreign reserves by an open-market sale of domestic assets, no separate reserve constraint is shown in Figure 2. In effect, the bank can borrow reserves freely from abroad by selling domestic assets to the public. (During a devaluation scare, this tactic would not work because no one would want to sell the bank foreign assets for domestic money.) Our analysis, however, assumes perfect asset substitutability between domestic and foreign bonds. Under imperfect asset substitutability, central bank domestic asset sales to attract foreign reserves would drive up the domestic interest rate relative to the foreign rate. Thus, while imperfect asset substitutability would give the central bank an additional policy tool (monetary policy), it would also make the bank responsible for an additional policy target (the domestic interest rate). If the government is concerned about the domestic interest rate because it affects investment, for example, the additional policy tool would not necessarily increase the set of attractive policy options. Imperfect substitutability was exploited by central banks under Bretton Woods, but it did not get countries out of the policy dilemmas illustrated in the text.

FIGURE 3

Policies to Bring about Internal
and External Balance

Unless the currency is devalued and
the level of domestic spending rises,
internal and external balance (point 1)
cannot be reached. Acting alone,
a change in fiscal policy, for example,
enables the economy to attain *either*
internal balance (point 3) *or* external
balance (point 4), but only at the cost
of increasing the economy's distance
from the goal that is sacrificed.
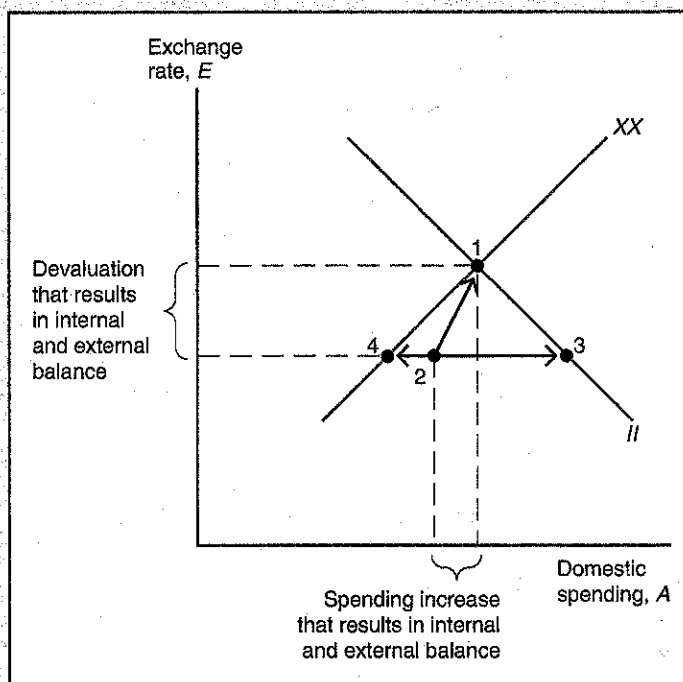
(point 1). Expansionary fiscal policy, acting alone, can eliminate the unemployment by moving the economy to point 3, but the cost of reduced unemployment is a larger external deficit. While contractionary fiscal policy alone can bring about external balance (point 4), output falls as a result and the economy moves further from internal balance. It is no wonder that policy dilemmas such as the one at point 2 gave rise to suspicions that the currency was about to be devalued. Devaluation improves the current account and aggregate demand by raising the real exchange rate EP^*/P in one stroke; the alternative is a long and politically unpopular period of unemployment to bring about an equal rise in the real exchange rate through a fall in P.[20]

In practice, countries did sometimes use changes in their exchange rates to move closer to internal and external balance, although the changes were typically accompanied by balance of payments crises. Many countries also tightened controls on financial account transactions to sever the links between domestic and foreign interest rates and make monetary policy more effective (in line with the trilemma). In this they were only partly successful, as the events leading to the breakdown of the system were to prove.

The External Balance Problem of the United States under Bretton Woods

The external balance problem of the United States was different from the one faced by the other countries in the Bretton Woods system. As the issuer of the Nth currency, the United States was not responsible for pegging dollar exchange rates. Its main

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[20]As an exercise to test your understanding, show that a fall in P, all else equal, lowers both II and XX, moving point 1 vertically downward.

responsibility was to hold the dollar price of gold at $35 an ounce and, in particular, to guarantee that foreign central banks could convert their dollar holdings into gold at that price. For this purpose, it had to hold sufficient gold reserves.

Because the United States was required to trade gold for dollars with foreign central banks, the possibility that other countries might convert their dollar reserves into gold was a potential external constraint on U.S. macroeconomic policy. In practice, however, foreign central banks were willing to hold on to the dollars they accumulated, since these paid interest and were international money *par excellence.* And the logic of the gold exchange standard dictated that foreign central banks should continue to accumulate dollars. Because world gold supplies were not growing quickly enough to keep up with world economic growth, the only way central banks could maintain adequate international reserve levels (barring deflation) was by accumulating dollar assets. Official gold conversions did occur on occasion, and these depleted the American gold stock and caused concern. But as long as most central banks were willing to add dollars to their reserves and forgo the right of redeeming those dollars for American gold, the U.S. external constraint appeared looser than that faced by other countries in the system.

In an influential book that appeared in 1960, economist Robert Triffin of Yale University called attention to a fundamental long-run problem of the Bretton Woods system, the **confidence problem.**[21] Triffin realized that as central banks' international reserve needs grew over time, their holdings of dollars would necessarily grow until they exceeded the U.S. gold stock. Since the United States had promised to redeem these dollars at $35 an ounce, it would no longer have the ability to meet its obligations should all dollar holders simultaneously try to convert their dollars into gold. This would lead to a confidence problem: Central banks, knowing that their dollars were no longer "as good as gold," might become unwilling to accumulate more dollars and might even bring down the system by attempting to cash in the dollars they already held.

One possible solution at the time was an increase in the official price of gold in terms of the dollar and all other currencies. But such an increase would have been inflationary and would have had the politically unattractive consequence of enriching the main gold-supplying countries. Further, an increase in gold's price would have caused central banks to expect further decreases in the gold value of their dollar reserve holdings in the future, thereby possibly worsening the confidence problem rather than solving it!

CASE STUDY   The End of Bretton Woods, Worldwide Inflation, and the Transition to Floating Rates

By the late 1960s, the Bretton Woods system of fixed exchange rates was beginning to show strains that would soon lead to its collapse. These strains were closely related to the special position of the United States, where inflation was gathering strength because of higher monetary growth as well as higher government spending on new social programs such as Medicare and on the unpopular Vietnam War.

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[21]See Triffin, *Gold and the Dollar Crisis* (New Haven: Yale University Press, 1960).

TABLE 1	Inflation Rates in Industrial Countries, 1966–1972 (percent per year)						
Country	1966	1967	1968	1969	1970	1971	1972
Britain	3.6	2.6	4.6	5.2	6.5	9.7	6.9
France	2.8	2.8	4.4	6.5	5.3	5.5	6.2
Germany	3.4	1.4	2.9	1.9	3.4	5.3	5.5
Italy	2.1	2.1	1.2	2.8	5.1	5.2	5.3
United States	2.9	3.1	4.2	5.5	5.7	4.4	3.2

Source: Organization for Economic Cooperation and Development. *Main Economic Indicators: Historical Statistics, 1964–1983*. Paris: OECD, 1984. Figures are percentage increases in each year's average consumer price index over that of the previous year.

The acceleration of American inflation in the late 1960s was a worldwide phenomenon. Table 1 shows that by the start of the 1970s, inflation had also broken out in European economies.[22] The worldwide nature of the inflation problem was no accident. Theory predicts that when the reserve currency country speeds up its monetary growth, as the United States did in the second half of the 1960s, one effect is an automatic increase in monetary growth rates and inflation abroad as foreign central banks purchase the reserve currency to maintain their exchange rates and expand their money supplies in the process. One interpretation of the Bretton Woods system's collapse is that foreign countries were forced to *import* unwelcome U.S. inflation. To stabilize their price levels and regain internal balance, they had to abandon fixed exchange rates and allow their currencies to float. The monetary trilemma implies that these countries could not simultaneously peg their exchange rates and control domestic inflation.

Adding to the tensions, the U.S. economy entered a recession in 1970, and as unemployment rose, markets became increasingly convinced that the dollar would have to be devalued against all the major European currencies. To restore full employment and a balanced current account, the United States somehow had to bring about a real depreciation of the dollar. That real depreciation could be brought about in two ways: The first option was a fall in the U.S. price level in response to domestic unemployment, coupled with a rise in foreign price levels in response to continuing purchases of dollars by foreign central banks. The second option was a fall in the dollar's nominal value in terms of foreign currencies. The first route—unemployment in the United States and inflation abroad—seemed a painful one for policy makers to follow. The markets rightly guessed that a change

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[22]The U.S. inflation numbers for 1971 and 1972 are artificially low because of President Nixon's resort to government-administered wage and price controls in August 1971. In principle, the U.S. commitment to peg the market price of gold should have limited U.S. inflation, but in practice, the United States was able to weaken that commitment over time, thus allowing the *market* price of gold to rise while still holding to the promise to redeem dollars from central banks at $35 per ounce. By the late 1960s, the United States was therefore the unique country in the system in that it did not face the full monetary trilemma. It enjoyed fixed exchange rates because *other* countries pegged their currencies to the dollar, yet it could still orient monetary policy toward domestic goals. For recent assessments of the worldwide inflation of the 1970s, see Michael Bordo and Athanasios Orphanides, eds., *The Great Inflation* (Chicago: University of Chicago Press, 2013).

in the dollar's value was inevitable. This realization led to massive sales of dollars in the foreign exchange market.

After several unsuccessful attempts to stabilize the system (including a unilateral U.S. decision in August 1971 to end completely the dollar's link to gold), the main industrialized countries allowed their dollar exchange rates to float in March 1973.[23] Floating was viewed at the time as a temporary response to unmanageable speculative capital movements. But the interim arrangements adopted in March 1973 turned out to be permanent and marked the end of fixed exchange rates and the beginning of a turbulent new period in international monetary relations.

The Mechanics of Imported Inflation

To understand how inflation can be imported from abroad unless exchange rates are adjusted, look again at the graphical picture of internal and external balance shown in Figure 2. Suppose the home country is faced with foreign inflation. Above, the foreign price level, P^*, was assumed to be given; now, however, P^* rises as a result of inflation abroad. Figure 4 shows the effect on the home economy.

You can see how the two schedules shift by asking what would happen if the nominal exchange rate were to fall in proportion to the rise in P^*. In this case, the real exchange rate EP^*/P would be unaffected (given P), and the economy would remain in internal balance or in external balance if either of these conditions originally held. Figure 4 therefore shows that for a given initial exchange rate, a rise in P^* shifts both II^1 and XX^1 downward by the same distance (approximately equal to the proportional increase in P^* times the initial exchange rate). The intersection of the new schedules II^2 and XX^2 (point 2) lies directly below the original intersection at point 1.

If the economy starts out at point 1, a rise in P^* *given* the fixed exchange rate and the domestic price level therefore strands the economy in zone 1 with overemployment and an undesirably high surplus in its current account. The factor that causes this outcome is a real currency depreciation that shifts world demand toward the home country (EP^*/P rises because P^* rises).

If nothing is done by the government, overemployment puts upward pressure on the domestic price level, and this pressure gradually shifts the two schedules back to their original positions. The schedules stop shifting once P has risen in proportion to P^*. At this stage, the real exchange rate, employment, and the current account are at their initial levels, so point 1 is once again a position of internal and external balance.

The way to avoid the imported inflation is to revalue the currency (that is, lower E) and move to point 2. A revaluation restores internal and external balance immediately, without domestic inflation, by using the nominal exchange rate to offset the effect of the rise in P^* on the real exchange rate. Only an expenditure-switching policy is needed to respond to a pure increase in foreign prices.

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[23]Many developing countries continued to peg to the dollar, and a number of European countries were continuing to peg their mutual exchange rates as part of an informal arrangement called the "snake." The snake evolved into the European Monetary System and ultimately led to Europe's single currency, the euro.

FIGURE 4

Effect on Internal and External Balance of a Rise in the Foreign Price Level, P^*

After P^* rises, point 1 is in zone 1 (overemployment and an excessive surplus). Revaluation (a fall in E) restores balance immediately by moving the policy setting to point 2.

Exchange rate, E

Distance = $E\Delta P^* / P^*$

XX^1

XX^2

1

2

II^1

II^2

Domestic spending, A
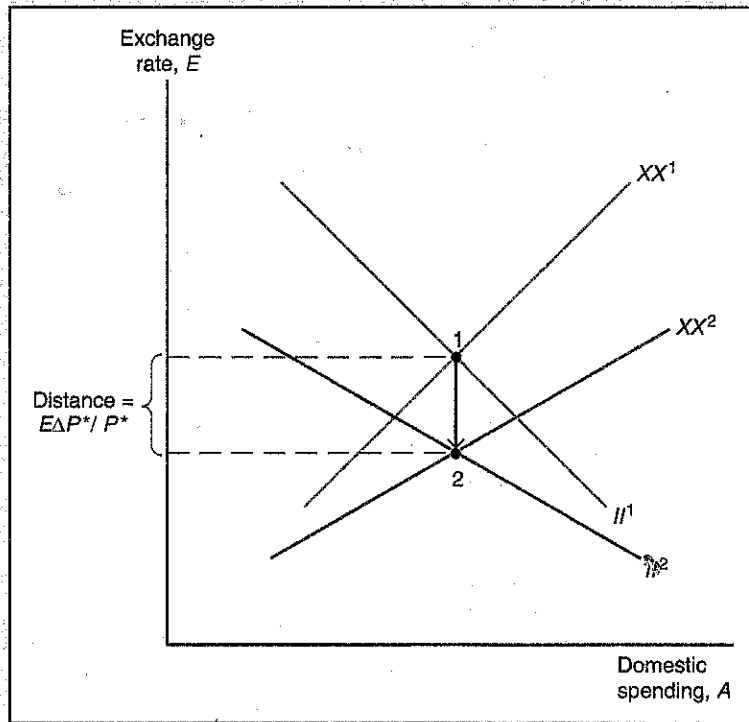
The rise in domestic prices that occurs when no revaluation takes place requires a rise in the domestic money supply, since prices and the money supply move proportionally in the long run. The mechanism that brings this rise about is foreign exchange intervention by the home central bank. As domestic output and prices rise after the rise in P^*, the real money supply shrinks and the demand for real money holdings increases. To prevent the resulting upward pressure on the home interest rate from appreciating the currency, the central bank must purchase international reserves and expand the home money supply. In this way, inflationary policies pursued by the reserve center spill over into foreign countries' money supplies.

Assessment

The collapse of the Bretton Woods system was partly due to the lopsided macroeconomic power of the United States, which allowed it to generate global inflation. But it was also due in large measure to the fact that the key expenditure-switching tool needed for internal and external balance—discrete exchange rate adjustment—inspired speculative attacks that made both internal and external balance progressively more difficult to achieve. The system thus was a victim of the trilemma. As international financial flows became harder to restrain, policy makers faced an increasingly sharp trade-off between exchange rate stability and domestic monetary goals. By the 1970s, however, the electorates of the industrial counties had long expected governments to give priority to the domestic economy. So it was fixed exchange rates that gave way.

The Case for Floating Exchange Rates

As international currency crises of increasing scope and frequency erupted in the late 1960s, most economists began advocating greater flexibility of exchange rates. Many argued that a system of floating exchange rates (one in which central banks do not intervene in the foreign exchange market to fix rates) would not only deliver necessary exchange rate flexibility but would also produce several other benefits for the world economy. Thus, the arrival of floating exchange rates in March 1973 was hailed by many economists as a healthy development in the evolution of the world monetary system, one that would put markets at center stage in determining exchange rates.

The case for floating exchange rates rested on at least four major claims:

1. *Monetary policy autonomy.* If central banks were no longer obliged to intervene in currency markets to fix exchange rates, governments would be able to use monetary policy to reach internal and external balance. Furthermore, no country would be forced to import inflation (or deflation) from abroad.
2. *Symmetry.* Under a system of floating rates, the inherent asymmetries of Bretton Woods would disappear and the United States would no longer be able to set world monetary conditions all by itself. At the same time, the United States would have the same opportunity as other countries to influence its exchange rate against foreign currencies.
3. *Exchange rates as automatic stabilizers.* Even in the absence of an active monetary policy, the swift adjustment of market-determined exchange rates would help countries maintain internal and external balance in the face of changes in aggregate demand. The long and agonizing periods of speculation preceding exchange rate realignments under the Bretton Woods rules would not occur under floating.
4. *Exchange rates and external balance.* Market-determined exchange rates would move automatically so as to prevent the emergence of big current account deficits and surpluses.

Monetary Policy Autonomy

Toward the end of the Bretton Woods fixed-rate system, countries other than the United States had little scope to use monetary policy to attain internal and external balance. Countries could hold their dollar exchange rates fixed only if they kept the domestic interest rate in line with that of the United States. Thus, in the closing years of fixed exchange rates, central banks imposed increasingly stringent restrictions on international payments to keep control over their interest rates and money supplies. However, these restrictions were only partially successful in strengthening monetary policy, and they had the damaging side effect of distorting international trade.

Advocates of floating rates pointed out that removal of the obligation to peg currency values would restore monetary control to central banks. If, for example, the central bank faced unemployment and wished to expand its money supply in response, there would no longer be any legal barrier to the currency depreciation this would cause. Similarly, the central bank of an overheated economy could cool down activity by contracting the money supply without worrying that undesired reserve inflows would undermine its stabilization effort. Enhanced control over monetary policy would allow countries to dismantle their distorting barriers to international payments. In other words, floating rates implied an approach to the monetary trilemma that sacrificed fixed exchange rates in favor of freedom of financial flows and of monetary policy.

Consistent with this view, advocates of floating also argued that floating rates would allow each country to choose its own desired long-run inflation rate rather than having to import passively the inflation rate established abroad. A country faced with a rise in the foreign price level will be thrown out of balance and ultimately will import the foreign inflation if it holds its exchange rate fixed. By the end of the 1960s, many countries felt that they were importing inflation from the United States. By revaluing its currency—that is, by lowering the domestic currency price of foreign currency—a country can insulate itself completely from an inflationary increase in foreign prices, and so remain in internal and external balance. One of the most telling arguments in favor of floating rates was their ability, in theory, to bring about automatically exchange rate changes that insulate economies from ongoing foreign inflation.

The mechanism behind this insulation is purchasing power parity. Recall that when all changes in the world economy are monetary, PPP holds true in the long run: Exchange rates eventually move to offset exactly national differences in inflation. If U.S. monetary growth leads to a long-run doubling of the U.S. price level while Europe's price level remains constant, PPP predicts that the long-run euro price of the dollar will be halved. This nominal exchange rate change leaves the *real* exchange rate between the dollar and the euro unchanged and thus maintains Europe's internal and external balance. In other words, the long-run exchange rate change predicted by PPP is exactly the change that insulates Europe from U.S. inflation.

A money-induced increase in U.S. prices also causes an *immediate* appreciation of foreign currencies against the dollar when the exchange rate floats. In the short run, the size of this appreciation can differ from what PPP predicts, but the foreign exchange speculators who might have mounted an attack on fixed dollar exchange rates speed the adjustment of floating rates. Since they know foreign currencies will appreciate according to PPP in the long run, they act on their expectations and push exchange rates in the direction of their long-run levels.

In contrast, countries operating under the Bretton Woods rules were forced to choose between matching U.S. inflation to hold their dollar exchange rates fixed or deliberately revaluing their currencies in proportion to the rise in U.S. prices. Under floating, however, the foreign exchange market automatically brings about exchange rate changes that shield countries from U.S. inflation. Since this outcome does not require any government policy decisions, the revaluation crises that occurred under fixed exchange rates are avoided.[24]

Symmetry

The second argument put forward by the advocates of floating was that abandonment of the Bretton Woods system would remove the asymmetries that caused so much international disagreement in the 1960s and early 1970s. There were two main asymmetries, both the result of the dollar's central role in the international monetary system. First, because central banks pegged their currencies to the dollar and accumulated dollars as international reserves, the U.S. Federal Reserve played the leading role in determining the world money supply, and central banks abroad had little scope to determine their own domestic money supplies. Second, any foreign country could devalue its currency against the dollar in conditions of "fundamental disequilibrium," but the system's rules did not give the United States the option to devalue against foreign currencies. Rather,

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[24]Countries can also avoid importing undesired *deflation* by floating, since the analysis above applies, in reverse, for a fall in the foreign price level.

dollar devaluation required a long and economically disruptive period of multilateral negotiation.

A system of floating exchange rates would do away with these asymmetries. Since countries would no longer peg dollar exchange rates, each would be in a position to guide monetary conditions at home. For the same reason, the United States would not face any special obstacle to altering its exchange rate through monetary or fiscal policies. All countries' exchange rates would be determined symmetrically by the foreign exchange market, not by government decisions.[25]

Exchange Rates as Automatic Stabilizers

The third argument in favor of floating rates concerned their ability, theoretically, to promote swift and relatively painless adjustment to certain types of economic changes. One such change, previously discussed, is foreign inflation. Figure 5, which uses the DD-AA model, examines another type of change by comparing an economy's response under a fixed and a floating exchange rate to a temporary fall in foreign demand for its exports.

A fall in demand for the home country's exports reduces aggregate demand for every level of the exchange rate, E, and thus shifts the DD schedule leftward from DD^1 to DD^2. (Recall that the DD schedule shows exchange rate and output pairs for which aggregate demand equals aggregate output.) Figure 5a shows how this shift affects the economy's equilibrium when the exchange rate floats. Because the demand shift is assumed to be temporary, it does not change the long-run expected exchange rate and so does not move the asset market equilibrium schedule AA^1. (Recall that the AA schedule shows exchange rate and output pairs at which the foreign exchange market and the domestic money market are in equilibrium.) The economy's short-run equilibrium is therefore at point 2; compared with the initial equilibrium at point 1, the currency depreciates (E rises) and output falls. Why does the exchange rate rise from E^1 to E^2? As demand and output fall, reducing the transactions demand for money, the home interest rate must also decline to keep the money market in equilibrium. This fall in the home interest rate causes the domestic currency to depreciate in the foreign exchange market, and the exchange rate therefore rises from E^1 to E^2.

The effect of the same export demand disturbance under a fixed exchange rate is shown in Figure 5b. Since the central bank must prevent the currency depreciation that occurs under a floating rate, it buys domestic money with foreign reserves, an action that contracts the money supply and shifts AA^1 left to AA^2. The new short-run equilibrium of the economy under a fixed exchange rate is at point 3, where output equals Y^3.

Figure 5 shows that output actually falls more under a fixed rate than under a floating rate, dropping all the way to Y^3 rather than Y^2. In other words, the movement of the floating exchange rate stabilizes the economy by reducing the shock's effect on employment relative to its effect under a fixed rate. Currency depreciation in the floating-rate case makes domestic goods and services cheaper when the demand for them falls, partly offsetting the initial reduction in demand. In addition to reducing the departure from internal balance caused by the fall in export demand, the depreciation reduces the increased current account deficit that occurs under fixed rates by making domestic products more competitive in international markets.

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[25]The symmetry argument is not an argument against fixed-rate systems in general, but an argument against the specific type of fixed exchange rate system that broke down in the early 1970s. A fixed-rate system based on an international gold standard can be completely symmetric.

FIGURE 5

Effects of a Fall in Export Demand

The response to a fall in export demand (seen in the shift from DD^1 to DD^2) differs under floating and fixed exchange rates. (a) With a floating rate, output falls only to Y^2 as the currency's depreciation (from E^1 to E^2) shifts demand back toward domestic goods. (b) With the exchange rate fixed at E^1, output falls all the way to Y^3 as the central bank reduces the money supply (reflected in the shift from AA^1 to AA^2).

(a) Floating exchange rate

(b) Fixed exchange rate
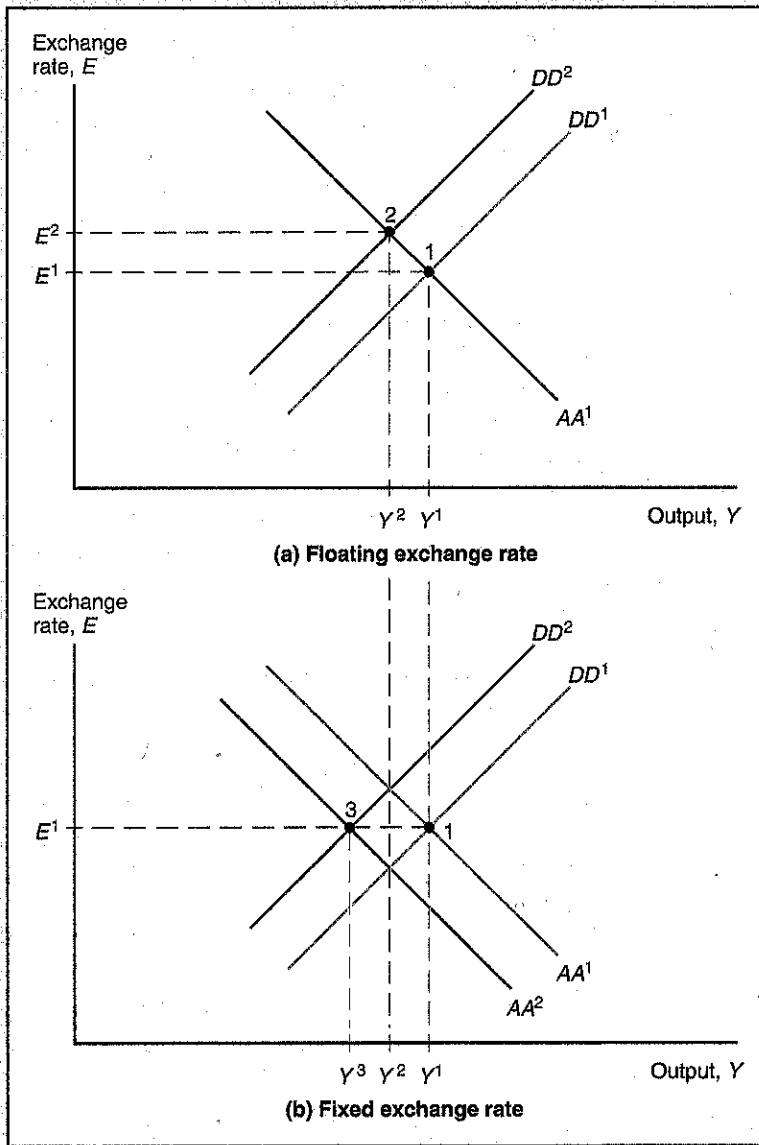
We have considered the case of a transitory fall in export demand, but even stronger conclusions can be drawn when there is a *permanent* fall in export demand. In this case, the expected exchange rate E^e also rises and AA shifts upward as a result. A permanent shock causes a greater depreciation than does a temporary shock, and the movement of the exchange rate therefore cushions domestic output more when the shock is permanent.

Under the Bretton Woods system, a fall in export demand such as the one shown in Figure 5b would, if permanent, have led to a situation of "fundamental disequilibrium" calling for a devaluation of the currency or a long period of domestic unemployment as wages and prices fell. Uncertainty about the government's intentions would have .

encouraged speculative capital outflows, further worsening the situation by depleting central bank reserves and contracting the domestic money supply at a time of unemployment. Advocates of floating rates pointed out that the foreign exchange market would automatically bring about the required *real* currency depreciation through a movement in the nominal exchange rate. This exchange rate change would reduce or eliminate the need to push the price level down through unemployment, and because it would occur immediately, there would be no risk of speculative disruption, as there would be under a fixed rate.

Exchange Rates and External Balance

A final benefit claimed for floating exchange rates was that they would prevent the emergence of persistently large current account deficits or surpluses. Because a country with a large current account deficit is borrowing from foreigners and thereby increasing its foreign debt, it will eventually have to generate larger surpluses of exports over imports to pay the interest on that debt. Those larger surpluses, in turn, will require a depreciated currency. Advocates of floating suggested that speculators, anticipating this depreciation, would drive the currency down in advance, making exports more competitive and imports more expensive in the short run. Such stabilizing speculation, it was held, would prevent current account deficits from getting too large in the first place. (The same mechanism, with appreciation replacing depreciation, would limit external surpluses.)

A corollary of this view is that floating exchange rates would not be too volatile, because stabilizing speculators would constantly drive them toward levels consistent with external balance.

How well did these predictions fare after 1973? We shall show that while some predictions were borne out, advocates of floating were on the whole too optimistic that a system of market-determined exchange rates would function free of exchange market turbulence or policy conflicts among countries.

CASE STUDY	The First Years of Floating Rates, 1973–1990

A review of the macroeconomic history of the world economy since 1973 offers key data for judging the successes and shortcomings of the modern international monetary system. We begin with a summary of the first turbulent years of floating exchange rates.

INFLATION AND DISINFLATION, 1973–1982

The opening act of the floating exchange rate era was a quadrupling in the world price of petroleum between late 1973 and early 1974, engineered by the newly

MyEconLab Real-time data

TABLE 2	Macroeconomic Data for Key Industrial Regions, 1963–2015					
Period	1963–1972	1973–1982	1983–1992	1993–2006	2007–2009	2010–2015
Inflation (percent per year)						
United States	3.3	8.7	4.0	2.7	2.1	1.7
Europe	4.4	10.7	5.1	2.4	2.3	1.5
Japan	5.6	8.6	1.8	0.2	0.0	0.5
Unemployment (percent of labor force)						
United States	4.7	7.0	6.8	5.3	6.6	7.6
Europe	1.9	5.5	9.4	9.4	7.8	10.1
Japan	1.2	1.9	2.5	4.0	4.3	4.2
Per Capita Real GDP Growth (percent per year)						
United States	2.8	0.9	2.4	2.1	−0.9	1.4
Europe	3.9	2.0	3.0	2.1	0.6	0.9
Japan	8.5	2.9	3.4	1.0	−3.8	1.4

Source: International Monetary Fund, Eurostat, and World Bank.

assertive Organization of Petroleum Exporting Countries (OPEC), an international cartel that includes most large oil producers. Consumption and investment slowed down everywhere, and the world economy was thrown into recession. The current account balances of oil-importing countries worsened.

The model predicts that inflation tends to rise in boom periods and fall in recessions. As the world went into deep recession in 1974, however, inflation accelerated in most countries. Table 2 shows how inflation in the main industrial regions spurted upward in the decade 1973–1982 even though unemployment was rising.

What happened? An important contributing factor was the oil shock itself: By directly raising the prices of petroleum products and the costs of energy-using industries, the increase in the oil price caused price levels to jump upward. Further, the worldwide inflationary pressures that had built up since the end of the 1960s had become entrenched in the wage-setting process and were continuing to contribute to inflation in spite of the deteriorating employment picture. The same inflationary expectations that were driving new wage contracts were also putting additional upward pressure on commodity prices as speculators built up stocks of commodities whose prices they expected to rise. Over the following years, central bankers proved unwilling to combat these inflationary pressures at the cost of yet-higher unemployment.

To describe the unusual macroeconomic conditions of 1974–1975, economists coined a new word that has since become commonplace: **stagflation,** a

combination of stagnating output and high inflation. Stagflation was the result of two factors:

1. Increases in commodity prices that directly raised inflation while at the same time depressing aggregate demand and supply
2. Expectations of future inflation that fed into wages and other prices in spite of recession and rising unemployment

Freed of the need to defend a fixed exchange rate, governments responded with expansionary policies that further fueled inflation. Many countries, moving to a different vertex of the trilemma, had even been able to relax the capital controls they had set up before 1974. This relaxation eased the adjustment problem of the developing countries, which were able to borrow more easily from developed-country financial markets to maintain their own spending and economic growth. In turn, the relative strength of the developing world's demand for industrial-country exports helped mitigate the severity of the 1974–1975 recession. But in the industrial countries, unemployment nonetheless jumped upward and remained stubbornly high, as shown in Table 2.
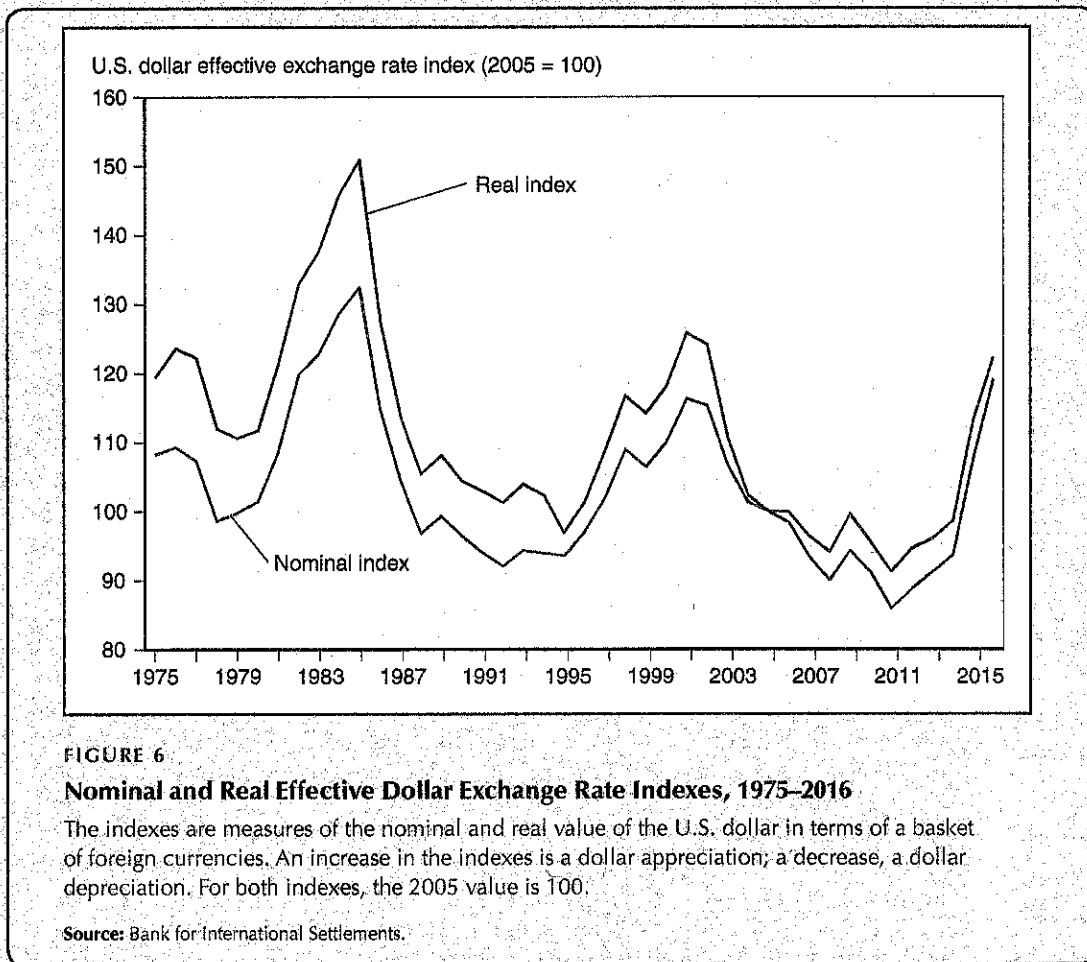
In the mid-1970s, the United States attempted to combat this unemployment through expansionary monetary policy, whereas other countries such as Germany and Japan were more worried about inflation. The result of this policy imbalance— vigorous expansion in the United States that was unmatched by expansion abroad—was a steep depreciation of the dollar after 1976. U.S. inflation reached double-digit levels (as did inflation in a number of other countries, including Canada, France, Italy, and the United Kingdom). The depreciation of the dollar in these years is evident in Figure 6, which shows both **nominal and real effective exchange rate indexes** of the dollar. These indexes measure, respectively, the price of a dollar in terms of a basket of foreign currencies and the price of U.S. output in terms of a basket of foreign outputs. Thus, a rise in either index is a (nominal or real) dollar appreciation, while a fall is a depreciation.

To restore faith in the dollar, President Jimmy Carter appointed a new Federal Reserve Board chairman with broad experience in international financial affairs, Paul A. Volcker. The dollar began to strengthen in October 1979 when Volcker announced a tightening of U.S. monetary policy and the adoption by the Fed of more stringent procedures for controlling money supply growth.

The fall of the shah of Iran in 1979 sparked a second round of oil price increases by disrupting oil exports from that country. In 1975 macroeconomic policy makers in the industrial countries had responded to the first oil shock with expansionary monetary and fiscal policies. They responded very differently to this second oil shock. Over 1979 and 1980, monetary growth was actually *restricted* in most major industrial countries in an attempt to offset the rise in inflation accompanying the oil price increase. This policy approach prevented an upsurge in inflation, but helped cause a worldwide recession.

November 1980 saw the election of President Ronald Reagan, who had campaigned on an anti-inflation platform. In light of the election result and Volcker's monetary slowdown, the dollar's value soared (see Figure 6). U.S. interest rates had also risen sharply late in 1979; by 1981, short-term interest rates in the United States were nearly double their 1978 levels.

By pushing up the U.S. interest rate and causing investors to expect a stronger dollar in the future, the U.S. action led to an immediate appreciation of the dollar.

U.S. dollar effective exchange rate index (2005 = 100)

FIGURE 6

Nominal and Real Effective Dollar Exchange Rate Indexes, 1975–2016

The indexes are measures of the nominal and real value of the U.S. dollar in terms of a basket of foreign currencies. An increase in the indexes is a dollar appreciation; a decrease, a dollar depreciation. For both indexes, the 2005 value is 100.

Source: Bank for International Settlements.

This appreciation made U.S. goods more expensive relative to foreign goods, thereby reducing U.S. output.

The dollar's appreciation was not welcomed abroad, however, even though it could, in theory, have lent foreign economies some positive stimulus in a period of slow growth. The reason was that a stronger dollar hindered foreign countries in their own fights against inflation, both by raising the import prices they faced and by encouraging higher wage demands from their workers. A stronger dollar had the opposite effect in the United States, hastening the decline of inflation there. The tight U.S. monetary policy therefore had a beggar-thy-neighbor effect abroad, in that it lowered American inflation in part by exporting inflation to foreign economies.

Foreign central banks responded by intervening in the currency markets to slow the dollar's rise. Through the process of selling dollar reserves and buying their own currencies, some central banks reduced their monetary growth rates for 1980 and 1981, driving interest rates upward. Synchronized monetary contraction in the United States and abroad, following fast on the heels of the second oil shock, threw the world economy into a deep recession, the most

severe between the Great Depression of the 1930s and the 2007–2009 crisis a generation later. In 1982 and 1983, unemployment throughout the world rose to levels unprecedented in the post–World War II period. While U.S. unemployment quickly returned to its pre-recession level, unemployment in Japan and especially in Europe remained permanently higher (see Table 2). Monetary contraction and the recession it brought quickly led, however, to a dramatic drop in the inflation rates of industrialized countries.

THE STRONG DOLLAR AND THE PLAZA ACCORD

During his election campaign, President Reagan had promised to lower taxes and balance the federal budget. He made good on the first of these promises in 1981. At the same time, the Reagan administration pushed for an acceleration of defense spending. The net result of these and subsequent congressional actions was a ballooning U.S. government budget deficit and a sharp fiscal stimulus to the economy. The U.S. fiscal stance encouraged continuing dollar appreciation (see Figure 6). By February 1985, the dollar's cumulative appreciation against the German currency since the end of 1979 was 47.9 percent. The recession reached its low point in the United States in December 1982, and output began to recover both there and abroad as the U.S. fiscal stimulus was transmitted to foreign countries through the dollar's steady appreciation.

While the U.S. fiscal expansion contributed to world recovery, growing federal budget deficits raised serious worries about the future stability of the world economy. Because increasing government deficits were not met with offsetting increases in private saving or decreases in investment, the American current account balance deteriorated sharply. By 1987, the United States had become a net debtor to foreign countries and its current account deficit was at the (then) postwar record level of 3.6 percent of GNP. Some analysts worried that foreign creditors would lose confidence in the future value of the dollar assets they were accumulating and sell them, causing a sudden, precipitous dollar depreciation.

Equally worrisome was the strong dollar's impact on the distribution of income within the United States. The dollar's appreciation had reduced U.S. inflation and allowed consumers to purchase imports more cheaply, but those hurt by the terms of trade change were better organized and more vocal than those who had benefited. Persistently poor economic performance in the 1980s had led to increased pressures on governments to protect industries in import-competing sectors. Protectionist pressures snowballed.

The Reagan administration had, from the start, adopted a policy of "benign neglect" toward the foreign exchange market, refusing to intervene except in unusual circumstances (for example, after a would-be assassin shot President Reagan). By 1985, however, the link between the strong dollar and the gathering protectionist storm became impossible to ignore.

Fearing a disaster for the international trading system, economic officials of the United States, Britain, France, Germany, and Japan announced at New York's Plaza Hotel on September 22, 1985, that they would jointly intervene in the foreign exchange market to bring about dollar depreciation. The dollar dropped sharply the next day and continued to decline through 1986 and early 1987 as the United States maintained a loose monetary policy and pushed dollar interest rates down relative to foreign currency interest rates. (See Figure 6.)

Macroeconomic Interdependence under a Floating Rate

Up until now, our modeling of the open economy has focused on the relatively simple case of a small country that cannot affect foreign output, price levels, or interest rates through its own monetary and fiscal policies. That description obviously does not fit the United States, however, with its national output level equal to about a fifth of the world's total product. To discuss macroeconomic interactions between the United States and the rest of the world, we therefore must think about the transmission of policies between countries linked by a floating exchange rate. We will offer a brief and intuitive discussion rather than a formal model, and restrict ourselves to the short run, in which we can assume that nominal output prices are fixed.

Imagine a world economy made up of two large countries, Home and Foreign. Our goal is to evaluate how Home's macroeconomic policies affect Foreign. The main complication is that neither country can be thought of any longer as facing a fixed external interest rate or a fixed level of foreign export demand. To simplify, we consider only the case of *permanent* shifts in monetary and fiscal policy.

Let's look first at a permanent monetary expansion by Home. We know that in the small-country case, Home's currency would depreciate and its output would rise. The same happens when Home's economy is large, but now, the rest of the world is affected too. Because Home is experiencing real currency depreciation, Foreign must be experiencing real currency *appreciation*, which makes Foreign goods relatively expensive and thus has a depressing effect on Foreign output. The increase in Home output, however, works in the opposite direction, since Home spends some of its extra income on Foreign goods and, on that account, aggregate demand for Foreign output rises. Home's monetary expansion therefore has two opposing effects on Foreign output, with the net result depending on which effect is the stronger. Foreign output may rise or fall.[26]

Next let's think about a permanent expansionary fiscal policy in Home. In the small-country case, a permanent fiscal expansion caused a real currency appreciation and a current account deterioration that fully nullified any positive effect on aggregate demand. In effect, the expansionary impact of Home's fiscal ease leaked entirely abroad (because the counterpart of Home's lower current account balance must be a higher current account balance abroad). In the large-country case, Foreign output still rises, since Foreign's exports become relatively cheaper when Home's currency appreciates. In addition, now some of Foreign's increased spending increases Home exports, so Home's output actually does increase along with Foreign's.[27]

We summarize our discussion of macroeconomic interdependence between large countries as follows:

1. *Effect of a permanent monetary expansion by Home.* Home output rises, Home's currency depreciates, and Foreign output may rise or fall.
2. *Effect of a permanent fiscal expansion by Home.* Home output rises, Home's currency appreciates, and Foreign output rises.

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[26]The Foreign money market equilibrium condition is $M^*/P^* = L(R^*, Y^*)$. Because M^* is not changing and P^* is sticky and therefore fixed in the short run, Foreign output can rise only if the Foreign nominal interest rate rises too and can fall only if the Foreign nominal interest rate falls.

[27]By considering the Home money market equilibrium condition (in analogy to footnote 27), you will see that Home's nominal interest rate must rise. A parallel argument shows that Foreign's interest rate rises at the same time.
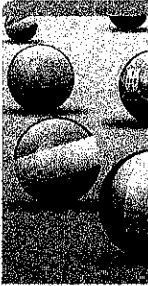
| CASE STUDY | Transformation and Crisis in the World Economy |

The fall of the Berlin Wall in 1989 marked the beginning of the end of the Soviet empire. Ultimately, the former Soviet bloc countries would embrace market structures and enter the world economy. At the same time, China was continuing a gradual process of market-oriented reforms begun in 1978, reforms that were starting to lead to rapid economic growth and modernization. These simultaneous changes would greatly increase the size of the global economy and labor force by the turn of the century.

CRISES IN EUROPE AND ASIA, 1990–1999

The reunification of West and East Germany on July 1, 1990, set off inflationary pressures in Germany. At the same time, other European countries were pegging their exchange rates to Germany's former currency, the deutsche mark (DM), within the European Union's fixed exchange rate mechanism, the European Monetary System (EMS). Germany's contractionary monetary response to its internal inflation pressures led to slower growth in its EMS partners, many of whom were not afflicted by rising inflation as Germany was. The resulting asymmetric pressures within the EMS led to a massive speculative attack on the EMS fixed parities in 1992.

Japanese inflation rose in 1989, in part the result of a relatively loose monetary policy from 1986 to 1988 designed to avoid further yen appreciation after the sharp post–Plaza Accord rise. Two very visible symptoms of these pressures were skyrocketing prices for Japanese real estate and stocks. The Bank of Japan's strategy of puncturing these asset price bubbles through restrictive monetary policy and high interest rates succeeded well, and Tokyo's Nikkei stock price index lost more than half its value between 1990 and 1992. Unfortunately, the sharp fall in asset prices threw Japan's banking system into crisis and the economy into recession by early 1992.

Recovery never really took hold. By 1998, the Japanese economy seemed to be in free fall, with shrinking GDP, declining prices, and its highest unemployment level in more than four decades. Japan's deflation and stagnation would prove protracted indeed, lasting with little interruption through the following decade and a half.

In 1997–1998, however, the problems of the Japanese economy spilled over to the developing countries in East Asia, with which it trades heavily. Many of these economies had experienced spectacularly rapid rates of GDP growth for many years through 1997. Many of them also held their exchange rates fixed, or in target ranges, against the U.S. dollar. Japan's slowdown in 1997 therefore weakened the East Asian economies.

The eventual result was a cascading series of speculative attacks on East Asian currencies, beginning with Thailand's baht in the spring of 1997 and moving on to Malaysia, Indonesia, and Korea. These economies fell into deep recessions, pulled down by Japan but also pulling Japan down in a vicious circle. Russia defaulted on its internal and external debts in 1998, setting off global investor jitters and

domestic financial chaos. The fear of a worldwide depression prompted a series of interest rate cuts by the Federal Reserve, as well as an unprecedented coordinated interest rate cut by the 11 European countries preparing to give up their national currencies in 1999 in favor of the euro. These measures helped to avert a global economic meltdown.

THE DOT-COM CRASH AND THE EMERGENCE OF GLOBAL IMBALANCES

The U.S. stock market soared in the late 1990s as money flooded into high-tech, "dot-com" stocks related to new, Internet-based technologies. Investment rose and the U.S. current account deficit swelled. When stock prices began to collapse in 2000, helping to create a recession, the Federal Reserve cut interest rates aggressively. Despite a fall in investment, the U.S. current account deficit was soon on the rise again because of falling saving. One factor reducing U.S. saving was a rapid increase in real estate prices, illustrated in Figure 7. Interest rates were low, and as Americans borrowed against their rising home equity values, the net U.S. household saving rate turned negative. As a result, the U.S. current account
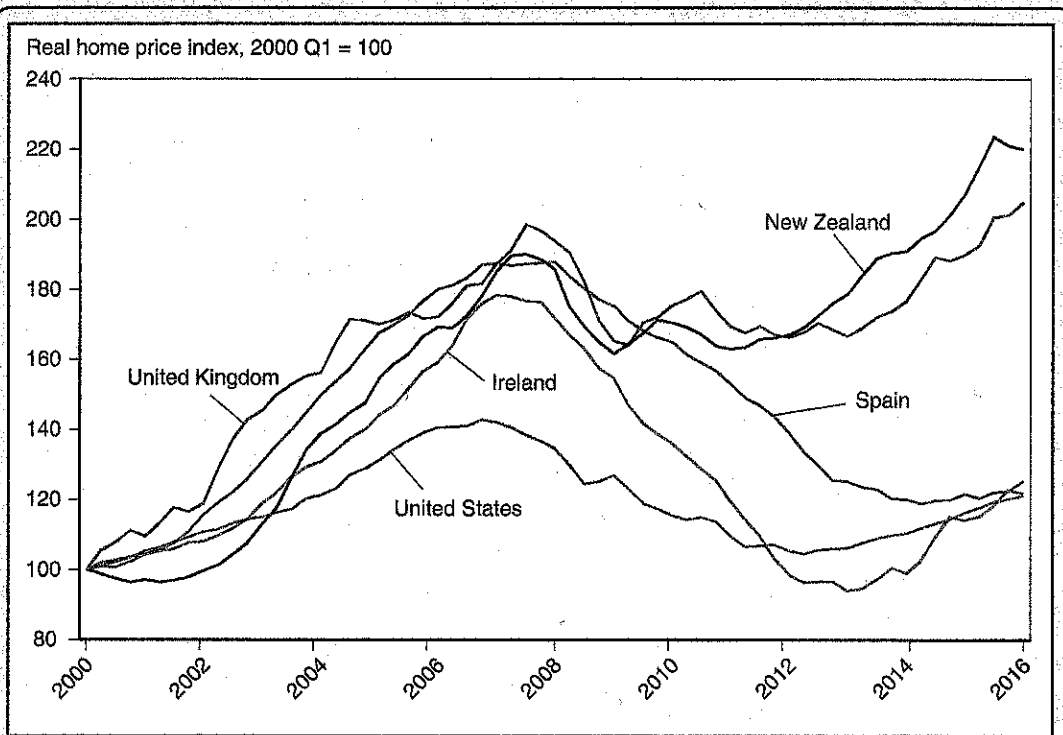

Real home price index, 2000 Q1 = 100

MyEconLab Real-time data

FIGURE 7

Real Home Prices in Selected Countries, 2000–2016

Home prices in the United States rose at an accelerating pace through 2006 before collapsing. However, the pace of price increase was even greater in a number of other countries.

Source: Federal Reserve Bank of Dallas, from http://www.dallasfed.org/institute/houseprice/index.cfm. Nominal home price index is divided by a personal consumption price deflator to obtain the real index.

deficit reached an unprecedented 6 percent of GDP by the middle of the decade (see Figure 2), and the dollar began to depreciate (see Figure 6). Real estate prices escalated as well in many countries outside the United States, ranging from the United Kingdom to Spain to Estonia, and these countries, like the United States, also tended to run bigger trade deficits.

Indeed, during the years after 1999, the pattern of global external imbalances widened sharply. Figure 8 gives a picture of this process. It is useful to think of the negative entries in the figure (the deficit entries) as showing net demands for global savings, while the positive entries (the surplus entries) show net supplies of savings (saving in excess of domestic investment needs). In an equilibrium for the global financial markets, the worldwide demand for savings equals the worldwide supply, which is another way of saying that the current account balances of all countries must add up to zero.

On the demand side, the dramatic explosion of the U.S. current account deficit was the dominant development. Because the current account equals saving minus investment, a large U.S. deficit meant that American investment (in effect, a demand for savings) far exceeded the supply of savings generated by American households, firms, and governmental units. Also contributing to the global demand for savings, though on a much smaller scale, was the investment-driven demand coming from the rapidly developing countries of Central and Eastern Europe (see Figure 8).

The puzzling feature of the data is that, as the U.S. deficit widened—reflecting an *increase* in American demand for the world's savings—the U.S. real long-term interest rate *fell*, continuing a process that had begun around 2000 when the dot-com crash reduced investment demand and market expectations of future economic growth (see Figure 9). Lower real interest rates helped drive American home prices higher, encouraging people to borrow against home equity and spend more out of national income, as noted above. It would seem more natural, instead, for real interest rates to have *risen*, encouraging U.S. saving and discouraging U.S. investment. How could the opposite, a fall in real interest rates, have happened? Why, moreover, was this phenomenon also seen in other countries, as shown in Figure 9? The answer must lie in a change in saving and investment behavior outside of the United States.

Figure 8 shows that over the 2000s, current account surpluses rose in Russia, the Middle East, Asia (notably China, but also Japan and newly industrialized countries such as Singapore and Taiwan), and Latin America. The surplus of Africa (not shown in the figure) also increased. Economists still debate the causes of these surpluses, but a number of likely factors stand out. One of these was the emergence of China as a major player in the world economy, especially after it joined the World Trade Organization in December 2001. Growth in the private Chinese economy starting in the late 1970s led to very rapid economic expansion, but also to economic disruption for much of the country's huge population—for example, a reduction in social benefits such as health care, which state-owned firms had earlier supplied. As a precautionary measure, the Chinese saved more than they had in the past. At the same time, China's torrid economic growth (coupled with rather strong growth in the United States) increased the prices of a range of primary commodities, notably petroleum. The revenues from exporting Brazilian soybeans and iron, Malaysian palm oil, and Russian, Venezuelan, Congolese, and Saudi
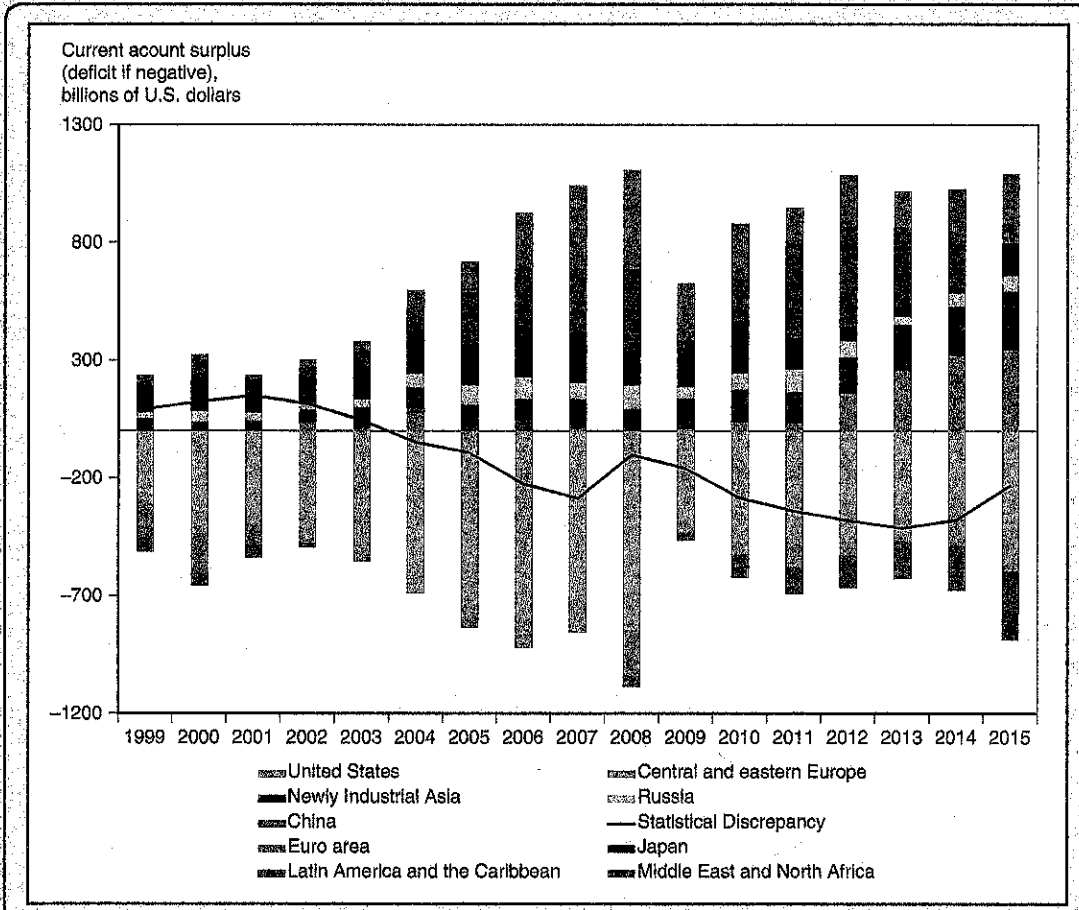
Current account surplus
(deficit if negative),
billions of U.S. dollars

United States
Newly Industrial Asia
China
Euro area
Latin America and the Caribbean

Central and eastern Europe
Russia
Statistical Discrepancy
Japan
Middle East and North Africa

FIGURE 8

Global External Imbalances, 1999–2015

During the first half of the 2000s, the large increase in the U.S. current account deficit was matched by increases in the surpluses of Asian countries (notably China), Latin America, and oil exporters. After 2008 the imbalances shrank temporarily, but have since increased again.

Source: International Monetary Fund, *World Economic Outlook* database.

petroleum all soared. These economic windfalls, running ahead of the recipients' abilities to spend or invest them, also helped to raise worldwide saving.

A second factor was at work in raising current account surpluses outside the United States. The economic and financial crises of the late 1990s had made poorer countries more cautious in their fiscal policies, and also reduced their willingness to invest. Similarly, economic uncertainty in Japan depressed investment demand there. One result of more conservative economic policies in the developing world was the rapid accumulation of U.S. dollar reserves as mentioned previously, an outcome that provided these poorer countries with a welcome cushion against possible future economic misfortunes.
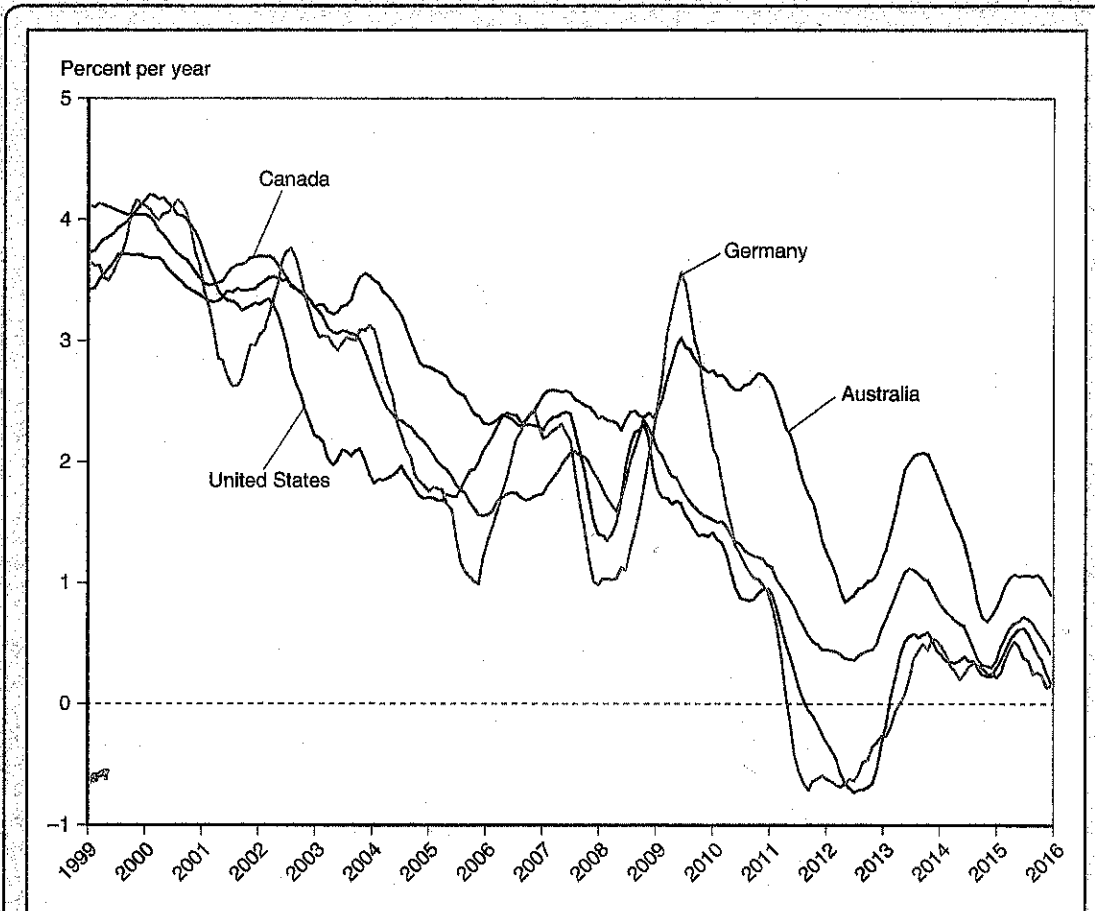
FIGURE 9

Long-Term Real Interest Rates for the United States, Australia, Germany, and Canada, 1999–2016

Real interest rates fell to low levels in the 2000s. Many countries followed the same trend.

Source: Global Financial Data and Eurostat. Real interest rates are six-month moving averages of monthly interest rate observations on ten-year inflation-indexed government bonds.

To summarize, the higher supply of savings from countries outside of the United States, coupled with generally lower investment demand, more than offset the effects on the global financial markets of the higher American current account deficit. The result was a fall in global interest rates, which contributed to global house-price appreciation.[28]

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[28]Problem 13 at the end of this chapter suggests a simple economic framework that will help you think through the effects of shifts in the world's demand and supply curves for savings. The article by Ben Bernanke in Further Readings offers a detailed analysis of the low real interest rates of the mid-2000s.

THE GLOBAL FINANCIAL CRISIS

In August 2007, a serious financial crisis erupted, this time not in the developing world but in the credit markets of the United States and Europe. The crisis spread worldwide, snowballing into a worldwide financial panic and recession in 2008–2009. The roots of the crisis lay in the U.S. home mortgage market.

One key element leading to the crisis was the period of lower long-term real interest rates, shown in Figure 9. Low interest rates contributed to the run-up in home prices in the United States and in many other countries, and in the United States led to much riskier practices among mortgage lenders (for example, lending with minimal or zero down payments, or with temporarily low "teaser" interest rates). To make matters worse, these "subprime" or "nonprime" mortgages were repackaged and sold to other investors worldwide, investors who had little idea in many cases of the risks they were taking on.

These low real interest rates stimulated global demand. Eventually, commodity exporters' consumption began to catch up to their income, and world investment demand rose. As you can see in Figure 9, real interest rates were low from 2003 to the end of 2005, and then rose sharply in the United States. This abrupt rise in interest rates left many who had borrowed to buy homes unable to meet their monthly mortgage payments. In turn, the homeowners' creditors ran into trouble, and the credit crisis of 2007 erupted. At higher interest rate levels, many of the subprime home loans made earlier in the 2000s by aggressive mortgage lenders started to look as if they would never be repaid. The lenders (including banks around the world) then encountered serious difficulties in borrowing themselves.

Despite interest rate cuts by many central banks and other financial interventions aimed at aiding their economies, the world slipped into recession. The recession deepened dramatically as the financial crisis itself intensified in the autumn of 2008. Global trade contracted at a rate initially more rapid than during the first stage of the Great Depression.[29] Major countries, including the United States and China, rolled out large fiscal stimulus programs, while central banks, in many cases, pushed their target nominal interest rates close to zero. While these policies prevented the world economy from going into free fall, unemployment rose sharply the world over (see Table 2), and output generally contracted in 2009. By 2010, the world economy had stabilized, but growth remained tepid in the industrial world, unemployment was slow to decline, and the recession left many governments with sharply higher fiscal deficits that could not be sustained indefinitely. In the years following 2009, much of the developing world initially recovered more robustly from the crisis than did the industrial world, but in much of Europe and Japan, recovery from the worst global crisis since the Great Depression remained halting and fragile. The United States and the United Kingdom returned

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[29]For a fascinating comparison of 2008 and its aftermath with the Great Depression of the interwar period, see Barry Eichengreen and Kevin Hjortshøj O'Rourke, "What Do the New Data Tell Us?" *Vox: Research-Based Policy Analysis and Commentary from Leading Economists,* March 8, 2010 (at http://www.voxeu.org/article/tale-two-depressions-what-do-new-data-tell-us-february-2010-update#apr609).

to more robust growth by the mid-2010s, but in the latter, recovery was cut short by its unexpected June 2016 vote to withdraw from the European Union. China slowed in the 2010s as it reoriented its economy away from high investment and toward consumption, but together with slower growth elsewhere, China's transition depressed the global demand for commodities, hurting the economies of commodity exporters, especially in the developing world.

In Japan, continuing deflation finally led in 2013, after more than two decades of lethargic economic growth and very low inflation, to an ambitious plan both to revitalize the economy and control a gross government debt that had grown to more than twice the size of GDP. One component of the plan was a Bank of Japan pledge to increase the money supply quickly and thereby raise the rate of inflation. The success of this bold initiative has been mixed, and inflation has consistently fallen short of the 2 percent per year target that the Japanese government has desired to achieve. The euro area's recovery stalled and reversed as an existential crisis erupted late in 2009. The euro crisis was driven by the slow growth, unemployment, banking problems, and high public debts bequeathed by the 2007–2009 global crisis. While the worst of the euro crisis was past by late 2012, the euro area has still not fully overcome its crisis legacies, and both the European Central Bank and the Bank of Japan are, as of this writing, struggling to stave off deflation.

CASE STUDY | The Dangers of Deflation

For the first decades after the demise of the Bretton Woods system in 1973, central banks across the world spent most of their time worrying about high inflation and its disruptive effects on the economy. It was to control high inflation that many central banks adopted regimes of inflation targeting, in which departures of actual or forecast inflation from an announced target—usually around 2 percent per year in industrial economies—triggers tighter or looser monetary policy.

While the case that high inflation is bad is easy to make, it may be less obvious why its opposite—below-target inflation or deflation—is also problematic. Of course, deflation may be a symptom of high unemployment, an extreme case being the Great Depression; but can deflation occur even when unemployment is not too different from historical averages, and in that case, should central bankers worry about it? Recent data (see the accompanying figure) show that inflation rates have persistently been below 2 percent in a number of industrial countries, in some cases bordering on deflation. Central banks have been vocally concerned and in most cases have responded aggressively.

Why have they done so? Here are a few of the dangers of deflation, dangers that also can apply (albeit to a lesser degree) to inflation rates that are below target and close to zero (sometimes referred to as "lowflation"):
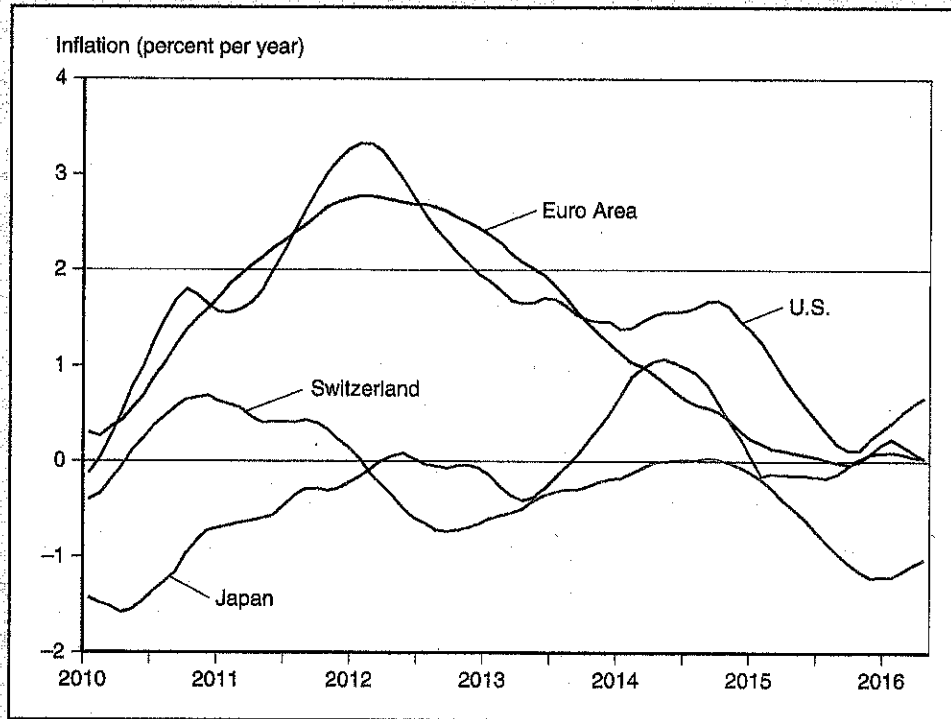
Recent Inflation Rates in Some Advanced Economies

The numbers shown are 12-month moving averages of monthly year-over-year inflation rates. Japan's CPI has been adjusted for the April 2014 increase in its value-added tax rate.

Source: OECD.

1. *Debt deflation.* The economist Irving Fisher of Yale University wrote about this problem during the Great Depression, but it remains quite relevant today because many households, businesses, and governments remain highly indebted after the series of financial crises that started in 2007. When prices fall, the real values of debts rise, making it harder for debtors to repay them. This change redistributes wealth from high-spending debtors to high-saving creditors, reducing overall aggregate demand, but it also raises the chances that debtors will default on their earlier borrowing. As a result, it becomes harder to escape the tepid economic growth that is likely the initial cause of the deflation, and deflationary forces may be reinforced, causing a downward spiral.
2. *Decreased economic resilience.* As we have seen, workers and firms may be reluctant to cut wages and prices in the face of economic changes, leading to unemployment. When there is some moderate inflation, however, necessary price changes can be accommodated more easily. For example, when energy prices rise sharply, businesses might need to cut labor costs in order to stay in business. If prices are rising at 2 percent and wages rise only 1 percent, then

real labor costs will fall; but if prices are not rising at all, workers would have to accept a 1 percent wage cut. In the latter case, resistance to nominal wage cuts would likely result in unemployment.

3. *More frequent liquidity traps.* Low inflation and deflation mean that, other things equal, nominal interest rates will tend to be lower—the Fisher effect. But if nominal interest rates are lower, it becomes more likely that the central bank will find itself in a liquidity trap and unable to respond to negative economic developments that could worsen unemployment. Central banks may move to unconventional monetary policies, but these may be less effective and come with undesirable side effects.

4. *Loss of inflation-target credibility.* Because the liquidity trap robs central banks of their prime tool for managing the inflation rate, central bank inflation targets can become less credible, allowing deflation or lowflation expectations to feed on themselves and reinforce the downward price pressures. Of course, such pressures are reinforced by debt deflation and the economy's reduced resilience. These forces may make the trap of zero interest rates and low inflation extremely hard to escape.

The fear of deflation is an important reason why central banks adopt inflation targets with positive, rather than zero, inflation. Some economists think that even a 2 percent inflation target provides insufficient insurance against the perils of deflation. One proposal is for industrial-country central banks to raise their targets—say, to the 4 to 6 percent levels that tend to prevail in countries such as India or Brazil. Another idea is for central banks to target a fixed price-level path that has an upward slope of 2 percent per year, rather than targeting the inflation rate itself. Under that proposal, if inflation ever falls below 2 percent, it must accelerate above that level later in order to regain the targeted CPI path; and thus, any fall in inflation below target automatically creates expectations of temporary future above-target inflation. Implementing either of these ideas is difficult, however, once the liquidity trap has been reached and inflation targets begin to lose their credibility. What can be done in that case? Some economists suggest that central banks simply print money and send it to consumers, who would then increase their spending and drive prices up. That approach, however, would blur the lines between monetary and fiscal policy in a way that many policy makers believe would raise the risk of future excessive inflation. Time will tell if the current deflationary pressures become so intractable that governments are driven to such extreme countermeasures.

What Has Been Learned Since 1973?

Earlier in this chapter, we outlined the main elements of the case for floating exchange rates. Having examined the events of the recent floating-rate period, we now briefly compare experience with the predictions made before 1973 by the proponents of floating.

Monetary Policy Autonomy

There is no question that floating gave central banks the ability to control their money supplies and to choose their preferred rates of trend inflation. As a result, floating exchange rates allowed a much larger international divergence in inflation. Did exchange

depreciation offset inflation differentials between countries over the floating-rate period? Figure 10 compares domestic currency depreciation against the dollar with the difference between domestic and U.S. inflation for the six largest industrial market economies outside the United States. The PPP theory predicts that the points in the figure should lie along the 45-degree line, indicating proportional exchange rate and relative price level changes, but this is not exactly the case. While Figure 10 therefore confirms that PPP has not always held closely, even over long periods of time, it does show that on balance, high-inflation countries have tended to have weaker currencies than their low-inflation neighbors. Furthermore, most of the difference in depreciation rates is due to inflation differences, making PPP a major factor behind long-run nominal exchange rate variability.

While the inflation insulation part of the policy autonomy argument is broadly supported as a *long-run* proposition, economic analysis and experience both show that in the short run, the effects of monetary as well as fiscal changes are transmitted across national borders under floating rates. The two-country macroeconomic model
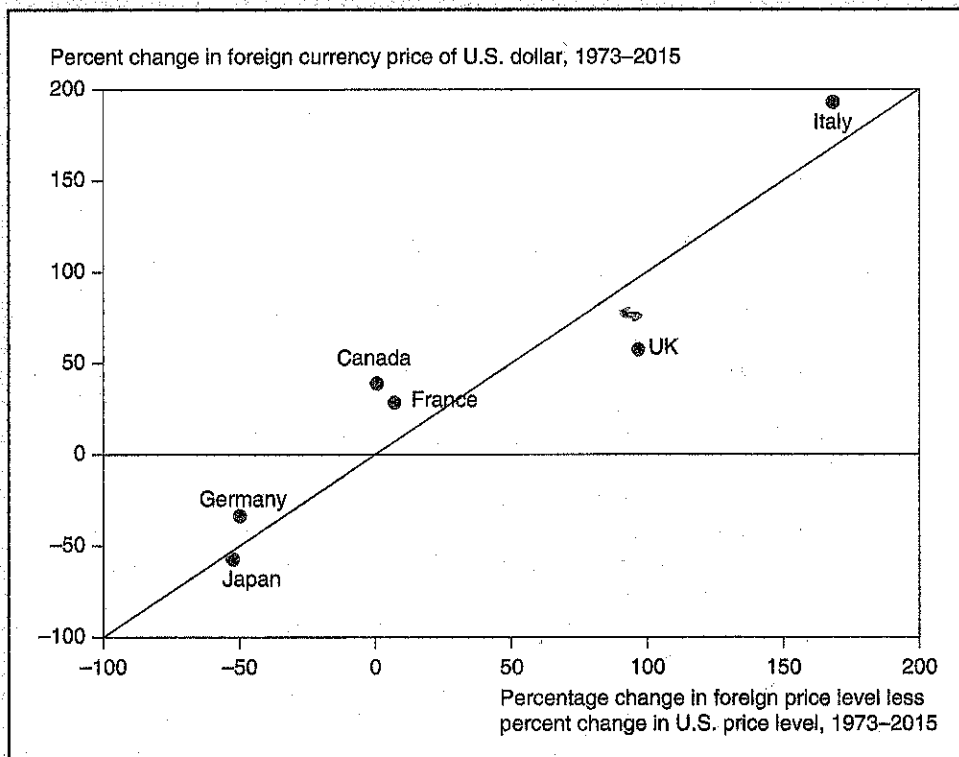

Percent change in foreign currency price of U.S. dollar, 1973–2015

Percentage change in foreign price level less percent change in U.S. price level, 1973–2015

FIGURE 10

Exchange Rate Trends and Inflation Differentials, 1973–2015

Over the floating-rate period as a whole, higher inflation has been associated with greater currency depreciation. The exact relationship predicted by relative PPP, however, has not held for most countries. The inflation difference on the horizontal axis is calculated as $(\pi - \pi_{US}) \div (1 + \pi_{US}/100)$ using the exact relative PPP relation.

Source: International Monetary Fund and Global Financial Data.

developed earlier, for example, shows that monetary policy affects output in the short run both at home and abroad as long as it alters the real exchange rate. Skeptics of floating were therefore right in claiming that floating rates would not insulate countries completely from foreign policy shocks.

Symmetry

Because central banks continued to hold dollar reserves and intervene, the international monetary system did not become symmetric after 1973. The euro gained importance as an international reserve currency (and the British pound declined), but the dollar remained the primary component of most central banks' official reserves.

Economist Ronald McKinnon of Stanford University has argued that the current floating-rate system is similar in some ways to the asymmetric reserve currency system underlying the Bretton Woods arrangements.[30] He suggests that changes in the world money supply would have been dampened under a more symmetric monetary adjustment mechanism. In the 2000s, China's policy of limiting its currency's appreciation against the dollar led it to accumulate vast dollar reserves, possibly reinforcing the worldwide economic boom that preceded the 2007–2009 financial crisis. As a result, some economists have characterized the period of the early and mid-2000s as a "revived Bretton Woods system."[31]

The Exchange Rate as an Automatic Stabilizer

The world economy has undergone major structural changes since 1973. Because these shifts changed relative national output prices (Figure 6), it is doubtful that any pattern of fixed exchange rates would have been viable without some significant parity changes. The industrial economies certainly wouldn't have weathered the two oil shocks as well as they did while defending fixed exchange rates. In the absence of capital controls, speculative attacks similar to those that brought down the Bretton Woods system would have occurred periodically, as recent experience has shown. Under floating, however, many countries were able to relax the capital controls put in place earlier. The progressive loosening of controls spurred the rapid growth of a global financial industry and allowed countries to realize greater gains from intertemporal trade and from trade in assets.

The effects of the U.S. fiscal expansion after 1981 illustrate the stabilizing properties of a floating exchange rate. As the dollar appreciated, U.S. inflation was slowed, American consumers enjoyed an improvement in their terms of trade, and economic recovery was spread abroad.

The dollar's appreciation after 1981 also illustrates a problem with the view that floating rates can cushion the economy from real disturbances such as shifts in aggregate demand. Even though *overall* output and the price level may be cushioned, some sectors of the economy may be hurt. For example, while the dollar's appreciation helped transmit U.S. fiscal expansion abroad in the 1980s, it worsened the plight of American agriculture, which did not benefit directly from the higher government demand. Real exchange rate changes can do damage by causing excessive adjustment problems in some sectors and by generating calls for increased protection.

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[30]Ronald I. McKinnon, *An International Standard for Monetary Stabilization*, Policy Analyses in International Economics 8 (Washington, D.C.: Institute for International Economics, 1984).

[31]See Michael Dooley, David Folkerts-Landau, and Peter Garber, *International Financial Stability: Asia, Interest Rates, and the Dollar*, 2nd edition (New York: Deutsche Bank Securities Inc., 2008).

Permanent changes in goods market conditions require eventual adjustment in real exchange rates that can be speeded by a floating-rate system. Foreign exchange intervention to peg nominal exchange rates cannot prevent this eventual adjustment because money is neutral in the long run and thus is powerless to alter relative prices permanently. The events of the 1980s show, however, that if it is costly for factors of production to move between sectors of the economy, there is a case for pegging rates in the face of temporary output market shocks. Unfortunately, this lesson leaves policy makers with the difficult task of determining which disturbances are temporary and which are permanent.

External Balance

As Figure 8 makes clear, the floating exchange rate system did not prevent large and persistent departures from external balance. True, China's refusal to allow a free float of its own currency is part of the story of the large global imbalances of the 2000s. If the Chinese yuan had been free to appreciate in the foreign exchange market, China's surpluses and the corresponding deficits elsewhere in the world might have been smaller.

But even before China's emergence as a world economic power and before the creation of the euro, large current account deficits and surpluses, such as the U.S. deficit of the 1980s and Japan's persistent surpluses, certainly occurred. Financial markets were evidently capable of driving exchange rates far from values consistent with external balance, as suggested by Figure 6 for the case of the dollar. Under floating, external imbalances have persisted for years before exchange rates have adjusted. Long swings in real exchange rates that leave countries far from external balance are called *misalignments*, and they frequently inspire political pressures for protection from imports.

The Problem of Policy Coordination

Problems of international policy coordination clearly have not disappeared under floating exchange rates. The problem of resolving global imbalances provides a good example, in the sense that unilateral action by deficit countries to reduce their imbalances would lead to global deflation, while surplus countries have little incentive to avoid that outcome by pumping up their internal demand and appreciating their currencies.

There are other examples that are perhaps even more striking, in the sense that all countries would clearly benefit if they could commit to coordinating their policies rather than going it alone in beggar-thy-neighbor fashion. For example, during the disinflation of the early 1980s, industrial countries as a group could have attained their macroeconomic goals more effectively by negotiating a joint approach to common objectives. The appendix to this chapter presents a formal model, based on that example, to illustrate how all countries can gain through international policy coordination.

Another instance comes from the global fiscal response to the recession that the 2007–2009 crisis caused. We saw earlier in this chapter that when a country raises government spending, part of the expansionary impact leaks abroad. The country will pay the cost of the policy, however, in the form of a higher government deficit. Since countries do not internalize all the benefits of their own fiscal expansions but pay the cost in full, they will adopt too little of it in a global recession.

If countries could negotiate an agreement *jointly* to expand, however, they might be more effective in fighting the recession (and they might even experience lower fiscal costs). The response to the 2007–2009 crisis was discussed periodically by the Group

of Twenty (G20) nations, an informal grouping of leading industrial and developing countries including Argentina, Brazil, China, India, and Russia. In the early stages of the crisis, there was widespread agreement on the fiscal response within the G20. Later on, as countries experienced more divergent rates of recovery, policy coordination became more difficult and G20 meetings yielded fewer concrete results.

Are Fixed Exchange Rates Even an Option for Most Countries?

Is there any practical alternative to floating exchange rates when financial markets are open to international trade? The post–Bretton Woods experience suggests a stark hypothesis: Durable fixed exchange rate arrangements may not even be *possible*. In a `financially integrated world in which funds can move instantly between national financial markets, fixed exchange rates cannot be credibly maintained over the long run unless countries are willing to maintain controls over capital movements (as China does), or, at the other extreme, move to a shared single currency with their monetary partners (as in Europe). Short of these measures, the argument goes, attempts to fix exchange rates will necessarily lack credibility and be relatively short-lived. You will recognize that these predictions follow from the trilemma.[32]

This pessimistic view of fixed exchange rates is based on the theory that speculative currency crises can, at least in part, be self-fulfilling events. According to that view, even a country following prudent monetary and fiscal policies is not safe from speculative attacks on its fixed exchange rate. Once the country encounters an economic reversal, as it eventually must, currency speculators will pounce, forcing domestic interest rates sky-high and inflicting enough economic pain that the government will choose to abandon its exchange rate target.

At the turn of the 21st century, speculative attacks on fixed exchange rate arrangements —in Europe, East Asia, and elsewhere—were occurring with seemingly increasing frequency. The number and circumstances of those crises lent increasing plausibility to the argument that it is impossible to peg currency values for long while maintaining open capital markets and national policy sovereignty. Moreover, many countries outside the industrial world have allowed much greater exchange rate flexibility in recent years, and apparently benefited from it. Some countries appear to be moving toward either greater control over cross-border financial flows or more drastic sacrifices of monetary autonomy (for example, adopting the euro). It seems likely that policy coordination issues will be confronted in the future within a system in which different countries choose different policy regimes, subject to the constraints of the monetary trilemma.

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[32]For an early statement of the hypothesis that fixed exchange rates combined with mobile capital can be unstable, see Maurice Obstfeld, "Floating Exchange Rates: Experience and Prospects," *Brookings Papers on Economic Activity* 2 (1985), pp. 369–450. For more recent discussions see Barry Eichengreen, *International Monetary Arrangements for the 21st Century* (Washington, D.C.: Brookings Institution, 1994); Lars E. O. Svensson, "Fixed Exchange Rates as a Means to Price Stability: What Have We Learned?" *European Economic Review* 38 (May 1994), pp. 447–468; Maurice Obstfeld and Kenneth Rogoff, "The Mirage of Fixed Exchange Rates," *Journal of Economic Perspectives* 9 (Fall 1995), pp. 73–96; and the book by Klein and Shambaugh in Further Readings.

SUMMARY

1. In an open economy, policy makers try to maintain *internal balance* (full employment and a stable price level) and *external balance* (a current account level that is neither so negative that the country may be unable to repay its foreign debts nor so positive that foreigners are put in that position). The definition of external balance depends on a number of factors, including the exchange rate regime and world economic conditions. Because each country's macroeconomic policies have repercussions abroad, a country's ability to reach internal and external balance depends on the policies other countries choose to adopt. A country running large, persistent deficits might appear to be violating its *intertemporal budget constraint*, putting it in danger of facing a *sudden stop* in foreign lending.

2. The limitations of alternative exchange rate regimes can be understood in terms of the open-economy *monetary trilemma*, which states that countries must choose two of the following three features of a monetary policy system: exchange rate stability, freedom of cross-border financial flows, and monetary policy autonomy.

3. The gold standard system contained a powerful automatic mechanism for ensuring external balance, the *price-specie-flow mechanism*. The flows of gold accompanying deficits and surpluses caused price changes that reduced current account imbalances and therefore tended to return all countries to external balance. The system's performance in maintaining internal balance was mixed, however. With the eruption of World War I in 1914, the gold standard was suspended.

4. Attempts to return to the prewar gold standard after 1918 were unsuccessful. As the world economy moved into general depression after 1929, the restored gold standard fell apart, and international economic integration weakened. In the turbulent economic conditions of the period, governments made internal balance their main concern and tried to avoid the external balance problem by partially shutting their economies off from the rest of the world. The result was a world economy in which all countries' situations could have been bettered through international cooperation.

5. The architects of the *International Monetary Fund (IMF)* hoped to design a fixed exchange rate system that would encourage growth in international trade while making the demands of external balance sufficiently flexible that they could be met without sacrificing internal balance. To this end, the IMF charter provided financing facilities for deficit countries and allowed exchange rate adjustments under conditions of "fundamental disequilibrium." All countries pegged their currencies to the dollar. The United States pegged to gold and agreed to exchange gold for dollars with foreign central banks at a price of $35 an ounce.

6. After *currency convertibility* was restored in Europe in 1958, countries' financial markets became more closely integrated, monetary policy became less effective (except for the United States), and movements in international reserves became more volatile. These changes revealed a key weakness in the system. To reach internal and external balance at the same time, *expenditure-switching* as well as *expenditure-changing* policies were needed. But the possibility of expenditure-switching policies (exchange rate changes) could give rise to speculative financial flows that would undermine fixed exchange rates. As the main reserve currency country, the United States faced a unique external balance problem: the *confidence problem*, which would arise as foreign official dollar holdings inevitably grew to exceed U.S. gold holdings. A series of international crises led in stages to the

abandonment by March 1973 of both the dollar's link to gold and fixed dollar exchange rates for the industrialized countries.

7. Before 1973, the weaknesses of the Bretton Woods system led many economists to advocate floating exchange rates. They made four main arguments in favor of floating. First, they argued that floating rates would give national macroeconomic policy makers greater autonomy in managing their economies. Second, they predicted that floating rates would remove the asymmetries of the Bretton Woods arrangements. Third, they pointed out that floating exchange rates would quickly eliminate the "fundamental disequilibriums" that had led to parity changes and speculative attacks under fixed rates. Fourth, they claimed that these same exchange rate movements would prevent large, persistent departures from external balance.

8. In the early years of floating, floating rates seemed, on the whole, to function well. In particular, it is unlikely that the industrial countries could have maintained fixed exchange rates in the face of the *stagflation* caused by two oil shocks. The dollar suffered a sharp depreciation after 1976, however, as the United States adopted macroeconomic policies more expansionary than those of other industrial countries.

9. A sharp turn toward slower monetary growth in the United States, coupled with a rising U.S. government budget deficit, contributed to massive dollar appreciation between 1980 and early 1985. Other industrial economies pursued disinflation along with the United States, and the resulting worldwide monetary slowdown, coming soon after the second oil shock, led to a deep global recession. As the recovery from the recession slowed in late 1984 and the U.S. current account began to register record deficits, political pressure for wide-ranging trade restrictions gathered momentum in Washington. At the Plaza Hotel in New York in September 1985, the United States and four other major industrial countries agreed to take concerted action to bring down the dollar.

10. Exchange rate stability was downplayed as a prime policy goal in the 1990s and 2000s. Instead, governments aimed to target low domestic inflation while maintaining economic growth. After 2000, global external imbalances widened dramatically. In the United States and other countries, external deficits were associated with rapidly increasing housing prices. When these collapsed starting in 2006, the global financial system seized up and the world economy went into deep recession.

11. One unambiguous lesson of these experiences seems to be that no exchange rate system functions well when international economic cooperation breaks down. Severe limits on exchange rate flexibility among the major currencies are unlikely to be reinstated in the near future. But increased consultation among international policy makers should improve the performance of the international monetary system.

KEY TERMS

balance of payments equilibrium	expenditure-switching policy	monetary trilemma
Bretton Woods agreement	external balance	nominal and real effective exchange rate indexes
confidence problem	internal balance	price-specie-flow mechanism
convertible currency	International Monetary Fund (IMF)	stagflation
expenditure-changing policy	intertemporal budget constraint	sudden stop

PROBLEMS MyEconLab

1. If you were in charge of macroeconomic policies in a small open economy, what qualitative effect would each of the following events have on your target for external balance?
   a. Large deposits of uranium are discovered in the interior of your country.
   b. The world price of your main export good, copper, rises permanently.
   c. The world price of copper rises temporarily.
   d. There is a temporary rise in the world price of oil.

2. Under a gold standard of the kind analyzed by Hume, describe how balance of payments equilibrium between two countries, A and B, would be restored after a transfer of income from B to A.

3. Despite the flaws of the pre-1914 gold standard, exchange rate changes were rare for the "core" countries (including the richer European countries and the United States). In contrast, such changes became frequent in the interwar period. Can you think of reasons for this contrast?

4. Under a gold standard, countries may adopt excessively contractionary monetary policies as all countries scramble in vain for a larger share of the limited supply of world gold reserves. Can the same problem arise under a reserve currency standard when bonds denominated in different currencies are all perfect substitutes?

5. A central bank that adopts a fixed exchange rate may sacrifice its autonomy in setting domestic monetary policy. It is sometimes argued that when this is the case, the central bank also gives up the ability to use monetary policy to combat the wage-price spiral. The argument goes like this: "Suppose workers demand higher wages and employers give in, but the employers then raise output prices to cover their higher costs. Now the price level is higher and real balances are momentarily lower, so to prevent an interest rate rise that would appreciate the currency, the central bank must buy foreign exchange currencies and expand the money supply. This action accommodates the initial wage demands with monetary growth, and the economy moves permanently to a higher level of wages and prices. With a fixed exchange rate, there is thus no way of keeping wages and prices down." What is wrong with this argument?

6. Suppose the central bank of a small country with a fixed exchange rate is faced by a rise in the world interest rate, R^*. What is the effect on its foreign reserve holdings? On its money supply? Can it offset either of these effects through domestic open-market operations?

7. How might restrictions on private financial account transactions alter the problem of attaining internal and external balance with a fixed exchange rate? What costs might such restrictions involve?

8. In the box on New Zealand, we derived an equation showing how the *IIP* changes over time: $IIP_{t+1} = (1 + r)IIP_t + NX_t$. Show that if $g = (GDP_{t+1} - GDP_t)/GDP_t$ is the growth rate of nominal output (GDP), and lowercase variables denote ratios to nominal GDP (as in the chapter), we can express this same equation in the form:

$$iip_{t+1} = \frac{(1 + r)iip_t + nx_t}{1 + g}.$$

Use this expression to find the ratio of net exports to GDP that holds the *IIP* to GDP ratio *iip* constant over time.

9. You are an economic adviser to the government of China in 2008. The country has a current account surplus and is facing gathering inflationary pressures.
   a. Show the location of the Chinese economy on a diagram like Figure 2.
   b. What would be your advice on how the authorities should move the yuan renminbi's exchange rate?
   What would be your advice about fiscal policy? In that regard, you have three pieces of data: First, the current account surplus is big, in excess of 9 percent of GDP. Second, China currently provides a rather low level of government services to its people. Third, China's government would like to attract workers from the rural countryside into manufacturing employment, so Chinese officials would prefer to soften any negative impact of their policy package on urban employment.

10. Use the *DD-AA* model to examine the effects of a one-time rise in the foreign price level, P^*. If the expected future exchange rate E^e falls immediately in proportion to P^* (in line with PPP), show that the exchange rate will also appreciate immediately in proportion to the rise in P^*. If the economy is initially in internal and external balance, will its position be disturbed by such a rise in P^*?

11. If the foreign *inflation rate* rises permanently, would you expect a floating exchange rate to insulate the domestic economy in the short run? What would happen in the long run? In answering the latter question, pay attention to the long-run relationship between domestic and foreign nominal interest rates.

12. Imagine that domestic and foreign currency bonds are imperfect substitutes and that investors suddenly shift their demand toward foreign currency bonds, raising the risk premium on domestic assets. Which exchange rate regime minimizes the effect on output—fixed or floating?

13. The Case Study titled Transformation and Crisis in the World Economy discussed the big global imbalances of the 2000s and suggested that one can analyze factors determining world real interest rates in terms of the balance between the world demand for savings (in order to finance investment) and the world supply of savings (just as in a closed economy—which the world is). As a first step in formalizing such an analysis, assume there are no international differences in real interest rates due to expected real exchange rate changes. (For example, you might suppose that yours is a long-run analysis in which real exchange rates are expected to remain at their long-run levels.) As a second step, assume that a higher real interest rate reduces desired investment and raises desired saving throughout the world. Can you then devise a simple supply-demand picture of equilibrium in the world capital market in which quantities (saved or invested) are on the horizontal axis and the real interest rate is on the vertical axis? In such a setting, how would an increase in world saving, defined in the usual way as an outward shift in the entire supply-of-savings schedule, affect equilibrium saving, investment, and the real interest rate? Relate your discussion to the Case Study and to the paper by Ben S. Bernanke in Further Readings. [For a classic exposition of a similar model, see Lloyd A. Metzler, "The Process of International Adjustment under Conditions of Full Employment: A Keynesian View," in Richard E. Caves and Harry G. Johnson, eds., *Readings in International Economics* (Homewood, IL: Richard D. Irwin, Inc. for the American Economic Association, 1968), pp. 465–486.]

14. The chapter suggested that because large increases in oil prices transfer income to countries that cannot rapidly increase their consumption or investment and therefore must save their windfalls, world real interest rates fall in the short run. Put together data on the U.S. real interest rate for 1970–1976, a period that includes the

first OPEC oil shock. How did the U.S. real interest rate behave? (You may assume that expected inflation rates equal actual inflation rates.)

15. We noted in this chapter that foreign central banks, especially in Asia, accumulated large dollar foreign reserves after 2000. One persistent worry was that those central banks, fearing dollar depreciation, would shift their reserve holdings from dollars to euros. Show that this action would be equivalent to a huge sterilized sale of dollars in the foreign exchange market. What might be the effects? Be sure to spell out your assumption about perfect versus imperfect asset substitutability.

16. Like its neighbor New Zealand, Australia has had a long string of current account deficits and is an international debtor. Go to the Australian Bureau of Statistics website at http://www.abs.gov.au/AUSSTATS and find the data you need to carry out an "external sustainability" analysis of the current account such as the one for New Zealand in the chapter. You will need data starting in 1992 for nominal GDP, the IIP, the current account, and the balance on goods and services NX (from "time series spreadsheets"). The goal of the exercise is to find the interest rate r on the IIP that stabilizes the ratio IIP/GDP at its most recent value given the historical average of NX and the historical average of nominal GDP growth (all since 1992). Warning: This is a challenging exercise that requires you to navigate the Australian data system and judge the most appropriate data to use.

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6. Once you have mastered a section via the "Quiz Me" test, you will receive a Mastery Point and be directed to work on the next section.

International Policy Coordination Failures

This appendix illustrates the importance of macroeconomic policy coordination by showing how all countries can suffer as a result of self-centered policy decisions. The phenomenon is another example of the Prisoner's Dilemma of game theory. Governments can achieve macroeconomic outcomes that are better for all if they choose policies cooperatively.

These points are made using an example based on the disinflation of the early 1980s. Recall that contractionary monetary policies in the industrial countries helped throw the world economy into a deep recession in 1981. Countries hoped to reduce inflation by slowing monetary growth, but the situation was complicated by the influence of exchange rates on the price level. A government that adopts a less restrictive monetary policy than its neighbors is likely to face a currency depreciation that partially frustrates its attempts to disinflate.

Many observers feel that in their individual attempts to resist currency depreciation, the industrial countries as a group adopted overly tight monetary policies that deepened the recession. All governments would have been happier if everyone had adopted looser monetary policies, but given the policies that other governments did adopt, it was not in the interest of any individual government to change course.

The argument above can be made more precise with a simple model. There are two countries, Home and Foreign, and each country has two policy options, a very restrictive monetary policy and a somewhat restrictive monetary policy. Figure A-1, which is similar to a diagram we used to analyze trade policies, shows the results in Home and Foreign of different policy choices by the two countries. Each row corresponds to a particular monetary policy decision by Home and each column to a decision by

FIGURE A-1

Hypothetical Effects of Different Monetary Policy Combinations on Inflation and Unemployment

Monetary policy choices in one country affect the outcomes of monetary policy choices made abroad.

Foreign. The boxes contain entries giving changes in Home and Foreign annual inflation rates ($\Delta\pi$ and $\Delta\pi^*$) and unemployment rates (ΔU and ΔU^*). Within each box, lower left entries are Home outcomes and upper right entries are Foreign outcomes.

The hypothetical entries in Figure A-1 can be understood in terms of this chapter's two-country model. Under somewhat restrictive policies, for example, inflation rates fall by 1 percent and unemployment rates rise by 1 percent in both countries. If Home suddenly shifts to a very restrictive policy while Foreign stands pat, Home's currency appreciates, its inflation drops further, and its unemployment rises. Home's additional monetary contraction, however, has two effects on Foreign. Foreign's unemployment rate falls, but because Home's currency appreciation is a currency *depreciation* for Foreign, Foreign inflation goes back up to its pre-disinflation level. In Foreign, the deflationary effects of higher unemployment are offset by the inflationary impact of a depreciating currency on import prices and wage demands. Home's sharper monetary crunch therefore has a beggar-thy-neighbor effect on Foreign, which is forced to "import" some inflation from Home.

To translate the outcomes in Figure A-1 into policy payoffs, we assume each government wishes to get the biggest reduction in inflation at the lowest cost in terms of unemployment. That is, each government wishes to maximize $-\Delta\pi/\Delta U$, the inflation reduction per point of increased unemployment. The numbers in Figure A-1 lead to the payoff matrix shown as Figure A-2.

How do Home and Foreign behave faced with the payoffs in this matrix? Assume each government "goes it alone" and picks the policy that maximizes its own payoff given the other player's policy choice. If Foreign adopts a somewhat restrictive policy, Home does better with a very restrictive policy (payoff $= \frac{8}{7}$) than with a somewhat restrictive one (payoff $= 1$). If Foreign is very restrictive, Home still does better by being very restrictive (payoff $= \frac{5}{6}$) than by being somewhat restrictive (payoff $= 0$). So no matter what Foreign does, Home's government will always choose a very restrictive monetary policy.

Foreign finds itself in a symmetric position. It, too, is better off with a very restrictive policy regardless of what Home does. The result is that both countries will choose very restrictive monetary policies, and each will get a payoff of $\frac{5}{6}$.

FIGURE A-2

Payoff Matrix for Different Monetary Policy Moves

Each entry equals the reduction in inflation per unit rise in the unemployment rate (calculated as $-\Delta\pi/\Delta U$). If each country "goes it alone," they both choose very restrictive policies. Somewhat restrictive policies, if adopted by both countries, lead to an outcome better for both.

Notice, however, that *both* countries are actually better off if they simultaneously adopt the somewhat restrictive policies. The resulting payoff for each is 1, which is greater than $\frac{5}{6}$. Under this last policy configuration, inflation falls less in the two countries, but the rise in unemployment is far less than under very restrictive policies.

Since both countries are better off with somewhat restrictive policies, why aren't these adopted? The answer is at the root of the problem of policy coordination. Our analysis assumed that each country "goes it alone" by maximizing its own payoff. Under this assumption, a situation where both countries were somewhat restrictive would not be stable: Each country would want to reduce its monetary growth further and use its exchange rate to hasten disinflation at its neighbor's expense.

For the superior outcome in the upper left corner of the matrix to occur, Home and Foreign must reach an explicit agreement; that is, they must *coordinate* their policy choices. Both countries must agree to forgo the beggar-thy-neighbor gains offered by very restrictive policies, and each country must abide by this agreement in spite of the incentive to cheat. If Home and Foreign can cooperate, both end up with a preferred mix of inflation and unemployment.

The reality of policy coordination is more complex than in this simple example because the choices and outcomes are more numerous and more uncertain. These added complexities make policy makers less willing to commit themselves to cooperative agreements and less certain that their counterparts abroad will live up to the agreed terms.

CREDITS

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TEXT

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