
A World of Multiple Monies

*When one has thoroughly mastered the principles of Bimetallism¹
one has the right to lead an introspective life.*

—Miss Prism in Oscar Wilde’s *The Importance of Being Earnest*

For most of human history, money was defined in terms of a precious commodity, typically gold or silver. The coining and standardization of money typically has been controlled at the national level, giving rise to different national currencies. For a long time before World War I and after World War II, most currencies were linked to gold, and thus the exchange rates between currencies were fixed. In 1973, the link to gold was abandoned, and the world’s major currencies have floated against each other ever since. Many minor currencies also have floated, but others are linked to the currencies of their neighbors. In practice, there is a wide spectrum of exchange rate regimes, ranging from currency unions to freely floating exchange rates, with various degrees of limited flexibility in between.

Exchange rate policy is one aspect of monetary policy. The overall objectives of monetary policy are price stability, output stability, and the maximization of economic growth over the long run. Each type of exchange rate regime offers advantages and disadvantages in achieving these objectives. Broadly speaking, a fixed exchange rate regime reduces the risks associated with future exchange rate movements (provided that the regime is long-lasting) by reducing the volatility of exchange rates. This may reduce transaction costs, stabilize inflation, encourage international trade and cross-border investment, and promote long-run economic growth. On the other hand, a floating exchange rate regime grants the central bank freedom to pursue its objectives more directly. Many central banks with floating exchange rates have been directed by their governments to stabilize inflation and economic output, which may, in turn, encourage investment and long-run economic growth.

1. Bimetallism is a system in which money is defined in terms of two metals.

The Invention of Money

Money has several roles, and here we refer specifically to money as currency—in other words, as something widely accepted as payment for goods and services rendered.² Money is quite obviously one of humanity’s greatest inventions. In his seminal treatise on money, William Stanley Jevons (1875, 3) declared, “Modern society could not exist in its present complex form without the means which money constitutes of valuing, distributing, and contracting for commodities of various kinds.”

Before money, trade and employment were conducted through barter. Bartering requires each person in a transaction to possess a commodity or labor skill that the other desires, a condition described by Jevons (1875, 5) as the “double coincidence” of wants. Money greatly increases the opportunities for trade because it breaks the need for a double coincidence: A person can buy what he or she wants even if the seller does not want the buyer’s skills or products. Widespread adoption of money enabled the specialization of labor, which is the fundamental building block of modern economies. The invention of money was no less important to economic development than the invention of agriculture, fire, or the wheel.

For money to work its magic, it is essential that many people share the same definition of what is money (or currency). The seller of a commodity or service is more willing to accept a given currency when there are more options available for spending that currency, which requires that sellers of other commodities and services also are willing to accept the currency.

The first currencies were basic commodities with intrinsic value, such as gold or seashells. With the rise of the nation-state, governments established standard measures and units for currencies in use in their jurisdictions, and most governments made the provision of currency a public monopoly. Over time, the links grew weaker between valuable commodities (such as gold) and currency. At first, banks issued paper receipts, or bills, for deposited valuables. Gradually, people realized that it was more convenient to use these receipts for transactions than to use actual gold or silver. Governments began to regulate banks’ issuance of such bills to prevent bank failures from causing economic and commercial disruptions. In almost all countries, governments eventually took over the issuance of paper money.³

2. This is money’s role as a medium of exchange. The other two important roles of money are as a unit of account and as a store of value. It is convenient and nearly universal to keep accounts of financial transactions and balance sheets in units of currency, and therefore, the role of money as a medium of exchange and as a unit of account are closely and uniquely linked. Money is not the only store of value, however. Others include real estate, durable goods, and various financial instruments that are claims on the future income of businesses, governments, and households. As a store of value, the word “money” often is used to mean wealth, despite the fact that money represents only a small share of total wealth.

3. Private banks still are allowed to issue paper currency under government supervision in Hong Kong, Macau, Northern Ireland, and Scotland.

For a long time, paper money was convertible, or redeemable, for gold or silver on demand. Initially, governments held large stocks of gold or silver to honor the promise of convertibility. Over time, governments learned that they were able to maintain the value of convertible paper money by reducing its supply when demand fell (relative to demand for gold) and increasing its supply when demand rose. The supply of paper money was adjusted using central bank purchases and sales of government or private-sector bonds, which also have the effect of lowering and raising interest rates. This allowed governments to reduce their large stocks of gold sitting idly in vaults, and it also gave rise to monetary policy as we currently know it—that is, the manipulation of the money supply to raise and lower interest rates.

Eventually, it became clear that paper money could remain valuable without being redeemable for a fixed amount of gold or silver. At first, convertibility was suspended only during wars and other emergencies. Nowadays, all countries use such “fiat” currencies, in which physical money has little intrinsic value and no fixed link to a particular commodity.⁴ Instead, the value of a currency arises from the combination of government control (with limited issuance) and social custom, including laws that mandate the acceptance of currency as payment, or legal tender, for debts and taxes.

Currencies and Borders

In general, only one currency serves as legal tender in a given country.⁵ But why stop at national borders? Wouldn't money be even more useful in greasing the wheels of commerce if all countries shared a common currency?

In some cases, currencies do transcend national boundaries, most notably the euro shared by the 17 members of the European Economic and Monetary Union (EMU). Other examples include the CFA franc, shared by predominantly francophone countries in central and western Africa,⁶ and the US dollar, shared by the United States as well as Ecuador, El Salvador, Panama, and some other countries and territories. But these exceptions prove the rule: Most countries have a unique currency.

The remainder of this chapter discusses the nature of various exchange rate regimes and explores the costs and benefits of sharing a currency across borders. It also describes how some of the benefits from a common currency may be obtained by maintaining a firmly fixed exchange rate between two or more countries.

4. According to the International Monetary Fund (IMF 2010), none of the IMF's 187 members has a currency linked to gold or any other commodity.

5. The People's Republic of China is an exception, with separate currencies for the Hong Kong and Macau special administrative regions, which were reunited with China during the 1990s.

6. Technically, there are two CFA francs, one for central Africa and one for west Africa, but they have been fixed at the same value for decades.

Figure 2.1 The spectrum of exchange rate regimes



Source: Authors' illustration.

Exchange Rate Regimes

From the 1870s until the start of World War I, the major currencies were defined in terms of gold, and thus the exchange rates among them were fixed. The period between World War I and World War II brought the Great Depression and turbulence in foreign exchange markets as countries went on and off the gold standard. After World War II, policymakers sought to avoid the chaos of the interwar years by returning to a new regime of fixed exchange rates. Under the Bretton Woods system—named after the resort in New Hampshire where 44 Allied nations agreed to the regime—most currencies were pegged to the US dollar, and the dollar was linked to gold, although the link to gold was not as strict as under the prewar gold standard (private individuals could not convert currency freely for gold at the stated parity). During the 1960s, as the global economy grew faster than the supply of gold and the United States allowed inflation to creep up, a gap opened between the official price of gold and the market price. When this gap grew too great, the US government refused to sell gold for dollars at the official parity, even to other governments. The Bretton Woods system collapsed in 1973, after governments failed to agree on a realignment of currencies and gold parities, and the world entered the modern era of floating exchange rates.

Two striking features of the modern era are the broad spectrum of exchange rate arrangements and countries' occasional transitions between different regimes, both orderly and disorderly. These regimes can be grouped into six categories (figure 2.1):⁷

- *Currency union.* Two or more countries use the same currency, which is managed by a single monetary authority. The member countries of the currency union may share responsibility for operating the monetary authority or it may be run solely by one member country. The latter is referred to as dollarization, reflecting the use on these terms of the US dollar in countries such as Ecuador, El Salvador, and Panama.
- *Hard peg.* The currency is fixed within a narrow band to another currency or basket of currencies. The monetary authority is configured to enhance

7. These categories are broadly similar to those in table 4.1 of Ghosh, Gulde, and Wolf (2002). Note that the terms fixed exchange rate and pegged exchange rate are used synonymously in this book, as are flexible exchange rate and floating exchange rate.

the credibility of the peg, for example, by enshrining the peg's value in law or by requiring that the domestic money supply be backed 100 percent by foreign exchange reserves in the target currency.

- *Adjustable peg.* Like a hard peg, the currency is fixed within a narrow band to another currency or basket of currencies, but the central bank or the government is free to change the peg value at any time.
- *Soft peg.* This term is used to describe regimes that allow a wide range of movement against the reference currency (or basket) around a constant central parity and regimes in which the target exchange rate moves over time, either smoothly or in discrete steps. The latter is sometimes called a crawling peg.
- *Managed float.* Authorities devote substantial efforts to stabilizing the exchange rate but do not have any specific target or bands.
- *Free float.* Authorities allow the exchange rate to be set by the markets and do not try to stabilize its level, although they may try to smooth disorderly movements. The central bank also may take into consideration the economic effects of exchange rate movements in setting monetary policy that feeds back to the exchange rate.

Table 2.1 lists countries in each of these regimes as of April 2010 according to the International Monetary Fund (IMF 2010, table 1). The top section of the table lists four currency unions: in Europe, eastern Caribbean, central Africa, and west Africa. The external exchange rate regimes of these supranational currencies are listed under the appropriate category in the remainder of the table: The Caribbean currency has a hard peg to the US dollar; the two African currencies have an adjustable peg to the euro; and the euro floats freely.

The IMF has changed its classification scheme over time in response to changes in country practices. In addition, the IMF categories do not correspond exactly to the six broad regimes described above. Box 2.1 describes the evolution of the IMF's classification of exchange rate regimes, it explains how the IMF classification differs from the definitions used in this book, and it describes three other prominent classifications.

Tools for Managing Exchange Rates

Central banks have two main tools to fix the value of their currency. The primary tool is monetary policy—namely, the short-term interest rate, which is determined by money creation. As described in chapter 3, raising the interest rate increases a currency's value, and lowering the interest rate decreases a currency's value. A secondary tool is the purchase or sale of foreign exchange reserves, also called foreign exchange intervention. If market demand for a currency declines, the central bank can prop up its value by selling foreign exchange reserves and buying its own currency. In other words, the central bank steps in to support demand.

Table 2.1 The IMF's 2010 de facto classification of exchange rate arrangements

Currency unions	Hard peg (currency board)	Adjustable peg^b	Soft peg^c	Managed float^d	Free float^e
European Economic and Monetary Union (EMU): Austria, Belgium, Cyprus, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Slovak Republic, Slovenia, and Spain ^a	ECCU Bosnia and Herzegovina, Brunei Darussalam, Bulgaria, Djibouti, Estonia, ^a Hong Kong, and Lithuania	CAEMC WAEMU Aruba, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belize, Bhutan, Bolivia, Burundi, Cambodia, Cape Verde, China, Comoros, Croatia, Denmark, Dominican Republic, Eritrea, Fiji, Guyana, Honduras, Iran, Iraq, Jamaica, Jordan, Kuwait, Lao, Latvia, Lebanon, Lesotho, Libya, Macedonia, Maldives, Morocco, Namibia, Nepal, Netherlands Antilles, Oman, Qatar, Rwanda, Samoa,	Algeria, Angola, Botswana, Costa Rica, Egypt, Ethiopia, Georgia, Guinea, Haiti, Kazakhstan, Kyrgyz Republic, Liberia, Malawi, Malaysia, Mauritania, Myanmar, Nicaragua, Nigeria, Paraguay, Russia, Singapore, Solomon Islands, Ukraine, Uzbekistan, Vanuatu, and Yemen	Afghanistan, Albania, Argentina, Armenia, Brazil, Colombia, Democratic Republic of Congo, The Gambia, Ghana, Guatemala, Hungary, Iceland, India, Indonesia, Israel, Kenya, Korea, Madagascar, Mexico, Moldova, Mongolia, Mozambique, Pakistan, Papua New Guinea, Peru, Philippines, Romania, Serbia, Seychelles, Sierra Leone, South Africa, Sudan, Switzerland, Tanzania, Thailand, Uganda, Uruguay, and Zambia	EMU Australia, Canada, Chile, Czech Republic, Japan, Mauritius, New Zealand, Norway, Poland, Somalia, Sweden, Turkey, United Kingdom, and United States
Eastern Caribbean Currency Union (ECCU): Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines					
Central African Economic and Monetary Community (CAEMC): Cameroon, Central African Republic, Chad, Republic of Congo, Equatorial Guinea, and Gabon					
West African Economic and Monetary Union (WAEMU):					

Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo

Unilateral adopters of a foreign currency (dollarization):

US dollar: Ecuador, El Salvador, Marshall Islands, Federated States of Micronesia, Palau, Panama, Timor-Leste, and Zimbabwe

Euro: Kosovo, Montenegro, and San Marino

Australian dollar: Kiribati

São Tomé and Príncipe, Saudi Arabia, Sri Lanka, Suriname, Swaziland, Syria, Tajikistan, Tonga, Trinidad and Tobago, Tunisia, Turkmenistan, United Arab Emirates, Venezuela, and Vietnam

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- a. Estonia joined EMU in January 2011.
 - b. This category includes the IMF categories conventional peg, stabilized arrangement, and pegged exchange rate within horizontal bands. In 2010, countries in the stabilized arrangement category were all pegged to another currency or currency basket. The horizontal bands in the third category were fairly narrow, at ± 5 percent.
 - c. This category includes the IMF categories crawling peg, crawl-like arrangement, and other managed arrangement.
 - d. This category is the IMF category floating. These countries do not have any specific target for the exchange rate but engage in occasional or frequent policy actions to damp exchange rate movements, primarily through intervention in the foreign exchange market.
 - e. This category is the IMF category free floating.

Source: IMF (2010, table 1).

Box 2.1 Classifying exchange rate regimes¹

The International Monetary Fund (IMF) has published its *Annual Report on Exchange Rate Arrangements and Exchange Restrictions* continuously since 1950. The regime categories have changed over time as the global monetary system has evolved.² Initially, the IMF reported simply whether a country had a fixed or a floating exchange rate. Later, information was added concerning the reference currency and the width of the band for countries with fixed rates. In recent years, the IMF has added considerable information regarding regimes that lie between simple pegs and free floats (see table 2.1).

The IMF formerly based its classifications entirely on what country authorities reported to the IMF staff. However, exchange rates did not always behave in a manner consistent with this “de jure” exchange rate regime. An influential paper by Maurice Obstfeld and Kenneth Rogoff (1995) found that many supposedly pegged exchange rates moved considerably over time. A subsequent paper by Guillermo Calvo and Carmen Reinhart (2002) showed that many supposedly floating exchange rates were actually being stabilized heavily by their respective authorities. Beginning in 1999, the IMF added its own assessment of the behavior of each member’s monetary authorities, which eventually led to the publication of both de jure and “de facto” classifications.

The published IMF categories do not correspond exactly to the six broad groupings described in this book, mainly because the IMF relies on purely observable criteria. For example, some exchange rate regimes classified by the IMF as adjustable pegs are better described as hard pegs because of implicit commitments that are widely viewed as credible. Denmark and Latvia are examples of relatively hard but nominally adjustable pegs. Some regimes classified as soft pegs may be better described as managed floats if the authorities routinely adjust their exchange rate target in response to economic and market conditions; Singapore is an example of such a flexible approach. Finally, the difference between managed floating and free floating is not clear-cut. The IMF bases these categories on the frequency of foreign exchange intervention (described in the next section of the text), but frequent intervention is not necessarily effective nor does it indicate the importance authorities place on the level of the exchange rate. The IMF’s procedures also ignore the use of monetary policy (through the short-term interest rate) to stabilize the exchange rate. In this book, a managed float is defined as a regime in which the central bank balances an exchange rate objective against other objectives—such as stable inflation and output—without defending any fixed value of the exchange rate. We define a free float as a regime in which the central

(box continues next page)

Box 2.1 Classifying exchange rate regimes (continued)

bank does not place any direct value on an exchange rate objective, although it may take into consideration the effects of the exchange rate on its other objectives.

Instead of relying on the IMF's assessment, some researchers characterize exchange rate regimes according to the actual behavior of exchange rates and, in some cases, use other data. Three prominent classifications are those of Eduardo Levy-Yeyati and Federico Sturzenegger (2003), Carmen Reinhart and Kenneth Rogoff (2004), and Jay Shambaugh (2004). These classifications are based on an annual analysis using daily or monthly data for each year.

- Levy-Yeyati and Sturzenegger (2003) classify currencies as pegged, intermediate, and floating based on cluster analysis of the change in the exchange rate, the volatility of the change in the exchange rate, and the change in foreign exchange reserves relative to a monetary aggregate. The principle is that the combination of a stable exchange rate and volatile reserves is an indicator of a fixed exchange rate, whereas the combination of a volatile exchange rate and stable reserves is an indicator of a floating exchange rate.
- Reinhart and Rogoff (2004) classify currencies based on their volatility relative to a band calculated over a five-year rolling window. The rolling band allows a currency to have a one-time devaluation even within a pegged regime.³ An important innovation of this classification is that it uses only market-determined exchange rates. For countries and years in which the officially reported exchange rate deviates from a parallel or black-market rate, Reinhart and Rogoff base their classification on the parallel rate. Exchange rates are assigned across 14 categories, which are also aggregated into a coarser grouping of five categories.
- Shambaugh (2004) assigns currencies to only two categories: pegged or nonpegged. A currency is pegged if the official exchange rate stays within a ± 2 percent band of the reference currency within the year, subject to the further condition that the peg lasts at least two years.

Klein and Shambaugh (2010, 47) show that if these three schemes and the IMF's classification are collapsed into only two categories—pegged and nonpegged—over the period 1973–2004, a pairwise comparison of the schemes are in agreement for 73 percent to 86 percent of the observations.

1. This box draws heavily on chapter 3 of Klein and Shambaugh (2010).

2. In the early years, much attention was focused on whether countries applied multiple currency practices, including applying different exchange rates to various types of transactions (imports versus exports, or goods and services versus financial flows). Few countries continue to maintain such multiple exchange rates.

3. The term devaluation is used to refer to an officially administered depreciation.

In a currency union, there are no internal exchange rates to manage, but the currency area as a whole must adopt an exchange rate regime for its relationships with its trading partners. Under a floating exchange rate, the monetary authority is free to use both monetary policy and foreign exchange intervention to pursue other goals.

In some countries, finance ministries play an important role in exchange rate policy, including through foreign exchange intervention. In addition, fiscal policy has an important influence on interest rates, especially long-term interest rates (chapter 7 briefly discusses fiscal policy). Nevertheless, exchange rates are primarily determined by monetary policy, and this book focuses on the role of monetary policy in the advanced economies and the relatively more advanced developing economies.

Financial Markets and the Impossible Trinity

Advanced economies have sophisticated financial markets with few restrictions on the international flow of capital. The foreign exchange markets in these economies are very large, and central banks would have to buy and sell impractically large quantities of foreign exchange in order to peg their exchange rates entirely through such intervention. In practice, these central banks rarely intervene in the foreign exchange markets. When they do, their purchases and sales have been small relative to various measures of money stocks, and these interventions have been widely considered to have had only limited effects (Truman 2003a).

A generally accepted principle of international finance is the impossible trinity, also known as the monetary policy trilemma (Frankel 1999; Obstfeld, Shambaugh, and Taylor 2004; Aizenman, Chinn, and Ito 2008). According to the principle of the impossible trinity, policymakers can choose only two of three desirable features of a policy regime: (1) monetary policy independence—the freedom to set the short-term interest rate; (2) exchange rate policy independence—the freedom to set (and thus stabilize) the exchange rate; and (3) free and open capital markets. For most of this book, the choice of free and open capital markets is taken for granted. Thus, the policy choice is between monetary independence and exchange rate independence. The choice is not all or nothing; it is possible to give up some monetary independence to gain some exchange rate independence, as in a managed float regime. However, the more tightly the exchange rate is controlled, the less freedom there is to set the interest rate.

Many developing economies have less sophisticated and more restricted financial markets that impede the flow of capital across borders. In these economies, the central bank has some scope to use the purchase and sale of foreign exchange reserves to stabilize the exchange rate while maintaining independent control of the short-term interest rate. (Chapter 8 examines issues relevant to these economies.)

Another difference between advanced economies and developing economies is the level of foreign-currency borrowing. There is relatively little foreign-

currency borrowing in advanced economies by governments or households, and business foreign-currency borrowing is mainly limited to exporters. In contrast, such borrowing is extensive in many developing economies. (Chapters 7 and 8 explore the issue of foreign-currency borrowing.)

The Vanishing Middle

One implication of the impossible trinity for economies with highly mobile capital is that pegged exchange rates can be subjected to speculative attacks whenever the peg appears to conflict with other policy objectives, such as stable inflation and output. Speculative attacks occur when financial market participants perceive a one-way bet. For example, if there is a significant chance that the government will devalue its currency to fight an economic slowdown, then market participants will sell that currency, because if the currency is devalued, they can buy it back more cheaply and make a profit, and if the currency is not devalued, they can buy it back at the same price and suffer no loss. This feature of a pegged exchange rate under pressure—“heads I win, tails I break even”—makes it irresistible to financial market speculators. A classic example is the attack that drove the UK pound out of the Exchange Rate Mechanism (ERM) in 1992 (this example is discussed in chapter 6).

Central banks can use foreign exchange intervention and monetary policy to fight speculative attacks, but both tools have drawbacks. Raising interest rates reduces the one-way nature of the speculative bet because it gives investors an extra return to holding the domestic currency. But, if a sharp depreciation seems imminent, it takes an astronomical interest rate to offset the potential gains from selling the domestic currency. In 1992, the Swedish central bank offered banks an overnight rate of 500 percent to deter speculation, and monthly interest rates soared to more than 30 percent.⁸ The drawback is that such high interest rates may be exactly the wrong medicine for a weak economy, as it was for Sweden in 1992. The alternative tool is foreign exchange intervention, but in economies with high capital mobility, the size of the necessary intervention can be enormous, and if the central bank or the government ultimately does devalue, the losses on the intervention can be very large.

As reported in two IMF studies (Rogoff et al. 2003; Ghosh, Ostry, and Tsangarides 2010), over the past two decades the dangers of speculative attack have led advanced economies and the more advanced developing economies to move away from adjustable pegs and soft pegs and toward more firmly fixed or floating regimes.⁹ Managed floats are not subject to speculative attack because no specific value of the currency is defended, and hence there is no one-way bet.

8. See Tom Redburn, “But Don’t Rush Out to Buy Kronor: Sweden’s 500% Gamble,” *New York Times*, September 17, 1992.

9. Denmark and Singapore are the only advanced economies in the middle regimes of table 2.1. As noted in box 2.1, these economies are more appropriately characterized as having a hard peg and a managed float, respectively.

At the other extreme, hard pegs are designed to convince market participants that there will never be a change in the value of the peg. However, the collapse of Argentina's hard peg in 2002 suggests that a true hard peg regime can be difficult to maintain. Perhaps for this reason, currency union and dollarization are considerably more common than hard pegs, and many countries that currently have hard pegs plan to join a currency union in the future.

Economic Objectives

Governments have many economic objectives and use many policy instruments to achieve them. For monetary policy and the choice of exchange rate regime, the most important objectives are:

- maximize total economic output (or national income) and employment;¹⁰
- stabilize output, employment, and prices; and
- maintain a sound and smoothly functioning financial system.

Economists generally agree that price stability is the most important objective for monetary policy for several reasons: (1) Monetary policy has a more lasting effect on prices than on output. (2) There are only rough estimates of the maximum sustainable levels of output and employment. (3) There are more suitable policy tools for promoting financial stability than short-term interest rates. Moreover, it is widely believed that reducing the volatility of prices is the most important action a central bank can take to enable the economy to reach its maximum sustainable level of output. In the words of Federal Reserve Chairman Ben Bernanke (2006):

Stable prices are desirable in themselves and thus are an important goal of monetary policy. But stable prices are also a prerequisite to the achievement of the Federal Reserve's other mandated objectives, high employment and moderate long-term interest rates. In particular, low and stable inflation and inflation expectations enhance both economic growth and economic stability.

Nowadays, there are few economists who would disagree with this assertion, though some might add the stability of the financial system to the list of a central bank's core objectives.

There is less agreement among economists about what action central banks should take to stabilize economic output or employment beyond measures

10. Economic output is the total of goods and services produced in an economy. It is commonly measured by the gross domestic product, or GDP. National income equals GDP plus the income from a country's foreign investments and workers based abroad minus the income earned on domestic assets held by foreigners and by foreign workers in the domestic economy. Because the effects of cross-border investment and expatriate workers are small for most economies, output and income are nearly equal in most cases. Both output and income typically are measured in gross terms, meaning that the depreciation of fixed capital is not netted out, but this distinction is not important for the purposes of this book.

directly aimed at ensuring price stability. Many believe that central banks inherently seek to stabilize output at too high a level, generating unwanted inflation and ultimately destabilizing output. Others believe that central banks can, and indeed have, overcome this destructive tendency in recent decades. This book presents evidence to support the latter view. This book also refers to central banks' output and employment objectives interchangeably, because from the point of view of a central bank, stabilizing output is tantamount to stabilizing employment, and maximizing output is tantamount to maximizing employment. To have a different effect on output than on employment would require microeconomic policies that are not in the central bank toolkit.

Fiscal policy is another tool that governments can use to stabilize output, but for reasons discussed in chapter 7, its role is rather limited. Therefore, in most of this book, monetary policy is assumed to be the only useful tool for macroeconomic stabilization.

The view that monetary policy also should be used to stabilize the financial system, in addition to inflation and output, is controversial. In particular, some economists argue that interest rates should be adjusted in response to asset prices and measures of credit creation in order to reduce the risk of asset price bubbles and to damp financial excesses (Borio and White 2003, BIS 2009). To the extent that bubbles and financial exuberance tend to cause unsustainably high economic growth and excessive inflation, this view is fully consistent with stabilizing output and inflation. The more complicated question is whether interest rates should be raised to prick a bubble even when output and inflation are near their targets and are expected to remain there. Most economists likely would say no (Kohn 2008; Posen 2009; Blanchard, Dell'Ariccia, and Mauro 2010). The main reason is that asset bubbles are not very responsive to interest rates, so that the central bank might have to raise rates high enough to cause a recession in order to have any meaningful effect on a bubble. For example, US house prices continued to rise at rates higher than inflation during the period in 2004–05 that the Federal Reserve was steadily raising the short-term interest rate.

More broadly, monetary policy is not well-suited to dealing with problems related to the functioning of financial markets; regulatory policies appear more appropriate to this task. Even before the global financial crisis of 2008, most major central banks pursued the goal of maintaining stable payments and financial systems, but the tools they used to achieve this were supervision, regulation, and emergency lending, not monetary policy. Much of the global policy response to the financial crisis has been aimed at making regulatory and supervisory policies more reflective of the links in both directions between the financial system and the broader economy. It appears likely that monetary policy will continue to be focused on stabilizing inflation and output, and other tools will be used to pursue financial stability.

As shown in table 2.2, governments in many economies have assigned to monetary policy the task of stabilizing prices. In 12 of these 19 economies, price stability is the principal goal of monetary policy, and only Hong Kong and Russia have not set price stability as an explicit goal. The most common

Table 2.2 Monetary policy mandates in selected economies

Economy	Stabilize				Other
	Prices	Exchange rate	GDP/employment	Maximize GDP/employment	
Australia	P ^a	s		s	
Brazil	P				
Canada	P	s	s	s	
China	P ^b	s		s	s ^b
Denmark	s	P			
Euro area	P			s	s ^c
Hong Kong		P			s ^d
India	o			o	
Japan	P		s	s	
Korea	P				s ^e
Mexico	P				
Russia		P			
Saudi Arabia	o	o			
Singapore	o		o	o	o ^d
Sweden	P				
Thailand	P	s			
Turkey	P	s		s ^f	
United Kingdom	P	s ^g			
United States	o			o	o ^h

P = principal objective; s = subsidiary objective; o = objectives not explicitly ranked

- The Reserve Bank of Australia interprets its legal mandate of stabilizing the currency to mean stabilizing domestic prices. Furthermore, it states that achieving price stability is its principal means of attaining its other mandated goals of maintaining full employment and contributing to “the economic prosperity and welfare of the people of Australia.”
- According to the website of the People’s Bank of China, “[t]he objective of the monetary policy is to maintain the stability of the value of the currency and thereby promote economic growth.” However, a recent speech by Deputy Governor Hu Xiaolin suggests that currency stability may be interpreted primarily as price stability, as in Australia. Deputy Governor Hu also lists achieving a balanced current account as a goal of monetary policy (Exchange Rate Regime Reform and Monetary Policy Effectiveness, speech by Hu Xiaolin, July 26, 2010).
- There is an objective of promoting European financial integration.
- Hong Kong and Singapore also have objectives of promoting their international financial centers.
- The Bank of Korea is required to carry out its policies “in harmony with the economic policy of the Government as long as this does not impede the price stabilization.”
- The Central Bank of the Republic of Turkey is directed to “support the growth and employment policies of the Government” to the extent that these are not in conflict with maintaining price stability.
- One of the objectives of the Bank of England is to maintain “confidence in the currency,” but this is pursued via price stability.
- The Federal Reserve’s third objective is “moderate long-term interest rates,” but it is implicitly understood that achievement of the first two objectives is the best way to attain the third.

Notes: Most central banks also have objectives related to stability of the payments and/or financial systems, but these objectives are not listed in this table because achieving these objectives is generally assigned to the supervisory and regulatory functions of the bank as well as to the bank’s direct lending to financial institutions.

Sources: Information on monetary policy mandates is taken from the websites of the respective central banks and it refers both to legislated objectives and to self-defined objectives.

additional goals are to stabilize the exchange rate and to maximize GDP and/or employment.

Most central banks tasked with stabilizing prices have a numerical target (or range) for inflation, set either elsewhere within the government or within the central bank itself.¹¹ The targeted annual rates of inflation (or central points of the associated ranges) vary from 1 percent in Japan to 5 percent in Turkey, but there is a pronounced cluster around 2 percent, especially in the advanced economies. In the developing economies, inflation goals typically are a little higher. It may seem surprising that price stability does not mean zero inflation, but there are several reasons for choosing a positive rate of inflation, which are discussed in box 2.2.

Research indicates that central banks often behave as if they are trying to stabilize economic output in addition to inflation, even in countries where stabilizing economic output is either not an explicit goal or is given less weight (Clarida, Galí, and Gertler 1998).

Relative Advantages of a Currency Union or a Free Float

Broadly speaking, the exchange rate regimes at each end of the spectrum are associated with the following tradeoffs:

- Moving toward a free float increases national economic sovereignty.
 - If accompanied by monetary policy oriented toward domestic economic stabilization, moving toward a free float reduces the volatility and uncertainty of inflation and output.
- Moving toward a currency union reduces economic transaction costs, facilitates greater economic and political integration, and reduces the volatility and uncertainty of exchange rates.
 - If monetary policy is not capable of stabilizing the domestic economy, moving toward a currency union may reduce the volatility and uncertainty of inflation and output, provided that monetary policy is stable for the union as a whole.
 - A country cannot peg its exchange rate to all other countries at the same time. Any benefit from a pegged exchange rate or currency union is partial at best.

What determines the relative benefits of these two exchange rate regimes?

- *Monetary policy.* The case for a floating exchange rate rests mainly on the ability of monetary policy to stabilize the domestic economy. For a country

11. Central banks in several of these countries are self-professed inflation targeters. According to Truman (2003b, 6), inflation targeting has four key elements: (1) Price stability is the principal goal of monetary policy. (2) There is a numerical target for price stability. (3) There is a time horizon for achieving this target. And (4) there is an ongoing process for evaluating success in achieving the target.

Box 2.2 Price stability does not require zero inflation

All countries that specify a numerical target for price stability have chosen to target a low but positive rate of inflation. Why not choose to target a constant price level or a zero rate of inflation? Below are four arguments for a low but positive rate of inflation.

Errors in Measuring Prices

There is an upward bias in the measurement of prices over time, primarily because of inadequate adjustment for quality improvements and the introduction of new goods. In principle, the price level captures the average movement over time in the prices of the goods and services that consumers buy, but because these goods and services change over time, statisticians must compensate for the effects of such changes on actual prices. For example, automobiles have changed enormously over time, with the addition of many new features (such as air conditioning, air bags, power windows, and antilock brakes) and increases in horsepower, reliability, and safety. Correspondingly, the price of an automobile has risen substantially over time. What matters for the measurement of inflation is what consumers would have spent on an automobile with the same quality and features in the previous year, but frequently there was no comparable auto in the previous year.

Quantifying the value of quality improvements in consumer goods and services is difficult, and most experts agree that statistical agencies tend to understate them. If quality improvements are understated, then inflation is overstated. This problem is particularly severe when new products are introduced. Overall, the consumer price index (CPI) in the United States probably overstates inflation by between $\frac{1}{2}$ and 1 percent per year.¹ Inflation is likely to be overstated by at least as much in other countries because many foreign statistical agencies do not go as far as the US Bureau of Labor Statistics in controlling for substitution bias and quality improvement.

Resistance to Price and Wage Cuts

In a modern market economy, the prices of various goods and services constantly change in response to changes in supply and demand. Changes that affect the price of one good relative to the price of another good are an essential feature of how the market directs consumers to buy the goods that are most abundant and producers to supply the goods that are most scarce. These market signals encourage efficiency and reduce waste.

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Box 2.2 Price stability does not require zero inflation *(continued)*

An overall zero inflation rate would imply that the prices of some goods are rising while the prices of other goods are falling. Many economists believe that businesses and workers are particularly reluctant to accept decreases in prices and wages, and such downward rigidity in prices and wages means that achieving a zero average rate of inflation would require persistently high unemployment and excess capacity.² Targeting instead a low but positive average inflation rate means that even those businesses and workers receiving lower-than-average price and wage increases do not have to accept outright price and wage cuts.

Substitution between Currency and Productive Capital

The rate of return on currency is zero. In normal times, people hold the minimum amount of currency needed to conduct their transactions because they can earn a much higher return on other assets. However, as the rate of inflation declines toward zero, interest rates and other nominal rates of return also decline, reducing the penalty for holding currency. Because currency is very safe and convenient, with low inflation and low interest rates people will prefer to hold currency than more risky but more productive capital. Therefore, low inflation rates crowd out capital in much the same way that high interest rates on government debt crowd out capital. A lower stock of productive capital implies a lower long-run level of economic output.

The Zero Bound on Interest Rates

Central banks traditionally use short-term interest rates to stabilize economic activity and inflation around their target levels. The effect of interest rates on the economy depends critically on the level of inflation: What matters is the difference between the interest rate and the inflation rate, known as the “real interest rate.” At times, central banks find it desirable to set the real interest rate below zero to stimulate economic activity, particularly during a recession. However, the real interest rate can be negative only when the inflation rate is positive because nominal interest rates cannot go below zero. Thus, it may be desirable to have a positive rate of inflation to give central banks running room to conduct stimulative monetary policy during bad times.

The vice chairman of the Federal Reserve Board, Janet Yellen (2011) has stated that a “modest positive rate of inflation over time allows for a slightly higher average level of nominal interest rates, thereby creating more scope for the [central

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Box 2.2 Price stability does not require zero inflation (continued)

bank] to respond to adverse shocks. A modest positive inflation rate also reduces the risk that such shocks could result in deflation, which can be associated with poor macroeconomic performance.”

According to research at the Federal Reserve Board, the risk of hitting the zero bound on nominal interest rates and the risk of falling into harmful deflation are considerably higher than most economists believed a few years ago (Chung et al. 2011).

1. The Boskin Commission (1996) reported an overstatement of $\frac{3}{4}$ to $1\frac{1}{2}$ percent. Abraham (1997, 1998) identifies one ongoing revision to the construction of the CPI that would reduce this bias by about 0.2 percentage point and she describes other planned changes that would have unspecified effects. Abraham admits, however, that bias from quality adjustment and from the introduction of new goods would persist.

2. Akerlof, Dickens, and Perry (1996) present evidence of downward wage rigidity in the United States. Holden and Wulfsberg (2008) find that downward wage rigidity is important both at the individual level and at the industry level in most countries in the Organization for Economic Cooperation and Development (OECD).

in which independent monetary policy is a source of stability, a floating exchange rate may be preferable. For a country in which monetary policy is not a source of stability, pegging the exchange rate or joining a currency union may be preferable.

- *Trade.* More trade links with other members of a currency union increase the benefits of a common currency (McKinnon 1963).
- *Labor and capital mobility.* Greater mobility of labor and capital between members of a currency union reduces the cost of giving up monetary policy independence (Mundell 1961).
- *Economic structure.* Countries with a similar mix of industries are likely to face similar economic shocks and thus have less need for an independent monetary policy (Mundell 1961, Kenen 1969). For example, commodity-producing economies often have different expansion and contraction cycles than other economies.
- *Economic flexibility.* Countries with more competitive markets and flexible prices and wages suffer less from the loss of an independent monetary policy (Mundell 1961).
- *Fiscal policy.* Fiscal policy becomes more important as a stabilizing mechanism in a currency union (Kenen 1969). Automatic transfers from countries with growing economies to those with contracting economies help to reduce the cost of currency union. Fiscal crises are more sudden in a currency union because the loss of an independent monetary policy

increases the risk of default, as demonstrated in the euro area during 2010–11 (De Grauwe 2011).

- *Exchange rate volatility.* When a floating exchange rate is excessively volatile, joining a currency union or pegging the exchange rate damps this volatility and thus may reduce any destabilizing effects on the economy (Flood and Rose 1995).

The effects of these factors may change over time. In particular, a currency union may encourage trade, cross-border investment, and labor mobility among the member countries and also may be accompanied by moves toward automatic fiscal transfers. Rose (2008) argues that the formation of the euro area has led to changes over time in member countries that have increased the benefits to them of currency stability.

In addition to the economic costs and benefits, exchange rate regimes also involve political costs and benefits. The formation of the euro area was driven as much by a political desire for greater integration as by any perceived economic benefits. In other cases, political considerations may outweigh the economic factors. Denmark retains its own currency at some cost (in terms of higher government bond yields) even though it is highly unlikely that the government will seek to exercise significant monetary policy autonomy from the European Central Bank.

Relative Advantages of Other Exchange Rate Regimes

Although much of the economic analysis of the costs and benefits of various exchange rate regimes focuses on the polar cases of a currency union and a free float, the optimal regime for a particular country does not have to be one of these extremes, especially if political constraints are taken seriously. The rest of this chapter considers the tradeoffs between each of the six exchange rate regimes.

Currency Union versus Hard Peg. On purely economic grounds, a jointly administered currency union is preferable to a hard peg because it reduces transaction costs without any further limits on monetary policy autonomy. In fact, smaller members of a currency union have a greater voice in monetary policy than they would under a hard peg. The case against a currency union relies on political considerations, namely the symbolic importance of having a national currency (again, Denmark is an example).

Some countries choose to unilaterally adopt another country's currency (dollarization) rather than a hard peg, even though this sacrifices seigniorage revenues and precludes any voice in monetary policy.¹² Some countries dollarize because there are no partner countries willing to form a currency union or because of the difficulty of establishing a truly credible hard peg. The demise

12. Seigniorage refers to the fiscal revenues from printing currency and minting coins.

of Argentina's currency board in 2002 shows that even apparently strong institutional features can not necessarily deliver a durable hard peg.

Hard Peg versus Adjustable Peg. An adjustable peg provides an element of independent monetary policy through the ability to change the peg value after a large economic shock. But this freedom to change the peg also creates uncertainty about the future value of the currency and thus raises transaction costs and may reduce trade and cross-border investment compared with a credible hard peg. As discussed above, adjustable peg regimes have proven to be untenable for countries with open capital markets, because any hint that the peg may change causes a speculative attack. For countries with low capital mobility, adjustable pegs remain a viable option. (Chapter 8 discusses options for these countries.)

Adjustable Peg versus Soft Peg. The choice between an adjustable peg and a soft peg is relevant only for countries with restrictions on international capital mobility.

Soft Peg versus Managed Float. A soft peg places some limits on the value of the exchange rate whereas a managed float does not. Neither regime differs much in terms of transaction costs. The difference lies mainly in the tradeoff between exchange rate stability and other economic objectives. A managed float is the only one of these two regimes that is tenable for an economy with a high degree of capital mobility because of the lack of any specified limit for the exchange rate.

Managed Float versus Free Float. The essential difference between a managed float and a free float is the weight the central bank places on stabilizing the exchange rate versus other goals, such as stabilizing the domestic economy. In a free float, stabilizing the exchange rate is given no weight, and other goals guide monetary policy. The choice between these regimes ultimately depends on the balance of economic gains from stabilizing the exchange rate and the economic costs of sacrificing other objectives to at least some extent. Neither regime reduces transaction costs. Both require the central bank to be fairly capable and sophisticated.

An economy with limited private capital mobility may find it possible to use a managed float to stabilize the exchange rate without sacrificing stability of inflation and output. But there are limits to this policy freedom, as discussed in chapter 8.