CHAPTER 2
AN OVERVIEW OF INTERNATIONAL MONETARY SYSTEMS AND INTERNATIONAL FINANCIAL MARKETS

Chapter Overview

This chapter covers an overview of the international monetary system, recent price behavior of international financial markets, and their policy implications for private and government sectors. The first section deals in broad terms with the alternative monetary arrangements associated with the different episodes of the international financial system in the last century. Specifically, the rules of the classical gold standard, the Bretton Woods system for pegged exchange rates, and the floating rate, U.S. dollar exchange rate system are reviewed. The major aspects and recent developments of European Monetary Systems are also included. Recent developments of the world’s major exchange rates and interest rates are discussed in the second section. The volatilities of nominal and real exchange rates, nominal and real interest rates are described graphically. The remainder of the chapter outlines the costs of exchange rate variability and strategic and managerial issues encountered by firms, and public policy issues in exchange rate regimes.

Chapter Outline

International Monetary Arrangements in Theory and Practice
  The International Gold Standard, 1879-1913
  The Spirit of the Bretton Woods Arrangement, 1945
  The Fixed-Rate Dollar Standard, 1950-1970
  The Floating-Rate Dollar Standard, 1973-1984
  The Plaza-Louvre Intervention Accord and Floating-Rate Dollar Standard, 1985-1999
  The Spirit of the European Monetary System, 1979
  The European Monetary System as a “Greater DM” Area, 1979-1998
  The Spirit of the European Economic and Monetary Union, 1999

Recent Behavior of Prices in International Financial Markets
  Exchange Rate Developments
  Interest Rate Developments
  Summary of Recent Developments

Policy Matters - Private Enterprises
  The Conduct of Business under Pegged and Floating Exchange Rates
  Greater Exchange Rate Variability under Floating
  Cost of Exchange Rate Variability

Policy Matter - Public Policy-makers
  Exchange Rate Policies in Emerging Markets
  Beyond Currency Boards to Full Dollarization
  Concerns About EMU

Summary
**Supplementary Notes**

*International Monetary Arrangements in Theory and Practice*

There are essentially two components under each international monetary arrangement, or alternatively, international monetary system: the exchange rate regime and the balance of payments adjustment mechanism. Knowledge of the basic structure of the balance of payments is a necessary background for understanding the international monetary arrangements.

**The Basic Structure of a Balance of Payments**

- Current account balance (CA)
  - Trade balance
  - Balance in services
  - Investment income
  - Unilateral transfer
- Capital account balance (KA)
  - Long-term capital balance
  - Short-term capital balance
  - (Statistical discrepancy)
- Balance in official reserve transactions (BR)

\[
CA + KA + BR = 0
\]
\[
CA + KA = \text{overall balance}
\]

The overall balance is also called official settlement balance (OSB).

See also notes on balance of payments in Chapter 17.

**Exchange Rate Determination under the Gold Standard**

In 1879 the U.S. dollar price for one troy ounce of gold was $20.67 while the British pound price was £4.2474. The exchange rate between the U.S. dollar and the British pound was thus determined as

\[
\frac{20.67}{4.2474} = 4.86656/\text{£}.
\]

**The Price-Specie Flow Mechanism**

This was proposed by David Hume as a description of the automatic balance of payments adjustment mechanism under the gold standard. It assumes that gold flows are strictly linked to changes in the money supply, and in turn to inflation. The mechanism may be depicted in the following flow diagram:
Trade surplus ==> net gold inflow ==> increase in domestic money supply ==> inflation ==> increase in prices of domestic goods relative to foreign goods (== loss of price competitiveness in the world market) ==> diminishing of trade surplus

The Spirit of the Bretton Woods Arrangement, 1945

Under the gold standard, it was very important for a country to maintain adequate gold reserves to back its currency's value. The system also implicitly limited a country's ability to expand its money supply. The growth in money was limited to the rate at which additional gold could be acquired by the country's monetary authorities. The Bretton Woods Agreement sought a set of rules that would maintain international monetary stability, but in the meantime remove countries from the tyranny of the gold standard and permit greater autonomy for national monetary policies.

Balance of Payments Adjustment under a Fixed Exchange Rate System

An essential feature of a fixed exchange rate system is that smaller economies (countries other than the United States under the Bretton Woods System; countries other than Germany in the European Monetary System) have no independence in pursuing monetary policies. Money supply and hence economic activities in these countries are geared toward the balance of payments adjustment. The mechanism works as follows:

Suppose a country has an overall balance deficit (CA + KA < 0). That is, the country has a greater demand for foreign goods, services, and assets than foreign demand for its own goods, services, and assets. This greater demand for foreign goods, services, and assets translate into a greater demand for foreign currencies, which puts a downward pressure on the country's own currency (or upward pressure for foreign currencies). The country's monetary authority has to defend the exchange rate by selling foreign currencies out of its international reserves. The decrease of the country's international reserves leads to a decline in the country's money supply, which in turn leads to an increase in the domestic interest rates. The balance of payments will then adjust through the following three channels:

1. Higher domestic interest rates lead to greater capital inflows, therefore the capital account improves;
2. Higher interest rate slow down domestic economic activities including imports, thus improving the current account balance;
3. The economic slowdown will also lower the relative price of domestic goods and services and promote exports, again improving the country's current account balance.

The balance of payments returns to equilibrium through these adjustments. The adjustment process may be depicted through the following flow diagram:

Overall balance deficit ==> decrease in international reserves (foreign exchange market intervention) ==> decrease in money supply (or lower rate of money growth) ==> increase in interest rate ==> balance of payment adjustment (through the three channels described above).
Note that under the fixed exchange rate system, the domestic money base adjusts to the external balance to keep the exchange rate fixed. The monetary authority has no freedom in choosing a particular monetary policy to deal with internal problems such as unemployment or inflation.

The Adjustment Process under a Floating Exchange Rate System

Under a (purely) floating exchange rate system, there is no foreign exchange market intervention by the monetary authorities. So the overall balance should be zero in equilibrium (CA + KA = 0). The monetary authority can now use discretionary monetary policy to deal with domestic economic issues. If the overall balance is in deficit (a greater demand for foreign currency) will lead to a depreciation of the domestic currency whereas a surplus will lead to an appreciation of the domestic currency. So the exchange rate serves essentially as a residual variable that adjusts to the external imbalances which may be the result of domestic policies.

Sterilized Intervention

Here, to sterilize is to reduce or negate the effect of foreign exchange market intervention on the domestic money supply. Buying or selling foreign exchange (foreign exchange market intervention) changes the level of a country's international reserves and the money base. As noted above, a change in the money base may have undesirable effects on the domestic economy (e.g. a rise of unemployment in a economic recession). To reduce or eliminate such effects, the monetary authority may choose to buy or sell government bonds through open market operation, which also leads to a change in the money base. The effect of open market operations should offset the effect of foreign exchange market intervention, thus leaving the money base unchanged.

The effect of sterilization may also be understood in the following way. The monetary authority (the central bank) has two types of assets that support the money base: foreign assets (international reserves) and domestic assets (say, domestic government bonds). Foreign exchange market intervention through selling foreign currencies will reduce foreign assets and reduce the money base. Sterilization through buying government bonds increases the central bank's holding of domestic assets and increase the money, offsetting the effect of foreign exchange market intervention on money supply.

Please note that sterilized intervention cannot go on indefinitely as the country may eventually run out of international reserves in the case of a persistent overall balance deficit.
Special Drawing Rights (SDR)

The value of the Special Drawing Right (SDR) in U.S. dollars is calculated by multiplying each currency's weight in the SDR times its current spot rate versus the U.S. dollar.

Example:

<table>
<thead>
<tr>
<th>Country</th>
<th>Currency</th>
<th>Currency per SDR</th>
<th>Spot Rate $ / unit (01/25/94)</th>
<th>U.S. $ Value of components</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>Dollar</td>
<td>0.5720</td>
<td>1.000000</td>
<td>0.572000</td>
<td>41.66%</td>
</tr>
<tr>
<td>Germany</td>
<td>mark</td>
<td>0.4530</td>
<td>0.571300</td>
<td>0.258799</td>
<td>18.85%</td>
</tr>
<tr>
<td>Japan</td>
<td>yen</td>
<td>31.8000</td>
<td>0.009011</td>
<td>0.286232</td>
<td>20.85%</td>
</tr>
<tr>
<td>France</td>
<td>Franc</td>
<td>0.8000</td>
<td>0.168380</td>
<td>0.134704</td>
<td>9.81%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>pound</td>
<td>0.0812</td>
<td>1.494500</td>
<td>0.121353</td>
<td>8.84%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td>1.373088</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
The European Currency Unit (ECU)

The value of the European Currency Unit (ECU) in U.S. dollars is calculated by multiplying each currency's weight in the ECU times its current spot rate versus the U.S. dollar.

Example:

<table>
<thead>
<tr>
<th>Country</th>
<th>Currency</th>
<th>Currency per SDR</th>
<th>Spot Rate (01/25/94)</th>
<th>$ / Unit</th>
<th>U.S. dollar Value of components</th>
<th>Percent of Total</th>
<th>Units / $</th>
<th>ECU/unit</th>
<th>Units/ECU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>mark</td>
<td>0.624200</td>
<td>0.571300</td>
<td>$0.3566</td>
<td>32.08%</td>
<td>1.7504</td>
<td>0.5140</td>
<td>1.9455</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>franc</td>
<td>1.332000</td>
<td>0.168380</td>
<td>0.2243</td>
<td>20.18%</td>
<td>5.9389</td>
<td>0.1515</td>
<td>6.6010</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>lira</td>
<td>151.8000</td>
<td>0.000588</td>
<td>0.0892</td>
<td>8.03%</td>
<td>1700.9696</td>
<td>0.0005</td>
<td>1890.5862</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>pound</td>
<td>0.087840</td>
<td>1.494500</td>
<td>0.1313</td>
<td>11.81%</td>
<td>0.6691</td>
<td>1.3446</td>
<td>0.7437</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>Kroner</td>
<td>0.197600</td>
<td>0.147200</td>
<td>0.0291</td>
<td>2.62%</td>
<td>6.7935</td>
<td>0.1324</td>
<td>7.5508</td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>franc</td>
<td>3.301000</td>
<td>0.027480</td>
<td>0.0907</td>
<td>8.16%</td>
<td>36.3901</td>
<td>0.0247</td>
<td>40.4467</td>
<td></td>
</tr>
<tr>
<td>Luxembourg</td>
<td>franc</td>
<td>0.130000</td>
<td>0.027480</td>
<td>0.0036</td>
<td>0.32%</td>
<td>36.3901</td>
<td>0.0247</td>
<td>40.4467</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>Guilder</td>
<td>0.219800</td>
<td>0.510200</td>
<td>0.1121</td>
<td>10.09%</td>
<td>1.9600</td>
<td>0.4590</td>
<td>2.1785</td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td>pound</td>
<td>0.008552</td>
<td>1.435300</td>
<td>0.0123</td>
<td>1.10%</td>
<td>0.6967</td>
<td>1.2913</td>
<td>0.7744</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>Drachma</td>
<td>1.440000</td>
<td>0.003979</td>
<td>0.0057</td>
<td>0.52%</td>
<td>251.3194</td>
<td>0.0036</td>
<td>279.3354</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>peseta</td>
<td>6.885000</td>
<td>0.007061</td>
<td>0.0486</td>
<td>4.37%</td>
<td>141.6230</td>
<td>0.0064</td>
<td>157.4105</td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td>escudo</td>
<td>1.393000</td>
<td>0.005697</td>
<td>0.0079</td>
<td>0.71%</td>
<td>175.5310</td>
<td>0.0051</td>
<td>195.0984</td>
<td></td>
</tr>
</tbody>
</table>

Total                          | $1.1115          | 100.00%             |
Recent Behavior of Prices in International Financial Markets

Mexican peso

[Graph: Mexican Pesos / US$100]

Southeast Asia currencies movements

Indonesian Rupiah

[Graph: Indonesian Rupiah / US$]
Malaysian Ringgit

![Malaysian Ringgit / US$ Graph]

Philippines Pesos

![Philippines Pesos / US$ Graph]
Thai Baht

Thai Baht / US$

Date

Exchange Rate

0 5 10 15 20 25 30 35 40
Answers to end-of-chapter questions

1. What is meant by the expression "the Rules of the Game" when applied to an international financial system? Why are rules desirable for an international financial system?

"Rules of the Game" refers to the responsibilities of policymakers to sustain their commitments in an international monetary system. Thus, one could speak about the rules of the game needed to sustain a pegged rate system, in general, or particular pegging arrangements such as Bretton Woods, the European Exchange Rate Mechanism, or currency boards in use among some countries. Rules are important because they determine, \textit{ex ante}, how policymakers should shape their domestic (or internal) policies and how they should respond to unanticipated economic shocks. By definition, exchange rates involve two countries. So rules are important to indicate which country bears the burden of adjustment when exchange rates are misaligned.

2. In what ways are the policies of countries constrained when they participate in a pegged exchange rate system?

In order to sustain a pegged rate system, countries must follow broadly similar monetary policies that achieve similar inflation rates to sustain purchasing power parity. Other factors that are beyond the direct control of policymakers (such as real productivity growth) may still affect exchange rates. Fiscal policies may be more constrained for their "time consistency." That is, fiscal deficits must be kept equal to the present value of the nation's future taxing power. If time consistency is violated, foreign investors may be unwilling to buy government debt at interest rates at parity with foreign rates. The countries' international reserves act as a buffer, but only as long as there is confidence and credibility in the peg.

3. In what ways are the policies of countries constrained when they participate in a floating exchange rate system?

Floating exchange rates relieve policymakers of an external constraint given by the peg. However, policymakers may be more exposed since beliefs about the current and future monetary and fiscal policies will affect today's exchange rate. Exchange rate changes are an immediate signal to voters and one that affects trade competitiveness and the cost of funds in international markets. Since most market participants prefer stability and predictability, policymakers may feel constrained toward policies that deliver their market characteristics.
4. The period of the international gold standard allowed countries to achieve the twin objectives of strong growth and stable prices. True or false? Discuss.

Cooper (1982) presented evidence to show that growth was slower and inflation volatility greater under the gold standard than it was in the post-World War II period. As the gold standard ended, the United States inaugurated its Federal Reserve System to help stabilize prices and the banking system relative to the record that had been achieved under the gold standard.

5. On what basis was Robert Triffin able to predict a collapse of the Bretton Woods system as early as 1960? Why did the Bretton Woods system survive until 1973?

Triffin observed that around 1960 the U.S. official gold stock was not large enough, when valued at $35 per ounce, to redeem the outstanding supply of U.S. official liabilities held by foreigners. Bretton Woods survived because various stop-gap measures were applied -- an unofficial closing of the gold window, two-tier gold markets separating official and private market prices, Special Drawing Rights (SDR) as a paper gold substitute for central bank reserves, and a 14% US$ devaluation to $42 per ounce of gold in 1971. But none of these measures addressed the fundamental flaws of Bretton Woods.

6. On what basis could it be argued that the United States defaulted on a major international commitment prior to the collapse of Bretton Woods?

The United States had pledged to redeem all official foreign liabilities at a rate of $35 per ounce. The United States first unofficially refused to permit exchanges of US$ for gold (that is, "closing the gold window"), then it changed the official rate of exchange between US$ and gold, and finally the United States officially blocked exchanges of US$ for central bank gold. The US$ remained fully convertible for purchases of goods, securities, or other currencies.

7. What reasons support the argument that the European Monetary System was achieving its objectives prior to 1992?

The EMS countries experienced some convergence in their inflation rates -- driven, in part, by a desire to meet an external objective of stability within the ERM system.

8. Define the term "long-swings" as it pertains to the US$ exchange rate during the floating rate period. How would the existence of "long-swings" affect financial managers?

"Long-swings" refers to the tendency for certain US$ exchange rates to move in one direction for a prolonged period. "Long-swings" behavior is contrary to a random walk, or trend-less behavior. If long-swings are in fact present, then managers may be able to gain by forecasting exchange rates on the basis of past trends.
9. Summarize the high and low measures of exchange rate volatility shown in Figure 2.7 for the DM. Does volatility appear to be constant over time or variable?

Volatility for the $/DM rate was as high as 19% in March 1985 and as low as 8% in August 1987. These measures suggest that volatility, measured by s, has not been constant.

10. Real effective exchange rates appear to be less volatile than nominal exchange rates. Explain why we observe this result.

Real effective exchange rates are generally less volatile than nominal exchange rates because inflation differences account for some portion of exchange rate changes and because a currency is usually stronger against some of its trading partners and weaker against others.

11. Summarize the high and low measures for nominal interest rates shown in Figure 2.9 for a single currency. In general, why do interest rates vary over time rather than take on a constant value?

Short-term Eurodollar interest rates ranged between 10% in 1989 and 3% in 1994. Interest rates respond to the demand and supply of funds in the private sector, the short-term lending rate determined by the nation's central bank, inflation, and other factors. As the demand for funds rises (falls) during an economic expansion (contraction), interest rates tend to rise (fall). Expectations of higher (lower) inflation tend to raise (lower) interest rates.

12. Define the concept of a "real interest rate." Discuss several ways to measure a real interest rate.

The real interest rate (r) is the nominal cost of funds (i) net of inflation (p). The real interest rate could be measured ex ante, based on an expected rate of inflation, or ex post using a realized rate of inflation. The expected rate of inflation could be forecast in various ways to extract a real interest rate. A realized rate of inflation could be measured by the consumer price index, the producer price index, or more specialized consumption bundles again leading to different real interest rate measures. The exact formula for the real interest rate is: \( r = \frac{i - p}{1+p} \). Since inflation rates are often small, especially over short periods, an approximation for the real rate is often used: \( r = i - p \).

13. In general terms, discuss how the conduct of business is affected by whether the international financial system is governed by pegged or floating exchange rates.

In theory, both pegged rate and floating rate systems can be operated to produce stable and predictable financial prices. And in practice, both systems have been operated to produce volatile and unpredictable price changes. The actual outcome depends in part on the frequency and intensity of external shocks which hit the macroeconomy, and in part
on the actions of policymakers. In practice, business managers may assume that a pegged rate system delivers exchange rate changes that are infrequent, but possibly large when they occur. The timing of exchange rate changes may depend on political events. A floating rate system produces continuous exchange rate changes driven by expectations of future monetary and fiscal policies, as well as external shocks. Business managers may be more likely to hedge financial risks under a floating rate system, since price changes are always taking place and may impose costs on the firm. Under pegged rates, managers may hedge on a selective basis and only when the system appears under stress.

14. In 1992, both the United Kingdom and Italy dropped out of the European Exchange Rate Mechanism. After the announcement, British interest rates fell and Italian interest rate rose. Explain why?

In 1992, Britain was saddled with higher unemployment and lower growth and wished to pursue a more expansive monetary policy. By leaving the ERM, the Bank of England was able to lower short-term rates to pursue this policy. For Italy, the ERM had acted as an external constraint keeping Italian monetary and fiscal policies somewhat in check to preserve the lire's link to the DM. When Italy left the ERM, the markets feared less monetary and fiscal restraint, and more inflation and budget deficits. Thus, Italian interest rates rose.

15. The Netherlands appears willing to pursue a European Monetary Union while Britain appears unwilling. What reasons can you list to explain these apparent differences?

The Netherlands appears to judge that it gains more than it loses through EMU. As a small country neighboring Germany, Dutch policymakers may feel that it has little to gain by pursuing an independent monetary policy with its own currency. The gains in terms of efficiency from a common money could be high, once the one-time transition costs are paid. Britain, on the other hand, is a larger country with a tradition of following its own monetary and fiscal policies. The Bank of England is the oldest national central bank and has only very recently been made independent of government. There is great reluctance in Britain to cede the essential elements of monetary policy to a group which is not directly responsible to British (and only British) voters. Implicitly, the British must feel they gain by retaining the option to pursue an independent monetary policy at critical times.

16. Today’s interest rate on 3-month US$ deposits is about 6.0% while the 3-month interest rate on Argentine pesos is about 7.5%. Discuss how this could happen even though Argentina has adopted a currency board.

Currency Board Arrangements: A monetary regime based on an implicit legislative commitment to exchange domestic currency for a specified foreign currency at a fixed exchange rate, combined with restrictions on the issuing authority to ensure the fulfillment of its legal obligation.
The interest differential, the interest rate paid on dollar-denominated accounts versus peso-denominated accounts, represents a market-determined risk premium of the system itself. The differential represents continued doubt over the system’s future.

17. What are the costs and benefits facing Argentina if they decide to abandon their currency board and adopt “full dollarization” in its place?

Beyond Currency Boards to Full Dollarization

Given the success of currency boards in stabilizing exchange rates and lowering inflation, the reader might wonder why policymakers could be less than fully satisfied with a currency board and what policy could offer improved results. While a currency board ties the hands of local monetary authorities and removes practically any scope for an independent monetary policy, the nation still retains its own money. Thus, the country retains the option to abandon the currency board and devalue, an option that might look attractive to exercise if other neighboring countries have devalued (and gained competitiveness) or if the currency board is under speculative attack. The country “pays” for its option by being forced to pay higher interest on loans in domestic currency - because lenders fear that they could be repaid in devalued units.

Several countries that have suffered for many years from currency devaluation, primarily as a result of inflation, have taken steps toward dollarization, the use of the U.S. dollar as the official currency of the country. Currently only Panama, Ecuador, and Liberia—three relatively small countries—officially use the U.S. dollar as their own. Argentina, however, may be next.

The prevalence of the U.S. dollar in Argentine society cannot be understated. Taxi drivers, restaurant owners, and ATM machines all actively utilize and dispense dollars. Virtually all rental and mortgage agreements are now denominated in dollars. Even cellular telephone contracts and payments are dollar-based.

The movement from maintaining a currency board system to dollarizing the entire economy, however, requires dramatic changes in the structure and responsibilities of monetary policy authorities, both in Argentina and in the United States. Under the proposed agreement now under discussion, the U.S. Federal Reserve System would take on the responsibility of regulating and supporting the federal banking system of Argentina. This role, lender-of-last-resort, requires the Fed to ultimately ensure the liquidity and stability of the entire banking system by acting as the lender who would provide additional liquidity during times of crisis.

Although both the United States and Argentina remain skeptical of the current proposals under discussion, the discussion itself indicates the growing interest in the formation of a long-term currency structure in the Americas that may eventually create a euro of its own, the dollar. [Reference: Eiteman, Stonehill, Moffett: Multinational Business Finance, 9th Edition, pp. 32-3.]
In addition, “if dollarization is to work, the government must make big policy sacrifices: it has perforce to renounce exchange-rate and monetary policy and, since it can no longer use inflation to balance its books, it must also be strict in fiscal policy. So if the economy is to grow, the government must attract capital from abroad, and increase productivity. And to adjust to external blows, the labor market must be flexible—and the government must give help to the displaced.”


Additional questions with answers

18. "The operation of the floating exchange rate system post-1973 has been a success." True or false? Discuss.

To gauge "success," we need a benchmark. Relative to those who thought that floating rates would be a disaster, experience has proved that international trade and investment could prosper even under floating rates. Relative to the most rosy scenarios where markets would adjust for all aberrant government policies and perpetually maintain rates at "equilibrium," floating rates have experienced prolonged periods of PPP deviations with substantial shifts in competitiveness. These competitive shifts have, at times, fostered trade friction. A good thought experiment is to imagine the performance of national economies in the 1973-present period under pegged rates, assuming that similar real shocks had hit the world economy. Would macroeconomic performance measured by real growth, inflation, and unemployment have been as favorable under a pegged rate system?

19. Define the concept of "exchange rate system neutrality." What is the importance of this concept for international financial policymaking?

"Exchange rate system neutrality" represents the case where real macroeconomic performance, measured by growth in income, inflation variability, unemployment, or other determinants of performance, is not affected by the choice of the exchange rate system. Policymakers have switched from pegged rates to floating (and in some cases back to pegged rates) based on a belief that under certain circumstances, one system will deliver (or permit) superior macroeconomic performance.
Answers to end-of-chapter exercises

1. Let the current MP/US$ rate be 4 MP/US$. Suppose the MP depreciates to 5 MP/$.
   a. Calculate the percentage depreciation of the MP.
   b. Express the foreign exchange rates in US$ terms and calculate the percentage
      appreciation of the US$.
   c. Does the MP depreciation in (a) equal the US$ appreciation in (b) multiplied by
      negative one? Explain why or why not?

SOLUTIONS:
   a. $(5-4)/4 = 25\%$
   b. $(0.20-0.25)/0.25 = -.05/0.25 = -20\%$
   c. No, in one case the depreciation of the MP is 25% while the appreciation of the
      US$ is only 20%. This happens because we use a different base exchange rate.

2. Let the current MP exchange rate be 4 MP/US$.
   a. A forecaster predicts a 150% MP depreciation. What value of the exchange rate is
      he predicting?
   b. Another forecaster predicts a 60% US$ appreciation. What value of the exchange
      rate is he predicting?
   c. Do the two forecasters in (a) and (b) agree or disagree with each other? Explain.

SOLUTIONS:
   a. $150\% = (X-4)/4; X=10$ MP/US$
   b. -60\% = (X-0.25)/0.25; X=0.10$ US$/MP$
   c. The two forecasters agree with each other. One has expressed the exchange rate
      change in terms of its impact on the value of the MP, while the other has chosen
      to express the exchange rate change in terms of its impact on the US$.
3. Again, let the current MP/US$ rate be 4 MP/US$. Suppose the MP depreciates to 5 MP/$.
   a. Calculate the percentage depreciation of the MP using logarithmic returns (continuous compounding). [Hint: See Box 2.8 and Appendix 4.1]
   b. Calculate the percentage appreciation of the US$ using logarithmic returns (continuous compounding).
   c. Does the MP depreciation in (a) equal the US$ appreciation in (b) multiplied by negative one? Explain why or why not?

   **SOLUTIONS:**
   a. \( \ln(5/4) = 0.223144 \), or 22.3144%
   b. \( \ln(0.20/0.25) = -0.223144 \), or -22.3144%
   c. Yes, in one case the depreciation is 22.31% and the appreciation is -22.31%. With continuous compounding, the magnitude of the changes is identical.

4. Let the current spot rate be 2.00 DM/US$.
   a. Forecaster A believes that in the next period, the DM rate will jump to 1.60 DM/US$ or 2.40 DM/US$ with equal probability. Calculate Forecaster A's expected exchange rate.
   b. Forecaster B tracks the US$/DM exchange rate. His forecasts for the next period are 0.625 US$/DM and 0.416667 US$/DM with equal probability. Calculate Forecaster B's expected exchange rate.
   c. Do A's and B's forecasts of exchange rates agree or disagree? Explain.

   **SOLUTIONS:**
   a. \( 0.5 \times 1.60 + 0.5 \times 2.40 = 2.00 \text{ DM/US$} \)
   b. \( 0.5 \times 0.625 + 0.5 \times 0.416667 = 0.520834 \text{ US$/DM} \)
   c. A and B really agree since 1.60 DM/US$ is the inverse of 0.625 US$/DM, and 2.4 DM/US$ is the inverse of 0.416667 US$/DM. Both A and B agree that two outcomes are possible and they assign the same probability to these outcomes. However, A and B appear to disagree since A's expected exchange rate is 2.00 DM/US$ which is not the inverse of 0.520834 US$/DM. This is a mathematical phenomenon known as Jensen's inequality. Even if the forward rate is the expected exchange rate, it must be a biased predictor of one quoting convention. The bias that originates from this source is called Siegel's paradox.