Chapter 4

Exchange Rate Determination

J. Gaspar: Adapted from Jeff Madura International Financial Management
The SDR was created by the IMF in 1969 to support the Bretton Woods fixed exchange rate system. A country participating in this system needed official reserves—government or central bank holdings of gold and widely accepted foreign currencies—that could be used to purchase the domestic currency in foreign exchange markets, as required to maintain its exchange rate. But the international supply of two key reserve assets—gold and the U.S. dollar—proved inadequate for supporting the expansion of world trade and financial development that was taking place. Therefore, the international community decided to create a new international reserve asset under the auspices of the IMF.
The SDR’s value is based on a basket of four key international currencies, and SDRs can be exchanged for freely usable currencies.

<table>
<thead>
<tr>
<th>Currency</th>
<th>Currency amount under Rule O-1</th>
<th>Exchange rate ¹</th>
<th>U.S. dollar equivalent</th>
<th>Percent change in exchange rate against U.S. dollar from previous calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euro</td>
<td>0.4230</td>
<td>1.12700</td>
<td>0.476721</td>
<td>0.688</td>
</tr>
<tr>
<td>Japanese yen</td>
<td>12.1000</td>
<td>119.83000</td>
<td>0.100976</td>
<td>-0.734</td>
</tr>
<tr>
<td>Pound sterling</td>
<td>0.1110</td>
<td>1.52770</td>
<td>0.169575</td>
<td>-0.966</td>
</tr>
<tr>
<td>U.S. dollar</td>
<td>0.6600</td>
<td>1.00000</td>
<td>0.660000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.407272</td>
</tr>
<tr>
<td>U.S.$1.00 = SDR ²</td>
<td>0.710595</td>
<td></td>
<td></td>
<td>-0.061³</td>
</tr>
<tr>
<td>SDR1 = US$</td>
<td>1.407270 ⁴</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter Objectives

In a system of flexible or floating exchange rates we will try to understand:

- How exchange rate movements are measured;
- How the equilibrium exchange rate is determined; and
- Examine the factors that affect the equilibrium exchange rate.
Measuring Exchange Rate Movements

• An exchange rate measures the value of one currency in units of another currency.

• When a currency declines in value, it is said to depreciate. When it increases in value, it is said to appreciate.

• On the days when some currencies appreciate while others depreciate against a particular currency, that currency is said to be “mixed in trading.”
Measuring Exchange Rate Movements

• The percentage change (% ∆) in the value of a foreign currency is computed as

\[
\frac{S_t - S_{t-1}}{S_{t-1}}
\]

where \( S_t \) denotes the spot rate at time \( t \).

• A positive % ∆ represents appreciation of the foreign currency, while a negative % ∆ represents depreciation.
Exchange Rate Equilibrium

- An exchange rate represents the price of a currency, which is determined by the demand for that currency relative to the supply for that currency.
Exchange Rate Equilibrium

S: Supply of £

D: Demand for £

Equilibrium exchange rate

Value of £

Quantity of £

$1.60

$1.55

$1.50
Exchange Rate Equilibrium

- The liquidity of a currency reflects how easily a particular currency can be bought or sold in the foreign exchange market.

- The $, €, £, and ¥ are liquid since there are many willing buyers and sellers of even large transactions and currency movements are relatively moderate.

- Conversely, illiquid currencies tend to exhibit more volatile exchange rate movements.
Factors that Influence Exchange Rates

\[ e = f(\Delta INF, \Delta INT, \Delta INC, \Delta GC, \Delta EXP) \]

- \( e \) = percentage change in the spot rate
- \( \Delta INF \) = change in the relative inflation rate
- \( \Delta INT \) = change in the relative interest rate
- \( \Delta INC \) = change in the relative income level
- \( \Delta GC \) = change in government controls
- \( \Delta EXP \) = change in expectations of future exchange rates
Factors that Influence Exchange Rates

Relative Inflation Rates

U.S. inflation ↑
⇒ ↑ U.S. demand for British goods, and hence £.

⇒ ↓ British desire for U.S. goods, and hence the supply of £.
Factors that Influence Exchange Rates

Relative Interest Rates

U.S. interest rates $\uparrow$

$\Rightarrow$ $\downarrow$ U.S. demand for British bank deposits, and hence £.

$\Rightarrow$ $\uparrow$ British desire for U.S. bank deposits, and hence the supply of £.
Relative Interest Rates

- A relatively high interest rate may actually reflect expectations of relatively high inflation, which may discourage foreign investment.

- It is thus useful to consider the real interest rate, which adjusts the nominal interest rate for inflation.
Factors that Influence Exchange Rates

Relative Interest Rates

- \( \text{real interest} \equiv \text{nominal interest} - \text{inflation rate} \)

- This relationship is sometimes called the Fisher effect.
Factors that Influence Exchange Rates

Relative Income Levels

U.S. income level $\uparrow$

$\Rightarrow$ $\uparrow$ U.S. demand for British goods, and hence £.

$\Rightarrow$ No expected change for the supply of £.
Factors that Influence Exchange Rates

Government Controls

- Governments may influence the equilibrium exchange rate by:
  - imposing foreign exchange barriers,
  - imposing foreign trade barriers,
  - intervening in the foreign exchange market or implementing QEs, and
  - affecting macro variables such as inflation, interest rates, and income levels.
Factors that Influence Exchange Rates

Expectations

- Foreign exchange markets react to any news that may have a future effect.
  - News of a potential surge in U.S. inflation may cause currency traders to sell dollars.
- Many institutional investors take currency positions based on anticipated interest rate movements in various countries.
Factors that Influence Exchange Rates

Expectations

• Economic signals that affect exchange rates can change quickly, such that speculators may overreact initially and then find that they have to make a correction.

• Speculation on the currencies of emerging markets can have a substantial impact on their exchange rates.
Confounding Effects

Interaction of Factors

• The various factors listed earlier sometimes interact and simultaneously affect exchange rate movements.

• For example, an increase in income levels sometimes causes expectations of higher interest rates, thus placing opposing pressures on foreign currency values.
How Factors Can Affect Exchange Rates

Trade-Related Factors
1. Inflation Differential
2. Income Differential
3. Gov’t Trade Restrictions

Financial Factors
1. Interest Rate Differential
2. Capital Flow Restrictions

U.S. demand for foreign goods, i.e. demand for foreign currency
Foreign demand for U.S. goods, i.e. supply of foreign currency

U.S. demand for foreign securities, i.e. demand for foreign currency
Foreign demand for U.S. securities, i.e. supply of foreign currency

Exchange rate between foreign currency and the dollar

U.S. demand for foreign goods, i.e. demand for foreign currency
Foreign demand for U.S. goods, i.e. supply of foreign currency
Factors that Influence Exchange Rates

Interaction of Factors

• The sensitivity of an exchange rate to the factors is dependent on the volume of international transactions between the two countries.

Large volume of international trade $\Rightarrow$ relative inflation rates may be more influential

Large volume of capital flows $\Rightarrow$ interest rate fluctuations may be more influential
An understanding of exchange rate equilibrium does not guarantee accurate forecasts of future exchange rates because that will depend in part on how the factors that affect exchange rates will change in the future.