Exchange Rates, Business Cycles, and Macroeconomic Policy in the Open Economy, Part 1

Agenda

- Exchange Rates
- How Exchange Rates Are Determined
  - A Supply-and-Demand Analysis

Exchange Rates

- Nominal exchange rates:
  - The nominal exchange rate indicates how much foreign currency can be obtained with one unit of the domestic currency.
  - For example, if the nominal exchange rate is 110 yen per dollar, one dollar can be exchanged for 110 yen.

Exchange Rates

- Nominal exchange rates:
  - Transactions between currencies take place in the foreign exchange market.
  - Denote the nominal exchange rate (or simply, exchange rate) as $e_{nom}$ in units of the foreign currency per unit of domestic currency.
Exchange Rates

• Nominal exchange rates:
  - Under a flexible-exchange-rate system or floating-exchange-rate system, exchange rates are determined by supply and demand and may change every day.
  - This is the current system for major currencies

Exchange Rates

• Nominal exchange rates:
  - In the past, many currencies operated under a fixed-exchange-rate system, in which exchange rates were determined by governments.
    - The exchange rates were fixed because the central banks in those countries offered to buy or sell the currencies at the fixed exchange rate.
    - Though major currencies are in a flexible-exchange-rate system, some smaller countries fix their exchange rates.

Exchange Rates

• Real exchange rates:
  - The real exchange rate indicates how much of a foreign good can be obtained for one unit of a domestic good.
    - Suppose the nominal exchange rate is 110 yen per dollar, a hamburger costs 1100 yen in Japan and $2 in the U.S.
      - The price of a U.S. hamburger relative to a Japanese hamburger is 0.2 Japanese hamburgers per U.S. hamburger.
    - The real exchange rate is 0.2 yen per dollar.
Exchange Rates

- Real exchange rates:
  - Although countries produce many goods, and price indexes should be used to get $P$ and $P_{For}$ to simplify matters, assume that each country produces a unique good.
  - If a country’s real exchange rate is rising, its goods are becoming more expensive relative to the goods of the other country.

Exchange Rates

- Appreciation and depreciation:
  - In a flexible-exchange-rate system:
    - When $e_{nom}$ falls, the domestic currency has become weaker and has undergone a nominal depreciation.
    - When $e_{nom}$ rises, the domestic currency has become stronger and has undergone a nominal appreciation.

Exchange Rates

- Appreciation and depreciation:
  - In a fixed-exchange-rate system:
    - When $e_{nom}$ falls, the domestic currency has become weaker and has undergone a nominal devaluation.
    - When $e_{nom}$ rises, the domestic currency has become stronger and has undergone a nominal revaluation.
Exchange Rates

• Appreciation and depreciation:
  ➢ In a fixed-exchange-rate system:
    • When $e$ falls, the domestic currency has become weaker and has undergone a real devaluation.
    • When $e$ rises, the domestic currency has become stronger and has undergone a real revaluation.

Exchange Rates

• Purchasing power parity:
  ➢ To examine the relationship between the nominal exchange rate and the real exchange rate, think first about a simple case in which all countries produce the same goods, which are freely traded.
    • If there were no transportation costs, the real exchange rate would have to be $e = 1$, or else everyone would buy goods where they were cheaper.

Exchange Rates

• Purchasing power parity:
  ➢ Setting $e = 1$ yields:
    \[ P = \frac{P^*}{e_{\text{nom}}} \]
    ➢ This means that similar goods have the same price in terms of the same currency, a concept known as purchasing power parity, or PPP.

Exchange Rates

• Empirical evidence:
  ➢ PPP holds in the long run but not in the short run.
    • Countries actually produce different goods.
    • Some goods are not traded internationally.
    • There are transportation costs.
    • There are also legal barriers to trade.
### Exchange Rates

- **Purchasing Power Parity:**

  ➢ When *PPP* doesn’t hold, changes in the real exchange rate can be decomposed into its parts:

  \[
  \frac{\Delta e}{e} = \frac{\Delta e_{nom}}{e_{nom}} + \frac{\Delta P}{P} - \frac{\Delta P_{For}}{P_{For}}
  \]

  ➢ This can be rearranged as:

  \[
  \frac{\Delta e_{nom}}{e_{nom}} = \frac{\Delta e}{e} + \pi_{For} - \pi
  \]

### Exchange Rates

- **Purchasing Power Parity:**

  \[
  \frac{\Delta e_{nom}}{e_{nom}} = \frac{\Delta e}{e} + \pi_{For} - \pi
  \]

  ➢ A nominal appreciation is due to either:
  - A real appreciation, and/or
  - A lower rate of inflation relative to the foreign country.

### Exchange Rates

- **Purchasing Power Parity:**

  ➢ *Relative purchasing power parity* works as a description of exchange-rate movements in high-inflation countries.

  - In such countries, movements in relative inflation rates are much larger than movements in real exchange rates.
Exchange Rates

• McParity:

  ➢ As a test of the PPP hypothesis, the Economist magazine periodically reports on the prices of Big Mac hamburgers in different countries.

  ➢ In 2006, the prices, when translated into dollar terms using the nominal exchange rate, range from just over $1 in China to over $5 in Switzerland, so *PPP definitely doesn’t hold.*

Price of a Big Mac

<table>
<thead>
<tr>
<th>Country</th>
<th>Dollar price of a Big Mac</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>5.30</td>
</tr>
<tr>
<td>Argentina</td>
<td>2.29</td>
</tr>
<tr>
<td>Brazil</td>
<td>2.78</td>
</tr>
<tr>
<td>Canada</td>
<td>3.14</td>
</tr>
<tr>
<td>China</td>
<td>1.31</td>
</tr>
<tr>
<td>Euro area</td>
<td>3.77</td>
</tr>
<tr>
<td>Great Britain</td>
<td>3.65</td>
</tr>
<tr>
<td>Japan</td>
<td>2.23</td>
</tr>
<tr>
<td>Malaysia</td>
<td>1.52</td>
</tr>
<tr>
<td>Mexico</td>
<td>2.57</td>
</tr>
<tr>
<td>Russia</td>
<td>1.77</td>
</tr>
<tr>
<td>South Korea</td>
<td>2.62</td>
</tr>
<tr>
<td>Switzerland</td>
<td>5.21</td>
</tr>
</tbody>
</table>

Exchange Rates

• The real exchange rate and net exports:

  ➢ The real exchange rate is important because it represents the rate at which domestic goods and services can be traded for those produced abroad.

  • An increase in the real exchange rate means people in a country can get more foreign goods for a given amount of domestic goods.
Exchange Rates

- The real exchange rate and net exports:
  - The real exchange rate also affects a country’s net exports (exports minus imports).
    - Changes in net exports have a direct impact on export and import industries in the country.
    - Changes in net exports affect overall economic activity and are a primary channel through which business cycles and macroeconomic policy changes are transmitted internationally.

Exchange Rates

- The real exchange rate and net exports:
  - The real exchange rate affects net exports through its effect on the demand for goods.
    - A high real exchange rate makes foreign goods cheap relative to domestic goods, so there’s a high demand for foreign goods so net exports decline.
    - The higher the real exchange rate, the lower a country’s net exports.

Exchange Rates

- The real exchange rate and net exports:
  - The J curve effect:
    - The effect of a change in the real exchange rate may be weak in the short run and can even go the “wrong” way.
    - Although a rise in the real exchange rate will reduce net exports in the long run, in the short run it may be difficult to quickly change imports and exports.

Exchange Rates

- The real exchange rate and net exports:
  - The J curve effect:
    - As a result, a country will import and export the same amount of goods for a time, with lower relative prices on the foreign goods, thus increasing net exports.
    - Similarly, a real depreciation will lead to a decline in net exports in the short run and a rise in the long run.
    - This pattern of net exports is known as the J curve.
The J Curve

• The real exchange rate and net exports:
  ➢ The J curve effect:
    • Our analysis assumes a time period long enough that the movements along the J curve are complete.
    • Thus, a real depreciation raises net exports and a real appreciation reduces net exports.

Exchange Rates

• The real exchange rate and net exports:
  ➢ The J curve effect:
    • Our analysis assumes a time period long enough that the movements along the J curve are complete.
    • Thus, a real depreciation raises net exports and a real appreciation reduces net exports.

How Exchange Rates Are Determined

• What causes changes in the exchange rate?
  ➢ To analyze this, we’ll use supply-and-demand analysis, assuming a fixed price level.
  ➢ Holding prices fixed means that changes in the real exchange rate are matched by changes in the nominal exchange rate.

How Exchange Rates Are Determined

• What causes changes in the exchange rate?
  ➢ The nominal exchange rate is determined in the foreign exchange market by supply and demand for the currency.
  ➢ Demand and supply are plotted against the nominal exchange rate, just like demand and supply for any good.
How Exchange Rates Are Determined

• What causes changes in the exchange rate?
  - Supplying dollars means offering dollars in exchange for the foreign currency.
  - The supply curve slopes upward, because if people can get more units of foreign currency for a dollar, they’ll supply more dollars.

• Why do people demand or supply dollars?
  - People want to buy dollars for two reasons:
    - To be able to buy U.S. goods and services (U.S. exports).
    - To be able to buy U.S. real and financial assets (U.S. financial inflows).
How Exchange Rates Are Determined

• Why do people demand or supply dollars?
  ➢ People want to sell dollars for two reasons:
    • To be able to buy foreign goods and services (U.S. imports)
    • To be able to buy foreign real and financial assets (U.S. financial outflows)

How Exchange Rates Are Determined

• Why do people demand or supply dollars?
  ➢ These transactions are the two main categories in the balance of payments accounts: the current account and the capital and financial account

An increase in foreign income

Factors that increase demand for U.S. exports and assets will increase demand for dollars, shifting the demand curve to the right and increasing the nominal exchange rate:

➢ For example, an increase in foreign income will lead to an appreciation of the dollar.
How Exchange Rates Are Determined

- Macroeconomic determinants of the exchange rate and net export demand:
  - Changes in real output or the real interest rate are linked to the exchange rate and net exports.
    - Generates an open-economy IS-LM model.
  - Effects of changes in output (income):
    - A rise in domestic output raises demand for goods and services, including imports, so net exports decline.
    - To increase purchases of imports, people must sell the domestic currency to buy foreign currency, increasing the supply of the domestic currency to the foreign exchange market, which reduces the exchange rate.
  - The opposite occurs if foreign output (income) rises.
    - Domestic net exports rise.
    - The exchange rate appreciates.
  - Effects of changes in real interest rates:
    - A rise in the domestic real interest rate causes foreigners to want to buy domestic assets, increasing the demand for domestic currency in the foreign exchange market and raising the exchange rate.
    - The rise in the exchange rate leads to a decline in net exports.
How Exchange Rates Are Determined

- Macroeconomic determinants of the exchange rate and net export demand:

  ➢ Effects of changes in **real interest rates**:

    - If the *foreign* real interest rate rises:
      - Domestic net exports rise.
      - The exchange rate depreciates.