Chapter 10
Exchange Rates, Business Cycles, and Macroeconomic Policy in the Open Economy
Economics 282
University of Alberta

The Open Economy
• Two aspects of the interdependence of the world economies:
  – international trade in goods and services;
  – worldwide integration of financial markets.

Nominal Exchange Rates
• If someone in one country wants to buy goods, services, or assets from someone in another country, normally she will first have to exchange her currency for that of her trading partner’s country.
Nominal Exchange Rates (continued)

- The nominal exchange rate, or exchange rate, between two currencies, $e_{nom}$, is the number of units of foreign currency which can be purchased with a unit of the domestic currency.

Exchange Rate Systems

- In a flexible-exchange-rate, or floating-exchange-rate, system exchange rates are not officially fixed, but are determined by conditions of supply and demand in the foreign exchange market.
- Under this system exchange rates move continuously.
Exchange Rate Systems
(continued)

- In a fixed-exchange-rate system exchange rates are set at officially determined levels.
- The official rates are maintained by the commitment of nations’ central banks to buy and sell their own currencies at the fixed exchange rate.

Real Exchange Rate

- The real exchange rate is the number of foreign goods someone gets in exchange for one domestic good.
- Real exchange rates are based on price indexes of “baskets” of goods. We assume that each country produces a single good.

Real Exchange Rate
(continued)

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

- \( E_{nom} \) is the nominal exchange rate;
- \( P_{For} \) is the price of foreign goods, measured in the foreign currency;
- \( P \) is the price of domestic goods, measured in nominal currency.
Appreciation and Depreciation

- Under a nominal depreciation the nominal exchange rate, $\theta_{nom}$, falls, a dollar buys less units of foreign currency, it becomes "weaker".
- Under a nominal appreciation the nominal exchange rate, $\theta_{nom}$, rises, a dollar buys more units of foreign currency, it becomes "stronger".

Appreciation and Depreciation (continued)

- The terms “depreciation” and “appreciation” are associated with flexible exchange rates.
- The fixed-exchange rate system equivalents are devaluation and revaluation.

Appreciation and Depreciation (continued)

- A real appreciation is an increase in the real exchange rate.
- With real appreciation the same quantity of domestic goods can be traded for more foreign goods.
- A real depreciation is a drop in the real exchange rate.
Purchasing Power Parity

- **Purchasing Power Parity (PPP)** similar foreign and domestic goods, or baskets of goods, should have the same price in terms of the same currency \((e=1)\).

Purchasing Power Parity (continued)

- The PPP implies that:
  \[
  e_{\text{nom}} = \frac{P_{\text{For}}}{P}
  \]
  - PPP holds in the very long run.

Purchasing Power Parity (continued)

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

After re-arranging

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

So, relative PPP is

\[
\frac{\Delta e_{\text{nom}}}{e_{\text{nom}}} = \pi_{\text{For}} - \pi
\]
The Real Exchange Rate and Net Exports

- The real exchange rate:
  - represents the rate at which domestic goods can be traded for foreign goods;
  - affects a country’s net export.
- The higher the real exchange rate is, the lower a country’s net exports will be.

How Exchange Rates are Determined

- The nominal exchange rate $\theta_{\text{nom}}$ is the value of a currency, say the dollar.
- The value of the dollar is determined by supply and demand in the foreign exchange market.
Demand for Dollars

- Reasons to demand dollars (national currency):
  - to be able to buy Canadian goods;
  - to be able to buy Canadian real and financial assets.
- The demand curve is downward sloping.

Supply of Dollars

- Reasons to supply dollars (national currency):
  - to be able to buy foreign goods;
  - to be able to buy real and financial assets in foreign countries.
- The supply curve is upward sloping.

Effects of Changes in Output (Income)

- When domestic output (income) rises the demand for imports increases and net exports must fall.
- The domestic currency depreciates, the exchange rate falls.
Effects of Changes in Output (continued)

- When foreign output (income) rises, exports increase and net exports must rise.
- The domestic currency appreciates, the exchange rate rises.

Effects of Changes in Real Interest Rate

- If the domestic country's real interest rate rises, other factors held constant, the country's real and financial assets are more attractive for investment.
- The demand for domestic currency increases and the exchange rate appreciates ($e_{nom}$ rises).

Effects of Changes in Real Interest Rate (continued)

- After the domestic real interest rate rises, the exchange rate appreciation reduces net exports.
- If the foreign country's real interest rate rises, the supply of domestic currency increases, the exchange rate depreciates, and the domestic country net exports rise.
Returns on Domestic and Foreign Assets

• In an open economy, savers have an opportunity to buy financial assets sold by foreign borrowers as well as those sold by domestic borrowers.

Returns on Domestic and Foreign Assets (continued)

• Investment decisions depend on:
  – nominal interest rates;
  – expected changes to the exchange rate.

Returns on Domestic and Foreign Assets (continued)

• The gross nominal rate of return on a foreign bond

\[
\text{expected gross nominal rate} = (1 + i_{\text{for}}) \frac{e'_{\text{nom}}}{e_{\text{nom}}}
\]

(10.4)

\(e'_{\text{nom}}\) is the expected future value of \(e_{\text{nom}}\).
Interest Rate Parity

- The difference in returns cannot persist for long, the nominal interest rates equalize.

Interest Rate Parity (continued)

- The equilibrium for the international asset market or nominal interest rate parity condition:

\[
\frac{e_{\text{nom}}}{e'_{\text{nom}}} (1 + i_{\text{Fur}}) = 1 + i \quad (10.6)
\]

Interest Rate Parity (continued)

- If the nominal exchange rate is expected to remain the same as its current value the nominal interest rate parity condition is

\[ i = i_{\text{Fur}} \]
Interest Rate Parity (continued)

• The real interest rate parity condition is:
  \[ \frac{e}{e'}(1 + r_{For}) = 1 + r \]

• For \( e = e' \) the condition is \( r = r_{For} \), which is the assumption in what follows.

The IS-LM Model for an Open Economy

• Assume that the expected (trend) rates of growth in domestic prices and money supply are given.
• Assume that the expected (trend) rate of growth in foreign prices \( P_{For} \) is given.
• Then changes in \( e \) are equal to changes in \( e_{nom} \).

The Open-Economy IS Curve

• Net exports have to be incorporated into the IS curve:
  – It is still downward sloping.
  – All factors shifting the IS curve in the closed economy shift the IS curve in the open economy.
  – All factors that change net exports also shift the IS curve.
The Open-Economy IS Curve (continued)

- The goods market equilibrium condition for an open economy is:
  \[ S^d - I^d = NX \]
- The \( S-I \) curve is upward sloping, it increases when \( r \) rises.
- The \( NX \) curve is downward sloping, it decreases when \( r \) rises.

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**Figure 16.4**

Goods market equilibrium in an open economy.

The upward sloping curve shows domestic saving \( S^d \) less desired investment \( I^d \). This curve slopes upward because a higher domestic interest rate induces less desired investment, and more domestic saving. The \( NX \) curve indicates net exports at the domestic interest rate. The curve slopes downward because higher domestic interest rates reduce net exports (due to a smaller domestic demand for imports). Net exports, \( NX \), is the excess of international saving over domestic investment. The solid curve shows the goods market at \( r \).
The Open-Economy IS Curve Shifter

- Any factor that changes the real interest rate that clears the goods market at a constant level of output shifts the IS curve.

- Any factor that changes $NX$, given $Y$, will shift the open-economy IS curve.
The Transmission of Business Cycles

- The impact of foreign economic conditions on the real exchange rate and net exports is one of the principal ways by which cycles are transmitted internationally.
- A decline in US output shifts the Canadian IS curve down.

Macroeconomic Policy with Flexible Exchange Rates

- An economy is small.
- The exchange rate does not change, that is \( f = f_{For} \).
- This is known as Mundell-Fleming model.
A Fiscal Expansion and the Flexible Exchange Rate

- An increase in $G$ crowds out $NX$:
  - shifts the $IS$ curve to the right;
  - $r$ is above $r_F$, the demand for Canadian financial assets increases;
  - the $e$ increases and the $NX$ falls;
  - the $IS$ curve shifts to the left where $e = e_F$;
  - no change in $Y$ and $P$.

A Monetary Expansion and the Flexible Exchange Rate

- An increase in $M$:
  - shifts the $LM$ curve to the right;
  - $r$ is below $r_F$, the demand for Canadian financial assets decreases;
  - the $e$ decreases and the $NX$ rises;
  - the $IS$ curve shifts to the right where $e = e_F$. 

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Figure 10.8

An increase in government purchases shifts the IS curve up and to the right, lowering $r_F$ so that the demand for Canadian financial assets decreases; the $e$ decreases and the $NX$ rises. The IS curve shifts to the right where $r = r_F$. No change in $Y$ and $P$.

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A Monetary Expansion (continued)

- The Keynesian model predicts further adjustments in the LR:
  - $Y$ is higher than $\overline{Y}$, $P$ increases;
  - the $LM$ curve shifts to the left;
  - $r$ is above $r_{For}$, the demand for Canadian financial assets increases;
  - the $e$ increases and the $NX$ falls;
  - the $IS$ curve shifts to the left, where $r = r_{For}$.

A Monetary Expansion (continued)

- The Keynesian model predicts:
  - a monetary expansion will result in a higher price level;
  - no change in $Y$, $r$, $NX$, $e$;
  - thus, monetary neutrality holds.

- The money neutrality holds immediately in the classical model.
Fixing the Exchange Rate

- In a fixed-exchange-rate system, the value of the nominal exchange rate is officially set.
- An overvalued exchange rate is a situation when an exchange rate ($e_{\text{nom}}$) is higher that its fundamental value ($e_{1}\text{nom}$).

**Figure 10.10**  
An Overvalued Exchange Rate  
The figure shows a situation in which the officially fixed nominal exchange rate, $e_{\text{nom}}$, is higher than the fundamental value of the exchange rate, $e_{1}\text{nom}$, as determined by supply and demand in the foreign exchange market. In this situation, the exchange rate is said to be overvalued. The country’s central bank can remedy the exchange rate at the official rate by selling its currency in the foreign exchange market, in the amount of $S$ per export. This loss of reserves also is reflected in an annulus of a balance of payments deficit.

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Overvalued Exchange Rate

- In a situation of an overvalued exchange rate a government can:
  - devalue its nominal fixed exchange rate;
  - restrict international transactions;
  - buy back its currency in foreign exchange market.
Overvalued Exchange Rate (continued)

- To support the domestic currency the central bank must use the reserves that correspond to the country’s balance of payment deficit.
- It cannot do that forever because the amount of reserves is limited.

A Speculative Run

- An attempt to support an overvalued currency can be ended by a speculative run – to avoid losses, financial investors frantically sell assets denominated in the overvalued currency.
How to Support an Overvalued Currency

- To support an overvalued currency a country could:
  - impose strong restrictions on international trade and finance;
  - devalue its currency;
  - make a policy change to raise the fundamental value of the exchange rate (use monetary policy).

Undervalued Exchange Rate

- An undervalued exchange rate exists if the officially fixed value is lower than the fundamental value of the exchange rate.
- An undervalued exchange rate could be maintained indefinitely if a country trading partners would not lose their reserves.
A Monetary Policy and the Fixed Exchange Rate

• An increase in $M$:
  – shifts the $LM$ curve to the right, $r$ is below $r^F$,
  – the exchange rate is overvalued.

• An decrease in $M$:
  – shifts the $LM$ curve to the left, $r$ is above $r^F$,
  – the exchange rate is undervalued.
A Monetary Policy (continued)

- Under fixed exchange rate the central bank cannot use monetary policy to pursue macroeconomic stabilization goals.

A Fiscal Policy and the Fixed Exchange Rate

- An increase in $G$:
  - shifts the IS curve to the right, $r$ is above $r_{For}$;
  - the exchange rate is undervalued;
  - the monetary expansion accommodates the fiscal expansion, LM shifts to the right where $r = r_{For}$. 

Figure 10.15
Determination of the exchange rate under fixed exchange rate

The downward-sloping imperfect capital mobility curve shows that a higher domestic interest rate would cause a lower fundamental value of the exchange rate. Only when the monetary policy is accommodated by the exchange rate does the exchange rate correspond to the fundamental value. If the exchange rate is undervalued, the monetary policy would become accommodated. A monetary policy to offset an exchange rate is a neutral policy.

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A Fiscal Policy (continued)

- $e_{\text{nom}}, P$ and $P_{\text{for}}$ are fixed in the short run and under the fixed exchange rate, $e$ is fixed.
- In the long run $P$ increases, $e$ increases, $NX$ fall.
- Eventually $NX$ have been crowded out by the fiscal expansion.

A Fiscal Policy (continued)

- In the classical model $P$ and $e$ increase immediately in response to the fiscal expansion and $NX$ is immediately crowded out.
- Under the fixed exchange rate fiscal policy is an effective tool for adjusting domestic output in the Keynesian short run.
Fixed versus Flexible Exchange Rates

- Benefits of fixed-exchange-rate systems:
  - less costly trade in goods between countries, i.e. lower transaction cost;
  - promoted monetary policy discipline.
- The downside is inability of a country to use its monetary policy to deal with recessions.

Open-Economy Trilemma

- In selecting an exchange rate system a country can choose only two of the three features:
  - a fixed exchange rate to promote trade;
  - free international movement of capital;
  - autonomy for domestic monetary policy.

Fixed Exchange Rate System

- Fixed exchange rates are useful when used in a group of countries:
  - large benefits can be gained from increased trade and integration;
  - monetary policies can be coordinated closely.
Flexible Exchange Rates System

- A flexible exchange rate system is useful if a country has specific macroeconomic shocks. Then they can be reduced with help of monetary policy.

Currency Unions

- A currency union is sharing of a common currency by a group of countries.
- A currency union reduces the cost of trading and prevents speculative attacks on currencies.
- However, monetary policies cannot be independent.

The Self-Correcting Small Economy

- A small open economy has more sources of unexpected shocks.
- However, there also exist a correcting mechanism in addition to the price level – an exchange rate adjustment.
The Self-Correcting Small Economy (continued)

- A fixed-exchange-rate system:
  - neutralized both fiscal policy and the shocks to the IS curve;
  - monetary policy and shocks to the LM curve have a magnified impact.

The Self-Correcting Small Economy (continued)

- A flexible-exchange-rate system neutralizes monetary shocks and magnifies effects of the fiscal policy.

End of Chapter