

Introduction to Macroeconomics

Robert M. Kunst

`robert.kunst@univie.ac.at`

University of Vienna
and

Institute for Advanced Studies Vienna

June 19, 2012

Outline

Introduction

National accounts

The goods market

The financial market

The IS-LM model

The labor market

The AS-AD model

Phillips curve, Okun's Law, and medium-run dynamics

The open economy

Openness in goods and financial markets

The goods market in an open economy

The Mundell-Fleming model

These slides follow the original slides of QUIJANO/QUIJANO that accompany the BLANCHARD textbook.

The model developed in this chapter is an extension of the IS-LM model to an open economy, known as the Mundell-Fleming model.

The main questions we try to solve are:

- ▶ What determines the exchange rate?
- ▶ How can policy makers affect exchange rates?

Equilibrium in the goods market

Equilibrium in the goods market can be described by equating demand for domestic goods and their production:

$$Y = C(Y - T) + I(Y, i) + G - \frac{1}{\varepsilon} IM(Y, \varepsilon) + X(Y^*, \varepsilon)$$

(+)
(+, -)
(+, +)
(+, -)

or, using the definitional identity

$$NX(Y, Y^*, \varepsilon) \equiv X(Y^*, \varepsilon) - \frac{1}{\varepsilon} IM(Y, \varepsilon),$$

more compactly, assuming Marshall-Lerner:

$$Y = C(Y - T) + I(Y, i) + G + NX(Y, Y^*, \varepsilon)$$

(+)
(+, -)
(-, +, -)

Behavior of demand components

- ▶ Private consumption C depends positively on disposable income $Y - T$;
- ▶ Investment I depends positively on output Y and negatively on the interest rate i ;
- ▶ Government spending G is taken as given;
- ▶ The quantity of imports IM depends positively on both output Y and the real exchange rate ε ;
- ▶ Exports X depend positively on foreign output Y^* and negatively on the real exchange rate ε .

Interpreting the equilibrium condition

$$Y = C(Y - T) + I(Y, i) + G + NX(Y, Y^*, \varepsilon)$$

(+) (+, -) (-, +, -)

The main implication of this equation is that both the interest rate and the real exchange rate affect demand and, in turn, equilibrium output:

- ▶ An increase in the interest rate leads to a decrease in investment spending, and to a decrease in the demand for domestic goods;
- ▶ An increase in the real exchange rate leads to a shift in demand toward foreign goods, and to a decrease in net exports.

Exogenous and fixed prices

This section assumes for simplicity that prices P and also P^* are exogenous and fixed.

Thus, there is zero inflation $\pi = 0$ and zero expected inflation $\pi^e = 0$. The nominal and the real exchange rate move together $\varepsilon = E$.

The equilibrium condition can be written as:

$$Y = C(Y - T) + I(Y, i) + G + NX(Y, Y^*, E)$$

(+) (+, -) (-, +, -)

Equilibrium in financial markets

Now that we look at a financially open economy, we must also take into account the fact that people have a choice between domestic bonds and foreign bonds.

We wrote the condition that the supply of money be equal to the demand for money as:

$$\frac{M}{P} = Y \cdot L(i).$$

We can use this equation to think about the determination of the nominal interest rate in an open economy

Domestic versus foreign bonds

Remember the uncovered interest parity (UIP) that follows from an arbitrage condition:

$$1 + i_t = (1 + i_t^*) \frac{E_t}{E_{t+1}^e}$$

The left side gives the return on domestic bonds, in terms of domestic currency. The right side gives the expected return on foreign bonds, also in terms of domestic currency. In equilibrium, the two expected returns must be equal.

Interest rates determine the exchange rate

If the expected future exchange rate is exogenous and given, i.e. $E^e = \bar{E}^e$, then:

$$E_t = \frac{1 + i_t}{1 + i_t^*} \bar{E}^e$$

or, without time subscripts:

$$E = \frac{1 + i}{1 + i^*} \bar{E}^e.$$

Interpreting the equilibrium formula for the exchange rate

$$E = \frac{1 + i}{1 + i^*} \bar{E}^e.$$

This relation says that the current exchange rate depends on the domestic interest rate, on the foreign interest rate, and on the expected future exchange rate:

- ▶ An increase in the domestic interest rate leads to an increase in the exchange rate;
- ▶ An increase in the foreign interest rate leads to a decrease in the exchange rate;
- ▶ An increase in the expected future exchange rate leads to an increase in the current exchange rate.

A monetary contraction implies an appreciation

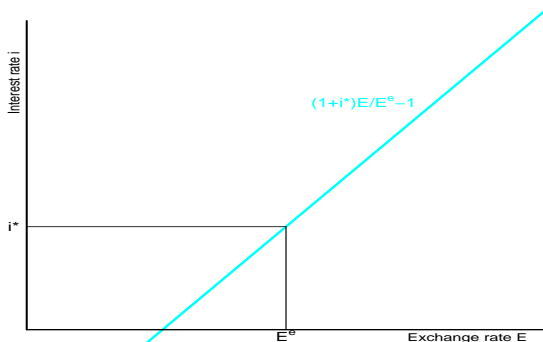
An increase in the domestic interest rate, say, after a monetary contraction, will cause the domestic interest rate to increase, and the demand for domestic bonds to rise. As investors switch from foreign currency to home currency (in our case, euros), the euro appreciates.

The more the euro appreciates, the more investors expect it to depreciate in the future, as the expected rate \bar{E}^e is unchanged.

The initial appreciation must be such that the expected future depreciation compensates for the increase in the domestic interest rate. When this is the case, investors are again indifferent and equilibrium prevails.

Interest parity: graphical representation

In an (E, i) -diagram, the interest-rate parity for given i^* , \bar{E}^e is a positively sloped line:



The point (\bar{E}^e, i^*) is on the line: if $E = E^e$, interest rates are equal.

IS-LM in an open economy

The open-economy versions of the IS relations is

$$Y = C(Y - T) + I(Y, i) + G + NX(Y, Y^*, \frac{1+i}{1+i^*} \bar{E}^e)$$

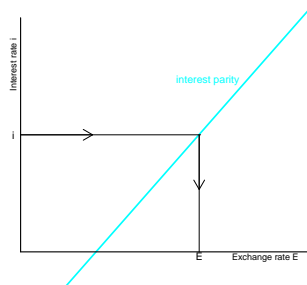
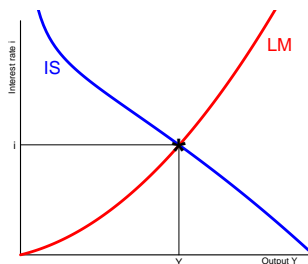
by substituting for E from the interest parity. For the LM relation, we have

$$\frac{M}{P} = Y \cdot L(i)$$

An increase in the interest rate now has two effects in the IS part:

- ▶ The first effect, which was already present in a closed economy, is the direct effect on investment;
- ▶ The second effect, which is present only in the open economy, is the effect through the exchange rate.

IS-LM in an open economy: graphs



The equilibrium interest rate from the IS-LM model determines the exchange rate E .

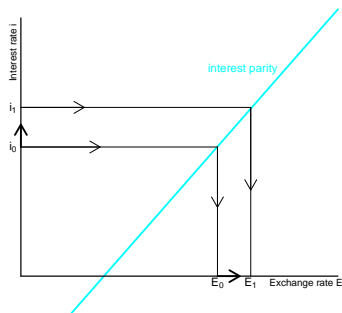
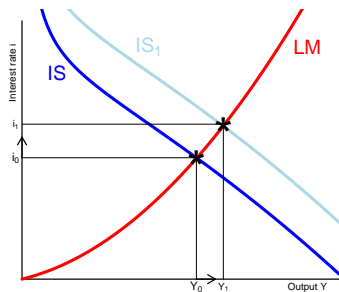
Default risk and sudden stops

In the model world, bonds have zero default risk. Bond holders receive the bond value inclusive of interest with probability one.

In the real world, even government bonds have positive **default risk**. UIP will not hold exactly, and differences in interest rates across countries may not only reflect expected exchange rates but also discrepancies in default risk. For example, interest differentials across the eurozone may not reflect expectations of different exchange rates and thus the probability of a country leaving the eurozone but rather different risks of bankruptcy.

Episodes during which bond holders want to sell all the assets they have in a country, no matter what the interest rate, are known as **sudden stops**. Such episodes have affected many Latin American and Asian emerging economies.

Fiscal expansion in an open economy: graphs



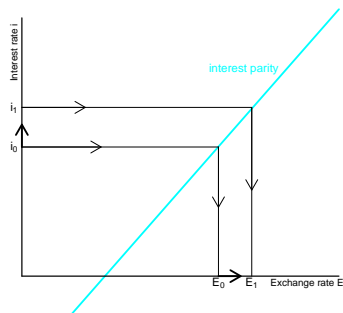
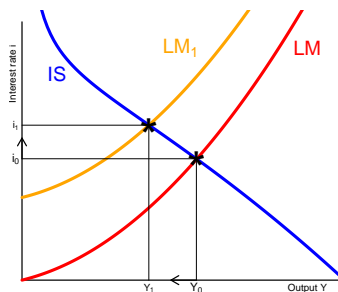
A fiscal expansion entails an appreciation.

The effects of a fiscal expansion in an open economy

What happens to the demand components when the government increases spending G ?

- ▶ Consumption C and government spending G both go up;
- ▶ The effect of fiscal policy on investment I was ambiguous in the closed economy, it remains ambiguous in the open economy;
- ▶ Both the increase in output and the appreciation combine to decrease net exports NX .

Monetary contraction in an open economy: graphs



A monetary contraction entails an appreciation.

The effects of a monetary contraction in an open economy

What happens to the demand components when the central bank decreases the money supply?

- ▶ Consumption C decreases as Y falls;
- ▶ Government spending does not change;
- ▶ Investment I suffers from the higher interest rate and falls;
- ▶ The effect on net exports NX is uncertain: the appreciation harms net exports but the lower output implies lower import demand and thus improves NX ;
- ▶ Conversely, a monetary expansion increases C and I with little if any cost in NX . Monetary policy is rather powerful in an open economy.

Pegs and their kin

Many central banks act under implicit and explicit exchange-rate targets and use monetary policy to achieve those targets.

Some countries operate under **fixed exchange rates**. These countries maintain a fixed E in terms of a specific foreign currency, such as the U.S. dollar or the euro.

Other countries operate under a **crawling peg**. These countries typically have inflation rates that exceed those of the major OECD economies.

Some countries maintain their bilateral exchange rates within some **bands**. The most prominent example is the European Monetary System (EMS). Under the EMS rules, member countries agreed to maintain their exchange rate vis-à-vis the other currencies in the system within narrow limits or bands around a central parity.

Pegging the exchange rate and monetary control

The interest parity condition is

$$1 + i_t = (1 + i_t^*) \frac{E_t}{E_{t+1}^e}.$$

Pegging the exchange rate $E_t \equiv E_{t+1}^e \equiv \bar{E}$ turns this relation into

$$1 + i_t = 1 + i_t^* \therefore i_t = i_t^*.$$

In words: Under a fixed exchange rate and perfect capital mobility, the domestic interest rate must be equal to the foreign interest rate.

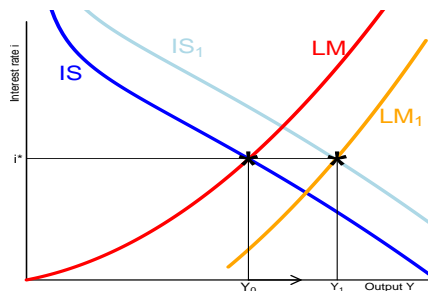
The end of monetary policy

Increases in the domestic demand for money must be matched by increases in the supply of money in order to maintain the interest rate constant, so that the following condition holds:

$$\frac{M}{P} = Y \cdot L(i^*)$$

In summary: Under fixed exchange rates, the central bank gives up monetary policy as a policy instrument.

Fiscal expansion under fixed exchange rates: graph



The central bank must accommodate the resulting increase in the demand for money. The outward shift of the IS curve must be followed by an outward shift of the LM curve.

The inherent problems of fixing the exchange rate

Reasons why fixing the exchange rate appears to be a bad idea:

- ▶ By fixing E , a country gives up a powerful tool for correcting trade imbalances or changing the level of economic activity;
- ▶ By committing to a particular E , a country abandons control of its interest rate, it must match movements in the foreign interest rate: risk of unwanted effects on its own activity;
- ▶ Although the country retains control of fiscal policy, one policy instrument is not enough. A country that wants to decrease its budget deficit can no more use a monetary expansion to offset the contractionary effect on output.

Of course, a fixed exchange rate has also advantages: elimination of depreciation and appreciation risk for trade and financial markets, import of price stability etc.