Lecture 6: Intermediate macroeconomics, spring 2016

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Literature: Krugman-Obstfeld-Melitz, chapters 17 and 18.



Topics

- Stabilisation policy under a flexible exchange rate
- Zero interest rates and the liquidity trap
- Systems of fixed exchange rates
- Interest rate parity under a fixed exchange rate
- Stabilisation policy under a fixed exchange rate
- Why devalue?
- Speculative attacks
- The gold standard, the Bretton Woods system and the ERM



A permanent change in money supply



Time

Fig. 17-14: Short-Run Effects of a Permanent Increase in the Money Supply



Fig. 17-15: Long-Run Adjustment to a Permanent Increase in the Money Supply



Fig. 17-16: Effects of a Permanent Fiscal Expansion



Why has a permanent fiscal policy no output effects?

- In the long run we have Y = Y_f and R = R* (output and interest rate at their equilibrium levels). Because P = M^s/L(Y_f, R*), P must be unchanged in the long run.
- In the short run M^s/P is given. Assume that Y↑. Then R↑.
 From interest rate parity we then have (E^e E)↑.
 A nominal exchange rate depreciation is expected.
- But an expected nominal depreciation must also imply an expected real depreciation as P is given in the long run. This cannot be true because Y must then increase even more in the long run than in the short run and can then never return to its equilibrium level $Y_{f.}$
- But everything will fit together if *Y* never changes, so that *Y* = *Y_f* even in the short run.



The mathematics of a permanent fiscal expansion

$$\frac{M^s}{P} = L(Y, R) \tag{1}$$

 $R = R^* + (E^e - E)/E$ (2)

$$Y = D(EP^*/P, Y-T, I, G, Y^*)$$
(3)

If $G\uparrow \Rightarrow E = E^e \downarrow$ so that *Y* remains constant according to equation (3), equations (1) and (2) are also fulfilled.

Initial equilibrium

 $Y = \overline{Y}$

 $R = R^*$ if $E^e = E$

<u>New equilibrium</u>

 $Y = \overline{Y}$

 $R = R^*$ if $E^e = E$

 $G \uparrow E^e = E \downarrow EP/P^* \downarrow$

Real appreciation

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The liquidity trap

- Monetary policy becomes inefficient when the interest rate reaches zero
- 1930s
- Japan from 1999
- Several economies in the recent recession
 - The Eurozone now
 - Sweden now



The Swedish Repo Rate



Note. Outcomes are daily data and the forecasts refer to quarterly averages.

Source: The Riksbank

Central Bank Interest Rates



$$R = R^* + (E^e - E)/E$$
$$R = 0 \Rightarrow 0 = R^* + (E^e - E)/E$$
$$E = E^e/(1 - R^*)$$

- When the domestic interest rate has reached zero, further increases in money supply *cannot* affect the exchange rate.
- At constant *M*/*P*, *R* = 0 will be reached when *Y* is below same value (as this implies low demand for real money balances).





How to deal with a liquidity trap

- Credible promise to raise money supply permanently
 - The idea is to create expectations of future inflation which will reduce the real interest rate (nominal interest rate minus inflation, that is make it negative at the zero interest rate)
- Unconventional monetary policy
 - Buy long-term (government) bonds (quantitative easing)
 - Done in the US during the financial crisis
 - Now large-scale purchases by the ECB
 - Also by Sveriges Riksbank
- Use fiscal policy



Figure 1:11. Purchases of government bonds decided by the Riksbank

Note: The purchase of government bonds will continue until the end of June 2016. As the Riksbank intends to reinvest coupon payments on the holdings of nominal government bonds, the nominal amount will not be exactly SEK 200 billion.

Source: The Riksbank



Figure 2:2. Government bond rates with 10 years left to maturity

Source: Macrobond

Is there really a zero interest-rate bound?

- Conventional wisdom has held that the interest rate cannot be reduced below zero
 - Otherwise no one would hold bonds/bank deposits
- But the Swedish repo rate is now -0,35 per cent
- Private banks still hold money in accounts at *Sveriges Riksbank*
- Borrowing rates for households and firms are still positive
- Rates on bank deposits are zero in the big banks
- Depositors would still hold money on deposits with negative interest rates in some range
 - Slightly negative rates can be seen as a cost of storing money in a safe place instead of in the mattress
 - But with very negative rates money would be put in safe deposits and storing firms would likely appear
 - This puts a limit to how negative rates can be for depositors
 - No one knows where the limit is

The size of the government spending multiplier

- How large is the government spending multiplier?: $\Delta Y / \Delta G$
- Important to know for fiscal policy in a downturn (recent recession)
- Traditional estimates: 0.5-1
- Larger multipliers in a recession (liquidity trap): 1.7-3.7 according to some estimates
- Figure 17-16 (permanent fiscal expansion under normal conditions and a flexible exchange rate): 0
- Figure 17-11 (temporary fiscal expansion under normal conditions and a flexible exchange rate): 0.5-1
- Figure 17-19 (temporary fiscal expansion in a liquidity trap and a flexible exchange rate): 1.7-3.7

Fixed exchange rates historically

- Gold standard: 1871-1915
- Failed attempts to restore the gold standard: 1920s
- Bretton-Woods system: 1945 1973

Current situation

- From 1973 floating exchange rates between most OECD currencies.
- But many small open economies have chosen to peg their currencies to large currencies (dollar, the British pound, euro – earlier the D-mark or the French franc) or a currency basket (a weighted average of currencies).
- Some countries have a "crawling peg" (depreciation against another currency at a given rate) or a "managed float" (the central bank tries to influence a floating exchange rate but does not change it according to a predetermined plan).



Sweden

- 1945 73: Fixed exchange rate within the Bretton Woods system (devaluation 1949)
- 1973 –77: Fixed exchange rate to the D-mark within the European "snake" (devaluation 1976)
- 1977 91: Fixed exchange rate to a trade-weighted basket with extra weight for the dollar (repeated devaluations: 1977, 1981 and 1982)
- 1991 92: Fixed exchange rate to the ecu (weighted average of the currencies within the EU). Abandoned after exchange rate crisis.
- 1992 ?: Freely floating exchange rate with inflation target for the central bank
- ? ?: EMU membership with the euro as the common currency????? (right now this seems very unlikely)



ERM (European Exchange Rate Mechanism) established 1979. Exchange rate band +/- 2.25% around central parity. Widened band after exchange rate crises 1992/93 to +/- 15 %, but Belgium, Denmark, France, Germany and the Netherlands maintained the earlier narrow bands.

ERM 2 after the start of EMU: 1999 – 2000 Denmark + Greece + euro area. Today Denmark and euro area. Condition for EMU entry: ERM membership for two years. Slovenia, Cyprus, Malta, Slovak Republic, Estonia, Latvia and Lithuania have been ERM members but are now in the euro area.



The central bank balance sheet

Assets	Liabilities
Foreign assets	Deposits held by private banks
Domestic assets	Currency in circulation
	Net worth



The central bank balance sheet (cont.)

- Foreign assets: foreign currency bonds owned by the central bank (international reserves). Affected by the central bank's interventions in the foreign exchange market. Gold included.
- Domestic assets: the central bank's claims on its own citizens and domestic institutions. Typically domestic government bonds and loans to domestic private banks.
- Deposits by private bank: may be withdrawn from the central bank at any time
- Currency in circulation: notes and coins
- Assets = liabilities + net worth
- Assume that the bank's net worth is constant: changes in the central bank's assets will be mirrored in the central bank's liabilities ⇒ changes in the central bank's assets affect the domestic money supply.
- Central bank liabilities = the monetary base = central bank money
- The money supply is a multiple of the monetary base



How can the central bank increase the money supply?

- Purchase foreign assets (increase the foreign exchange reserves)
- Purchase domestic assets (the stock of assets held by the private sector decreases)
 - The money the central bank uses to pay for the purchase directly enters the money supply and causes it to expand
 - Repurchase (repo) transactions: if the central bank purchases government bills, it also enters an agreement to sell the bills at a given future date.
 - Repo transactions affect the repo rate, i.e. the short-term interest rate.



Money supply and the current crisis

- Normally central banks only make transactions in shortterm papers
- In the economic crisis central banks have increased the money supply also through transactions in longer-term papers (quantitative easing, unconventional measures)
 - purchase of government and commercial bonds
 - lending to banks against corporate debt collateral
 - lending to banks on longer term
- Huge expansion of central bank balance sheets





Figure 4-1: The monetary base

A fixed exchange rate and interest rate parity

Interest rate parity: $R = R^* + (E^e - E)/E$ Credible fixed exchange rate $\Rightarrow E^e = E$. This implies: $R = R^*$

Monetary policy must be pursued such that: $M/P = L(R^*, Y)$ $Y^\uparrow \Rightarrow L^\uparrow$. This must be matched by M^\uparrow



Monetary policy and fixed exchange rates

- Under a fixed exchange rate the central bank buys and sells foreign assets to keep the exchange rate fixed and to maintain domestic interest rates equal to foreign interest rates
- Under a fixed exchange rate the central bank is not able to adjust domestic interest rates to attain other goals
- Monetary policy in therefore ineffective in influencing output and employment



Fig. 18-1: Asset Market Equilibrium with a Fixed Exchange Rate, *E*





Fiscal policy and fixed exchange rates in the short run

- Expansionary fiscal policy increasing output and income raises demand of real monetary assets, putting upward pressure on interest rates and on the domestic currency.
- To prevent an appreciation of the domestic currency, the central bank buys foreign assets, thereby increasing the money supply and decreasing interest rates.





Conclusions on stabilisation policy

- Flexible exchange rate
 - Monetary policy is the primary stabilisation tool
 - Fiscal policy is not so effective (exchange rate offset)
- Fixed exchange rate
 - Monetary policy is ineffective (tied down by interest rate parity)
 - Fiscal policy is the only effective stabilisation tool



Devaluations and revaluations

- Depreciations and appreciations: changes in the value of a currency under a floating exchange rate. Governed by markets.
- Devaluations and revaluations: changes in the value of a currency under a fixed exchange rate. Governed by the central bank.
- Devaluation: a unit of domestic currency is made less valuable, so that more units must be exchanged for one unit of foreign currency.
- Revaluation: a unit of domestic currency is made more valuable, so that fewer units need to be exchanged for one unit of foreign currency.



Devaluation

- The central bank buys foreign assets ⇒ the money supply increases and domestic interest rates fall, causing a fall in the rate return on domestic currency deposits.
- Domestic products become less expensive relative to foreign products ⇒ aggregate demand and output increase.
- Official international reserve assets, i.e. foreign bonds, increase.



Fig. 18-4: Effect of a Currency Devaluation



Why does a country devalue?

- 1. Expansionary fiscal policy may be impossible because of large budget deficits and large government debt: Sweden 1992 or Argentina 2001.
- 2. Under a fixed exchange rate and free capital movements an exchange rate devaluation is the only way of using monetary policy.
- 3. Past inflation may have deteriorated international competitiveness and "priced a country out of international markets".
- 4. Foreign exchange reserves may be depleted, for example because of large current account deficits.



Balance of payment crisis

- A balance of payments crisis arises if the central bank does not have enough international reserves to maintain the fixed exchange rate.
- To sustain a fixed exchange rate the central bank must have enough foreign assets to sell to meet the demand for the national currency at the fixed exchange rate.
- If investors expect that the domestic currency will be devalued, they will demand foreign assets instead of domestic assets (whose value is expected to fall).
- This fear exacerbates the crisis:
 - Investors exchange domestic currency for foreign currency depleting the foreign exchange reserves even more.
 - Financial capital is moved to foreign assets: capital flight. The government can seek to keep capital in the country by raising the interest rate, i.e. by decreasing the money supply.
- The outcome is high interest rates, low money supply, low aggregate demand, low output and low employment.

Fig. 18-5: Capital Flight, the Money Supply, and the Interest Rate



Speculative attacks

- 1. Response to future unavoidable development
- 2. Self-fulfilling expectations (multiple equilibria)

It is always "<u>technically possible</u>" to defend a fixed exchange rate through selling foreign currency from foreign exchange reserves or currency obtained from borrowing: the problem is the <u>goal conflicts caused by high interest rates</u>

- Lower employment
- Higher interest rates on government debt and thus larger government budget deficits
- Private sector bankruptcies (banks and financial firms)

Examples: Sweden 1992, Mexico 1994, Brazil 1998-99,

Argentina 2001

- Dramatic increases in unemployment
- Huge government budget deficits
- Bankruptcies of banks, financial firms and real estate firms





Speculative attacks on a strong currency

- Flight to Swiss francs during the financial and euro crises
- Appreciation of the Swiss franc threat to Swiss competitiveness
- The Swiss central bank set a floor to the franc/euro exchange rate of 1.2 in August 2011
- Prepared to buy unlimited amounts of euros to defend the floor
- Credible promise in the sense that the central bank can never run out of Swiss francs always possible to print unlimited amounts
- But growth of forex reserves causes the money supply to increase and could cause inflation
- But this did not happen because of the recession
- But in the end the floor was abandoned in January 2015 and the Swiss franc appreciated

Fig. 18-6: The Swiss Franc's Exchange Rate against the Euro and Swiss Foreign Exchange Reserves, 2006–2013





CHF vs. EUR: Change from 1 January 2013 to 15 August 2015

Source: European Central Bank

The Baltic economies

- Fixed exchange rates vis-à-vis the euro
 - currency boards
 - all outstanding central bank debt backed by foreign currency reserves
- Typical emerging-market crisis
 - earlier large current-account deficits and capital inflows (Swedish banks)
 - reckless lending by Swedish banks
 - high inflation and lost cost competitiveness
 - capital flow reversals
 - expectations of exchange rate depreciations
 - interest rate hikes
 - deep recessions
- Need to restore competitiveness through wage and price cuts

$$-\frac{EP^*}{P}\uparrow$$
 by lowering *P* at constant *E*



Why didn't the Baltic economies devalue?

- Violation of EMU entry criterion
- Fixed exchange rate seen as anchor for low inflation
- Most of private-sector debt is in euros (foreign currency)
- Devaluation would increase the domestic-currency value of debt denominated in euros

 $D = ED^*$

• But what matters is the <u>real</u> burden of debt

$$\frac{D}{P} = \frac{ED^*}{P}$$

- The real burden of debt increases also if $P \downarrow$
- <u>Main difference</u>: it takes longer time to achieve real exchange rate depreciation through wage/price cuts than through exchange rate devaluation
- But surprisingly large cuts in nominal wages and unit labour costs





Source: Eurostat, last accessed 15 January 2013.

Fig. 18-8: Growth Rates of International Reserves



The historical gold standard

- During the <u>gold standard</u> central banks guaranteed that currencies could be converted into gold at a fixed price
- The gold standard thus implied a fixed price of different currencies in gold: this locked all cross exchange rates between different currencies
- The gold standard tied changes in money supply to changes in the gold stock: this ensured that inflation would not run away
 - An increase in gold production (so that the gold stock increases) would reduce the price in the ordinary market below the fixed
 - parities to currencies
 - Hence gold producers would sell gold to central banks
 - Central banks would pay by printing money
- The gold standard was abandoned only during deep crises (usually wars): implicit commitment to return to earlier parities afterwards
- Long-run price movements tied to changes in the gold stock associated with swings in gold production
- Monetary policy could not be used for stabilisation of the business cycle

Gold-dollar exchange standard in the Bretton Woods system

- The dollar functioned as a <u>reserve currency</u>
- N 1-problem: With N currencies only N 1 countries need to maintain fixed exchange rates (because there are only N – 1 exchange rates)
- The reserve currency country (the US) can choose any rate of change of money supply: the others must adjust their money supply increases and interest rates so that they maintain fixed exchange rates vis-à-vis the dollar.
- The system worked until the US started printing money and create inflation in the 1960s (financing of the Vietnam war and domestic social reforms)
- Other countries (Germany, France, Japan) were not prepared to maintain fixed exchange rates, as this implied that they would import inflation
- The Bretton-Woods system broke down after a series of serious exchange rate crises



Fig. 18-9: Currency Composition of Global Reserves



Source: International Monetary Fund, Currency Composition of Foreign Exchange Reserves, at http://www.imf.org/external/np/sta/cofer/eng/index.htm. These data cover only the countries that report reserve composition to the IMF, the major omission being China.

ERM system in the 1980s and 1990s

- Germany functioned as reserve currency country
- Germany determined the inflation rate in the ERM area (other countries could import price stability from Germany)
- But German monetary policy aimed at stabilising the German business cycle
- In the early 1990s after German unification there was a strong boom in Germany at the same time as Europe went into recession. German high interest rates to keep down domestic inflation aggravated the recession in the rest of Europe.
- EMU was seen by many (France in particular) as a way of replacing German control of European monetary policy with common European decision making in a common European Central Bank.



Fig. 21-2: Inflation Convergence for Six Original EMS Members, 1978–2012

Country's annual inflation less Germany's annual inflation (percent per year)

