# Lecture 1: Intermediate macroeconomics, spring 2016

Lars Calmfors

Literature: Mankiw, chapters 3 and 6.



### **Topics**

- **1.** The relationship between saving, investment and the interest rate in a closed economy (the world economy)
- 2. The relationship between fiscal deficits and the interest rate
- **3.** The relationship between saving, investment and the current account in an open economy
- 4. The relationship between the fiscal balance and the current account in an open economy
- 5. Trade imbalances in the euro area
- 6. The current account and the exchange rate
- 7. Sweden's crisis in the 1990s and the exchange rate depreciation
- 8. The need for real exchange rate depreciations in the euro area



# A model of a closed economy

Y=F(K, L)	Production function				
$K = \overline{K}$	Given capital stock				
$L = \overline{L}$	Given labour force				
Y = C + I + G	Goods market equilibrium				
C = C(Y-T)	Consumption function				
I = I(r)	Investment function				
$G = \overline{G}$	Given government expenditure				
$T = \overline{\mathrm{T}}$	Given lump sum tax				

Goods market equilibrium

$$\overline{Y} = C(\overline{Y} - \overline{T}) + I(r) + \overline{G}$$
$$\overline{G} \uparrow \Rightarrow r \uparrow \Rightarrow I \downarrow$$

Equilibrium in the market for credit ("loanable funds")

$$\overline{S} = \overline{Y} - C(\overline{Y} - \overline{T}) - \overline{G} = I(r)$$

Saving = Investment

$$S = [\overline{Y} - \overline{T} - C(\overline{Y} - \overline{T})] + [\overline{T} - \overline{G}] = I(r)$$

Private saving + Government saving = Investment

 $\overline{G}\uparrow \Rightarrow r\uparrow \Rightarrow I\downarrow$ 

### **Terminology**

- T G = Government saving = The government's budget balance or the fiscal balance
- If T G > 0, then there is a budget surplus or fiscal surplus
- If T G < 0, then there is a budget deficit or fiscal deficit
- Sometimes the term government net lending is used to denote the fiscal balance
- Positive government net lending means a fiscal surplus
- Negative government net lending means a fiscal deficit

# Figure 3-7: The consumption function



Disposable income, Y - T

# Figure 3-8: The investment function



Quantity of investment, I

# Figure 3-9: Saving, investment and the interest rate





Investment, Saving, I, S





### **Different interest rates in the real world**

- Only one interest rate in the model
- Many interest rates in the real world
- terms
- credit risk
- tax treatment
- The interest rate in the model is best interpreted as the interest rate on long-term bonds
- The real interest rate is the nominal interest rate minus the inflation rate



### **Recent and current situation**

- Fiscal deficits in many countries
  - insufficient fiscal restraint in good times
  - fall in tax revenues in the financial crisis
  - support to the financial sector
  - fiscal stimulus programmes
- High interest rates in countries with solvency problems
- Low interest rates in countries without credibility problems because of low investment demand



Public finances

	Gross debt <sup>e)</sup>				Fiscal balance®			
	1999-	2008/	2010-		1999-	2008/	2010-	
	2007	2009	2013	2014	2007	2009	2013	2014
Germany	62.2	68.6	78.5	74.5	-2.2	-1.5	-1.2	0.2
France	62.3	73.3	87.0	95.5	-2.5	- 5.2	- 5.2	- 4.4
Italy	102.9	107.4	120.4	132.2	- 2.9	- 4.0	- 3.4	- 3.0
Spain	48.2	46.1	76.4	98.1	0.2	-7.7	-9.0	- 5.6
Netherlands	49.3	55.6	63.8	69.7	-0.6	-2.6	- 3.9	- 2.5
Belgium	100.8	95.8	102.6	105.8	-0.5	-3.3	-3.7	- 3.0
Austria	66.2	74.1	81.9	87.0	- 2.2	- 3.4	-2.7	- 2.9
Greece	102.3	118.0	162.3	175.5	- 5.3	- 12.6	- 10.5	-1.6
Finland	40,6	37.2	51.1	59.8	3.8	0.8	-2.0	- 2.9
Portugal	59.6	77.6	115.0	127.7	-4.3	- 6.8	-7.2	- 4.9
Ireland	31.1	52.4	110.9	110.5	1.6	- 10.5	- 14.7	- 3.7
Slovakia	40.5	32.1	47.8	54.1	- 5.3	- 5.1	-4.6	- 3.0
Slovenia	25.7	28.1	52.0	82.2	- 2.3	-4.0	-7.6	- 4.4
Luxembourg	6.6	15.0	20.8	23.0	2.5	1.4	0.1	0.2
Latvia	12.2	27.5	42.1	40.3	- 1.7	- 6.5	-3.3	-1.1
Cyprus	59.2	49.7	76.1	107.5	-2.5	-2.4	- 5.3	- 3.0
Estonia	5.0	5.8	8.1	9.9	0.7	-2.5	0.1	- 0.4
Malta	65.5	65.3	68.8	71.0	- 5.0	-3.8	-3.1	- 2.5
Euro area	69.0	75.0	88.7	94.7	- 1.9	-4.2	-4.2	- 2.6
United Kingdom	39.8	58.7	82.8	89.0	- 1.8	-7.9	-7.8	- 5.4
Sweden	49.0	38.5	36.9	40.3	1.1	0.6	-0.6	- 2.4
Denmark	43.6	36.9	45.0	44.1	2.3	0.2	-2.4	- 1.0
Poland	43.2	49.0	54.6	49.1	-4.1	- 5.6	-5.1	- 3.4
Czech Republic	24.6	31.4	42.6	44.4	- 3.7	-3.8	-3.1	-1.4
Romania	19.5	18.2	34.8	39.4	- 2.6	-7.2	-4.3	- 2.1
Hungary	58.9	75.0	79.4	76.9	- 6.3	-4.1	-3.7	- 2.9
Croatia <sup>®</sup>	28.2	40.2	63.2	81.7	- 2.9	-4.3	- 6.1	- 5.6
Bulgaria	45.0	13.7	17.0	25.3	0.5	-1.3	-1.8	- 3.6
Lithuama	20.5	22.2	38.1	41.3	-1.8	-0.3	-5.4	-1.1
European Union"	01.8	08.3	82.9	88.1	-1.7	-4.0	- 4.0	- 3.0
United States	47.2	79.4	100.1	105.6	- 2.6	- 10.3	- 8.9	- 5.5
Japan	107.0	201.0	231.0	245.1	- 5.9	-7.3	-9.0	-7.1
Switzerland	63.3	50.1	49.1	47.2	0.2	1.2	0.3	0.5
" As a percentage of gross domestic product. For the European countries, definitions according to the Maastricht								
Fireaty, For the Omited States, Japan and Switzerland, definitions are according to the IMF. – <sup>10</sup> Data on Croatia is only available from 2001 annuards.								
" Lata on Croana is only available from 2001 onwards.								

Sources: European Commission, Autumn 2014; IMF World Economic Outlook, October 2014.





Figure 1.20





# Figure 3-11: An Increase in the demand for investment



Investment, Saving, I, S

### Figure 3-12: An increase in investment demand when saving depends on the interest rate



# Figure 6-1: Imports and exports as a percentage of output: 2012



# **Equilibrium in the open economy**

$$Y = C^{d} + I^{d} + G^{d} + EX$$

$$C = C^{d} + C^{f} \qquad \Rightarrow \qquad C^{d} = C - C^{f}$$

$$I = I^{d} + I^{f} \qquad \Rightarrow \qquad I^{d} = I - I^{f}$$

$$G = G^{d} + G^{f} \qquad \Rightarrow \qquad G^{d} = G - G^{f}$$

$$Y = (C - C^{f}) + (I - I^{f}) + (G - G^{f}) + EX$$

$$Y = C + I + G + EX - (\underbrace{C^{f} + I^{f} + G^{f}}_{IM})$$

$$Y = C + I + G + \underbrace{EX - IM}_{NX}$$

Y = C + I + G + NX

### **Equilibrium in the open economy, cont.**

NX = Y - (C + I + G)

Net Exports = Output – Domestic Spending



# **BNP-andelar**

# Procent av BNP, löpande priser



### Saving-investment balance in an open economy

$$Y = C + I + G + NX$$
$$Y - C - G = I + NX$$
$$S = I + NX$$

Saving can be of two forms: physical accumulation of real capital (I) or accumulation of financial claims on the rest of the world resulting from net exports (NX).

S - I = NX

- Net exports are the difference between saving and investment.
- Net exports = trade balance
- Saving minus investment = net capital outflow (net foreign investment) = Net exports = Trade balance
- Net capital outflow can take many forms
  - lending to foreign banks
  - purchases of foreign bonds
  - purchases of foreign assets (equity, real estate)



# **Table 6-1: International Flows of Goods and Capital: Summary**

Trade Surplus	Balanced Trade	Trade Deficit
Exports > Imports	Exports = Imports	Exports < Imports
Net Exports $> 0$	Net Exports $= 0$	Net Exports < 0
Y > C + I + G	Y = C + I + G	Y < C + I + G
Saving > Investment	Saving = Investment	Saving < Investment
Net Capital Outflow $> 0$	Net Capital Outflow $= 0$	Net Capital Outflow $< 0$

This table shows the three outcomes that an open economy can experience.

### **Figure 6-6:The trade balance, saving, and investment: The U.S. Experience**



### A model of a small open economy

$$r = r^{*}$$

$$Y = \overline{Y} = F(\overline{K}, \overline{L})$$

$$C = C(Y - \overline{T})$$

$$I = I(r)$$

$$NX = (Y - C - \overline{G}) - I = S - I$$

# $\frac{\text{Reduced form}}{NX} = \left[\overline{Y} - C(\overline{Y} - T) - \overline{G}\right] - I(r^*)$ $NX = \overline{S} - I(r^*)$

Net export equals the difference between saving and investment at the given world market real rate of interest

# Figure 6-2: Saving and investment in a small open economy



### Figure 6-3: A fiscal expansion at home in a small open economy



### Figure 6-4:A fiscal expansion abroad in a small open economy



### Figure 6-5: A shift in the investment schedulein a small open economy



Investment, Saving, I, S

Current account balance = Net exports + Net return on foreign assets  $CA = NX + r \cdot NFA$ 

CA = current account balance

NX = net exports

r = interest rate

NFA = net foreign assets = foreign assets - foreign debt

Mankiw simplifies the analysis by neglecting the net return on foreign assets.

In most advanced economies NFA  $\approx 0$ .

Germany is an exception; NFA  $\approx$  50 per cent of national income (GDP-

depreciation of capital). In Great Britain (with colonial empire)

before World War I, NFA was twice the size of national income.

Hence NFA added approximately  $2 \times 0.05 = 10$  per cent to national

income.

In France (also with colonial empire) before World War I, NFA was about the size of national income. Hence NFA added approximately 5 per cent to national income.



### The real exchange rate

**Real exchange rate = the relative price between domestic and foreign goods** 

*p* = price of domestic (Swedish) output in domestic currency (SEK)

 $p^*$  = price of foreign (US) output in foreign currency

e = nominal exchange rate (units of foreign currency per unit of domestic currency, \$/SEK)

 $\varepsilon$  = real exchange rate

The price of output in a country is called the GDP deflator

Real exchange rate = nominal exchange rate (\$/SEK) × Swedish output price (SEK) / foreign output price (\$)

 $\varepsilon = e \times (p/p^*)$ 

### **<u>Relative rates of change</u>**

- Percentage change of a ratio ≈ Percentage change of numerator Percentage change of denominator (if small changes)
  - If  $z = \frac{x}{y}$ , then  $\frac{\Delta z}{z} \approx \frac{\Delta x}{x} \frac{\Delta y}{y}$
- Percentage change of a product ≈ Percentage change of factor 1 + Percentage change of factor 2 (if small changes)

- If 
$$z = xy$$
 then  $\frac{\Delta z}{z} \approx \frac{\Delta x}{x} + \frac{\Delta y}{y}$   
Hence if  $\varepsilon = \frac{ep}{p}$  then:

$$\frac{\Delta\varepsilon}{\varepsilon} \approx \frac{\Delta e}{e} + \frac{\Delta p}{p} - \frac{\Delta p^*}{p}$$

Percentage change in real exchange rate  $\approx$  percentage change in nominal exchange rate + percentage change in Swedish output price – percentage change in foreign output price

### The real exchange rate, cont.

 $\epsilon\uparrow\Leftrightarrow$  real appreciation (the relative price of domestic goods increases)

 $\epsilon {\downarrow} \Leftrightarrow$  real depreciation (the relative price of domestic goods falls)

$$NX = NX(\varepsilon)$$
  $\varepsilon \uparrow \Rightarrow NX \downarrow$ 

Net export is negatively related to the real exchange rate (the relative price of domestic goods)



# Figure 6-7: Net exports and the real exchange rate



# Figure 6-8: How the real exchange rate is determined



Net exports, NX

### Figure 6-9: The impact of expansionary fiscal policy at home on the real exchange rate



### Figure 6-10: The impact of expansionary fiscal policy abroad on the real exchange rate



### Figure 6-11 The impact of an increase in investment demand on the real exchange rate



#### **Elimination of current account deficits**

- This requires a real exchange rate depreciation
- Sweden had large current account deficits in the late 1980s before the 1990s crisis
- These deficits were eliminated through a large nominal and real exchange rate depreciation in 1992 when the fixed exchange rate was abandoned and the krona was allowed to float
- Large increases in net exports in subsequent years
- At the same time large fiscal deficits were turned into surpluses
- Greece, Portugal, Ireland, Spain and Italy all have had current account deficits after large real exchange rate appreciations
- But real exchange rate depreciations are difficult to achieve within the eurozone where there are no longer any nominal exchange rates between countries
- Instead lower inflation (price and wage cuts) are required in crisis countries and higher inflation in Germany and other surplus countries

ULC = unit labour cost = the labour cost of producing one unit of output  $ULC = \frac{WL}{Y}$ 

W = wage L = employment Y = outputInstead of  $\varepsilon = e \cdot \frac{p}{p_*}$  one often uses relative unit labour costs, *RULC*, as a measure of the real exchange rate:  $RULC = e \cdot \frac{ULC}{ULC*}$ 

e = the nominal exchange rate

*ULC* = domestic unit labour cost

*ULC*\* = foreign unit labour cost

# Nominal exchange rate and relative unit labour costs vis-à-vis EU-15 for Sweden







and Portugal.

Sources: OECD Economic Outlook No. 89 (Sweden); and Ameco and own calculations (EU-8).

# GDP deflators of selected countries in the euro area



Figure 9 in Sinn, Hans-Werner, "The Greek Tragedy", CESifo Forum Special Issue 2015 (June)

Price level of goods produced in Greece in relation to the rest of the Eurozone (index values)





Source: European Commission, DG ECFIN, General Government Data and AMECO, Autumn 2014.

# Changes in the primary fiscal balances relative to pre-crisis GDPa)

The primary fiscal balance is government revenue minus government expenditure excluding interest payments.