Sensorveiledning /assessment guidelines SØK1151 H2020

Question 1.

Question 1 is most effectively discussed departing from an IS-LM -UIP model for open economy with flexible exchange rates.

a) At the outset the model could consist of 4 equations:

$(1) Y = C(Y - T) + I(Y, i, o) + G + NX(Y, Y^*, \varepsilon)$

$(2)\ i = \bar{\imath}$

$(3)\ E = \frac{(1+i)}{(1+i^*)}\,\overline{E^e}$

$(4)\varepsilon = \frac{EP}{P^*}$

The basic assumptions behind the model should be briefly described (constant prices, demand determined output and a negative relationship between unemployment and output-Okun's law). The equations and symbols should be explained:

(1) is the equilibrium conditions for the goods market, i.e. that aggregate domestic output, Y (GDP) equals aggregate demand

Aggregate demand consists of:

Domestic private consumption $C(Y - T)$ which is an increasing function of disposable $(Y - T)$ income, $(C' > 0)$, Net taxes (T) is assumed to be exogenous.

Domestic government spending, G, assumed to be exogeneously determined by the government.

Domestic investment demand $I(Y, i, o)$ is an increasing function of output, $I'_Y > 0$ and decreasing in the interest rate, $I'_i < 0$. To capture the effect of oil and gas investments it is useful to introduce a shift parameter, o, in the investment function. This shift parameter can represent oil and gas investments, $I'_o > 0$, meaning that an increase in oil and gas activity increase investment demand. Thus, a reduction of oil and gas investments due to falling oil prices as described in the text, can be interpreted as a reduction in o. If the investment function is formulated as a linear function of Y and I, ($I = b_0 + b_1 Y + b_2 i$), with $b_1 > 0$ and $b_2 < 0$, an exogeneous reduction in investment due to falling oil and gas investment can be interpreted as a reduction in the constant term b_0.

Foreign net demand for domestic goods is represented by net exports $NX(Y, Y^*, \varepsilon)$ which is a negative function of Y, $NX'_Y < 0$, a positive function of foreign output, Y^*, $NX'_{Y^*} > 0$ and a negative function of the real exchange rate (given that the Marshall Lerner condition is fulfilled). The students should explain that the net export function is derived from underlying export demand and import demand functions.

(2) represents the horizontal LM-curve, where the central bank sets the policy interest rate $\bar{\imath}$. The students should comment that this simple formulation implies that the central bank adjusts the money supply so as to reach the policy rate $\bar{\imath}$.

(3) represents the UIP-curve which defines the equilibrium nominal exchange rate based on the uncovered interest parity condition in the international bond market, see textbook ch.19.2.

(4) defines the real exchange rate.

Under the assumption of constant prices, which can be normalized to $P = P^* = 1$,

$\varepsilon = E$, i.e. equal to the nominal exchange rate. Thus, by inserting (3) into (1), the model can be usefully represented by two equations

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

(ii) $\quad i = \bar{i}$

Here: (i) represents the IS-curve in the open economy with flexible exchange rates, while (ii) represents the LM-curve. When using the model to discuss questions a) and b), it is useful to draw the UIP-curve together with the IS and LM curves. The students should explain the slopes of the IS, LM and UIP curves and shifts in the IS curve.

a)Having established the relevant model, the effects of reduced oil and gas investments in Norway in 2015-16 can readily be discussed and interpreted as a leftward shift in the IS curve. The reduction in investment demand leads to a direct fall in output, and via multiplier effects (which should be explained), equilibrium output falls and unemployment increases. Private consumption decrease because of the fall in disposable income through the multiplier effect. Since the interest rate is unchanged, the exchange rate is unaffected. The fall in output (income) reduce import demand and so net export increase (improved trade balance).

b) Fiscal and monetary policy to counteract the fall in output and increased unemployment:

i) Expansionary fiscal policy (increased government spending, G or reduced taxes, T) can be used to increase output and reduce unemployment. Since investment and consumption depends positively on Y, investment and consumption increase via the multiplier effect. The reduction in Y also increase import demand, so net export decrease. If the government budget was balanced initially, the expansionary fiscal policy leads to a government budget deficit and an increase in government debt. Effective candidates would note that further discussion of the consequences of government deficit and debt is delegated to question 2.

ii)Expansionary monetary policy is straightforward interpreted as a reduction in the policy interest rate, i.e a downward shift in the LM curve. It is important that the students explain that the policy works via two different channels that both leads to increased equilibrium output and reduced unemployment:

-Reduced interest rate stimulates domestic investments, and equilibrium output increase

-Reduced interest rate leads to depreciation of the Norwegian currency as seen from the reduction in E along the UIP curve. The decpreciation of the Norwegian currency, increases net exports (given the Marshall Lerner condition is fulfilled) and equilibrium output increase.

Compared to fiscal policy, within this model with exogeneous net taxes, the expansionary monetary policy does not lead to government deficit. (The best candidates may argue that this conclusion would be if net taxes, T depend on income).

The effect on net exports from expansionary monetary policy is twofold: The depreciation partially improves net exports (increase exports and reduce imports), while the increase in output (income) partially increase import.

It is also relevant to mention that in an initial situation with interest rate close to zero before the shock would limit the possibility to use expansionary monetary policy to counteract the fall in unemployment and activity level (liquidity trap).

c) The candidates should interpret a hypothetical Norwegian membership in the Euro zone as a situation with fixed exchange rates. In this case, the equilibrium condition in the exchange rate market is changed. Consider (3)

$$(3) E = \frac{(1+i)}{(1+i^*)} \overline{E^e}$$

Under a credible fixed exchange regime (like the Euro zone), the exchange rate is constant and equal to the expected exchange rate, i.e. $E = E^e$. Thus, in this case equilibrium in the financial market requires $i = i^*$ which represents the LM-curve in this case. Hence, if Norway were part of the Euro-zone, expansionary monetary policy in terms of reduced policy interest rate would not be available. The, the only option available in order to counteract the negative effects on output and unemployment from the fall in investment demand generated by the drop in petroleum prices, would be to use expansionary fiscal policy. Of course, fiscal policy has the same effects as in the flexible exchange rate regime.

Question 2.

The candidates should discuss the arguments from the opposition party departing from the fundamental government budget constraint discussed in chapter 22 in textbook.

$$(1) \; Deficit_t = r \cdot B_{t-1} + G_t - T_t$$

(1) says that the budget deficit in year t equals real interest payment $(r \cdot B_{t-1})$ on the initial debt, plus government spending minus net taxes, $G_t - T_t$ (primary deficit). r is the real interest rate. Assuming that deficits can be financed by selling bonds to the private sector only, the change in debt from the end of year t-1 to end of year t is thus

$$(2) \; B_t - B_{t-1} = r \cdot B_{t-1} + G_t - T_t$$

According to (2), the change in debt from t-1 to t equals real interest payment on the initial debt $(r \cdot B_{t-1})$ plus the primary budget deficit $(G_t - T_t)$. According to (2), when the government uses expansionary fiscal policy (either by increasing G or decreasing T or both) to counteract a decrease in private consumption, the government runs a budget deficit. This implies an increase in government debt and the debt must be repaid in the future. One consequence may be that taxes need to be increased in the future which may (if consumers realize this) imply ricardian equivalence, discussed in chapter 22.3 in textbook.

A relevant interpretation of the concerns from the opposition parties is that they are worried about the future development of government debt as a share of output (GDP=Y). The students should demonstrate and explain that (2) can be reframed as

(3) $\frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} = (r - g)\frac{B_{t-1}}{Y_{t-1}} + \frac{G_t - T_t}{Y_t}$

where $\frac{B_t}{Y_t}$ is debt as share of GDP, g is the yearly output growth rate and $\frac{G_t - T_t}{Y_t}$ is the primary deficit as share of GDP and r is the real interest rate.

According to (3) the evolution of the debt to GDP ratio depends on four factors:

1)The ratio of the primary budget deficit to GDP

2)The real interest rate

3)The growth rate of the economy

4) The initial debt ratio

According to (3), the tax cut implies that the government may need to run a sufficiently large budget surplus share in the future to avoid the debt share to increase over time. One reason for the concern from the opposition parties is that a high debt to GDP ratio generated by the tax cut, generates risk of vicious circles. A high deficit due to large tax cuts today in a situation with low economic growth, g, and a large initial government debt ratio, $\frac{B_{t-1}}{Y_{t-1}}$, can lead to higher perceived risk of default and subsequently to a higher interest rate, r as the lenders requires a risk premium and hence the debt increases due to higher interest payments. The worry about default can become self-fulfilling as the increase in debt can in turn lead to higher perceived risk of default and a higher interest rate. Together these forces may lead to a debt ratio explosion. In a worst case scenario, the government may have no choice other than to default or rely on money printing resulting in hyperinflation. In these cases, the economic costs in the future becomes high.

Question 3.

A simple neoclassical economic growth model as in chapter 10-11 in textbook should be established.

The assumption and definitions of production technology (production function with constant returns to scale), the savings rate and capital accumulation equations must be explained. The candidates should be able to explain why an increase in saving and investment for example generated by a higher savings rate generates a period of economic growth until the economy reaches a new steady state (long run) output level. Once the economy have reached the steady state levels of capital per worker and hence output per worker, the growth rate is zero if there is no underlying technological progress in the economy. The dynamics and the steady state can be illustrated by figures ala figures 11.2 and 11.4 in textbook. Thus, the statement that an increase in saving and investment increase economic growth in the long run is not correct in a world with no underlying technological progress. Without technological progress, long term economic growth is zero according to the neoclassical growth model. In a situation *with* technological progress, the steady state (long run) economic growth equals the technological growth rate and is independent of the saving rate.