STOCKHOLMS UNIVERSITET
Nationalekonomiska institutionen HT09

Intermediate Macroeconomics, 7.5 ECTS

SEMINAR EXERCISES

SEMINAR 1. *Mankiw-Taylor: chapters 3, 5 and 7. (Lectures 1-2).*

Question 1.

Assume that the production function is $Y = F(K,L)$, where Y = output, K = capital and L = labour! Assume that K and L are constant! Demand for goods and services in the economy is given by $C + I + G$, where C = private consumption, I = investment, and G = government expenditure. Assume also that consumption is a function of disposable income only, i.e. $C = C(Y - T)$, where T = taxes!

a) What is the relationship between saving and the real interest rate in such an economy?

b) How is the equilibrium in the economy determined if investment depends on the real interest rate r, i.e. $I = I(r)$?

c) What happens to the components of the demand for goods and services if T increases? What mechanism brings the economy back to equilibrium?

d) What happens to the level of investment if there is an upward shift in the investment schedule?

Question 2.

Now, assume instead that we have an open economy! Saving in the economy is given in the same way as in Question 1. Furthermore, assume that the world interest rate is higher than the autarchy interest rate in the domestic economy (the interest rate the country would have had if the economy was closed)!

a) How high is investment and saving in this economy? Explain how investment and saving are related to each other and compare with a closed economy!

b) Does the trade balance show a surplus or a deficit?

c) Discuss how the model above can be used to explain the macroeconomic imbalances in the world economy (the trade imbalance between the US and China)! Discuss how the imbalances can be eliminated! What does this imply for the real exchange rate?

Question 3.

Assume that the production function for an economy is $Y = AK^{0.3}L^{0.7}$, where Y = GDP, A = total factor productivity, K = the real capital stock and L = employment.

a)   Use the production function to derive an equation showing how the GDP growth rate depends on the growth rates of total factor productivity, capital and employment! What is the rate of GDP growth if the capital stock falls by 2 percent, employment falls by 1 percent and total factor productivity grows by 1.5 percent.

b) Rewrite the equation derived in (a) so that it instead shows how the rate of growth of GDP per employed worker depends on the growth rates of total factor productivity and capital intensity (the capital stock per employed person)! What will be the growth rate of GDP per employed if one makes the same assumptions as in (a)?

Question 4.

Assume that demand for goods and services in a closed economy is comprised of consumption and investment! In equilibrium we have:

$$Y = C + I.$$

Moreover, assume that the consumption function is given by:

$$C = (1 - s)Y.$$

Thus, individuals save a given fraction of their income, s, and consume the rest. Furthermore, assume that the rate of depreciation is δ and the rate of population growth is n.

a) Describe the long run equilibrium (steady state) in this economy! Explain why the capital stock per worker is constant in long-run equilibrium!

b) How is output and capital per worker affected if the savings rate (s) is changed?

c) What is the optimal level of capital given by the golden rule in a steady state? What can be done to reach it?

d) What happens to capital per worker and output per worker in a steady state if population growth falls? Explain intuitively!

SEMINAR 2. *Mankiw-Taylor: chapters 6-8. Swedish Fiscal Policy: chapter 5. OECD Economic Outlook: chapter 4. (Lectures 2-3).*

Question 1.

Assume that we have a Solow model of the same type as in the previous seminar, but that we also include technological progress in the model! We model this by measuring labour efficiency with a parameter E. The production function is then

$$Y = F(K, L \cdot E)$$

Here $L \cdot E$ can be interpreted as efficiency units of labour.

a) Derive output per efficiency unit of labour as a function of capital per efficiency unit from the production function!

b) Assume that the rate of growth of labour efficiency is g percent! Explain what the long run equilibrium is in this expanded Solow model! Illustrate how output and capital per efficiency unit of labour is determined!

c) Given your answer in question (a), what will the growth rate of output and output per capita be in equilibrium if population growth is n percent and the growth of labour efficiency g percent? Motivate your answer!

d) Explain what is meant by endogenous growth!

Question 2.

Assume that we have an economy where a certain share (f) of the unemployed (U) manage to find work during a given period of time! Assume also that a certain share (s) of the employed are separated from their jobs every period! Denote employment by E and the total labor force by L!

a) Derive an expression for the unemployment rate (U/L) in a steady state! What is unemployment if $s = 0.01$ and $f = 0.25$?

b) Repeat the exercise for $f = 0.15$!

c) Are there any objections to describing the labour market in this way?

Question 3.

Now, assume instead that the unemployed can be divided into two groups: "easy to place" and "hard to place"! The number of "easy to place unemployed" is denoted U_1 and they find work with probability f_1. The number of "hard to place unemployed" is denoted U_2 and they find work with probability f_2, where $f_2 < f_1$. L is the total labor force. A given fraction s of the employed are losing their job each period.

a) Derive an expression for total unemployment in a stationary equilibrium $(U/L = (U_1 + U_2)/L)$!
    Assume that a fraction g of the unemployed is hard to place!
    (Hint: The flows in and out of U have to be equal in a steady state. U/L is to be expressed in terms of s, g and f.)

b) What is unemployment if $s = 0.02$, $f_1 = 0.4$, $f_2 = 0.1$ and $g = 0.2$?

c) What happens to unemployment if the fraction of hard to place unemployed (g) increases to 0.5?

Question 4.

a) Discuss in general which factors affect the equilibrium rate of unemployment in a country!

b) Discuss how the labour market reforms of the liberal-conservative Swedish government are likely to have affected the equilibrium rate of unemployment!

c) Discuss how the current recession in Sweden is likely to affect the equilibrium rate of unemployment!

SEMINAR 3. *Krugman-Obstfeld: chapters 13-16. (Lectures 4-6).*

Question 1.

The so called Balassa-Samuelson effect is central for understanding the differences in price levels and rates of inflation among countries with different levels of income.

a) Explain why the *consumer price level* is higher in rich countries than in poor countries!

b) What does the Balassa-Samuelson effect imply for the difference in the *inflation rates* between rich and poor countries? Explain! (Note that the question is about the inflation rate and that productivity growth is assumed to be higher in poor countries!)

Question 2.

The rate of inflation (the actual and the expected) is 10 percent in country A and 5 percent in country B. The real interest rate in country B is 1 percent.

a) What will the nominal and real interest rates be in country A if interest rate parity and relative PPP holds?

b) Now assume that interest rate parity still holds but that deviations from relative PPP are possible! What will the nominal and real interest rates be in country A given the above assumptions about inflation rates if the real exchange rate of country A is expected to depreciate by 12 percent?

Question 3.

Discuss, with the help of Krugman-Obstfeld's AA- and DD-curves, the effects of an expansionary fiscal policy (an increase in government spending) on the interest rate, the (nominal) exchange rate, output and the price level!

a) What are the effects of a *temporary* increase in government spending?

b) What are the effects of a *permanent* increase in government spending? Distinguish between the short run (fixed price level, variable output) and the long run (variable price level, output at its equilibrium level).

Question 4.

The Swedish economy now finds itself in a deep recession mainly caused by a fall in exports.

a) Use the AA-DD model to explain how a fall in exports affects the exchange rate and output! Does the model explain what has happened during the current recession?

b) Analyse how Riksbanken can counteract a fall in domestic output through monetary policy!

c) Assume that the Swedish economy finds itself in a liquidity trap at the zero interest rate bound. What does this imply for the effectiveness of monetary policy? What can then be done by policy makers to raise output again?

SEMINAR 4. *Krugman-Obstfeld: chapters 17 and 20. Mankiw-Taylor: chapter 14. OECD Economic Outlook: chapter 1. Swedish Fiscal Policy: chapter 1. (Lectures 6-8).*

Question 1.

Estonia, Latvia and Lithuania are maintaining fixed exchange rates against the euro within the ERM system. These economies are now in deep recessions with many borrowers unable to service their debts.

a) What consequences will expectations of devaluation have for domestic-currency interest rates?

b) One way out of the crisis is to achieve a real exchange rate depreciation. This can be done through either a nominal exchange rate adjustment or wage/price cuts. Discuss which method is to be preferred!

Question 2.

A crucial question is whether the EMU constitutes an *optimal currency area*.

a) Discuss different mechanisms of adjustment if a country within the EMU is exposed to a large recessionary shock! Does the EMU meet the criteria for being an optimal currency area?

b) Italy is currently in a situation where the real exchange rate has substantially appreciated. Discuss what measures that could be taken to bring about a real depreciation!

c) Would Italy be able to solve its problems by leaving the EMU?

Question 3.

Assume that unemployment is a function of inflation according to the following expectations-augmented Phillips curve:

$$ u = u* - \left(\pi - \pi^e \right), $$

where $u*$ is the natural (equilibrium) rate of unemployment and π^e is the expected (future) rate of inflation. Assume also that agents have correct expectations of the inflation rate and that the central bank's preferences are given by the "loss function":

$$ L = u^2 + \lambda \pi^2, $$

where λ denotes the weight that the central bank puts on stabilising unemployment.

a) Show what rate of inflation a central bank with the weight $\lambda = 1$ will choose! (Help: Minimise the loss function with respect to π taking the unemployment equation into account and taking the expected rate of inflation as given. After the first-order condition for a minimum of the loss

function has been derived, insert $\pi^{e} = \pi$ in the equation and solve for π)! Assume that the equilibrium rate of unemployment, u^{*}, is 0.05.

b) Assume that a more "liberal" executive board of the central bank is appointed with instead the weight $\lambda = 0.5$ for inflation! What will be the new rate of inflation?

c) What can we learn from the calculations above?

Question 4.

a) Explain the meaning of a Taylor rule!

b) How should the *real* interest rate be adjusted to a fall in the inflation rate according to the Taylor rule? Explain the intuition!

c) Suppose that the Taylor rule indicates a negative nominal interest rate. How should the central bank then react?

SEMINAR 5. *Mankiw-Taylor: chapters 15 and 17. OECD Economic Outlook: chapters 1-4. Swedish Fiscal Policy: chapters 1-3. (Lectures 9-10).*

Question 1.

Assume that the consumption of a household is based on both current income and the (expected) future income.

$$C_1 = Y_1 - S_1$$

$$C_2 = (1+r)S_1 + Y_2,$$

where C_1, Y_1 and S_1 are consumption, income and saving in the current period, C_2, Y_2 and S_2 are consumption, income and saving in the next period and r = real interest rate.

a) Derive the household's intertemporal budget constraint! Assume that the households' preferences are such that $Y_1 - C_1 < 0$! Illustrate the intertemporal equilibrium in a diagram!

b) Assume that the household becomes more pessimistic regarding its future income! How will this affect consumption today and in the future?

c) Assume that the real interest rate falls! How will this affect the household's consumption decision?

Question 2.

Assume that we have Ricardian equivalence. This implies that consumption depends on expected life-time incomes and that individuals understand the government's intertemporal budget restriction.

a) How will consumption be affected by a tax reduction today if future government consumption is assumed not to be affected? Motivate your answer using the intertemporal budget restrictions that households and the government are facing!

b) How is private consumption today affected if there is a temporary reduction in government consumption during the current period? How is aggregate demand affected?

c) Is Ricardian equivalence a reasonable description of reality?

Question 3.

The government budget balance as a percentage of GDP and government debt as a percentage of GDP are two central variables when evaluating fiscal policy.

a) One definition of long-run fiscal sustainability is that the debt-to-GDP ratio converges to a constant value. This requires that government nominal debt increases at the same rate as nominal GDP. Use this condition for deriving a relationship between the government budget deficit as a percentage of GDP (which is taken to be constant from year to year) and government debt as a percentage of GDP in a steady state!

b) Assume that a country has a constant budget deficit of 4 percent of GDP! What value will the debt ratio converge to if the annual nominal growth rate of GDP is 5 percent?

Question 4.

The Swedish Ministry of Finance adheres to best international practice of publishing long-run sustainability calculations for public finances.

a) Explain what is meant by long-run sustainability of public finances!

b) The *S2* indicator and intertemporal financial net worth are two frequently used indicators of long-run fiscal sustainability. Explain these two concepts and how they are related!

c) Calculations by the European Commission show positive *S2* indicators for most EU-countries, implying that the current fiscal policy is not sustainable. The main reason is increasing costs for an ageing population. Discuss different strategies to address this problem!