

This document provides the answers to the questions at least one class teacher was not able to complete during class.

## Macroeconomics 1

### Partial solution to problem set 1

4. Suppose Toyota buys BMW German plants. The take-over has no effect on the quantity of car produced at the plants.

What is the effect of the acquisition on the following variables in subsequent years (choose between *up*, *down* and *unchanged*)?

- a) German GDP **unchanged** the cars are still produced domestically
- b) German GNP **falls** the profits now accrue to Japanese shareholders who are not resident in Germany.

## Macroeconomics 1

### Partial solutions to problem set 2

4. If taxes increase with income, disposable income responds less than one to one to changes in gross income. This is because taxes fall in recessions (when  $Y$  is low) and increase in booms. So, consumption and equilibrium output fluctuate less in response to shocks that affect equilibrium income.

a) Write down the expression for equilibrium output.  $Y = \frac{1}{1-c_1(1-t)}\bar{Z}$  with  $\bar{Z} = \bar{C} - c\bar{T} + \bar{I} + \bar{G}$ .

b) The Keynesian multiplier is  $\frac{1}{1-c_1(1-t)}$ . With respect to the case discussed in the lecture (constant taxes), does the economy respond more or less to a change in autonomous spending? It responds less. The Keynesian multiplier gives the change in equilibrium output with respect to a change in autonomous spending  $\bar{Z}$ .

$$\left. \frac{\Delta Y}{\Delta \bar{Z}} \right|_{\text{proportional tax}} = \frac{1}{1 - c_1(1 - t)} < \frac{1}{1 - c_1} = \left. \frac{\Delta Y}{\Delta \bar{Z}} \right|_{\text{lump-sum tax}} \quad (1)$$

The Keynesian multiplier is smaller with proportional taxes (for the reason mentioned above). That is why direct taxes (which in the real world are usually progressive) are called an automatic stabilizer.

## Macroeconomics 1

### Partial solutions to problem set 3

3. Please derive labour market equilibrium. Explain that equation 1 (the price setting equation) comes from profit maximization (marginal revenue=marginal cost), identifying MC and reminding students that unless there is perfect competition the price level is set as a mark up over marginal revenue and cost. Justify equation 2 (the wage setting curve) stressing that workers wage claims are likely to be lower when unemployment is higher and when outside sources of income (e.g. unemployment benefits) are lower. Stress that the model assumes flexible wages and prices and correct expectations for both workers and firms (long-run assumptions). Derive equilibrium both graphically in the  $(W/P, u)$  space and algebraically. Stress that we have two equations and three endogenous variables. Yet, since two of them enter only as a ratio (the real wage) we can determine the real wage and the unemployment rate. Emphasize that the only variables that affect equilibrium are the price mark up  $\mu$  and  $z$ . Use the production function to derive the long run labour market equilibrium locus  $Y = \bar{Y}(\mu, \bar{z}, \bar{L})$  in the  $(Y, i)$  space.

- a)  $W/P = 1/(1 + \mu) = 1/1.05$ ,  $Y = N = 895$  and  $u = 10.5\%$ .
- b) Show graphically how the price setting curve shifts down (explain the intuition, firms want to make higher profits so the real wage has to fall) and how the equilibrium real wage falls and  $u$  goes up as workers are willing to work at the lower real wage only if the cost of being unemployed (negatively related to  $u$ ) increases. Show how the MRLE locus shifts left.
  - i) The real wage decreases
  - ii) Output decreases
  - iii) The unemployment rate increases
- c) Suppose that  $\bar{z}$  falls to 0.05. Show that the wage setting curve shifts down as workers wage demands are lower. The real wage is unaffected since it is determined by the price mark up, but now more workers are willing to work at that wage and the unemployment rate falls.
  - i) The real wage is unchanged
  - ii) Output increases
  - iii) The unemployment rate decreases

4. In the long run labour market equilibrium determines the real wage. So if the nominal wage halves prices have to halve to keep the real wage unchanged (given that firms want to keep a constant mark up of prices over costs). Stress why nominal variables do not matter (no money illusion: workers are interested in the real purchasing power of their wage and firms in the mark up).

- a) false
- b) false
- c) false

## Macroeconomics 1

### Partial solution to problem set 4

4. Now the interest rate is fixed at the level desired by the central bank. In order to keep the interest rate fixed, the central bank has to supply any amount of money that the public demands at that interest rate. That is, as output and money demand change, the central bank adjusts the supply of money to demand. This means that it loses control of the money supply. As in a standard demand/supply framework if you control the supply of one commodity the price adjusts to clear the market, but if you want to fix the price then you have to adjust supply in response to any change in demand at the fixed price. The LM curve is then horizontal at the target interest rate.

**Macroeconomics 1**  
Partial solution to problem set 5

4. The government increases government expenditure  $G$  by 200. If the consumption function is given by

$$C = 100 + 0.7(Y - \bar{T}) \quad (2)$$

and the investment function is the same as in equation 1.

Curves shift as in the previous question. Discuss that a given amount of expenditure can be financed through taxes or debt. The latter way is more expansionary (i.e. we are assuming Ricardian equivalence does not hold) at given interest rate, so it requires a bigger fall in investment to keep the goods market in equilibrium.

In both cases the long run equilibrium level of output cannot change as it is determined on the labour market. So total aggregate demand cannot change.

a)  $\Delta \bar{G} = 200, \Delta \bar{T} = 0.$

- i)  $\Delta G = 200, \Delta C = 0.$  So we require  $\Delta I = -200$  which calls for  $\Delta i = 0.2$  (a bigger increase in the the long run equilibrium interest rate)
- ii) the change in the long run equilibrium level of consumption  $\Delta C = 0$
- iii) the change in the long run equilibrium level of aggregate saving  $\Delta S = \Delta S_G = \Delta I = -200.$

b)  $\Delta \bar{G} = \Delta \bar{T} = 200$

- i)  $\Delta G = 200, \Delta C = -140.$  So we require  $\Delta I = -60$  which calls for  $\Delta i = 0.06$  (an increase in the the long run equilibrium interest rate)
- ii) the change in the long run equilibrium level of consumption  $\Delta C = -140$
- iii) the change in the long run equilibrium level of aggregate saving  $\Delta S = S_p = \Delta I = -60.$  Government saving is unaffected (balanced budget), but since a balanced budget fiscal expansion