1 Keynesian model

1.1 The Basic Keynesian Setup

- Premise: Some prices or wages are fixed in the short-run. Implies that some markets need not clear.

- Money market: reacts quickly to information. Assume it always clears.

- Goods market: reacts somewhat more slowly, but assume able to change production so it clears.

- Labor market: reacts most slowly. When economy out of general equilibrium, assume labor supply not equal to labor demand. Employment determined by labor demand. May have excess supply of labor, hence unemployment.

1.2 The IS-LM-FE Model

- Depict relationship between output and real interest rate via three curves.

- IS (investment=savings) represents goods market equilibrium. Re-labelling of output demand curve.

- LM (liquidity=money) represents money market equilibrium for a given price.

- FE (full-employment) represents labor market equilibrium. Re-labelling of output supply curve.
• In short run with fixed prices/nominal wages, output determined by intersection of IS and LM. In long run, prices/wages adjust so reach general equilibrium at intersection of IS-LM-FE.

1.3 Aggregate Demand and Supply Curves, We Have Different versions of the models

• Keynesian model with sticky prices
• Keynesian model with sticky nominal wages
• Keynesian model with efficiency wages (real wage rigidities)

2 Homework

1. Suppose that there is a temporary change in consumer sentiment, so that households cut back on consumption spending, but this has no other direct effects on the economy. Consider the Keynesian model with sticky prices, and discuss the short and long run effects on output and interest rates of the following policy options.

Solution: The shock causes a leftward shift in the IS curve. Recall that the SRAS is horizontal and LRAS is vertical. Also, in the long run $Y$ always returns to its original level, and in the short run, $P$ does not change (sticky prices), so I won’t mention these explicitly below. The question doesn’t mention efficiency wages, so we’ll assume that the FE curve is our usual output supply curve, and so is not vertical. However answers with a vertical FE curve are also acceptable.

(a) The money supply is adjusted to return the economy to full employment.

Solution: If the money supply is adjusted, the LM curve shifts to the right so that IS, LM and FE intersects at the same point, $Y$ falls slightly (due to the slope of the FE curve), $r$ falls, and $P$ is of course unchanged. This holds in the LR too, as the policy adjusted things immediately. (If the FE curve were vertical, then there would be no change in output.)

(b) Government spending is adjusted to return the economy to full employment.
Solution: If $G$ is expanded, this shifts the IS curve back to its original level. No change in $Y, r, P$ in either the short or the long run compared to the equilibrium before the shock.

2. Suppose that instead of being on a fiat money system, where it is essentially costless to change the money supply, an economy runs on a commodity money system. In particular, to print more money the government must mine more gold and this costs real resources, which the government finances via lump sum taxes. As usual, assume that increases in money supply are distributed in a lump sum fashion to the households, so that the government retains no seignorage revenue. Assuming that all prices and wages are flexible, answer the following.

(a) What are the effects of a one-time increase in the money supply in this commodity money system? Consider the effects on output, real interest rates, employment, real wages, and the price level.

Solution: Here the effect is a combination of an increase in the money supply and a temporary tax increase, as real resources are used up in mining (recall that all taxes and transfers are lump-sum, so we can just net them out, and the result is a tax).

The increased taxes lead to an increase in the labor supply, shifting aggregate supply to the right too. This results in lower $w$ and $r$, and higher $N$ and $Y$ (wealth effect). Also, output demand shifts to the right, increasing $Y$ further, and raising $r$ (the net result is a rise in $r$). The higher $Y$ would also reduce prices (increased money demand), but because of the increased money supply, the effect on $P$ is ambiguous.

(b) Now suppose that there is a new government mine discovered, and the government increases the growth rate of the money supply requiring ongoing taxes to pay for the extraction of the gold. What are the effects of this on output, real interest rates, employment, real wages, and the price level?

Solution: Here a continuing increase in money supply (and hence inflation) is combined with a permanent tax increase.

The permanent increase in taxes will be matched by a permanent decrease in consumption, hence $Y^d$ does not shift, only $N^s$ and $Y^s$ shift to the right, resulting in lower $w$ and $r$, and higher $N$ and $Y$ (wealth effect). Higher $Y$ would increase, while higher inflation would decrease money demand, which
would make the initial effect on the price level ambiguous. In the long run, however, the price level will keep increasing.

3 Exercise (2nd Midterm, 2010)

Recently the government has announced a temporary expansion of government purchases $G$ in an effort to help stimulate the economy. Suppose that current taxes remained unchanged, and that $G$ will return to its original level in the next period. This question will use different versions of the models we have discussed in class. In each case, describe the short-run effects of the change on output, the real interest rate, employment, the real wage, and the price level.

1. Use the real business cycle model with flexible prices.

Solution: Increasing government spending means that people should pay more tax in the future. So, there is a negative wealth effect. People consume less, invest less, and work more. The direct effect of the increase in government spending is an increase in output demand, with the labor supply effect leading to a (smaller) increase in output supply. So employment, output, and the real interest rate increase. The real wage falls. As output has increased and the interest rates have increased, the effect on money demand is ambiguous (the change in $Y$ would increase it, but the increase in $r$ would decrease it.) So the price level effects are ambiguous. It is plausible to think that the change in $Y$ will have larger impact, leading to an increase in money demand, which drives up the price level.

So: $Y \uparrow; N \uparrow; r \uparrow; w \downarrow; P$?

2. Use the Keynesian model with sticky prices and efficiency wages.

Solution: There is a horizontal short-run AS curve at the fixed price level $P$. The increase in government spending shifts the IS curve out, so in the short-run both $Y$ and $r$ increase. Since the real wage is set by efficiency considerations, it is unchanged. Since the real wage is rigid, changes in labor supply then only affect level of unemployment, not employment. Employment is unchanged.

So: $Y \uparrow; N \leftrightarrow; r \uparrow; w \leftrightarrow; P \leftrightarrow$

3. Use the Keynesian model with sticky nominal wages.
Solution: The increase in government spending shifts the IS and AD curves out. Therefore, output, the real interest rate, and the price level increase, where the last effect comes from the upward sloping AS curve which results with sticky nominal wages. Since nominal wages are fixed in the short-run, and the price increases, the real wage falls and employment (determined by labor demand) increases.

So: $Y \uparrow; N \uparrow; r \uparrow; w \downarrow; P \uparrow$