

Suggested Solutions: EC4010 Midterm

November 29, 2010

Section A

1. b
2. c
3. a or e
4. e
5. b
6. a
7. b
8. c
9. c
10. b

Section B

a.) Reductions in interest rates by the monetary authority cannot always counter rises in bond's risk premia during a recession. As such, expansionary monetary policy can have limited impact on the rates that matter for investment and other determinants of aggregate demand—and thus can be of limited use when it is needed most. [10 MARKS]

b.) The three equation model is

$$y_t = \frac{\rho - r_t}{\theta} + c_{t+1} + g_t \quad (1)$$

$$i_t = r_n + \pi + \gamma(y_t - y_n) + \beta(\pi - \bar{\pi}). \quad (2)$$

$$\pi_t = \frac{\alpha\delta}{1 - \delta}(y_t - y_n) + \phi E_t \pi_{t+1} \quad (3)$$

1. Because the substitution effect would dominate, a *temporary* fall in labour tax rates would raise labour supply.
2. The rise in labour supply raises the productive capacity of the country and hence potential output y_n . Because the change is temporary, there is little change in consumption demand and hence production (recall that aggregate output/production is demand-determined.) As a result, the output gap, $y - y_n$, falls.
3. According to the New Keynesian Phillips curve (Eq. 3), the fall in $y - y_n$ reduces inflation. [One could also argue that the rise in labour supply induces a fall in wages, which—because some firms *can* adjust—reduces prices, also causing a fall in inflation.]
4. At this point, the fall in inflation would ordinarily induce the central bank to lower interest rates; this is what the Taylor rule would prescribe. Yet because the economy is in a liquidity trap, the Taylor rule (Eq. 2) is redundant, and the real interest rate is given by $r = 0 - \pi$.¹ For this reason, the fall in inflation *raises* the real interest rate.
5. According to the New Keynesian IS Curve (Eq. 1), the rise in the real rate reduces aggregate demand and production.
6. In turn, this causes the output gap to widen further, causing more disinflation (via Eq. 3), and so on—in other words, we can get a “deflationary spiral.” [25 MARKS]

¹Formally, $i_t = \max(0, r_n + \pi + \gamma(y_t - y_n) + \beta(\pi - \bar{\pi}))$.

Section C

- a.) i. This is a taste parameter that governs the taste for work/leisure. It is distinct from σ , which mediates the disutility from *additional* work. [6 MARKS]
- ii. a) Because it reduces labour supply for every given level of the wage, the labour supply curve shifts inwards in a boom. Coupled with the usual rise in labour demand, this causes the wage to rise more than otherwise. This causes marginal costs to rise more, creating more upward pressure on prices, and therefore reducing the degree of real rigidity. Because it reduce price rigidity, it makes monetary policy less effective. [6 MARKS] b) On average, inflation is now more responsive to changes in the output gap. For this reason, the coefficient on the output gap in the New Keynesian Phillips curve—which is inversely related to the degree of real rigidity—rises. [6 MARKS]
- b.) i. A firm's optimal price P_i is given by $P_i = \frac{\eta}{\eta-1}W$. In a symmetric equilibrium, $P_i = P$ and hence $P = \frac{\eta}{\eta-1}W \Rightarrow \frac{W}{P} = \frac{\eta-1}{\eta}$. [6 marks]
- ii. The marginal product of labour is one: $Y = L \Rightarrow \frac{dY}{dL} = 1$. For efficiency, workers must receive a real wage of one in equilibrium. After the subsidy, the real wage is $\frac{(1+\tau)W}{P}$. But we know that $\frac{W}{P} = \frac{\eta-1}{\eta}$, so the condition reduces to $(1 + \tau) \frac{\eta-1}{\eta} = 1$.² This implies $\tau = \frac{1}{\eta-1}$, as required. [11 marks]

²Note that firms' optimal prices are not affected; the nominal marginal cost is still W .