

## Problem Set 2: Labour, General Equilibrium & Monetary Policy

### Labour & General Equilibrium

**Exercise 1.** Some people claim that the U.S. labour market remains depressed since people expect taxes on labour income to be higher in the future. Is this view consistent with the *intertemporal substitution of labour*?

**Exercise 2.** To maximize workers' welfare, why is it optimal to have a zero tax rate on capital, but a 100% tax rate on all *existing* capital?

**Exercise 3.** Suppose a person lives for  $T$  periods and their current and future real income increases *permanently* by  $Y$ . According to the permanent income hypothesis, how should consumption respond? What would happen if higher income uncertainty is associated with higher incomes? (Assume marginal utility is strictly convex).

**Exercise 4.** Suppose that there are two closed economies – A and B – in the world. Except for the fact that consumers in country A have a higher discount factor ( $\beta$ ) than in country B, both countries are identical. Which country has the higher natural interest rate? If A has a higher  $\theta$  than B, where does the interest rate rise most if investment demand rises?

**Exercise 5.** Suppose that, in a particular country, there is a high mortality rate. You could represent this as a probability  $p$  that the consumer will not exist the following period. Using the stochastic Euler equation, determine how this would affect the natural rate of interest and the level of equilibrium investment each period.

**Exercise 6.** From 1982-84, long-run interest rates rose significantly in Japan. Explain how this was caused by rising U.S. budget deficits. Explain too how the latter development led to the emergence of so-called “twin deficits”: the simultaneous occurrence of budget *and* current account deficits.

### Monetary Policy

**Exercise 7.** Paul Krugman has argued that that natural rate of interest is currently *negative*. If the nominal rate is zero, how could this be attained?

**Exercise 8.** Write down the *Euler equation* between periods 1 and 2. Write the Euler equation for periods 2 and 3. Use the *expectations theory of the term structure* to write the Euler equation between periods 1 and 3, in terms of the interest rate on a 2-year bond. Assume no risk premium, no inflation, and no uncertainty.

**Exercise 9.** If the nominal interest rate on a two year bond is 6%, and the current short-run interest rate is 2%, what are expectations of the short-run rate for next year? [Assume no risk premium in long-run rates].

**Exercise 10.** Suppose the central bank raises the rate of money growth *permanently* from 0% to 2%. The current short-run nominal interest rate is 4%. Assume prices are fully flexible. What would happen to long-run rates? What effect would central bank independence have on long-run rates?

**Exercise 11.** If the natural real interest rate is 4%, what is the natural *nominal* interest rate? Assume money growth is 2% percent, and output growth is 3%.

**Exercise 12.** Using the expectations theory of the term structure, explain the following:

‘Reports that the fiscal stimulus package could total 600 billion over 10 years, much larger than expected by bond investors contributed to a further sell-off yesterday among concerns about rising future issuance of government bonds. Yesterday, five-year and 10-year yields ended at 3.04% and 4.06%, respectively, up from 2.98% and 4.03% on Friday.’

**Exercise 13.** Multiple Choice Questions: 2012 Midterm, Questions 8-10; 2011 Midterm, Questions 1-9.