Intertemporal Macroeconomics
Supervision 2

Short questions

(1) Consider the neoclassical model derived in the lecture. Imagine that supply depends positively on the real interest rate, while consumption and investment demands depend negatively. Suppose the economy is initially in an equilibrium position.

Permanent productivity increase

(a) What are the effects of a permanent increase in the level of productivity A on output, the level of consumption and investment and the interest rate?

(b) Are the results different from the ones when investment was not considered? Why?

Temporary productivity increase

(c) What are the effects of a temporary increase in the level of productivity A on output, the level of consumption and investment and the interest rate?

(d) Are the results different from the ones when investment was not considered? Why?

Anticipated productivity increase

(e) What are the effects of an anticipated permanent increase (from the next period on) in the level of productivity A on output, the level of consumption and investment and the interest rate?

(f) Are the results different from the ones when investment was not considered? Why?

Problems

(2) (Tripos 2003) Consider the following two-period investment problem. A firm has production function $Y = F(K)$ where F is concave ($F' > 0$ and $F'' < 0$). In period 1 it decides how much to invest, I_1, in order to produce output in period 2. The capital stock of the firm in period 2, K_2, is given by $K_2 = (1-\delta)K_1 + I_1$, where δ is the depreciation rate, $0 < \delta < 1$, and K_1 is the pre-determined level of capital stock. Assume that one unit of capital costs the same as one unit of output and normalize this price to 1.

Suppose the firm maximizes the present discounted value of profits, Π, which are defined as

$$\Pi = F(K_1) - I_1 + \frac{F(K_2)}{1+r} + \frac{(1-\delta)K_2}{1+r}$$

(a) Derive the optimal demand for capital and give an economic interpretation of the condition. where r is the real interest rate.

(b) Suppose now that firms have to pay an additional installation cost $\phi(I_1/K_1)$ when investing I_1. Assume that installation costs ϕ are convex ($\phi' > 0$ and $\phi'' > 0$). Profits are therefore given by

$$\Pi = F(K_1) - I_1\left[1 + \phi(\frac{I_1}{K_1})\right] + \frac{F(K_2)}{1+r} + \frac{(1-\delta)K_2}{1+r}$$

Derive the optimal demand for capital as a function of the marginal adjustment cost q defined as

$$q = 1 + \phi(\frac{I_1}{K_1}) + (\frac{I_1}{K_1}) \times \phi'(\frac{I_1}{K_1})$$

(c) Provide an economic interpretation of q. In particular, relate the answer from part (a) to the answer from part (b) and explain the role of q in determining investment.

Essay (800 words max)

(3) (Question B5 from Sample Exam paper) "Aggregate data do not lend support to neoclassical business cycle models". Discuss this statement paying particular attention to intertemporal decisions about consumption, labour/leisure and investment.

Readings

- Barro (1997) Macroeconomics, 5th edition, chapters 5, 6, and 9.
- Doppelhofer (2009), Intertemporal Macroeconomics. Forthcoming in: Cambridge Essays in Applied Economics. Available at:
  `http://www.econ.cam.ac.uk/intranet/faculty/prado/teaching.htm`
- Williamson (2008) Macroeconomics, 3rd edition, chapters 4, 8, and 9.

Further Readings[1]

- Abel, A.B. (1990). Consumption and Investment. In B.M. Friedman and F.H. Hahn (eds.), Handbook of Monetary Economics. Vol. II. North-Holland: Elsevier.
- Abel, Bernanke and McNabb (1998) Macroeconomics, chapters 4.2 and 11.1.
- Baddeley (2003) Investment: Theories and Analysis, London: Palgrave Macmillan.
- Blanchard (2005) Macroeconomics. 4th edition, chapters 16 and 26.
- Burda and Wyplosz (2005) Macroeconomics: A European Text. 4th edition, ch. 6.
- Caballero (1999) Aggregate Investment. In Taylor and Woodford (eds) Handbook of Macroeconomics, Vol I, North Holland: Elsevier.
- Hayashi, F. (1982) Tobins Marginal q and Average q: A Neoclassical Approach. Econometrica 50, 213-24.
- Hall and Jorgenson (1967) Tax Policy and Investment Behavior. American Economic Review 57, 391-414.
- Mankiw (2002) Macroeconomics, 5th edition, chapter 17.
- Prescott (1986) Theory Ahead of Business-Cycle Measurement. Carnegie Rochester Conference Se- ries on Public Policy 25, 11-44.
- Summers (1986) Some sceptical observations on real business cycle theory, Federal Reserve Bank of Minneapolis Quarterly Review 10, 23-27.
- Stadler (1994), Real Business Cycles. Journal of Economic Literature 32(4), 1750-83.
- Symposium on Business Cycles (1999), Journal of Economic Perspectives 13(2).