



# THE BUSINESS SCHOOL

**10365**

## **Macroeconomic Themes (2002/03)**

**Level: 3**

**Semester: 1**

**Credits: 15**

**Lecturer: Dr. Keshab Bhattarai**



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## Macroeconomic Analysis

**Additional Notes**

## **Introduction**

Classical economists such as Adam Smith (1776), Ricardo (1817), J. B. Say (1817), Malthus (1790) Mill (1844), Marshall (1922) and Pigou (1925) explained economic events using competitive market clearing models in which prices and wages were perfectly flexible. Foreign trade and payment were arranged under the self-correcting mechanism of the gold standard system. Quantity theory of money postulated a direct and proportional link between money supply and price level leaving no role for a monetary policy in determining real output, employment and income. Persistent unemployment and inflation were impossible in the classical analysis. They favoured free, open and liberal market policy and in which the main objective of the government was to keep law and order. Invisible hand of the price system allocated resources efficiently and effectively. The aggregate demand always equalled the aggregate supply and there was no gap between the savings and investment. Increasing level of investment activities, made possible by higher rate of saving, contributed towards capital accumulation and to the higher growth rate as seen throughout the 19<sup>th</sup> century in the majority of western countries.

The great depression of 1930s, with high level of unemployment rate and deflation, exposed serious limitations inherent in the classical system. John Maynard Keynes published the “General Theory of Employment, Interest and Money” in 1936 and argued that self-correcting mechanism propounded by the classical economist had serious flaws. As aggregate demand is not always equal to aggregate supply, high rate of unemployment may persist for a long time if government does not step in for stabilising the economy. As the market fails to guarantee the full employment it is possible for the economy to remain under full employment if not corrected by active policy intervention. He strongly argued that it is important and often necessary to fine-tune the economy using the monetary and the fiscal policy whenever output and employment remain out of their potential levels. Hicksian (1936) IS-LM model, that formalised the Keynesian idea remained the most popular tool for macroeconomic analysis, was believed to be one the major factors for correct policy action by governments that led to an unprecedented growth and stability in all western countries from 1940s to early 1970s. The trade off between unemployment and inflation as shown by the Phillips (1956) curve led policy makers believe that higher level of output and employment were achievable by expansionary monetary policy. However, belief in that link between monetary and real sectors of the economy remained strong only until the emergence monetarism, particularly until the precise analysis of natural rate of unemployment hypothesis by Friedman in 1968.

The predictions of Keynesian model and belief on demand management policy gradually met with many more sceptics in 1970s. After hikes in oil prices in early 1970s one after another economies entered in stagflationary period, with no trade-off between inflation and unemployment. The strength of Keynesian theories became questionable particularly its unrealistic assumptions on the supply side of the economy. The rational expectation or the new classical school to the macroeconomics emerged under the intellectual leadership of Lucas, Sargent, Prescott who were very critical about the economic policy prescription derived from the Keynesian analysis. Based on micro-foundation, they brought together both the supply and the demand side of the macro economy under the market clearing general equilibrium hypothesis. They like the classical economists argued for minimal role of the government earning the name the New Classical school. They used the representative household and firms,

emphasised on the dynamics and business cycle in an economy in response to technology and productivity shocks. However not all macroeconomists were happy with the New classical theories. The adherents of the Keynesian school, Mankiw, Ball and Taylor and others, New Keynesian economists, came to defend the Keynesian analysis using tools developed by the New Classical economists. They incorporated concepts such as the staggering wage contracts and union bargaining, menu cost, real rigidity and sticky wages and prices, market imperfections and information asymmetry in the Keynesian model as done by the monetarists and new classical economists. They proved propositions showing that the demand management policy were still relevant in containing the undesirable effects of business cycle in the economy. The big controversy still remains and is far from settled.

Despite such disagreement about the role of economic policy in the short run there was no serious dissimilarity among the macroeconomists about the analysis of economic growth in the long run. After Harrod-Domar and Solow models new endogenous growth models that emphasise on research and development and human capital, have received considerable attention in the macroeconomic literature in recent years. Advancement in the computational technology has made it possible to compute more decentralised dynamic general equilibrium models for dynamic economic policy analysis for more realistic structure on consumption, production and trade in the small open economy or the interdependent economies in the global economy.

Main focus of this module will be to introduce students to this more recent development in the macro economics and make them familiar with the standard tools that is often used for comparative and dynamic analysis by these economists with more focus on micro-foundation. These models will be used to study the economic growth and impacts of fiscal, monetary and exchange rate policies in output, employment and prices in the economy.

### **Module Outline**

The major objective of this module is to improve understanding of macroeconomics among students who would like to further advance their knowledge in macroeconomics after doing core macro modules in the second year. It covers some major techniques used for comparative static and dynamic analysis and to find the impacts of various macroeconomic policy measures taken by policy makers. Students should have a good understanding of the macroeconomic theory presented in the macroeconomic models and macroeconomic analysis taught in the second year.

### **Aims**

This module aims to consolidate understanding of standard techniques used by Keynesian, monetarist, new classical and new Keynesian economists for analysing the impacts of policies designed to contain the demand and supply shocks in the economy in the short run and to promote the economic growth in the long run. Teaching activities in this module will demonstrate

- (a) how to choose an appropriate theory to analyse a macroeconomic question.
- (b) how formulate a macroeconomic question with due appreciation of different points of views on the functioning of the economy particularly regarding the

importance of the behaviour of the household, firm, government and the external sector in determining the macroeconomic equilibrium.

- (c) how select key macroeconomic variables and formulate a model for analysing cause and effect.
- (d) how be able to diagnose a problem and analyse it critically.
- (e) how follow key articles in important journals and be able to read more advanced text-books in the macroeconomics.

### **Learning Outcomes**

After the successful completion of this module students should be able to

- (a) appreciate the major difference among macroeconomists on effectiveness of demand management and supply oriented policies in an economy.
- (b) use the structural model to do comparative static analysis using the tax, government expenditure and money supply multipliers.
- (c) be able to find out the price system that is consistent with the demand and supply balances in goods, labour, capital markets and where the both government and balance of payment condition are satisfied.
- (d) do simple dynamic optimisation to find optimal capital accumulation, saving and investment in a growing economy.
- (e) choose appropriate model to analyse the impacts of fiscal, monetary, exchange rate and trade policies in the economy.
- (f) be familiar with the more decentralised structure of the economy.

### **Skills**

Module requires understanding of the theory, analytical approach using some basic mathematics, using the relevant macroeconomic time series for analysis. Students will learn dynamic programming and constrained optimisation for macro policy and use the first or second order difference equations to explain the business cycle in the economy.

### **Significance of the Module**

This module fits well with other modules in the economics B.Sc.(Econ) degree programme. It uses knowledge that students have from their previous year and provides more advanced and up to date analytical techniques for analysis than presented in the Macroeconomic Models and Macroeconomic Analysis taught in the second year. This module aims to bridge the gap between the undergraduate and postgraduate study for those who would like to continue economics after the degree program and build enough confidence to apply macroeconomic tools for those who like to be practitioners. Students should be able to follow the academic articles in macroeconomic issues in key journals or be able to critically assess and evaluate any policy documents in the private or the public sectors.

## **Structure of Teaching & Learning Activities**

The module will be delivered by two 50 minutes lecture sessions each week ( 20 lectures in total) and by 5 problem based tutorial sessions. Topics for lectures and tutorials are included at the end. Attendance on both lectures and classes is compulsory.

## **Assessment**

The module will be assessed by following **three** components

- One examination (80%). The examination will be an unseen paper and will be of 2 hours duration. You will be required to answer 2 questions from a choice of 5 in which one question relates to analytical technique and another will be a short essay type. An example of a past examination for this module is included at the end of this Handbook but notice that the structure of this module has changed this year.
- One one-hour mid-term exam (10%). It will be based on the material covered until the mid-term exam. You should answer 2 out of 5 questions. One of it will be of a problem solving nature.
- One written essay (10%). This should be word-processed and will consist of not more than 2000 words.

Submission date(s) for Coursework:

Essays are due by 5 PM on the Monday December 2<sup>nd</sup>, 2002.

Assignment title(s):

- Essay should be based on one of the following topics and should contain a model and analysis and its application to the real world situation.
  - a. Critical assessment on the role of fiscal policy in containing the macroeconomic fluctuations under Keynesian and New Keynesian analysis in understanding.
  - b. Evaluation of the contribution and limitations of the rational expectation school in macroeconomics.
  - c. What guidance can the theory of “time inconsistency” in economic policy provide for the macroeconomic policy makers?
  - d. What are the costs and benefits of monetary policy co-ordination in national and international level?
  - e. Should the central bank be independent in designing monetary policy?

Assessment Criteria for Coursework:

Assessment criteria mentioned in pages 43-44 of the Undergraduate Handbook from the economics department applies to this essay.

Bear in mind that essays differ in style, motivation, originality, organisation, depth of analysis, clarity of presentation and facts and figures used to support the

arguments. Essays that provide a good motivation, used one or two models (graphical and algebraic version as necessary) thoroughly to analyse the issue, present few empirical facts and relate them to the theory, provide a good conclusion and are original in their presentation may get first class marks. Essay that relies more on secondary rather than original thinking gets second class marks. Sloppy, incoherent and inconsistent presentation may lead to a low pass or a failing grade. Full citation and references should be provided whenever any idea is borrowed from the literature. Copying without citation will be considered academic dishonesty and leads a failing grade (see below).

#### Submission of Coursework:

A Business School Cover Sheet must be attached to all Coursework and must be completed legibly and in full. Coursework must be submitted by the date and time stipulated in the essay box outside the school office.

#### **Academic Dishonesty and Plagiarism**

All work which is submitted for assessment must be your own work. Academic dishonesty is an attempt to engage in deception or fraud and will be penalised accordingly. It is a **very serious** offence.

\* It is important that you have read and thoroughly understood the section entitled 'Plagiarism' in the *'University of Hull Business School Student Handbook'* and that you have read and understood the *'Code of Practice on the Use of Unfair Means'* which is published on the University of Hull website

### Study Programme Summary

Lecture #	Week	Lectures: Mon. 12:15 Robert Blackburn LT B; Tues. 10:15 S26 WF Topics
1	1(sept 30)	Macroeconomic equilibrium: Comparative Static Analysis in a Structural Model
2	1	Derivation of tax, money supply and government expenditure multipliers
3	2	Rational expectation and Lucas critique
4	2	Intertemporal budget constraint (two and infinite periods)
5	3	Intertemporal optimisation and Euler equations: decomposition of income and substitution effects of change in the interest rate
6	3	Introduction to the dynamic optimisation technique : current value Hamiltonian: Optimal capital accumulation
7	4	Firms optimisation: Investment, Tobin's q and financial market
8	4	General equilibrium analysis with production
9	5	Growth in a dynamic economy – Ramsey-Cass-Koopman Model
10	5	Analysis of transitional dynamics in a neo-classical growth model
11	6	Business cycles analysis: a model to study the fluctuation of output around the steady state
12	6 (Nov 5)	<b>Mid-term</b>
13	7	Credibility and time inconsistency of an economic policy
14	7	Impact of shocks to aggregate demand and supply on output and inflation
15	8	Central bank independence and inflation
16	8	Monetary Policy co-ordination
17	9	Exchange rate overshooting
18	9	Real business cycle
19	10	Macroeconomic impacts of anticipated and unanticipated monetary policy
20	10	Macroeconomic impacts of anticipated and unanticipated fiscal policy
21	11	Ricardian equivalence and Seigniorage
22	11	Interest policy rule and economy
23	12	Review
24	12	Review ( <b>December 17</b> )

### Tutorial Schedule

Class no.	Week of	Time Monday 2:15 S22 WF; Thursday 11:15 SRA Cohen Topics
1	3	Comparative Static Analysis in a structural model: policy multipliers
2	4	Intertemporal optimisation by consumers
3	5	Investment decision by a representative firm
4	6	General equilibrium between households and firms
5	7	Dynamic optimisation: Optimal Capital Accumulation
6	8	Business cycles
7	9	Rules versus discretion in setting the economic policy
8	10	Feedback rule vs. policy irrelevance proposition
9	11	International Policy co-ordination
10	12	Central bank independence

Students are expected to try solving these problems before coming to the class.

## **Study Programme**

The main contents of this module include formal analysis of macroeconomic equilibrium and fluctuations around it, economic growth, optimal policy choices and time inconsistency problems and policy co-ordination. My lecture notes will contain the most of the technical materials, which should be complemented by reading textbooks or journal articles listed below.

Readings:

In addition to chapters from the book students are expected to have reading of the key journal articles on the topics listed below. These articles can either be accessed on line from the electronic resources of the library or will be made available from its short loan section. Library web sites allows access to most of these articles.

<http://www.learndev.hull.ac.uk/librarydb/EJaz.cfm>, <http://uk.jstor.org/>

### **A. Fluctuations and Macroeconomic Equilibrium**

- Macroeconomic equilibrium: Comparative Static Analysis in a Structural Model
- Derivation of tax, money supply and government expenditure multipliers
- Analysis of Impacts of a Stabilisation policy

Readings:

Lecture notes

Hicks, J. R.(1937): Mr. Keynes and the "Classics"; A Suggested Interpretation, *Econometrica* 5: 1937.

Keynes JM (1936) *The General Theory of Employment Interest Rate and Money*, London, MacMillan.

David Romer (1996) *Advanced Macroeconomics*, McGraw Hill.

Sheffrin *The Making of Economic Policy*, Blackwell, 1991.

Chrystal K. A. and Simon Price (1994) *Controversies in Macroeconomics*, 3<sup>rd</sup> edition, Harvester Wheatsheaf.

### **B. Models For Analysis Of Macroeconomic Policy In The Long Run**

- Intertemporal optimisation and Euler equations: decomposition of income and substitution effects of change in the interest rate
- Introduction to the dynamic optimisation technique : current value Hamiltonian
- Firms optimisation: Investment, Tobin's q and financial market
- Capital accumulation
- Growth in a dynamic economy
- Transitional dynamics

Readings:

Lecture notes

Lucas, Robert Jr. and Sargent, *After Keynesian Macroeconomics*, Spring 1979, Federal Reserve Bank of Monneapolis Quarterly Review.

Burda and Wyplosz (2002) *Macroeconomics: A European Text*, 3rd edition Oxford Univ. Press.

*Keshab Bhattarai (1999) A Forward-Looking Dynamic Multisectoral General Equilibrium Model of the UK Economy, Hull Economics Research Paper no. 269.*

Jones, Charles (CJ) Introduction to economic growth, 2000, Norton.

David Romer (1996) Advanced Macroeconomics, McGraw Hill.

Ramsey, F.P. (1928) "A Mathematical Theory of Saving," *Economic Journal* 38, 543-559.

Romer, Paul "Capital Accumulation in the Theory of Long Run Growth" in Barro R.

J. (1989) ed. Modern Business Cycle Theory, Harvard University Press.

### C. Macroeconomic Shocks and Policies

- Business cycles analysis
- Credibility and time inconsistency
- Central bank independence
- Interest policy rule and economy
- Exchange rate overshooting
- Real business cycle
- Policy co-ordination

### Readings

Lecture notes

Friedman, M. (1968), "The Role of Monetary Policy," American Economic Review, No.1 vol. LVIII March

Taylor J (1993) Discretion versus policy rules in practice, Carnegie Rochester Conference Series on Public Policy 29 Amsterdam.

Tobin J (1969) A general Equilibrium Approach to Monetary Theory, *Journal of Money Credit and Banking* 1 (Feb) 15-29.

Fleming J. Marcus (1962) Domestic financial policies under fixed and under floating exchange rates, IMF staff paper 9, November , 369-379.

Mundell R. A (1962) Capital mobility and stabilisation policy under fixed and flexible exchange rates, *Canadian Journal of Economic and Political Science*, 29, 475-85.

Books:

Burda and Wyplosz (2002) Macroeconomics: A European Text, 3rd edition Oxford Univ. Press.

Cooly Thomas F (1995) Frontiers of Business Cycle Research, Princeton.

David Romer (1996) Advanced Macroeconomics, McGraw Hill.

A. Stevenson, V.M. Muscatelli and M. Gregory (1988) Macroeconomic Theory and Stabilisation Policy, Phillip Allan, London.

Gartner Manfred (2003) Macroeconomics , Prentice Hall.

Hiejdra and Van Der Plug (2002) Foundations of Modern Macroeconomics, Oxford University Press, 2002.

### D. Rational expectation and economic policies

- Impacts of anticipated and unanticipated fiscal policy
- Ricardian equivalence and Seigniorage
- Impacts of anticipated and unanticipated monetary policy

Readings:

- Diamond, Peter 1965: National Debt in Neoclassical Growth Model, AER, December 1965, 1127-56.
- Barro, R. J. (1974), "Are Government Bonds Net Wealth?," Journal of Political Economy pp. 1095-1117.
- HM Treasury (2002) Reforming Britain's Economic and Financial Policies, Palgrave.
- Rebelo S. (1990) Long run policy analysis and long run growth, Journal of Political Economy vo. 99 no. 3 pp. 500-521.
- Phillips A W. (1958) The relation between unemployment and the rate of change of money wage rates in the United Kingdom, 1861-1957.
- Phelps E. S. (1968) Money wage dynamics and labour market equilibrium, Journal of Political Economy, 76 , 678-711.
- King R.G.and Plosser C.I. (1984) Money Credit and Prices in a Real Business Cycle, American Economic Review, 64 (June) 263-380.

## Tutorial 1 (Multiplier in a structural model)

Consider a macroeconomic model for an economy.

$$\begin{aligned}
 \text{Consumption :} & \quad C = a + bY^d \quad \text{and} \quad Y^d = Y - \tau Y \\
 \text{Investment :} & \quad I = \Omega - wr \\
 \text{Imports:} & \quad IM = \phi_0 + \phi_1 Y \\
 \text{Demand for money:} & \quad L(y, r) = kY - \psi r \\
 \text{Income:} & \quad Y = C + I + G + X - IM
 \end{aligned}$$

Assume that aggregate supply is infinitely elastic,  $E_{s,p} = \infty$ , price and marginal productivity of labour are constants,  $P = \bar{P}$ ,  $MPL = c$ ;  $\frac{W}{P} \leq MPL$  and the structural coefficients  $a, b, \tau, k, \Omega, \phi_0, \phi_1, w, \psi$  and exogenous variables  $X$  and  $G$  are all greater than 0.

- (a) Using above equations find the equilibrium output and the interest rate that is consistent with (a) the equilibrium in the goods market (b) the equilibrium in the money market and (c) equilibrium in both markets
- (b) Derive formulas for output and the interest rate multipliers for this economy with respect to (a) government expenditure (b) money supply (c) and the tax rate. Determine the sign of each of these multipliers.

- (c) Now consider the Keynesian model with the production function as following

$$\text{Production function: } Y = F(K, N); F_N > 0; F_K > 0; F_{NN} < 0 \quad F_{KK} < 0$$

$$\text{Labour demand} \quad \frac{W}{P} = F_N(N, K)$$

$$\text{Labour supply :} \quad W = W_0 + W(N)$$

$$\text{where} \quad W(N) = \begin{cases} 0 & \text{for } N \leq \bar{N} \\ + & \text{for } N > \bar{N} \end{cases}$$

$$\text{Money market equilibrium} \quad \frac{M}{P} = M(Y, r); M_y > 0, M_r < 0$$

$$\text{Income:} \quad Y = C + I + G + X - IM$$

- (i) derive the income tax multiplier for this model and determine its sign.
- (ii) derive the income tax multiplier for this model when the money demand depends upon the disposable income and determine its sign.

## Tutorial 2 (Intertemporal Optimisation by consumers)

1. All economic agents are constrained by a life time budget constraints. Derive an intertemporal budget constraint for a representative household, firm, government and the economy as a whole for (i) a two period economy and (ii) an economy with the infinite horizon.
2. A household lives for two periods and has the following utility function which is given by

$$U(C_1, C_2) = U_1(C_1) + \frac{1}{1+\rho} U_2(C_2).$$

Where  $C_1$  and  $C_2$  are consumption in period 1 and period 2 and  $\rho$  is the discount factor. This household has endowment of  $Y_1$  in period 1 and  $Y_2$  in period 2. Market interest rate is  $r$ .

- i. Construct an intertemporal budget constraint and the Lagrangian function for this household.
- ii. Derive the first order conditions for lifetime utility maximisation.
- iii. Give the Euler equation for this problem using your answers in (ii). State how the consumption in period 1 depends upon the lifetime wealth and the interest rate and the subjective discount factor.
- iv. What is the intertemporal rate of substitution? Derive a term for it in this problem.
- v. Decompose the income and substitution effects of a change in the interest using above results. How does the impact of an increase in the interest rate depend upon the rate of inter-temporal substitution.

Application (optional): estimate income and substitution effects of consumption using data on output, consumption and the interest rate for the UK economy.

### Tutorial 3 (Investment decision by a representative firm)

1. You own one financial asset. Its value at time  $t$  is given by  $f(t) = e^{0.4\sqrt{t}}$ . The market interest rate is 4 percent. You can cash it anytime and keep the entire amount in the bank if it is profitable to do so. When would be it optimal to sell this asset at the current interest rate? How does this optimal time change if the interest rate rises to 5 percent?
2. Consider a profit maximisation problem of a representative firm for two period economy.

$$\Pi_t = P_t \cdot \frac{F(K_1)}{1+r} - P_1^k K_1 - P_1^k (1-\delta)K_2$$

- a. derive the first order condition for profit maximisation by the firm.
- b. Show the relationship between the user cost of capital and the marginal productivity of capital using the above equation. Give the role of investment tax credit in enhancing the investment. Use diagram to explain your results.
- c. Derive the value of the firm in terms of above profit function.
- d. If household owns the firm show how investment income enters into the intertemporal budget constraint of a representative household.
- e. Now consider a firm that lives for an infinite life time whose profit function for period  $t$  is given as following.

$$\Pi_t = P_t \cdot F(K_t) - I_t - I_t \phi \left( \frac{I_t}{K_t} \right)$$

where  $\Pi_t$  is the profit,  $P$  is price,  $F(K)$  is the output,  $P \cdot F(K)$  is the revenue of the firm,  $I_t$  is investment,  $I_t \phi \left( \frac{I_t}{K_t} \right)$  is the installation cost with  $\phi' \left( \frac{I_t}{K_t} \right) > 0$  and

$\phi'' \left( \frac{I_t}{K_t} \right) > 0$ . The law of motion of the capital stock is  $K_{t+1} = (1-\delta)K_t + I_t$ .

- f. Show how the value of the firm depends upon the expected streams of profit in the using the above equation.
- g. Derive the investment function in terms of the Tobin's  $q$  in this model.

Application: Fit a quadratic adjustment cost function for investment in the UK.

## Tutorial 4 (General equilibrium between households and firms)

1. Problem of a representative household:

$$\text{Max } U = C_1^\beta l^{1-\beta}$$

$$\text{Subject to } c \leq w(1-l) + rK + \Pi$$

Problem of a representative firm:

$$\text{Max } \Pi = AK^\alpha N^{1-\alpha} - rK - wN$$

- Define a competitive equilibrium for this economy.
  - Find the wage rate and the interest rate in the equilibrium
  - Solve for the optimal values of consumption, leisure, labour supply and the output for this economy.
  - Formulate the problem with sales and income tax. Discuss qualitatively the macroeconomic impacts of (a) switching completely to the sales taxes or (b) to labour income taxes (c) capital income tax.
2. There are two people living in an economy. For simplicity assume that a fixed amount of output of 200 is produced each year. Entire output is consumed in the same year. Utility of individual 1 and 2 is represented by  $U_1 = \sqrt{Y_1}$  and

$$U_2 = \frac{1}{2}\sqrt{Y_2}.$$

- What is the utility received by each individual if the output is divided equally between these two people? What is the output received by each if it is distributed so that each of them gets the same amount of the utility?
- What is the distribution of output that maximises the total utility for the whole economy?
- If person 2 needs utility 5 in order to survive how should the output be distributed?
- Suppose that the authorities like to maximise the social welfare function

$$W = U_1^{\frac{1}{2}} U_2^{\frac{1}{2}}, \text{ how should the output distributed between them?}$$

### Tutorial 5: Dynamic optimisation

1. Any economy has to decide how much to consume today and how much save and invest to add into the capital stock of the economy. The optimal capital stock maximises the present value of utility from consumption.

Problem:  $\text{Max} \int_0^T e^{-rt} C(t) dt$

Subject to the production technology:  $Q = Q(K)$

Capital accumulation constraint:  $\dot{K} = Q - C - \delta K$

- a. Write the current value Hamiltonian for dynamic optimisation in this model.
  - b. Discuss first order conditions and the terminal conditions required for dynamic optimisation
  - c. Use a phase diagram to determine the convergence process towards the optimal capital stock.
  - d. Apply this model for determining the optimal pricing strategy for exhaustible resources (non-renewable resources) such as oil and gas in a competitive economy.
2. Consider a dynamic economy with

Preference:  $\int_0^\infty e^{-\rho t} \frac{C_t^{1-\sigma}}{1-\sigma} dt$

Technology:  $Y_t = A_t K_t^\alpha N_t^{1-\alpha}$  assume  $A_t = 1$   $N_t = 1$

Capital accumulation:  $\dot{K}_t = Y_t - N_t C_t - \delta K_t$

All of the above notations have usual meaning.

- (a) Write the current value Hamiltonian for this problem.
- (b) Give four first order conditions for the dynamic optimisation in this economy.
- (c) Characterise the balanced growth path using those conditions for this economy
- (d) Discuss the transitional dynamics in  $(\theta_t, K_t)$  space when  $(\dot{\theta}_t = 0)$  and when  $(\dot{K}_t = 0)$ .

## Tutorial 6 (Business cycles)

1. Consider a simple dynamic model for an economy with

$$\text{Consumption: } C_t = a_0 + a_1 Y_{t-1}$$

$$\text{Investment: } I_t = b_0 + b_1 (Y_{t-1} - Y_{t-2})$$

$$\text{National income: } Y_t = C_t + I_t$$

- Find out the steady state income level for this economy.
- Solve for dynamic adjustment path towards the steady state.
- Using answers to (a) and (b) derive the time path for output for this economy.
- Select parameters  $(a_0, a_1, b_0, b_1)$  which gives (i) convergence to the steady state  
(ii) divergence from the steady state and (iii) regular cycle around the steady state
- Estimate the values of the above parameters taking the national income, consumption and investment series of the UK economy from 1970 to 2000.

2. Provide a single equation representation for the interest rate determination rule

$$y_t - y^* = d(i_{t-1} - i_t^*) \quad (1)$$

$$\pi_t = \pi_t^* + c(y_{t-1} - y_{t-1}^*) \quad (2)$$

$$i_t = i_t^* + a(y_t - y_t^*) + b(\pi_t - \pi_t^*) \quad (3)$$

Solve this model for the actual interest rate and discuss parameter values that show

- convergence of actual interest rate towards its target.
- divergence of the actual interest rate from its target.
- a regular cycle around the target.

### Tutorial 7 (Rules versus discretion in setting the economic policy)

Policy makers want to minimise the social cost function as following

$$\text{Min } \Omega = \frac{1}{2}(y - y^*)^2 + \frac{\beta}{2}\pi^2$$

subject to the Lucas supply function  $y = \bar{y} + \alpha(\pi - \pi^e) + \varepsilon$

where  $\Omega$  is the measure of the social cost,  $y$  is log of output,  $y^*$  is the target output,

$\bar{y}$  is the trend output,  $\pi$  is the actual inflation, and the  $\pi^e$  is the expected inflation. A

bliss point is achieved when  $y = y^*$  and  $\pi = 0$ .

- (a) Represent the policy makers cost functions as a concentric circles around the bliss point in the  $(\pi, y)$  space.
- (b) Find the optimal values of inflation and output and the social cost  $\Omega$ 
  - (i) under the discretion
  - (ii) under a policy rule
  - (iii) when policy makers cheat public by surprising them with a higher inflation
3. Provide a graphical illustration on how the inflation bias differs between the central bank and the government. Using an aggregate demand and aggregate supply lines show how the central bank reacts to a shock when (a) it only cares about inflation (b) it cares about both inflation and output (c) if it cares only about the output.
4. A central bank decides to reduce inflation by 50% percent. Show diagrammatically how it would affect if (i) prices and wages are sticky, (ii) when wage rate and price levels are perfectly flexible (iii) in the intermediate case.
5. Discuss how the fixed and flexible exchange rate system impacts the aggregate supply curve for an economy.

### **Tutorial 8 (Exchange Rate and Policy co-ordination)**

For simplicity assume that there are only two countries in the World, country A and Country B.

1. Discuss the impacts of expansionary monetary policy in country A in output and reserves of both countries under the fixed exchange rate regime if (i) the capital is perfectly mobile across countries (ii) if capital is completely immobile between country A and B
2. Do question (1) again when exchange rates are flexible across these countries.
3. Discuss the impacts of expansionary fiscal policy in country A in output and reserves of both countries under the fixed exchange rate regime if (i) the capital is perfectly mobile across countries (ii) capital is completely immobile between country A and B
4. Do question (3) again when exchange rates are flexible across these countries.
5. What is exchange rate overshooting? Use a diagram to discuss it in response to an increase in the money supply.

## Tutorial 9 (Feedback rule vs. policy irrelevance proposition)

1. Demand in an economy is given by

$$y_t = \lambda y_{t-1} + \beta m_t + u_t$$

where  $y_t$  is deviation of actual output from its trend, and  $m_t$  is real money balance and  $u_t$  is idiosyncratic disturbance term with a zero mean and a constant variance.

Policy makers like to minimise the variance of output  $\text{var}(y_t) = \sum y_t^2$ . Policy feedback rule is  $m_t = g y_{t-1}$ .

- a. Find the optimal feedback rule that minimises  $\text{var}(y_t) = \sum y_t^2$ .
- b. What should be the money supply under the optimal feedback rule?
- c. Show that an economic policy does not have any impact on output under the rational expectation model using the Lucas aggregate supply function

$$y_t = \lambda y_{t-1} + \beta(m_t - E_{t-1}m_t) + u_t.$$

2. Now consider an open economy model given the following model

Money demand:  $m^d - p_t = \alpha \bar{y} - \alpha_2 r_t + \varepsilon_t$

PPP:  $p_t = p^* + e_t$

UIP:  $r_t = r^* + (e_{t-1} - e_t) + \eta_t$

Expectation:  $E e_{t+1}^e = e_{t+1}$

Sterilisation policy:  $m^s = \bar{m} - \mu(e_t - e + \psi_t)$

- (a) what is the exchange rate in this model in the steady state?
- (b) Decompose the variation in the exchange rate (or in the price level) in terms of shocks to the demand for money, to the interest rate and to the exchange rate.

### **Tutorial 10 (central bank independence and policy coordination)**

1. Use a diagram with a balance of payment relation between two countries to show that
  - (a) A co-operative solution to the expansionary policy is superior to the Nash equilibrium in the model
  
2. Discuss three examples where the more independent central banks have been able to achieve the targets of the monetary policy.

THE UNIVERSITY OF HULL

Department of Economics

Level 3 Examination

January, 2002

**MACROECONOMIC THEMES**

Wednesday, 23 January, 9.30 am to 11.30 am

Answer any THREE of the following questions:

Do not open or turn over this exam paper, or start to write anything until told to by the Invigilator. Starting to write before being permitted to do so may be seen as an attempt to use Unfair Means.

- 1 Explain, in some detail, how would you combine the Uncovered Interest Parity and the Covered Interest Parity conditions to devise a testable hypothesis about the expected rate of depreciation of the exchange rate.
- 2 Use the model of inter-temporal substitution of consumption to explain the relationship between consumption growth, the rate of interest and the rate of time preference.
- 3 If the real wage rate were to follow a random walk, would you expect workers to substitute their labour supply inter-temporally in response to a shock in the wage process? Would you expect them to substitute labour inter-temporally in response to a change in the interest rate? Explain in some detail.
- 4 Explain, in some detail, the process of capital accumulation in response to a positive productivity shock.
- 5 Write down an expression for the inter-temporal budget constraint of the government and use this constraint to argue for and against the hypothesis that a tax cut in period 1 will serve to raise consumption in period 1.
- 6 The government debt of an open economy with highly mobile capital is increasing at a rate greater than the interest rate. What developments may force the government to stabilize the size of its debt?
- 7 EITHER:

*The evidence shows that the cyclical pattern of the interest rate coincides with the cyclical pattern of GDP. Does this support the New Keynesian theories or the Real Business Cycle theories? Explain in some detail.*

OR:

The evidence shows that the real wage rate is mildly pro-cyclical. Does this support the New Keynesian theories or the Real Business Cycle theories? Explain in some detail.

8 Answer either (a) or (b).

(a) Write brief essays on the following topics:

- (i) The Laffer Curve
- (ii) The Beveridge Curve
- (iii) Cyclically Adjusted Budget Deficits

OR

(b) Write brief essays on the following topics:

- (i) The Deadweight Loss of Taxation
- (ii) Automatic Stabilizers and the Budget Deficit
- (iii) Time Inconsistency and Inflation

(10365)

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(END)

THE UNIVERSITY OF HULL

Level 3 Examination

2001

**MACROECONOMIC THEMES**

Friday, 19 January, 1.30 pm to 3.30 pm

Answer THREE questions. All questions carry equal marks.

1 Outline the main tenets and policy implications of monetarism.

2 EITHER

Outline the basic beliefs of New Classical Macroeconomics.

OR

Analyse, and critically evaluate the justifications for, the Lucas "surprise" supply function.

3 Explain and highlight the importance for macroeconomics of:

(a) the "Lucas critique" of macroeconomic policy-making;  
[50 marks]

(b) the Tinbergen "targets-instruments" theorem.  
[50 marks]

Illustrate each answer with a simple formal example.

4 Analyse the "policy neutrality" proposition. Point out the importance in this context of whether the market clears or not.

5 EITHER

Analyse the behaviour of trade unions as a source of real wage rigidity and highlight its implications for unemployment.

OR

Analyse nominal price (or wage) stickiness as a reason for the effectiveness of nominal aggregate demand policies.

(10365)  
(continued)

- 6 (a) What is meant by, and what are the main implications of, the "time inconsistency of optimal government policy"?  
[60 marks]
- (b) Analyse the usefulness of Central Bank independence as a solution to the above problem.  
[40 marks]
- 7 Outline the main dilemmas that policy-makers have faced in the conduct of monetary policy in the UK since 1979 and the major policy developments in this area during this period.
- 8 State and explain the government budget constraint and point out its implications for sound fiscal policy.

(10365)  
(END)

## Reading and Resources

### Reading List

There is no single core text book for this module. In 1975 M.J.C. Surrey had edited a volume "Macroeconomic Themes", which is a bit old in the current context. Advanced Macroeconomics by David Romer is a good text, presents difficult concept using reasonable amount of technical tool but some of its chapters may be accessible only after completing this module. For general more non-technical reviews texts by Miles and Scott (2002), Mankiw's and Blanchard,s texts used in the second year should be enough. Manfred (2003) and Burda and Wyplosz (2002) texts are simple and have good theoretical and applied problems at the end of the chapters and have good web pages for students. Stevenson, Muscatelli and Gregory (1988) has a good coverage of stabilisation policy but it is out of print. Sheffrin (1989), K.A. Crystall and Simon Price (1994) are easy reading. Sargent and Ljungqvists (2000) and Sargent(1987) are more for post-graduate level. Jones(2002) provides good analysis of growth and Cooley (1996) is good for more recent advancement in the business cycle research. I will try to provide lecture notes based on my studies, which might be complemented by reading any of these text-books.

#### Key Texts:

David Romer *Advanced Macroeconomics*, McGraw Hill 1996.  
Gartner Manfred, *Macroeconomics*, Prentice Hall, 2003.

Burda and Wyplosz *Macroeconomics: A European Text*, 3rd edition Oxford Univ. Press, 2002.

**Other Recommended texts:**

Chrystal K.A and Simon Price (1994) *Controversies in Macroeconomics*, 3<sup>rd</sup> Edition, Harvester Wheatsheaf.

Cooly Thomas F (1995) *Frontiers of Business Cycle Research*, Princeton.

A. Stevenson, V.M. Muscatelli and M. Gregory (1988) *Macroeconomic Theory and Stabilisation Policy*, Phillip Allan, London.

Gartner Manfred (2003) *Macroeconomics*, Prentice Hall.

Hiejdra and Van Der Plug (2002) *Foundations of Modern Macroeconomics*, Oxford University Press, 2002.

Sheffrin SM (1989) *The Making of Economic Policy*, Blackwell.

**Journal List**

The following Journals are appropriate to the module and will contain further articles which you may find helpful. You will find following journal in the current periodical section of library.

*American Economic Review, Journal Political Economy, Journal of Economic Perspective, Journal Macroeconomics, Journal of Monetary Economics, Economic Journal, Journal of Money Credit and Banking, Economic Letters, Applied Economics, Applied Economics Letters International Economic Review, Journal of Policy Modelling.*

**WWW Sites**

You will find these Web sites helpful for the module and are advised to consult them regularly. You may discover other Websites which are also helpful.

HM-Treasury UK <http://www.hm-treasury.gov.uk> ;

Bank of England <http://www.bankofengland.co.uk>

European Central Bank <http://www.ecb.int/>

International monetary fund: <http://www.imf.org>

**Other Sources:**

*For example: Econlit JSTOR databases through the electronic services in the library should be useful for the literature search. Financial Times has plenty of day to day news and story about the macroeconomic events in real life.*

The range of references and resources available throughout the University Library is increasing constantly on a daily basis. The list above should be thought of as an opening into the literature. You are strongly encouraged to browse through the stock and to pay particular attention to the New Periodicals shelves.

**Programme Changes**

Wherever possible, the programme timetables and content will be delivered as outlined in the Module Handbook. However, at times changes do have to be made

but in the event of such changes occurring every effort will be made to re-schedule the activity, or replace it with work of an equivalent nature.

### **Attendance**

The University has an Attendance Policy, which requires all students to attend all timetabled sessions for their programme of study. An Attendance Register will be kept for tutorial sessions and students with unauthorised absence will be subject to School and University disciplinary procedures. You are reminded that unauthorised absence may affect your course progress and LEA grant entitlement.

It is important that you have read and understood the section *entitled 'General Attendance'* in the Hull University Business School Student Handbook.

### **Student Support**

All modules are supported by tutorial assistance. A list of Module Staff and their office numbers, telephone extensions and E.mail addresses is available on the inside front cover of this document. A specified time for Tutorials for this module can be seen in the Study Programme. Appointments may sometimes be made at other times but you are advised to contact your tutor to arrange an appointment. Arrange your tutorial by signing the Tutorial Sheet on your tutor's office door. This support is specifically for assistance with a named module upon which the tutor teaches.

Enquiries of a general nature, which may range over a number of modules, should be addressed to the Programme Leader of your registered degree.

### **Health and Safety**

You are responsible for your own health and safety at all times. It is vitally important that you act sensibly and safely for both indoor and outdoor activities. You are required to follow all safety instructions and guidelines as laid down in your *'University of Hull Business School Student Handbook'*.

### **Module Evaluation**

The module will be evaluated by means of the Business School Module Evaluation Questionnaire (MEQ), which all students are required to complete at the end of the module. The results of this formal evaluation will be forwarded to Student-Staff Committees and to Undergraduate Committee and will be used to make alterations and improvements to the delivery of the module next year if these are deemed to be necessary. Additional module evaluation techniques may also be employed. Issues concerning the module can be forwarded to the School Student-Staff Committee. You may also have the opportunity to make informal comments and suggestions concerning the module in tutorial sessions.

The Module Staff hope that you enjoy studying this module and that it makes a valuable educational contribution to your Course Programme.