ECON4100 ADVANCED ECONOMIC ANALYSIS

2004 Session 1

Introduction

This is a course in advanced microeconomic and macroeconomic analysis. The purpose of this course is to familiarise you with how theoretical techniques are used to address and model real economic phenomena.

The aim of the first half of the course is to familiarise you with the optimisation based approach which underlies most of modern neoclassical economics. In doing so you will develop skills necessary for comprehending modern journal articles on economics.

We will approach the two familiar topics of producer and consumer theory with a much greater degree of rigour than you will have seen in undergraduate courses. The deeper level of analysis will bring new insights and will extend your level of mathematical technique.

By successfully completing the first half of this course your learning outcomes should include:
- know the basic results and techniques of optimisation theory;
- know necessary and sufficient conditions for equilibrium in individual decision-making problems;
- be able to apply comparative statics techniques to derive testable results from theoretical models;
- know the basic results of producer theory and be able to derive them;
- know the basic results of consumer theory and be able to derive them;
- be able to apply optimisation techniques to solve microeconomics problems.

The second half of this course is on advanced macroeconomics, that is, big-picture questions about phenomena such as inflation, unemployment, exchange rates, and fiscal and monetary policy. Prior knowledge will be assumed about such things as IS-LM analysis and the AD-AS model. Having successfully completed the second half of the course you will:

- understand the nature and limitations of macro league tables
- know the stylised facts about business cycles
- understand the rational expectations hypothesis and its leading competitors on the question of how expectations are formed

- understand the life-cycle permanent-income hypothesis and its limitations
- understand the tax-smoothing hypothesis an its limitations
- know the debate about the optimal tax mix
- know a variety of rules for the conduct of monetary policy
- know the debate about universal versus targeted welfare
- know the stylised facts about the returns and risks to the main asset classes
- know about the impact of uncertainty on investment

The time and place for classes is

Tuesday 2:00-5:00 p.m., JG129

The presenter of the first half of the course will be
Dr Kieron Meagher
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The presenter of the second half of the course, and course coordinator, will be
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Assessment

	Part-I	Part-II
Final exam	30%	30%
Tutorial presentation	10%	-
Assignment	10%	-
Review Essay	-	20%
Total	50%	50%

Part I

You will be split into small groups and assigned a topic to present to the class. The topics are mainly based on chapters of the textbook which are not covered in class but which closely relate to material covered in class. You will be assessed on: (i) communicating the intuition underlying your topic; (ii) appropriate communication of technical detail and results; (iii) difficulty and time available for preparation; and (iv) general presentation skills.

There will be a single assignment given for this part of the course. Details of the assignment, such as due date, will be given in class.

Part II

Assessment in the second half of this course will be as follows:

- Review essay: 20%

Your review essay will consist of a summary and appraisal of any of the articles listed below with a dagger against it. Each student will be expected to review a different article, and these will be allocated on a first-come first-served basis. Before writing up your review article, you will be expected to present a 10-minute summary of it to your classmates (thereby gaining helpful feedback). Use two or three overheads in your presentation. Because this year's class is large, there is a particular need not to speak for too long; in the event your presentation exceeds 15 minutes in length, excess minutes (over 15) will incur a penalty. Hand in your written review within three weeks of your oral presentation; please keep a copy. Your written review should not exceed 1600 words in length.

Textbooks

The *required* textbook for the first half of the course is:

Eugene Silberberg and Wing Suen, *The Structure of Economics: a Mathematical Analysis,* 3rd edition, McGraw-Hill, 2001.

A reference for the second half of the course is:

David Romer, *Advanced Macroeconomics*, 2nd edition, McGraw-Hill, 2001

University Rules

You should be aware of the University Assessment Policy:

http://www/fce.unsw.edu.au/current_students/responsibilities.shtml#misconduct

In addition to cheating in exams the university's rules also contain harsh penalties for plagiarism. Plagiarism entails taking and using as one's own, the thoughts or writings of another without acknowledgement including:
(a) where paragraphs, sentences, a single sentence or significant part of a sentence which are copied directly, are not enclosed in quotation marks and appropriately footnoted;
(b) where direct quotations are not used, but ideas or arguments are paraphrased or summarised, and the source of the material is not acknowledged either by footnoting or other reference within the text of the paper; and
(c) where an idea, which appears elsewhere in print, film or electronic medium, is used or developed without reference being made to the author or the source of the idea.

Topics

Part I: Advanced Microeconomic Theory

Subject to time, we will follow the chapters of the textbook listed below. Individual topics may be dealt with in greater or lesser depth than in the textbook. I will give a

concise summary of examinable topics at the end of the course. Each of the following topics will take approximately one-week.

1. Profit maximisation (chapter 4)

2. Background: student presentations
2.1 Comparative statics and the paradigm of economics (chapter 1)
2.2 Review of single variable calculus (chapter 2)
2.3 Review of multivariate calculus (chapter 3)

3. Comparative statics 1: Traditional methods (chapters 5 & 6)

4. Comparative statics 2: The envelope theorem and duality (chapter 7)

5. Comparative statics 3: The latest advances
Monotone comparative statics lecture notes by Professor Tim Van Zandt

6. Cost and production 1 (chapters 8 & 9)

7. Cost and production 2 (chapters 8 & 9)

If you want more details of the mathematics, an alternative presentation of the mathematical techniques used or more maths problems to practice let me suggest:

Carl Simon and Lawrence Blume, (1994), *Mathematics for Economists,* W.W. Norton and Company, New York.

Alpha Chiang, (1984), *Fundamental Methods of Mathematical Economics,* McGraw-Hill book Co, Singapore

Most classic graduate microeconomic textbooks are more advanced than this course. If you are looking for an alternative, but slightly more advanced, presentation see:

G.A Jehle and P. Reny (2001), *Advanced Microeconomic Theory,* 2nd edition, Pearson education.

If you want to refresh only the concepts of microeconomics, without the technical detail, any intermediate level textbook should be suitable.

Part II

The lecture program for the second half of the course is as follows:

Week 8:   27 April
            Introduction to Macroeconomics: International GDP
            Comparisons, Business Cycles, Expectations and
            Forecasting

OECD league table, limitations of GDP-based performance criteria; Hodrick-Prescott filter; leading indicators; evaluating forecasting performance, modelling expectations.

† Australian Treasury, "Macroeconomic Forecasts: Purpose, Methodology and Performance", *Economic Roundup*, Autumn 1996.

† Box, S., 'The Irish Economy: Lessons for new Zealand?", New Zealand Treasury working paper #98/1, 1998. Available at the website of the New Zealand Treasury.

† Carroll, C., "The Epidemiology of Macroeconomic Expectations", NBER Working Paper No. 8695, 2001. Available via www.nber.org.

† de Roos, N. and B. Russell, "Towards an Understanding of Australia's Co-Movement with Foreign Business Cycles", RBA Research Discussion Paper 9607, 1996.[A later version has been published in the *Economic Record*]

Dowrick, S. and J. Quiggin, "Australia, Japan and the OECD GDP Rankings and Revealed Preference", *Australian Economic Review*, 1st Quarter 1993, 21-34.

† Fisher, L., G. Otto and G. Voss, "Australian Business Cycle Facts", *Australian Economic Papers* 35(67), 1996, 202-222.

† Hodrick, R. and E. Prescott, "Postwar US Business Cycles: An Empirical Investigation", *Journal of Money, Credit and Banking* 29, 1997, 1-16.

† Hamilton, J. and D. Kim, "A Re-Examination of the Predictability of Economic Activity Using the Yield Spread", NBER [@www.nber.org], Working Paper No. 7954, 2000. [A later version has been published in the *Journal of Money, Credit and Banking*]

† International Monetary Fund, Annex 1.1 of: "New Zealand: Selected Economic Isssues", 2003. Available from the website of the IMF.

† Kohli, U. "Real GDP, Real Domstic Income, and Terms of Trade Changes", *Journal of International Economics,* 2004, 83-106.

† Parente, S and E. Prescott, "A Unified Theory of the Evolution of National Income Levels", working paper, Federal Reserve Bank of Minneapolis, 2003. Available from the website of this branch of the Fed, or from Professor Prescott's website.

† Woodford, M., "Revolution and Evolution in Twentieth-Century Macroeconomics", 1999. Available at www.princeton.edu/~woodford

Romer Chs 4 and 5.

Week 9: 4 May
Consumption and Saving

Two-period Fisher diagram; measuring and taxing economic income in conditions of inflation; Hall, Campbell and Lettau/Ludvigson versions of the life-cycle permanent-income hypotheses; influence of rates of return on consumption and saving.

† Carroll, C., "Buffer-Stock Saving and the Life Cycle/Permanent Income Hypothesis", *Quarterly Journal of Economics*, 1997, 1-56.

† Campbell, J.Y., "Does Saving Anticipate Declining Labour Income? An Alternative Test of the Permanent Income Hypothesis", *Econometrica*, 55, 1987, 1249-1273.

† Commonwealth Treasury of Australia, "OECD Report on Taxation and Household Saving", *Economic Roundup*, Summer 1995, 55-66.

†Edey, M. and L.Gower, "National Saving: Trends and Policy", in D.Gruen and S.Shrestha (eds.), *The Australian Economy in the 1990s,* Economic Group, Reserve Bank of Australia, 2000, 277-315. [www.rba.gov.au].

† Hahm, J-H., "Consumption Adjustment to Real Interest Rates: Intertemporal Substitution Revisited", *Journal of Economic Dynamics and Control*, 22, 1998, 293-320.

† Hall, R.A., "Stochastic Implications of the Life-Cycle Permanent Income Hypothesis: Theory and Evidence", *Journal of Political Economy*, 1978, 971-987.

† Lettau, M. and S.Ludvigson, "Consumption, Aggregate Wealth, and Expected Stock Returns", *Journal of Finance* 56, 2001, 815-850.

Romer, Ch. 7.

Week 10: 11 May
Fiscal Policy

Budget case study; taxation and the labour market; dynamic optimal taxation, tax reform.

† Aschauer, D., "The Equilibrium Approach to Fiscal Policy", *Journal of Money Credit and Banking*, 20, 1988.

† Barro, R. "On the Determination of the Public Debt', *Journal of Political Economy,* 87, 1979, 940-971.

† Barro, R., "Notes on Optimal Debt Management", May 1999. WWW: http://post.economics.harvard.edu/faculty/barro/barro.html

† Bordo, M. and E. White, "A Tale of Two Currencies: British and French Finance During the Napoleonic Wars", *Journal of Economic History*, 1991, 303-316.

† .Costello, P., "Budget Speech 2004-05", Australian Government Publishing Service. Available at www.treasury.gov.au

Fisher, L., and G. Kingston, "Joint Implications of Consumption and Tax Smoothing", *Journal of Money, Credit and Banking,* 2004.

† Judd, K. "The Impact of Tax Reform in Modern Dynamic Economies", undated. Available at www.bucky.stanford.edu

† Lucas, R., "Supply-Side Economics: An Analytical Review", *Oxford Economic Papers*, April 1990.

† Persson, T. and L. Svenson, "Why a Stubborn Conservative Would Run a Deficit: Policy with Time-Inconsistent Preferences", *Quarterly Journal of Economics*, 1989, 325-246.

Romer, Ch. 11.

Week 11:   18 May
Monetary Policy

Recent Australian experience; time consistency; relative roles of fiscal and monetary policy in stabilising the economy, understanding extreme inflations; fiscal foundations of monetary regimes; inflation, taxation and the current account, currency boards.

† Bayoumi, T. and J. Gagnon, "Taxation and Inflation: A New Explanation for Capital Flows", *Journal of Monetary Economics* 38, 1996, 303-330.

†Cochrane, J., "Fiscal Foundations of Monetary Regimes", University of Chicago, 2003. Available at http://gsbwww.uchicago.edu/fac/john.cochrane/research/Papers/

†Congdon, T., "The UKs Achievement of Economic Stability": How Did It Happen?", *World Economics* 3, 2002, 25-41.

† Dornbusch, R. and Fischer, S., "Stopping Hyperinflations Past and Present", *Welwirtschaftliches Archiv.,* 1986.

† Hanke, S., and M. Sekerke, "Monetary Options for Postwar Iraq, 2003. Available from the website of the Cato Institute.

Kingston, G., "The Foreign Currency Loans Affair: An Economist's Perspective", *Australian Economic Papers*, 1995, 31-49.

†MacFarlane, I., "Australian Monetary Policy in the Last Quarter of the Twentieth Century", *Economic Record* 75, September 1999, 213-224.

† Mankiw, N., "Recent Developments in Macroeconomics: A Very Quick Refresher Course", *Journal of Money Credit and Banking* 20, 1988.
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Romer, Ch. 10.

Week 12:   25 May
Employment and Welfare Policy

Recent Australian experience; universal versus targeted welfare; lessons from Sweden.

† Lindbeck, A., "The Swedish Experiment", *Journal of Economic Literature* XXXV, 1997, 1273-1319.

† Mitchell, D., A. Harding and F. Gruen, "Targeting Welfare", *Economic Record* 70, 1994, 315-340.

† Valentine, T., "The Sources of Unemployment: A Simple Econometric Analysis", *Economic Papers*, December 1993, 1-20.

Week 13   1 June
Asset Prices

Macro perspectives on asset returns; expectations theory of the term structure of interest rates; empirical regularities in exchange rates; monetary models of exchange rates, commodity prices and the exchange rate.

Boyer, R. and G. Kingston, "Currency Substitution Under Finance Constraints", *Journal of International Money and Finance*, 1987, 235-250.

† Campbell, J., "Consumption-Based Asset Pricing", 2001. WWW: http://post.economics.harvard.edu/faculty/campbell/campbell.html

† Campbell, J. and R. Shiller, "Valuation Ratios and the Long-Run Stock Market Outlook: An Update", NBER Working Paper No. 8221, 2001.

† Chen, Y. and K. Rogoff, "Commodity Currencies", *Journal of International Economics,* 2003 (Special issue on exchange rate models), 133-160.

Kingston, G. and M. Melecky, "Currency Preferences and the Australian Dollar", working paper School of Economics, 2003.

† McGrattan, E. and E. Prescott, "Is the Stock Market Overvalued?", NBER Working Paper No. 8077, 2001.

† Mussa, M., "Empirical Regularities in the Behaviour of Exchange Rates and Theories of the Foreign Exchange Market", in K. Brunner and A. Meltzer (eds), *Carnegie-Rochester Conference Series on Public Policy*, Vol.11, 1979, 9-58.

† Obstfeld, M. and K. Rogoff, "The Six Major Puzzles in International Macroeconomics: Is There a Common Cause?", NBER Working Paper No.7777, 2000.

Week 14:   8 June
Investment

Investment in the national accounts; capital expenditure decisions in practice; "Tobin's Q"; embedded options

Abel, A.B. and J.C. Eberly, "The Effects of Irreversibility and Uncertainty on Capital Accumulation", *Journal of Monetary Economics* 44, 1999, 337-606.
in investment projects.

Australian Bureau of Statistics, *Australian National Accounts,* Cat. No.5206.0 (available at www.abs.gov.au).

† Dixit, A., "Investment and Hysteresis", *Journal of Economic Perspectives* 6, 1992, 107-132.

†Graham, J. and Harvey, C., "How Do CFOs Make Capital Budgeting and Capital Structure Decisions?", *Journal of Applied Corporate Finance,*2002 (Spring), pp8-28.

† Pindyck, R., "Irreversibility, Uncertainty and Investment", *Journal of Economic Literature* XXIX, 1991, 1110-1148.

†Pindyck, R., "Irreversability and the Explanation of Investment Behavior",in D.Lund and B.Oksendal (eds), *Stochastic Models and Option Values,* North Holland, 1991,129-141.

Romer, Ch. 8.

EXERCISES ON MACROECONOMICS

Introduction to Macroeconomics

Imagine that you are evaluating the performance of a macroeconomic forecasting service. Its track record for the 1990s was as follows:

Date (t)	1991	1992	1993	1994	1995
P_t: Forecast at t-1 for t	4	6	8	10	12
A_t: Actual at t	2	4	6	8	10

Date (t)	1996	1997	1998	1999	2000
P_t: Forecast at t-l for t	10	12	14	16	18
A_t: Actual at t	12	14	16	18	20

(a) The *forecast error* at each date is given by actual minus predicted value. List the forecast errors for this sample. (This will consist of a list of ten numbers).

(b) A *turning point* can be defined here as a time of downturn immediately following two or more successive ups, or an upturn following two or more successive downs. At which dates, if any, is it first revealed that there has been a failure to predict a turning point?

(c) At which dates, if any, is it first revealed that a forecast that there will be a turning point turned out to be incorrect?

(d) A forecasting service is *biased* if its average forecasting error is significantly different from zero. Does the above sample suggest bias?

(e) A forecasting service is subject to *positive first-order serial correlation* if either positive or negative forecasting errors tend to come in "sets". Does the above sample suggest positive first-order serial correlation?

(f)   This sample illustrates that performance in relation to turning points is not a "sufficient statistic' for evaluating forecasting performance overall. Elaborate.

(g)   The *mean square error* (MSE) of a sample of forecasts is the sum of the squared errors divided by the number of observations. What is the MSE of the above sample?

(h)   A *static* forecast is produced by assuming $P_t = A_{t-1}$. To what extent were the above forecasts produced in this way?

(i)   Necessary conditions for a *rational* forecasting procedure include the absence of either significant bias or significant serial correlation. Does the above sequence of forecasts pass this joint test?

(j)   Why is it unlikely that the above actuals could represent a time series of asset prices, for example, an index of stock prices?

Consumption and Saving

1.   The diagram refers to the two-period choice problem of an individual with endowment point A.
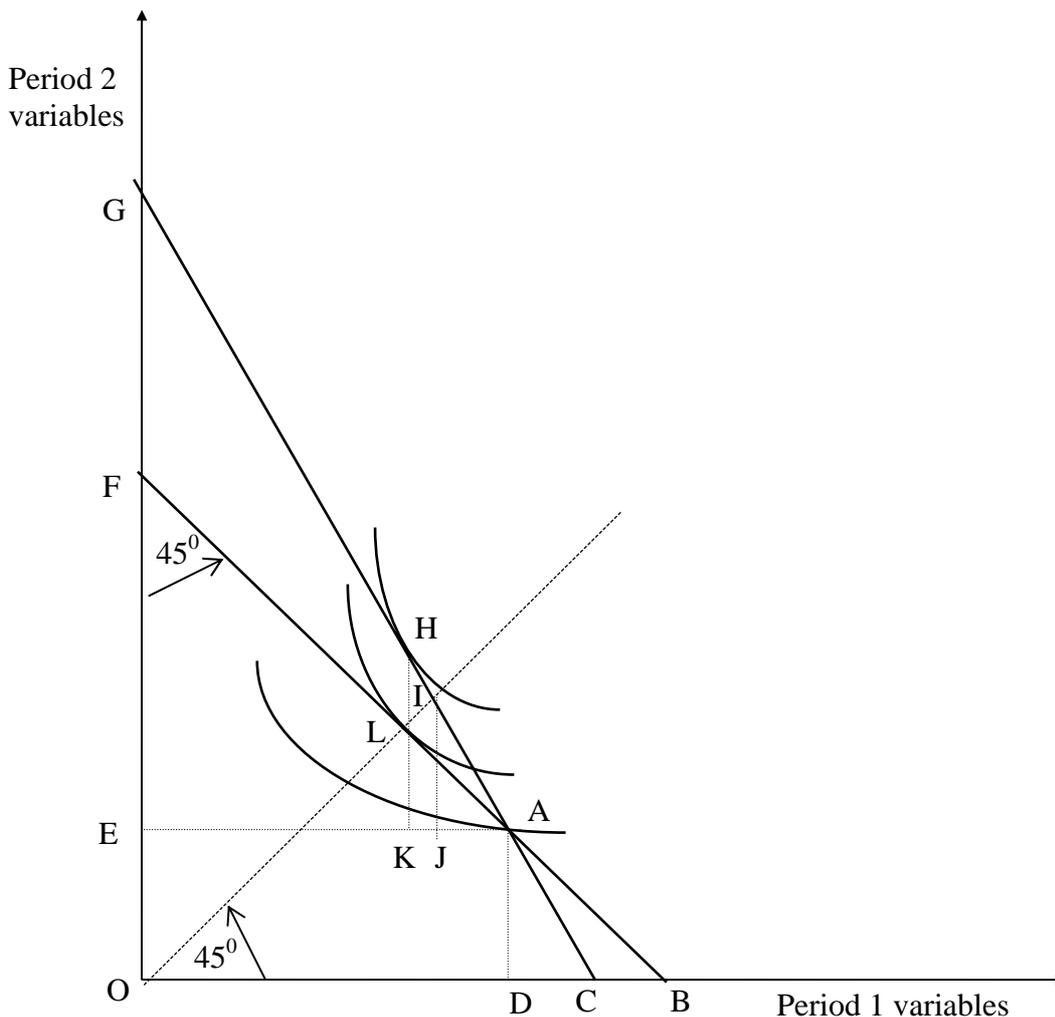
(a)   Explain why the interest rate implied by the budget line *BF* is zero, while the interest rate implied by the budget line *CG* is not.

(b)   *Permanent income* can be defined as the individual's maximum uniform consumption rate. If, for example, the ruling interest rate is the positive one, then the individual's permanent income is given by distance *EJ*. What is the individual's permanent income if the ruling interest rate is zero?

(c)   What is the individual's ex-post consumption point if the individual makes a first-period consumption/saving decision in the expectation that the interest rate will be the positive one, yet the ex post interest rate turns out to be zero?

(d)   *Wealth* can be defined as the individual's maximum feasible current consumption. *Welfare* can be defined as the individual's lifetime utility. Use this diagram — in particular, its scenario of two alternative interest rates — to make the point that an increase in wealth does not necessarily go hand in hand with an increase in welfare.

2.   Like the preceding exercise, the so-called *intertemporal optimising* model of the current account is based on Irving Fisher's ideas. (In the simple version here, money is a "veil" — the current account is unaltered by changes in the money supply or the exchange rate). A small open economy is treated analogously to a price-taking household.   The following rough diagram attempts to portray this setup:

$Y=(1, 1.5)$

$Y'=(1,3)$

$C=(1.5, .5)$

$C'=(2, 1.5)$
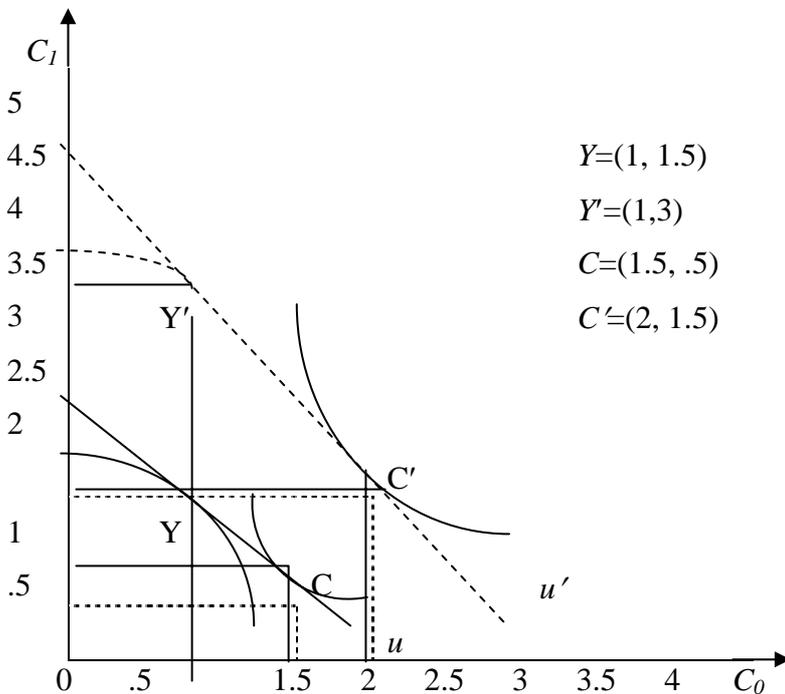
Notation:

c_0 national absorption or consumption this period
c_1 national absorption or consumption in the future
u, u' national utility levels

y_0	national output this period
y_1	national output in the future
C, Y	national absorption and output points

(a)   Noting that absorption less output is the *trade deficit*, what is this country's trade deficit, given that the national absorption and production points are C and Y?

(b)   What is this country's anticipated future trade surplus?

(c)   Now suppose this country revises upwards its anticipations of future resources, moving its output point to Y'. (The world real interest rate is unaffected). What is the new trade deficit?

(d)   What is the new anticipated future trade surplus?

(e)   The "*stages*" theory of the balance of payments uses the foregoing kind of analysis to rationalize the fact that "young" economies (e.g. Australia) tend to have trade deficits, financed by capital imports, whereas mature economies (e.g. Japan) tend to have the opposite. Give a more detailed outline of this theory.

Fiscal Policy

1.   Consider the following competitive classical model of an economy with distortionary taxation:

$$W/P = a - bN^d \qquad \text{... labour demand}$$

$$(1-\tau)W/P = N^s \qquad \text{... labour supply}$$

$$N^d = N^s = N \qquad \text{... equilibrium}$$

$$Y = aN - (b/2)N^2 \qquad \text{... production function}$$

Here W = nominal wage, P = price level. N^d = labour demand, N^S = labour supply, τ = proportional wage tax, and Y = real output.

(a)   Solve for equilibrium Y.

(b)   Portray your solution for Y in a "classical cross" diagram. In other words, show Y as the appropriate area under the labour demand curve in a diagram with N on the horizontal axis and W/P on the vertical axis.

(c)   Upon redrawing your answer to (b), now indicate the areas corresponding to (i) revenue from the proportional wage tax τ and (ii) the deadweight efficiency loss induced by τ.

(d)   Assuming infinitely elastic labour demand (i.e., $b = 0$), find the value of the revenue-maximising proportional wage tax τ_{Rmax}.

(e) *Marginal excess burden,* otherwise known as the *marginal efficiency cost* or *marginal welfare cost* of taxation, is the increase in the excess burden of taxation that ensues when the tax rate is raised by just enough to generate one more dollar of revenue. In geometric terms MEB is the increase in the area of the deadweight-loss triangle divided by the increase in the area of the revenue rectangle. In algebraic terms, if deadweight efficiency loss (i.e. excess burden) is called *EB*, and revenue is called *R*, then $MEB = (dEB/d\tau) \div (dR/d\tau)$.

Portray marginal excess burden as a function of the tax rate in the case of infinitely elastic labour demand.

2. Consider a "benevolent" (efficient) government that needs to raise its revenue by means of "distortionary" (non-lump-sum) taxation. Its aim over two periods is to choose tax rates τ_1 and τ_2 that minimise the objective

$$\sum_{t=1}^{2} \frac{1}{2}\omega_t^2 \tau_t^2$$

subject to the constraints

$$G_1 = \tau_1(1-\tau_1)\omega_1^2 + B$$
$$G_2 + B = \tau_2(1-\tau_2)\omega_2^2$$

where G_t denotes exogenous purchases (*t=1,2*), ω_t is an exogenous productivity shock, and *B* is government borrowing.

(a)   Prove that the tax rate will be "smoothed" through time, i.e., $\tau_1 = \tau_2 \ (= \tau*)$.

(b)   Find a closed form solution for $\tau*$ in terms of G_t and $\omega_t \ (t = 1,2)$.

3. *Review of Keynesian macroeconomics.* Consider an economy described by the following relationships:

        $C = (1 - s)(Y - T)$ ... consumption function
        $M = mY$ ... imports function
        $Y = C + I + G + X - M$ ... GDP identity

Notation:

        C consumption
        s propensity to save out of disposable income, $0 < s < 1$
        Y GDP
        T tax revenue, assumed exogenous
        I investment, assumed exogenous
        G government purchases, assumed exogenous
        M imports
        m propensity to import, $0 < m < 1$

(a)   Prove that GDP is given by

$$Y = [I + G + X - (1 - s)T]/(s + m).$$

(b)   Deduce that the trade surplus, $X - M$, is given by

$$X - M = X - \left[m/(s+m)\right]\left[I + G + X - (1-s)T\right].$$

(c)   Deduce that an increase in government purchases will reduce the trade surplus (or increase the trade deficit).

(d)   Deduce that the above negative relationship will approach one-for-one as the propensity to save approaches zero.

(e)   Deduce [from (b)] that an increase in taxes will lift the trade surplus.

(f)   If S [= Y-C-T] denotes saving, explain why $-(X - M) = I - S + G - T$ is valid simply as a matter of accounting.

(g)   An alternative macroeconomic perspective, known as the *permanent income hypothesis,* holds that this period's consumption and saving are determined by households' expectations concerning disposable income over a long period of time, and not merely by disposable income this period. On this view, a $1 increase in taxes that is expected to be temporary will leave consumption unchanged and will lower savings by $ 1. Use the identity

$$-(X - M) = I - S + G - T$$

to deduce that if the permanent income hypothesis is correct then a temporary increase in taxes will have no effect whatsoever on the trade deficit(contrary to the Keynesian model)

Monetary Policy

1.   Consider an economy with an inflation-unemployment tradeoff given by

$$\pi_t = -2\left(u_t - 4\right) + \pi_t^e$$

Notation:

π_t this year's inflation rate (% p.a.)

u_t this year's unemployment rate (% p.a.)

π_t^e last year's expectation of this year's inflation rate.

(a)   Portray this economy on a diagram with the rate of unemployment on the horizontal axis and the rate of inflation on the vertical axis. In particular, draw

in the long-run Phillips curve, and also two short-run Phillips curves, one for the case $\pi_t^e = 0$, and the other for the case and the other for the case $\pi_t^e = 4$.

(b)   Suppose the policymaker's utility function V_t is given by

$$V_t = -u_t - (1/8)\pi_t^2$$
$$= -4 + (1/2)(\pi^e - \pi_t) - (1/8)\pi_t^2$$

Portray V_t on the diagram for the case $\pi^e = 0$.

(c)   Add another indifference curve that portrays a suboptimal but "time-consistent" equilibrium for the case $\pi^e = 4$.

2.   Nations facing stresses and strains on revenues from conventional taxes sometimes resort to money printing — the so-called *inflation tax*.

In steady state, and absent real output growth, inflation (π) will equal the rate of growth of money base (μ).

Real revenue per period from money creation

$$= \frac{\Delta H}{P}$$

$$= \left(\frac{\Delta H}{H}\right) \Big/ \left(\frac{H}{P}\right)$$

$$\equiv \mu h$$

$$= \pi h$$

This question is on the inflation-tax concept. Consider the following economy:

(1) $h = .15 - .5\pi$ demand for real money base
(2) $\pi = \mu$ steady state quantity theory in a zero growth economy

Notation:

h real money base
π (expected and actual) inflation rate
μ growth rate of nominal money base (assumed exogenous).

(a)   Plot equation (1) in a diagram with h on the horizontal axis and π (= μ) on the vertical axis.

(b)   Plot the product πh in a diagram with π on the horizontal axis and revenue ($=\pi h$) on the vertical axis. Assume here that π is no greater than .3 (i.e., .inflation cannot exceed 30% p.a.).

(c)   Find the revenue-maximising rate of inflation (expressed in terms of percent per annum).

(d)   Assuming that h is measured as a fraction of GDP, find the maximum amount of revenue obtainable from the inflation tax (expressed as a percentage of GDP).

(e)   Findlay and Jones of the Australian National University found that the marginal welfare cost of personal income taxes in Australia is the order of 40c. Determine the rate of inflation that would make the marginal welfare cost of the inflation tax equal to the marginal welfare cost of the personal income tax.

3.   Consider the following model of inflation and interest rates:

Monetary equilibrium:
(1) $R = -\eta(m - p).$

Fisher effect:
(2) $R = \delta + E(p_{+1} - p).$

Notation
R nominal interest rate
η inverse of the semi-elasticity of demand for money
n log of the nominal money stock, assumes exogenous
p log of the price level
E conditional expectations operator
Subscript $+1$ lead the variable thus designated one period ahead
δ *ex ante* real interest rate, assumed parametric

Assume "full current information", i.e., agents know everything about the economy up to and including the current period of time.

(a)   Verify that the (log of) the price level will satisfy the equation

$$p = m + \frac{\delta}{\eta} + \frac{1}{\eta}E(p_{+1} - p).$$

(b)   Use repeated forward iteration of the foregoing equation to express the (log of the) price level as a discounted weighted sum of expected future (logs of the) money supply levels

4.   Explain with illustrations the workings of Taylor rules.

Employment and Welfare Policy

1(a). Explain with illustrations the concept of "effective" marginal tax rates, i.e., nominal rates adjusted for loss of welfare benefits.

1(b). Sir Humphrey Appleby (Yes, Prime Minister) said that "we can have as much unemployment as we can afford". What did he mean by this? Do you agree?

2. What is "double dipping"? Should the age pension be universal rather than means tested? Should all social security be universal?

Asset Prices

1. Consider the following model of inflation, interest and exchange rates in a two-currency floating-rate world:

World monetary equilibrium:

(1a) $\quad R = -\eta(m-p) - \gamma(m^*-p^*) \qquad 0 \leq \gamma \leq \eta$

(1b) $\quad R^* = -\gamma(m-p) - \eta(m^*-p^*)$

Uncovered interest parity:

(2) $\quad E(s_{+1} - s) = R - R^*$

Absolute purchasing power parity:

(3) $\quad p - p^* = s$

Fisher effect:

(4a) $\quad R = \delta + E(p_{+1} - p)$

(4b) $\quad R^* = \delta + E(p^*_{+1} - p^*)$

Notation

$R(R^*)$ domestic (foreign) nominal interest rate.

$\eta(\eta^*)$ inverse of the semi-elasticity of demand for local money with respect to the local interest rate, assumed parametric.

γ currency substitution parameter.

m(m*)   log of nominal domestic (foreign) money stock, assumed exogenous.

p(p*)   log of domestic (foreign) price level.

s   log of domestic currency units per foreign currency unit.

E   conditional expectations operator.

Subscript+1:   lead the variable thus designated one period ahead.

　　　δ real interest rate, assumed constant

(a)   Verify that the exchange rate will satisfy the equation:

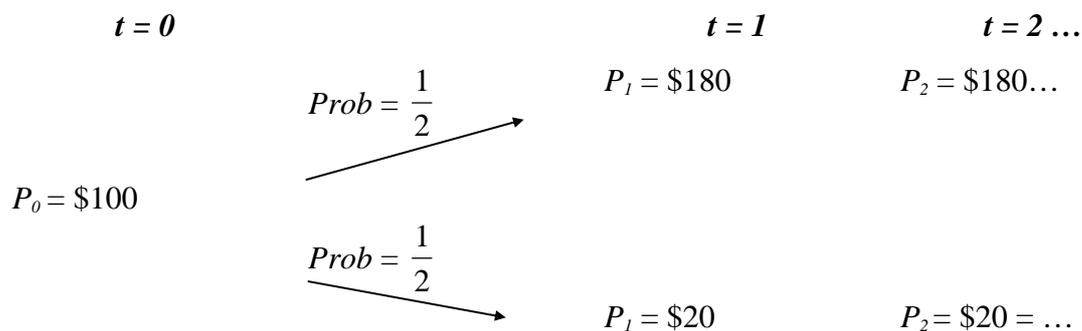$$s = m - m* + \left(\frac{1}{\eta - \gamma}\right) E\left(s_{+1} - s\right) .$$

(b)   Explain why, in the case of currency substitution absent ($\gamma = 0$), a sufficient condition for random-walk-like behaviour of the exchange rate, at all horizons, is infinitely-elastic money demand ($\eta \to 0$).

(c)   Explain why, in the case of currency substitution present ($\gamma > 0$), a sufficient condition for random-walk-like behaviour of the exchange rate, at all horizons, is perfect substitution between currencies ($\gamma \to \eta$).

(d)   In the case of perfect currency substitution, will nominal interest rates be equalised internationally?

Investment

1. Consider the following Pindyck-type opportunity to invest in a widget factory:

$t = 0$		$t = 1$	$t = 2 \dots$
	$Prob = \frac{1}{2}$ ↗	$P_1 = \$180$	$P_2 = \$180\dots$
$P_0 = \$100$			
	$Prob = \frac{1}{2}$ ↘	$P_1 = \$20$	$P_2 = \$20 = \dots$

As in the standard Pindyck example, the cost of this investment project is \$800, and the interest rate is 10% p.a.

(a)   What is the value of the option embedded in this investment

opportunity?

(b)   Why is it more valuable than its Pindyck counterpart (in which price either flips up to $150 or down to $50) even though expected future price is $100 in each case? [*Hint:* volatility is valuable to holders of options]