Macroeconomics Tutorials

Introduction

This document provides a guide to the tutorial sequence in Macroeconomics for Finals. A full description of the course, including suggestions for further reading and examples of exam questions, is available from the Department of Economics intranet and should be read in conjunction with these notes. The course is being taught under its current rubric for the fourth time. The current exam format requires answers to three short questions (each answer to take roughly 20 minutes) and two essay questions (each answer to take roughly 60 minutes). Note that the total time for the paper in summer 2013 will be 3 hours (as for core Micro) and not the 2.5 hours shown on papst papers from 2010 and 2011 (the change reflects the fact that the paper is now a full weight Finals paper rather than a 2/3 paper). However, the exam papers for 2010-12 are still very good guides to the style of questions you can expect in the Finals paper in 2013.

A couple of observations on the Macro paper relative to the Micro paper are the following: (i) in Macro the short answer questions are much less likely to involve the use of mathematics to solve formal models, and instead concentrate on diagrammatic analysis intended to illustrate a macroeconomic principle, evaluate a policy proposal, or explain some feature of real world behaviour – if you look through examples of questions on the intranet page, you will see that many of the section A (short answer) questions are essentially mini essays, the main difference relative to a full essay being that they focus on a specific issue that might form part of a broader discussion in a full essay; (ii) the essay titles from section A of macro exam papers through 2009 are still a pretty good guide to the sorts of questions that will appear on the essay part (section B) of the new exam paper that has been in effect since 2010. Obviously some topics will receive a bit less emphasis under the new syllabus, and others a bit more, but it is worth looking through some of the past papers **and the examiners reports associated with them** when preparing for collections and the final exam.

In what follows I provide a list of topics for weeks 2-8 of term and the vacation topic that we will pick up as eighth tutorial at the start of Trinity tem. For each topic I have tried to provide an overview of the material, a discussion of the motivation for studying it and some

thoughts on how it relates to some of the Macroeconomics from Prelims. I have tried to align the tutorials with the lecture series as far as possible, but one of the great challenges when studying Macro is figuring out how different bits of theory fit together, and there is not really an agreed sequencing of topics. As such, you will find that there are various points in the course at which we go back to fill in details from earlier topics. For example, a core component of the first 3 lectures by Simon Wren-Lewis (and the tutorial in week 4) is the so called Swan diagram that combines the determination of the real exchange rate and equilibrium unemployment. This can be covered assuming just Prelims knowledge of exchange rates, and this will be the approach in both the lectures and tutorials, but after we have covered open economy and exchange rate adjustment as part of the week six topic, you should have a few more tools at your disposal with which to re-evaluate the core relationships in the Swan diagram and the conclusions that follow for macroeconomic policy. As we cover different topics I shall try to emphasise how you could combine material across topics in order to develop alternative perspectives on standard questions that form the focus of many essay titles. In the case of some topics, I have provided lists of short questions that you may want to think through whilst doing the reading, or use as a revision check list after you have completed the reading. The written work for each week is indicated under a separate heading. There is a lot of material, so don't worry if you feel that some aspects of a topic are hazy the first time round. Macro, perhaps more than any other paper in Economics, is a paper for which the different bits seem to fit together much better the second or third time you think about them, and you will have the chance to do that during the long vacation and when we meet for revision classes in 2013.

Textbooks

Unfortunately there is not a textbook that covers all of the topics required for the course at a suitable level. The book entitled *Macroeconomics: Imperfections, Institutions & Policies* by Carlin and Soskice (hereafter, CS) will be very helpful for the topics on medium-run macro, monetary policy and open economy macroeconomics, and is the book to purchase if you are aiming to buy just one book. However, during the course of the term it will be necessary to supplement this with material from *Advanced Macroeconomics* by David Romer and some specialist books on monetary economics, international economics and economic growth. There

are also references to journal articles and unpublished pieces, all of which are available online. As always, if you think that the college library needs to buy extra copies of any of the books that I mention below, just let me know.

Data and blogs

It is important to have a good understanding of the main features of macroeconomic data for the UK and other OECD countries during the last 40 years. A good source of cross-country macroeconomic data is the Penn World Tables, available online at:

http://www.bized.co.uk/dataserv/penndata/pennhome.htm

Specific series for the UK can be obtained at the following site:

http://www.statistics.gov.uk/default.asp

Additionally, try to familiarise yourself with the long table of macro data provided at the end of each of the past exam papers through 2008 – it's worthwhile making sure that you are aware of the main trends in the data even though the applied topics on the exam for which these tables were intended have now been dropped from the syllabus.

It is important to build up some familiarity with the stylised facts of macroeconomic fluctuations. These are the empirical regularities pertaining to the size and persistence of economic fluctuations, as well as the co-movements amongst macroeconomic aggregates over the course of the cycle. A good understanding of these empirical relationships not only clarifies what has to be explained by macro models, but can also be seen as the genesis for different strands of the theoretical literature. Textbook discussions can be found in:

Lectures on Macroeconomics by Olivier Blanchard and Stanley Fischer, MIT Press, 1989.

The discussion in the above reference is very good but a little old now, an alternative discussion can be found in the first chapter of CS. I will draw attention to relevant stylised facts as we work through the course.

As you will be aware, macroeconomic performance and policy have been in the spotlight recently following the financial crisis and the 'Great Recession'. Some very interesting perspectives on these issues are provided on economists' blogs. Two excellent pages to look at are those by Martin Wolf of the FT and Paul Krugman of the New York Times, but you will find many others as you browse online.

Finally, let me know if you have any questions regarding the readings and questions below, or any views concerning the structure/content of the Macro tutorials.

1 Economic Growth

The literature on economic growth is macroeconomics in the very long-run. Over shorter horizons we may worry about problems of deficient demand, unemployment and how best to use fiscal and monetary policy to stabilize the economy, but in the long-run all mainstream macro models predict that countries end up at the natural rate of output on the long-run aggregate supply (AS) curve that we analyzed in the prelims course last year. The key question then is how this long-run or natural output level evolves through time. Higher living standards in Europe relative to Africa come from the fact that its natural output has expanded more rapidly through time, i.e. its long-run AS curve has shifted to the right at a faster pace, so why has this been the case? Is there some set of policies that low income countries could adopt in order to replicate the growth achieved in other countries, or do differences in long-run well-being depend on factors beyond policy-makers' control such as geography, climate, institutional frameworks and so on? The Solow growth model provides a starting point for investigating such questions. It takes the kind of production function in technology, capital and labour that we used last year to pin down the natural rate of output in the classical model, and then specifies equations of motion for each of these factor inputs. The solution to the model is a balanced growth path for output and other macro variables. Along this equilibrium growth path the rate of GDP growth is independent of factors such as savings and population growth rates, hence the Solow model is often described as an exogenous growth model, since steady-state GDP growth depends only on the exogenously given rate of technological progress. We will look at the properties of the Solow model and some of its empirical failures. Then we proceed to the literature on 'endogenous' or 'new' growth models – these are models in which equilibrium GDP growth depends not only on the rate of technological progress but also the savings and population growth rates that can be influenced by economic policy measures. We will look at two classes of such models: those with non-decreasing returns to capital (AK models or the Lucas model featuring both human and physical capital), and those in which the total level of factor productivity is endogenously determined (Romer-Jones). These models are attractive at a macro level in that they point to a richer set of growth determinants than Solow's exogenous growth model. But at a micro level they are less attractive in that they presume factor inputs can be re-allocated via policy

measures towards education (in the Lucas model) or research and development (Romer-Jones), unimpeded by market failures such as externality problems, lack of complete property rights, public good problems etc.

In between exogenous growth theory and endogenous growth theory, there are perspectives that might be termed 'semi-endogenous' growth theory. In these models the impact of faster capital accumulation is to ultimately raise only the level of income, not the growth rate, but the amount of time for which growth stays high is longer than in Solow – reading 3 below is a classic example of a semi-endogenous growth model (it's essentially the Lucas miodel in the CS book but without the assumption of constant returns acroos physical and human capital).

A lot of recent literature has emphasised that the key to understanding the growth process for low income countries in particular is not a model in which steady-state growth is endogenous. Instead, the key is to think of such countries as converging on some level of capital and technology as in the Solow model, but only very slowly. International differences in growth performance then depend on 'absorptive capacity', i.e. the rate at which countries can incorporate frontier capital and technology into domestic production. This in in turn depends on a wide range of factors such as the strength of political, legal and economic institutions, the skills and human capital of the domestic workforce, the openness of the country to foreign labour, technologies, ideas, trade, capital etc. The lecture slides and CS are good on this.

1.1   Reading

1. For the core Solow material read either chapters 1-3 of *Introduction to Economic Growth,* by C. Jones (1998 edition of the book) or chapter 13 of CS. These readings are particularly useful for the first essay title below.

2. For endogenous growth models see the lecture slides, chapter 14 of CS or chapters 4-8 of Jones referenced above (if you use the Jones then it's best to first go through the lecture slides and use that as a basis for targeting material given that 5 chapters are referenced).

The following three articles are classics that are recommended at some stage, but you can probably leave them until the vacation, depending on the essay you choose to do from the list below (they help to re-inforce and extend points developed in the textbook treatments).

3. *A Contribution to the Empirics of Economic Growth,* by Mankiw, Romer and Weil, published in *Quarterly Journal of Economics*, 1992, pages 407-437.

4. *The Growth of Nations,* by Mankiw, published in *Brookings papers on Economic Activity,* pages 275-326, 1995.

5. *The New Growth Evidence,* by Jon Temple, published in *Journal of Economic Literature,* 1999, pages 112-156.

Finally, at some point you should take a look at

6. Greenhalgh and Rogers (2010) Innovation, IP and Economic Growth, Chapters 8 and 9.

1.2   Questions

Answer one of the following essay questions. In addition to answering one of the questions, think through how you might go about answering the other questions, as we will cover all of them in the tutorial.

1. 'The neo-classical growth model gives insufficient weight to the impact of capital on output.' 'The neo-classical model attributes all differences in growth rates between countries to differences in the growth rate of the capital stock.' Can both these statements be true? (2006 exam.) Hint: See readings 3 and 4on the first hypothesis. Think about differences in the α parameter as providing an exception to the second.

2. 'In the neo-classical growth model a rise in the savings rate may or may not increase per capita consumption. If it does, welfare must rise.' Discuss. Hint: Consider the golden rule level of capital from the textbooks.

3. Analyse the impact of encouraging a) capital inflows and b) labour inflows on the growth rate of GDP per capita. What effect does devoting a greater share of GDP to human capital accumulation have on the level and growth rate of output? Hint: For the first part, contrast the predictions of the Solow model with those of endogenous growth models. In the case of labour inflows, how is the evolution of technology different depending on parameter assumptions of Romer vs Jones? Similarly, how do the effects of capital accumulation differ across the Lucas and Mankiw-Romer-Weil models of human capital?

4. How far can the shortcomings of the Solow neoclassical growth model be overcome by

alternative models of economic growth? (Reading 4 will be useful.)

5. What does endogenous growth theory imply for the debate on per capita income convergence?

6. 'R&D-based models of economic growth are appealing in theory, but are rarely useful in practice.' Discuss.

2 Inter-temporal Macroeconomics

In this topic we look at the theoretical analysis of aggregate consumer spending and also Real Business Cycle Theory (applications of inter-temporal consumption theory to the current account of the balance of payments will be covered in the open economy topic in week 7, and Ricardian Equivalence will be covered as part of the fiscal policy topic in week 8). The material builds on the introduction to the analysis of consumption given in the Prelims course, and it is worth revising the definitions and models covered last year. Our analysis this time begins from a formal treatment of the lifetime consumption decision of a representative agent. We obtain the inter-temporal efficiency condition, or Euler equation, that characterises the equilibrium consumption path for such agents. We then obtain a solved out version of the consumption function based on the case of constant elasticity of substitution preferences and consider how current consumption might respond to shifts in incomes, asset prices, real interest rates, the private rate of discount and the demographic structure. Next, we show how restrictions can be imposed on the general theory of consumer expenditure to derive Hall's (1978) result that consumption follows a martingale process (a random walk). We round off the theory by considering some extensions of the baseline theory that may help to account for some anomalies thrown up by the empirical literature, especially the excess sensitivity and excess smoothness of consumption.

In the second part of the topic we will look at Real Business Cycle (RBC) models. Following the critique of Keynesian Economics in the 1960s and 1970s and particularly the development of the policy inefficacy proposition as part of the Lucas model, some economists started to look beyond aggregate demand shocks in searching for the explanation for aggregate fluctuations in output, employment, consumption, real wages and real interest rates. Real Business Cycle theorists developed models in which prices were instantaneously flexible and expectations rational such that aggregate demand could not influence output – many RBC models did not even include monetary policy given that it played such a minor role in explaining fluctuations under these assumptions. Instead, fluctuations arose due to random shocks to technology/productivity that displaced the long-run vertical aggregate supply curve. As such, recessions represent equilibrium phenomena – output is low because technological regress has occurred, but given the

technological regress, the output achieved (and the associated level of social welfare) constitute the first best. In other words, output is at the potential or trend level during a downturn, but potential output is lower. This stands in stark contrast with models based on nominal rigidities in which real fluctuations occur because of a lack of price adjustment, i.e. recessions are inefficient disequilibrium phenomena associated with market failures (the incomplete nominal adjustment).

The challenge for RBC theory is to explain how small changes in technological conditions can result in large changes in output, employment and so on and at the same time produce the correlations between macroeconomic variables that are observed in the data. The key insight here is that technological blips will induce temporary changes in factor returns (real interest rates and real wages) which then elicit inter-temporal substitution of consumption/savings (and hence investment in capital) and leisure time (and hence labour supply) in order to maximise lifetime utility. These movements in factor inputs represent the propagation mechanism in RBC models, but many of the criticisms of this theory of fluctuations relate to this mechanism.

2.1 Readings

1. In addition to the lectures notes, the key reading is *The Assessment: Consumer Expenditure* by John Muellbauer, published in *Readings in Macroeconomics,* edited by Tim Jenkinson. This piece originally appeared in the *Oxford Review of Economic Policy,* 1994, pages 1-41.

2. As an alternative to the above you may wish to consult chapters 1,2 and 6 of *Understanding Consumption,* by Angus Deaton, or the chapter on consumption in Romer's textbook.

3. An overview of the ways in which the intertemporal approach to consumption has shaped applied research on aggregate consumer spending, and a review of the findings from such work, is provided in the following article (probably best left for now, return to it during the vacation if you want to pursue this topic in more detail):

J. Muellbauer, 'Housing, Credit and Consumer Expenditure' in Housing Finance, and Monetary Policy, A Symposium Sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, August 30 - September 1, 2007, pages 267-334. Annual series: Federal Reserve Bank of Kansas City. Available online at:

http://www.kc.frb.org/publicat/sympos/2007/PDF/Muellbauer_0415.pdf

4. On RBC read the lecture notes and sections 1-5 of chapter 4 in Romer. For the most part, the maths is not too difficult, and you do not need all the details. Try to focus on the first-order condition for labour supply in equation (21) and that for consumption in equation (23), and the associated discussion.

The above discussion refers to inter-temporal optimisation by agents in continuous time. In the tutorial we will work though a discrete time version of the problem – the economics involved is identical across the two cases, the only difference is that in continuous time a variable is defined at any point in time $(x(t))$ whilst in discrete time variables are defined for specific periods (today, tomorrow etc.) so the notation is x_t. A discrete time version of the inter-temporal optimisation problem is presented in the lecture notes on the course intranet page.

5. Carlin and Soskice offer a brief treatment of RBC models on pages 55-58 and some technical details can be found in the first part of section 2 of chapter 15. See also the link to the Nobel lectures on RBC in footnote 9 on page 55 of Carlin and Soskice, although I think that the discussion is too scattered to be of real use for this topic.

6. Additional references are *Real Business Cycles* by N.G. Mankiw, published in *Journal of Economic Perspectives,* 1990, pages 79-90, *Equilibrium Business Cycles: Theory and Evidence* by A. Mullineux and D. Dickinson, published in *Journal of Economic Surveys,* 1992, *Understanding Real Business Cycles* by C. Plosser, published in *Journal of Economic Perspectives,* 1989, and the articles in the OXREP issue from Autumn 1997 (pieces by Cooley, Muellbauer, and Millard, Scott and Sensier). A discussion of the empirics of business cycle fluctuations, written from an RBC perspective, is contained in 'Determinants of UK business cycles' by Holland and Scott, in the *Economic Journal*, 1998, pp. 1067-92. Try to skim through some of these and make brief notes. The articles contain a lot of good material, especially regarding the empirical evaluation of RBC models (the technology shocks that represent the impulses to the models are typically measured using series for total factor productivity (TFP), a.k.a. the Solow residual, but there are many reasons to think that this will not be a good measure of productivity shocks) and extensions of RBC models to allow for multiple sectors, indivisible labour supply, government interventions and so on. The frustrating thing is that none of the references do a

good job in setting out exactly what an RBC model is in terms of the optimisation problem of a representative agent and how the solution to that problem varies with technological shocks.

2.2 Questions

Sketch out an essay plan (2/3 sides of arguments, diagrams etc.) for **one** of the following questions.

1. Despite a negative shock to incomes and low real interest rates, the household saving ratio in the United Kingdom is at its highest in 10 years (chart overleaf refers). Why might this trend be considered surprising? How can it be explained? Hint: As well as thinking about the other economic factors that may drive consumption and saving, try to think about factors outside the lecture and textbook treatment such as uncertainty over future income flows.

2. Empirical evidence has shown that consumer spending in the UK rises by a lot more after a 1% fall in interest rates than does consumer spending in Japan. How could this result be explained in terms of (a) preferences over consumption and the discount rate for future consumption; (b) the allocation of income between the present and the future; (c) the net asset positions of consumers?

3. Suppose that utility (u) from consumption (c) in any period t is given by $u = ln(c_t)$.

(i) Using the consumption Euler equation, explain why Hall's random walk result for consumption fails.

(ii) How can the properties of logarithmic utility be used to explain the excess smoothness of consumption documented by Deaton (1987)?

(iii) What other factors may be important in explaining the evidence for excess sensitivity and excess smoothness in consumption?

4. Use a standard Real Business Cycle (RBC) model to analyse the macroeconomic effects of a one period reduction in the rate of income tax. How would the results differ if the tax cut were to be phased out gradually? To what extent do you think these predictions will occur in practice?
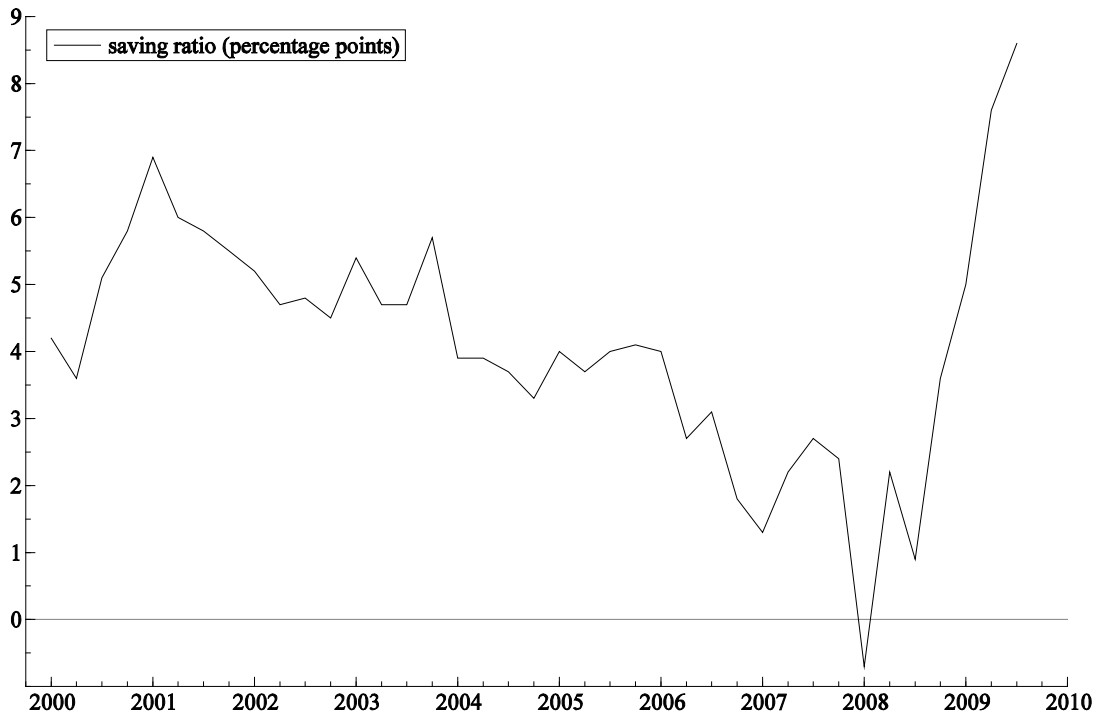
Chart XXX: The saving ratio is household gross saving as a percentage of gross disposable income plus the change in the net equity of households in pensions funds. Source: Office for National Statistics.

2.3 Further RBC notes and questions

The following questions are from a previous RBC topic and may be useful if you plan to follow up that topic.

1. What are the microeconomic assumptions behind RBC models?

2. Suppose production Y at some time t is given by $Y_t = A_t K_t^\alpha L_t^{1-\alpha}$ where A is technology, K capital and L labour. Based on the classical model studied last year, what is the impact on real wages and the real interest rate of a one period improvement in technology, i.e. $A_{t-1} < A_t >$ $A_{t+1} = A_{t-1}$? Based on this, will RBC models run into the Tarshis-Dunlop problem discussed in the context of Old Keynesian and Friedmanite real wage dynamics?

3. Keep the results in question 2 in mind and turn to the Euler (first-order) equations mentioned in the lecture slides. How will consumption and leisure time change (relative to their equilibrium values) as agents re-optimise following technology shocks? What effects does this have on (i) capital accumulation; (ii) labour supply? Why might this pattern of adjustment be important in the context of RBC explanations of output fluctuations?

4. How persistent do you think the rise in output associated with a positive technology shock will be? What would be the effects of making the technology shock more persistent? Can you see how a more persistent technology shock would mean less inter-temporal substitution in the first place – look at the imbalance across the two sides of the Euler equations.

5. How plausible do you consider the notion of **temporary** technological shocks to be? Can you think of examples of negative technology shocks? What potential problems can you see in relation to the inter-temporal substitution mechanism that is central to RBC theory?

6. How do you think RBC theorists might explain international business cycle correlations? Hint: Beyond thinking about common technological shocks, consider the optimal strategy of an investor seeking to spread risk following a technological improvement in his or her own country

3 Medium-run Macroeconomic Adjustment

An important theme in Macroeconomics is that the effects of policy interventions depend on the time horizon at which those effects are evaluated, given that price adjustment, expectations formation and income constraints take effect through time rather than instantaneously. In Prelims Macro we considered various explanations for the claim that monetary policy expansions raise output and lower unemployment in the short-run, but leave those variables unchanged in long-run equilibrium (if you need a refresher, look at the material on the vertical long-run aggregate supply curve, the vertical long-run Phillips curve, and the roles that adaptive versus rational expectations and price stickiness play in determining how rapidly the economy reaches long-run equilibrium). In this topic the model from last year is extended in two important ways, following the analysis in Simon's first set of lectures and the textbook material referenced below. Firstly, the competitive labour market used last year to pin down equilibrium employment and hence the position of the vertical aggregate supply curve, is replaced with a more realistic imperfectly competitive labour market – the WS-PS diagram. In this framework, a much broader set of factors can influence PS (labour demand) and WS (labour supply). The second main innovation is to then consider how fluctuations in the real exchange rate can induce shifts in PS, essentially through varying the purchasing power of the money wage offered by firms. The main result is an ERU (Equilibrium Rate of Unemployment) curve in output/real exchange rate space that indicates how output is non-unique even after all prices and wages have had time to adjust (in Prelims output was unique in equilibrium and equal to the full employment level).

A potential confusion is that CS label the flexible price ERU a medium-run equilibrium, to be contrasted with a short-run in which all not all prices have adjusted (in Prelims we used the label long-run where CS use medium-run). CS save the term long-run to describe an equilibrium in which, in addition to all prices having adjusted (the medium-run condition), the balance of trade and current account are equal to zero. These ideas are brought together by adding to the medium-run ERU relation an AD (or ISXM) curve that defines points on which the economy must always operate in the short-run, and a BT (balanced trade) line intended to represent points to which the economy must converge in the long-run when trade is balanced, and no country is borrowing from another in order to generate domestic consumption (as we will discuss, a

constraint imposing exactly balanced trade has limited practical relevance, but we can instead think of the BT live summarising points at which the external accounts are at sustainable levels of deficit or surplus, and later in the term we will be precise about what sustainable means). The resulting diagram is known as the Swan diagram. This framework can be used to evaluate the effects of fiscal and monetary policy changes (respectively, shifts of or movements along the AD function) on the domestic unemployment and inflation outcome (captured by the ERU curve) and the external accounts (captured by the BT curve). The consequences of supply-side changes such as increases in productivity or variations in trade union bargaining power can also be evaluated in terms of their impacts on the domestic labour market and the external trade position. As such, the model provides a more general perspective on macroeconomic equilibrium than do models studied last year, e.g. ISLM and ASAD.

3.1 Reading

1. To get started, revise your prelims material on ISLM, the open economy extension of ISLM (the Mundell-Fleming results), the current account, capital account and real exchange rate, and the aggregate supply and aggregate demand diagram.

2. For an introduction to labour markets and aggregate supply under imperfect competition, read chapters 2-3 of CS[1], in particular the introduction to the imperfectly competitive labour market in chapter 2, the summary of macroeconomic adjustment in Figure 2.14 and the summary questions at the end of chapter 2, and the section on Phillips curves at the start of chapter 3 (up to page 81). The core material for this week is then chapters 4, 10 and 11 (except sections 6 and 7) from CS. Also, for a nice piece of comparative static analysis using this framework, see the discussion around Figure 18.6 in CS.

This is a lot of material to cover and is therefore the only compulsory reading for this week. As noted above, this topic makes use of the open economy concepts studied in Prelims. There is some advanced open economy material in CS, in chapter 9, which may prove useful, but it is something that we will return to in week six, so there is no need to go over it in detail at this stage.

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[1]The first half of chapter two reviews the ISLM model from Prelims, which you could skim quite quickly if you feel happy with that material.

3.2 Essay questions

Answer one of the following essay questions. Try to keep your answer to 4-5 sides. In addition to answering one of the questions, think through how you might go about answering the other two questions, as we will cover all three in the tutorial. Please try to ensure that within your tutorial group, at least two (and preferably three) of the below questions are covered as a full essay.

1. 'Whether the economy is open or closed, the gap between actual unemployment and equilibrium unemployment can be inferred from the change in inflation.' Discuss.

2. Why might a permanent fiscal expansion lead to an increase in output in both the short-run (when prices are sticky) and the medium-run (when there has been sufficient time for prices to clear markets)? Assuming that net exports must be zero in long-run equilibrium, is the rise in output tenable in the long-run? What combination of policy reforms could be introduced alongside the fiscal expansion to ensure that as much as possible of the short-run output effect of fiscal expansion is preserved in the medium-run and the long-run?

3. Consider the open economy ERU-BT-AD diagram (the Swan diagram). Suppose that an economy is initially at the intersection of these three curves in output/real exchange rate space, so that the conditions for short-run, medium-run and long-run equilibrium are satisfied. Are the following statements true or false? Use the Swan diagram to justify your answers, and provide as much detail as you can concerning the comparative static results that you describe, e.g. explain exactly why it is that there is a difference between short-run and medium-run equilibria, or how it is that some assumption concerning the exchange rate regime is important to the process of adjustment.

- Following a domestic fiscal expansion the balance of trade deficit at the short-run equilibrium will be larger under flexible exchange rates than under fixed exchange rates, but the balance of trade deficit at the medium-run equilibrium will be independent of the exchange rate regime.

- Following an increase in export demand under fixed exchange rates, the balance of trade moves into surplus at both the short-run equilibrium and the medium-run equilibrium.

- Following an increase in immigration the real exchange rate depreciates and the balance

of trade is in surplus at the medium-run equilibrium.

- Following a fiscal expansion, the real exchange rate at the short-run equilibrium overshoots its value at the medium-run equilibrium if and only if the nominal exchange rate is flexible.

- Following a rise in domestic productivity when the nominal exchange is flexible, the real exchange rate will depreciate instantly and there will be a trade surplus.

3.2.1 Suggestions for writing the essays

Essay 1: There are obviously several ways to approach this essay. The starting point is the basic implication from the NAIRU (=WS/PS) model, namely that just one unemployment level (that for which WS=PS) is consistent with stable inflation and that U<NAIRU implies WS>PS and hence rising inflation (and vice versa). One way to proceed would then be to investigate the robustness of this proposition in various scenarios – thinking through the following questions may help.

i. In the case of a closed economy, is the proposition in the essay title true irrespective of whether expectations are formed adaptively or rationally?

ii. In the case of a closed economy, is this proposition true following both an aggregate demand shock and a pure cost-push shock, for example a seasonal increase in food prices?

iii. CS outline some models in which the NAIRU is hysteretic (look up hysteresis in unemployment in CS), i.e. adjusting in response to (otherwise short-run) changes in actual unemployment. Does the proposition above hold true when models of hysteresis apply?

iv. In the case of an open economy and a country operating a fixed exchange rate, a fiscal expansion will trigger lower unemployment and rising inflation when expectations are adaptive as opposed to rational, as in a closed economy. But how do the subsequent paths for inflation and unemployment in the open economy case differ from the closed economy case? Why is it that inflation will stabilise more rapidly and at a lower level of unemployment? How might we wish to revise the claim in the question in light of this?

v. In an open economy, can monetary policy effect a movement along the ERU curve in the same way as fiscal policy?

Essay 2: This requires the standard textbook exposition of fiscal expansion in open economies

under alternative exchange rate regimes. But how plausible do you consider the negatively sloped ERU function to be? The trade-off embedded in the ERU function essentially derives from the notion that appreciation of the real exchange rate squeezes the fraction of output per capita paid to foreign producers for imports, such that a larger fraction can be paid to domestic workers (the PS line shifts up and is closer to the neo-classical labour demand relation). But is this mechanism tenable? How would it be affected if a US producer of a good sold to the UK set its sterling price not by multiplying the dollar price by the nominal exchange rate (so called producer currency pricing), but by matching the price of a competitor good in the UK (known as local currency pricing). If all UK imported goods are priced in this way, what does the ERU curve look like, and what does this imply for the scope for fiscal policy to induce permanent changes in the NAIRU? For the second part you need to consider mechanisms that may enforce balanced trade in the very long-run, and for the third part, you need to consider policies to stabilise the real exchange rate and lock in higher output via shifts of the ERU and BT curves.

Essay 3: This is more structured, and you just need a page or so and diagram for each of the fives cases. As noted above, try to be as precise as you can concerning the descriptions of the various short-run and medium-run equilibria. Also, note that in some of the cases, more than one of the three curves may shift.

3.3   Other questions to consider

Here are other questions that you may wish to consider. All but iv and v are quite basic and are really a guide to what should be in the written notes that you make from the textbook and the lectures. If you have queries concerning any of them, drop me an email or we can discuss in the tutes.

i. How is the WS function related to the competitive labour supply function? What factors influence the position and slope of the WS curve? What is the Calmfors-Driffill hypothesis in relation to the WS curve?

ii. How is the PS function related to the competitive labour demand function? What factors influence the position and slope of the PS curve?

iii. Show how the WS-PS framework can rationalise equilibrium involuntary unemployment.

How does the real wage and the level of voluntary unemployment compare with the perfectly competitive case.

iv. 'A rise in the level of real wages means that firms reduce employment.' 'A rise in the level of real wages means that policy makers can safely allow employment to rise.' Are these statements inconsistent?

v. 'The NAIRU is simply the natural rate of unemployment with wage bargaining.' Discuss. Hint: In addition to the technical differences between the two models, try to think about how the predictions and insights from NAIRU models add to those from simple neo-classical (natural rate) models.

vi. What conditions are captured by the ERU, AD and BT curves in employment (output)/real exchange rate space? What factors influence the positions and slopes of these curves? Why is it said that short-run equilibrium must be on the AD curve, medium-run equilibrium on the AD and ERU curves and long-run equilibrium on the AD, ERU and BT curves?

vii. Why is the AD curve typically drawn steeper than the BT curve? What would happen to the slope of the AD curve relative to the BT curve if the LM curve were horizontal rather than positively sloped? How does the elasticity of export demand affect the slopes of the curves?

viii. Under what conditions would the ERU curve be vertical/horizontal?

4 Monetary Policy I

This topic looks at some of the main controversies in contemporary monetary economics. Before starting the work for this week you should return to your Prelims notes and make sure that you are familiar with the following topics.

The Quantity Theory of Money - Assumptions, Implications and Limitations

The Keynesian Theory of Money Demand - Assumptions, Implications and Limitations

The Monetarist Theory of Money Demand -Assumptions, Implications and Limitations

Narrow and Broad Measures of the Money Supply

The Creation of the Money Supply and the Credit Multiplier

Keynesian and Monetarist Perspectives on the Monetary Transmission Process

The Links Between Money and Inflation

The Costs and Benefits of Inflation

The main focus of the first monetary policy topic is the three equation IS-PC-MR model set out in Carlin and Soskice. We will look at the foundations of this model and the policy insights that it supports.

4.1 Readings

Note: The main reading for this week is the core textbook material under item 1. Item 2 is a more advanced and very long piece, and in the essay advice I provide some guidance on how best to use it in tackling the essay questions. Item 3 is another attempt at tackling similar issues to items 1 and 2, you may want to defer reading it for now, but return to it during the vacation if you want an additional perspective on the issues addressed in this topic. Similarly, items 4-7 are mainly for future reference should you wish to build on this topic in the future. For now, if you are interested in some empirical findings that relate to essay titles 1 and 2 below, then you could read the abstracts/introductions to items 4-6.

1. For the basic framework, read chapters 3 and 5 in Carlin and Soskice and also section 7 in chapter 11.

2. Clarida, R., J. Gali, and M. Gertler, "The Science of Monetary Policy: A New Keynesian Perspective", Journal of Economic Literature 37 (December 1999), pp. 1661-1707.

3. Another useful reference is Allsopp, C. and D. Vines (2000). 'The Assessment: Macroeconomic Policy' *Oxford Review of Economic Policy*, winter 2000.

A result that comes out of the theoretical analysis of the three equation model is that when the short-run Phillips curve is steeper, or when it shifts down more rapidly (=the economy is characterised by less inflation inertia) inflation shocks can be reduced at lower per unit output cost. A key question then is what characteristics induce a steep or fast-moving SRPC? The literature has considered a range of factors, including the openness of the economy to international trade and the preferences and ideology of the policy-maker, see the following three articles for some discussion and evidence.

4. Ball, L. (1994). 'What determines the sacrifice ratio?' in N. Mankiw ed. *Monetary Policy*, University of Chicago Press. Article on the web if you search using google, or email me for a copy.

5. Temple, J. (2002) 'Openness, Inflation and the Phillips Curve: A Puzzle.' Journal of Money, Credit and Banking, 34, 450-468.

6. Caporale, B. and T. Caporale (2008). 'Political Regimes and the Cost of Disinflation.' Forthcoming in the Journal of Money, Credit and Banking – see the JMCB website (forthcoming articles section) for a copy, or email me.

7. The first two references above deal with the question of exactly how interest rates should be set following a shock, whilst the applied pieces ask what characteristics are required of policy in general in order for disinflation to be relatively painless. A question that sits in the background is why does the Monetary Policy Committee conduct policy using short-term interest rates rather than, say, the quantity of credit that it makes available to private banks via open market operations – the importance of credit supply was seen during the credit crunch that started in 2007. For some discussion of why policy is typically set in the form of interest rates nowadays, see lecture 7 on the Money & Banking paper. This describes a transition from the scenario in the early 1980s when the Federal Reserve was literally setting credit quantities and the Bank of England was setting interest rates in order to achieve very precise and detailed targets for

different measures of credit and money. For some background on the UK experience in the 1980s, see the course lecture notes as well as the references suggested by Simon Wren-Lewis:

Cobham, D 'The making of Monetary Policy in Britain 1975-2000' Wiley, or Laidler, D (1985) 'Monetary policy in Britain: Success and Shortcomings', Oxford Review of Economic Policy, No1. p35-43.

4.2 Essay questions

Answer one of the following essay questions. Try to keep your answer to 4-5 sides. In addition to answering one of the questions, think through how you might go about answering the other questions as we will cover all of them in the tutorial. Please try to ensure that within your tutorial group, at least two (and preferably three) of the below questions are covered.

1. What determines the degree to which the monetary authorities should respond to a rise in inflation above the target rate? (2007 exam.)

2. Describe the differences in the dynamic relationship between output and inflation implied by the traditional and New Keynesian Phillips curves. Are there any other predictions from the New Keynesian Phillips curve that seem to be at odds with the data? (Adapted from the 2009 exam.) Hint: On the second part of the question, consider the effects of an anticipated and credible reduction in the inflation target on the actual inflation rate – would you expect to see such changes to inflation in the data?

3. Suppose the European Central Bank and the Federal Reserve in the US appear to follow a similar Taylor rule. Does this imply they have similar objectives?

4. (a) Consider the IS-PC-MR model. The economy is initially in equilibrium at a 2% inflation target. At the end of period $t - 1$ the policy authority announces that the inflation target will be 1% from period $t + 1$ onwards. From period t onwards, describe the adjustment towards the new equilibrium in each of the following three cases:

i. a Phillips curve based on adaptive expectations;

ii. a Phillips curve based on rational expectations;

iii. a New Keynesian Phillips curve.

(b) i. drawing on both the ISPCMR diagram and the WSPS diagram, show the effects of a

permanent productivity increase when the inflation target is constant and the policy-maker is aware of the rise in productivity;

ii. how would the outcome differ if the policy-maker observed the productivity increase one period after it actually occurred?;

iii. now suppose that the economy is open to trade, so that the Swan diagram is applicable; if the exchange rate is free to float, would it matter whether the policy-maker observed the productivity shift immediately or with a lag?

4.2.1 Suggestions for writing the essays

For essay 1: In addition to thinking about the basic parameters in the model such as the inflation aversion of the policy-maker, the slope of the Phillips curve and the semi-elasticity of the IS curve, you should briefly think about the country characteristics that (openness to trade, wage-setting practices, strength of monetary transmission etc.) affect these model parameters. An important one is openness to trade – when the sum of exports and imports to GDP is large, how might the slope of the IS curve change? Will the slope of the short-run Phillips curve change (see Temple reading above)? Will the slope of MR change? Other country characteristics that may matter include wage-setting practices and the strength of monetary transmission due to the state of housing markets and the banking system.

Also think about the following:

(i) What is the relevance of private sector expectations and policy credibility in this context? In particular, suppose that a fraction θ of the private sector behaves a la CS and sets expected inflation to last period's inflation, whilst a fraction $1 - \theta$ expect the policy-maker to return inflation to roughly the inflation target, π^T, so $\pi_t^e = \theta \pi_{t-1} + (1 - \theta)\pi^T$. In such circumstances, and all else equal, will interest rates respond more or less aggressively to an inflation surge than they would in the case of purely adaptive expectations. How would the situation compare if inflation evolved according to the New Keynesian Phillips Curve $\pi_t = E_t \pi_{t+1} + k output\ gap$?

(ii) How does the answer depend on the origins and persistence of the inflation shock? CS consider pure output shocks and pure inflation shocks in their diagrams, but what if there was a shock that increased inflation but also shifted the IS curve left? What then happens to the

optimal response of the interest rate to inflation?

(iii) Under what circumstances may the policy-maker discount rate be important in answering this question? Hint: Consider a static optimum on the CS MR line where MR intersects PC, northwest of the long-run equilibrium. What can we say about the current marginal benefit of lowering inflation versus the current marginal cost? But what is the marginal benefit tomorrow from lowering inflation today? And what is the corresponding marginal cost? So if the policy-maker discounts the future only a little bit, what can be said about the total net marginal benefit of cutting inflation a little relative to the CS optimum?

(iv) How does the size of the interest rate response depend on the presence of a lag or even a double lag (see CS for the terminology) in the macroeconomic effects of interest rate changes?

(v) What happens to the optimal monetary policy response when other measures such as fiscal policy or wage accords are available?

(vi) How does uncertainty regarding the origins of a shock or the structure of the economy influence the best policy response?

(vii) What is the optimal monetary policy response to an inflation surge that is caused by an export boom that shifts out the IS and AD curves and causes the economy to adjust south-east along the ERU curve? See CS chapter 11.7.

For essay 2: The traditional Phillips curve is one that relates current inflation to terms in the expectation of current inflation (you could consider adaptive or rational expectations, what are the differences?), the current output gap and a shock term. This is to be contrasted with the New Keynesian Phillips curve. To see the origins of the NKPC, see the lecture slides, or lecture 1 from the Money and Banking course (see the section on the Taylor model, which is an example of a New Keynesian model). In order to see how the NKPC gives different inflation/output dynamics to more traditional models, read section 2.1 in the Clarida, Gali and Gertler piece (item 2 above), and focus in particular on equation 2.6. In the context of this equation, suppose that in the current period t agents learned that the expected output gap would rise from 0 in t to 1 in $t+1$, but then fall to 0.5 in $t+2$ and back to 0 in $t+3$. In this example, when output is above trend in periods $t+1$ and $t+2$, will inflation be rising or falling? How does this compare with the case of a positive output gap when the Phillips curve takes a more traditional form?

For the supplementary question in essay 2, the following additional reference may be useful:

Mankiw, N. G. 'The Inexorable and Mysterious Tradeoff Between Inflation and Unemployment' Economic Journal, May conference volume, pages 45-61.

The materials for lectures 1 and 2 in the Money and Banking option paper may also be useful.

For essay 3: Ask yourself the question 'If two policy authorities raise interest rates by identical amounts following a rise in inflation, does it follow that they have the same indifference contours over output and inflation? If not, what other features of the IS-PC-MR model might explain why heterogeneous preferences map to similar observed policy actions? Some of the factors listed for essay 1 then come into play.

For essay 4, ai and aii are straightforward. For aiii think about how future inflation affects current inflation in the New Keynesian set-up. For part (b) CS chapter 11.7 will be useful.

5 Monetary Policy II

The second monetary policy topic deals explicitly with the conduct of monetary – why is it the responsibility of appointed central bank committees rather than elected governments, and why are inflation targets and, an emphasis on transparency and talk of 'policy rules' so widespread in practice and in the literature? Why has recent debate focussed on the need for price path targets and interest rate projections?

5.1 Readings

1. Carlin and Soskice chapter 5 gives an introduction to the inflation bias problem, as does Romer chapter 10.

2. For a detailed treatment of the problem of the inflation bias and possible solutions, read chapter 8 in *Monetary Theory and Policy* (2nd ed.) by Carl Walsh. Note that this is a graduate text and the treatment can be hard to follow. There is a nice summary of the evidence relating to the inflation bias problem. Much of this material is summarised in lectures 5 and 6 on the Money & Banking option paper, see the dept intranet. Simon Wren-Lewis refers to inflation bias due to policy-maker myopia, and distinguishes it from inflation bias due to the excess output target. Bias due to myopia comes from the idea that a forward-looking policy-maker facing a private sector that sets inflation expectations adaptively would not choose to launch surprise inflation in any period, since the cost would be higher expected and actual future inflation (which a forward-looking policy-maker cares about). So for inefficient inflation bias to occur when expectations are adaptive the policy-maker must be myopic – hence inflation bias due to myopia. When expectations are rational the mechanism linking high inflation today to high expected and actual inflation tomorrow is absent, so even a forward-looking policy-makers creates an inflation bias – this is bias due to an excess output target rather than myopia.

3. The inflation bias is the best known example of discretionary monetary policy being sub-optimal due to a time inconsistency problem. A less well known but perhaps more important example of time inconsistency leading to sub-optimal policy outcomes is the case of stabilisation bias, which refers to too large an interest rate increase/output decrease occurring in the current period when the short-run Phillips curve takes the form of the New Keynesian Phillips curve.

For more on the stabilisation bias see the relevant section in R. Clarida, J. Gali, and Mark Gertler, "The Science of Monetary Policy: A New Keynesian Perspective", Journal of Economic Literature 37 (December 1999), pp. 1661-1707. Also see the European Central Bank working paper referenced under question 4 below.

4. For essay title 3 below, the following reference will be useful

Rudebusch, G. and J. Williams (2006). 'Revealing the Secrets of the Temple: The Value of Publishing Interest Rate Projections' Federal Reserve Bank of San Francisco working paper 2006-31. Mainly focus on sections 1 and 2. An overview of the model developed in section 3 and 4 is all that you need.

5. On price level targeting (see the fourth and fifth essay titles below, see European Central Bank working paper 818 by Gaspar, Smets and Vespin for relevant material and also Steve Ambler in the Journal of Economic Surveys 2009 (Price Level Targeting and Stabilisation Policy: A Survey). The Sinclair article in the reading list by Simon Wren-Lewis is useful for thinking about the costs and benefits of inflation.

The following articles are not core readings. You may wish to skim them very quickly at this stage and then return to them at a later stage if you find them helpful.

6. An interesting extension of the model of the inflation bias is provided in *Openness and Inflation: Theory and Evidence,* by David Romer, published in *Quarterly Journal of Economics,* 1993, pages 869-903 (summarised in the Money and Banking lectures).

7. A well known piece on the important topic of inflation targeting is 'Inflation Targeting: A New Framework for Monetary Policy?' by B. Bernanke and F. Mishkin, *Journal of Economic Perspectives*, 1997, pages 97-116.

8. A piece that relates to the early days of inflation targeting at the Bank of England is 'Inflation Targeting in Practice, the UK Experience' by John Vickers in the Bank of England Quarterly Bulletin, 1998. Note: The Bank of England website is an excellent resource when gathering information on the monetary policy topic, take time to browse the Inflation Reports, speeches made by MPC members and other relevant links.

9. A piece that looks at the conduct of UK monetary policy through time is 'UK Monetary

Policy 1972-1997: A Guide Using Taylor Rules' CEPR Discussion Paper No. 2931 (available online). Published in P. Mizen (ed.), 'Central Banking, Monetary Theory and Practice: Essays in Honour of Charles Goodhart', Volume One, Cheltenham, UK: Edward Elgar, 2003, pp. 195-216.

10. For a discussion of Taylor rules and other issues relating to the conduct of monetary policy, see lecture 8 from the Money and Banking paper.

11. On current monetary policy and central bank independence, see the first four articles in Journal of Economic Perspectives Vol. 21, No. 4, Fall 2007.

5.2 Questions

Answer one of the following essay questions. Try to keep your answer to 4-5 sides. In addition to answering one of the questions, think through how you might go about answering the other questions as we will cover all of them in the tutorial. Please try to ensure that within your tutorial group, at least two (and preferably three) of the below questions are covered.

1. 'While a conservative (inflation averse) monetary authority might reduce inflation bias, it does nothing for stabilisation bias.' Explain and discuss this statement. (2009 exam.)

2. 'The time inconsistency problem in macroeconomics only arises if the monetary authority has an unrealistic output target'. Discuss.

3. 'If expectations are rational, it is imperative that central banks indicate how long they expect any changes they make to interest rates to last.' Explain and discuss this statement (2009 exam.) Hint: Why do statements over future policy have extra bite today when the Phillips curve takes the form of the NKPC and the IS curve is forward-looking as in the Clarida, Gali and Gertler article? If the time inconsistency problem captured in the stabilisation bias is applicable, what happens to the relevance of these arguments? Finally, look up the yield curve and the expectations hypothesis online, or see lecture 10 from the Money and Banking course – why are statements over future policy especially important when firms and households borrow at the long end of the yield curve? Do time inconsistency issues arise in this case?

4. What criteria should determine the inflation target? Would a long range target for the price level be better? (2006 exam.)

5. 'In the light of macroeconomic developments over the past two years, it is time to move from inflation targeting to price level targeting.' Explain and discuss. (2010 exam)

6 Open Economy Macroeconomics

This topic deals with much of the theory relevant to the lectures on open economy macroeconomics given by Simon Wren-Lewis. The syllabus for this part of the course begins with a review of Balance of Payments accounting and some of the basic concepts in International Economics. The course then looks at the well known Mundell-Fleming model and some of its key predictions. Much of this material was covered in Prelims, so to save time this week, try to revise the following basic concepts from last year's notes and/or the Mankiw textbook:

The Balance of Trade

The Current Account

The Capital Account

The Balance of Payments

Fixed and Floating Exchange Rate Regimes

The Difference Between Nominal and Real Exchange Rates

The Mundell-Fleming Results

The following slides provide a review of some of these concepts:

http://www.economics.ox.ac.uk/members/christopher.bowdler/oubepbop.pdf

6.1 Reading

1. Read chapter 9 from *Macroeconomics: Imperfections, Institutions and Policies* by Carlin and Soskice.

2. Carlin and Soskice (2010) 'A New Keynesian Open Economy Model for Policy Analysis'. CEPR discussion paper number 7979. Available here:

http://www.cepr.org/pubs/new-dps/dplist.asp?dpno=7979

This paper is an extension of the material in the CS textbook. I have not read the entire paper yet, but the analysis I have covered seems quite intuitive and a useful extension of the textbook material.

The following readings are optional:

3. Read chapters 15 (PPP debate) and 20 (European Monetary Union) in *International Economics: Theory and Policy* by Krugman and Obstfeld (seventh edition). It may be worthwhile

skimming other parts of this book – chapters 12-14 review the basics from prelims, 16 and 17 do some fiscal and monetary policy analysis, culminating in Mundell-Fleming, 18 gives some historical details concerning the international monetary system and 19 is about macroeconomic policy coordination between countries. My main feeling is that the treatment is not advanced enough, but in places there is discussion of ideas not mentioned in the more focussed discussion provided by Carlin and Soskice. I would suggest going through the sub-headings and end of chapter summaries and noting concepts and real world examples that appear to add value to notes taken under (1) above.

4. If you find that the treatment of the Dornbusch model in the Carlin and Soskice and Krugman-Obstfeld textbooks is a little bit light, then you could try looking it up in *Macroeconomic Dynamics*, by R. Shone (I have a copy in my room if you want to borrow it).

5. Likewise, for additional detail on CIP and UIP, a very detailed survey is given in chapter 2 of *The Economics of Exchange Rates* by Luca Sarno and Mark Taylor. This contains more detail than you need, especially on the empirical front, so concentrate on the early sections.

6.2   Essay Plans

Sketch out an essay plan (2/3 sides of arguments, diagrams etc.) for **one** of the following questions.

1. 'A lower interest rate is a sign of a looser monetary policy, and the currency will therefore jump depreciate, but then gradually appreciate.' 'A lower interest rate is a sign that inflation is expected to be lower, and the value of the currency will jump upwards and thereafter continue to rise.' Discuss. (2007 exam)

This is from the 2007 exam. How can the perspectives on exchange rates provided by the UIP and PPP hypotheses be used to answer this question? Also, try to think about how the answer depends on (a) whether the interest rate change in question was anticipated or unanticipated; (b) what is happening to world interest rates at the time of the interest rate change.

2. Explain how the Dornbusch model is capable of producing exchange rate overshooting following permanent changes in the money supply. How robust is this result? What other mechanisms may lead to real exchange rate overshooting?

The first part of this question is straightforward. For the second part, note that the key link in the Dornbusch model is that prices are sticky and therefore fail to move in line with the money supply, such that real interest rates vary for a period causing exchange rates to move. So would overshooting go through in forward-looking models in which changes to the money supply are announced in advance of their implementation? Can the price level keep pace with the money supply in such models? What else may help to explain why money and prices 'stay in line'? For the final part on other sources of real exchange rate overshooting, go back to the Swan diagram.

3. In the early 1980s, the UK became a net exporter of oil, and the Conservative government introduced a policy of steadily declining money supply growth targets. Why did this produce a perfect storm (rapid appreciation for the UK exchange rate)? (2009 exam).

For the bit on oil, think about how the net exports of oil affected the AD and BT lines in Swan. What then happens to the equilibrium real exchange rate and how will this impact the nominal exchange rate? The bit on money supply goes back to Dornbusch.

4. In an open economy under flexible exchange rates, how does monetary policy influence the impact of a permanent increase in commodity prices on output and inflation? (from specimen paper II)

For this question, try to think through two types of commodity price shocks: (i) a rise in commodity prices that is matched by increases in domestic prices and wages so that relative prices are unchanged throughout; (ii) a rise in commodity prices in excess of domestic inflation so that the relative price of imported commodities increases. What happens to the PS curve and the VPC in the latter case? In the former case, why is the slope of the IS curve and hence the monetary policy reaction to the shock different to the case of a closed economy? See the material in the Carlin and Soskice working paper in reading 2 above on this question and also the analysis presented in the lecture slides.

6.3 Other questions to consider

Here are some other questions to think through whilst doing the readings and making notes.

1. Outline the conditions necessary for a devaluation of the exchange rate to be successful

in improving the current account under the Marshall-Lerner condition. What happens to the Marshall-Lerner condition if the supply of domestic exports is not perfectly elastic? If the Marshall-Lerner condition fails, how are the AD and BT lines from the Swan diagram affected? It is often argued that flexible exchange rates ensure that macroeconomic adjustment following a shock is faster in open economies than in closed economies. How is this logic affected when the Marshall-Lerner condition fails?

2. How would the predictions of the Mundell-Fleming model change if i) capital immobility were introduced; ii) flexible prices were introduced (and private expectations over prices/inflation were formed adaptively); iii) the country in question was large relative to the world economy, e.g. in the case of the US?

3. What determines a country's nominal exchange rate in i) the short-run, ii) the long-run?

4. What are the differences between CIP and UIP? What explanations are therefore for the empirical failures of these two conditions?

5. During the period between the discovery of oil in the North Sea and its extraction, the UK current account moved sharply into deficit. Can you link these two events. What would you expect to have happened to the UK exchange rate over the same period, and why?

6. What is the PPP hypothesis? If PPP holds, will the Swan diagram be useful for macroeconomic analysis, what happens to the three curves? What are the theoretical objections to PPP? Can any of these be applied to the apparent overvaluation in sterling around the turn of the century?

7. What are the potential advantages and disadvantages of the UK joining the single European currency?

The list of potential advantages can be quite concise because it is mainly textbook stuff relating to lower trade costs once currency conversion costs and exchange rate uncertainty are eliminated. The main focus will be the likely costs of membership – only once these are shown to be small enough is entry likely to proceed. An important concept in this regard is that of an optimal currency area (OCA), first studied formally by Mundell in the 1960s. Here are some questions to help guide your thoughts on the Mundellian notion of an OCA:

i. Why might asymmetric macroeconomic shocks across Europe lead to problems for the

European monetary union? What might cause these asymmetric shocks? Do you think that the asymmetry of shocks will persist after the formation of a monetary union?

ii. Supposing that asymmetric shocks are a fact of life, what condition would have to apply in order for the 12 members of the European Monetary Union to constitute an optimal currency area (according to the Mundellian definition)? Do you think that this condition holds in practice?

iii. 'The problem with Mundel's model of optimal currency areas is that it assumes that labour mobility (a form of real adjustment) is a good replacement for floating exchange rates (a form of nominal adjustment). If economists wish to define the limits of optimal currency zones, they should first think about exactly what constitutes a substitute for flexible exchange rates and interest rates.'

a) To what extent does this observation undermine the relevance of Mundel's model in judging whether or not the Euro-12 constitute an optimal currency area?

b) According to what other criteria might we wish to judge whether or not a particular region constitutes an OCA? HINT: Think about the other ways in which a country may get back to full employment following a reduction in the level of aggregate demand. Does the Eurozone represent an OCA according to these alternative criteria? Hint: Think about recent proposals to bolster the Eurozone such as the Stabilization Fund to assist Greece and Ireland, and calls for the creation of a common Eurozone bond backed by the governments of all the member countries.

c) Under what circumstances would Mundel be correct in asserting that labour mobility is the condition required to ensure that macroeconomic performance does not deteriorate following the reduction of 12 exchange rates to one? HINT: Think about the circumstances under which *nominal* exchange rate adjustment can be a tool for achieving *real* macroeconomic adjustment.

7 Fiscal Policy and Debt Stabilization

The fiscal policy topic spans the fiscal policy and debt lectures by Simon Wren-Lewis, the use of the Swan model to analyse fiscal policy (covered previously) and the Ricardian Equivalence hypothesis covered in the inter-temporal macro lectures. As such, it draws on much of the material covered earlier in the term. Additional readings are provided below. The topic is challenging given that many of the questions touch upon the policy debates over austerity versus stimulus that were active during 2010. The advice on how to approach the essays reaches out to many of the observations and lessons learned from the recent episode. As a result, it is difficult to get completely on top of this topic the first time round, but it is worth persevering with the material and returning to it over the summer because the debates involved are fascinating and the implications for economic policy hugely important.

7.1 Reading

1. Read the lecture slides for lectures 12 and 13 from the SWL sequence, including a review of the Mundel-Fleming results for the effects of fiscal policy under fixed and floating exchange rates.

2. Review the inter-temporal macro lecture on Ricardian Equivalence and the references for that topic provided on the intranet page.

3. The tax smoothing principle is covered in textbooks such as Mankiw from Prelims, and good sources are available using google to search on that topic. A formal derivation of the tax smoothing result is provided towards the end of lecture 9 in the Money and Banking sequence. The idea is simply that taxes today and taxes tomorrow are both distortionary, so if a certain minimum level of taxation has to be raised then it pays to equate the marginal welfare loss from taxation across periods. The marginal cost of taxation tomorrow has to be weighted up by the real interest rate, since we have to tax more tomorrow to pay the interest, but then weighted down to account for discounting of future outcomes. This exactly parallels the consumption Euler equation from last week. If the interest rate and discount rate effects cancel then assuming the tax revenue function and welfare losses from tax are unchanged through time, there is perfect smoothing of tax rates.

4. CS chapter 6. This contains a useful refresher on some of the basics of fiscal policy (e.g. when is it effective) and some formal material on conditions for debt sustainability in the long-run. However, many of the key issues for the essay topics below are not emphasised in CS, so you can probably move through this reading quite quickly.

5. Wren-Lewis, Simon (2010). 'Macroeconomic policy in light of the credit crunch: the return of counter-cyclical fiscal policy?' *Oxford Review of Economic Policy,* volume 26, number 1, pages 71-86. This is the key reading for this week as it covers the core material on arguments for an against government debt reduction, and also reviews issues relating to the effectiveness of fiscal policy. Some of the ideas touched upon in this article are discussed in more detail in entries on the topical notes section os Simon's website, see the following link

http://www.economics.ox.ac.uk/members/simon.wren-lewis/#_Topical_Notes

6. Buiter, Willem (2010). 'The limits to fiscal stimulus' *Oxford Review of Economic Policy*, volume 26, number 1, pages 48-70. This reference makes some useful points and will help to consolidate other things that you come across, but you can read it more quickly that the Wren-Lewis article.

7. A key debate relating to the fiscal tightening being implemented in many major economies (excepting the US) is whether or not withdrawing government demand from the economy will lead to a recession. This is likely if (i) prices are sticky and cannot fall to revive demand; (ii) there is limited scope for monetary policy expansions to replace the lost demand; (iii) net exports are insufficiently elastic with respect to a depreciating nominal exchange rate and therefore do not fill the demand gap. The Keynesian view is that deficient demand may persist for long periods in the aftermath of fiscal tightening, and the associated decline in consumer and business confidence may raise private savings whilst simultaneously cutting private investment, such that the growth path of the economy is affected on a permanent basis. A Neo-classical perspective is that one of (i)-(iii) will rebalance the economy following a shift towards tighter fiscal policy. A more extreme view is that Ricardian Equivalence holds for non-distortionary tax rises, such that private borrowing perfectly offsets government saving, and consumption demand is unaltered. An even more radical view is that aggressive fiscal consolidations actually stimulate aggregate demand and the long-term productive capacity of the economy. The view here is that

Keynesian problems are small or non-existent via some combination of the above arguments, and that (a) debt reduction reduces risk premia on government bonds, which in turn reduces funding costs for corporate lending such that private investment rises; (b) lower spending on government consumption induces increased labour supply. The additional capital and labour promote faster non-inflationary economic growth.

The Keynesian, Neo-classical and Ricardian perspectives are summarised in the following piece that I wrote for a non-specialist readership

http://www.economics.ox.ac.uk/members/christopher.bowdler/fiscal_policy_article.pdf

The theoretical mechanisms behind the view that fiscal consolidations may be expansionary are discussed in various papers by Silvia Ardagna, browse the paper abstracts here

http://www.economics.harvard.edu/faculty/ardagna/papers_ardagna

A critique of Ardagna's work has been offered by Martin Wolf from the FT, see for instance

http://www.ft.com/cms/s/0/969c17c6-7e2b-11df-94a8-00144feabdc0.html#axzz18NLsvp5s

The following IMF publication provides very recent evidence on the macroeconomic costs from fiscal consolidations

International Monetary Fund World Economic Outlook October 2010, chapter 3, 'Will it Hurt? Macroeconomic Effects of Fiscal Consolidation'. Link available here

http://www.imf.org/external/pubs/ft/weo/2010/02/pdf/c3.pdf

The following paper provides evidence on the impacts of expansionary fiscal policies. Applying the conclusions for the opposite case of fiscal contraction provides insights regarding the conditions that support fiscal tightening at low cost in terms of lost output.

Ilzetzki, Mendoza and Vegh (2010). How big (small) are fiscal multipliers? NBER working paper 16479.

8. The deficit bias problem is described in the SWL lectures. If you want further detail on this, I suggest reading the introduction to the following paper and then following up the papers mentioned in the introduction and also the Lambertini paper mentioned in the list of references

http://www.economics.ox.ac.uk/research/WP/pdf/paper460.pdf

The following references are things that you might go back to over the long vacation if you are particularly interested in the issues addressed in this topic.

9. On fiscal rules, see Wren-Lewis, S. (2003) 'Changing the Rules' New Economy Vol 10, pp 73-78 (also available from his homepage). In relation to this, it will be worth looking up the golden rules for UK fiscal policy introduced by Gordon Brown and the fiscal rules imposed under the Stability and Growth Pact associated with the European Monetary Union.

10. Willem H. Buiter (2003) 'Ten Commandments for a Fiscal Rule in the E(M)U' Oxf Rev Econ Policy 2003 19: 84-99.

11. Background on fiscal policy can be found in the Winter 2005 issue of Oxford Review of Economic Policy.

7.2 Essay

Write a 4-6 page essay on one of the following essay titles:

1. Consider an economy which is heading for a significant macroeconomic downturn. Should the policy response be a fiscal expansion based around tax cuts and increased government spending, or would the costs of this policy outweigh the benefits? How does your answer depend on how open the economy is? (2009 exam)

2. 'When interest rates hit the zero lower bound, fiscal automatic stabilizers should be allowed to operate, but further disretionary fiscal policy should be avoided given the risk of explosive national debt.' Discuss.

Suggestions: The first two essay titles cover some of the same ground, in that they get at the appropriate role for fiscal policy. A very basic pre-requisite for fiscal intervention is that it has some impact on the IS curve and aggregate demand. So issues such as Ricardian Equivalence, crowding-out of investment via rises in the risk premia in long-term interest rates and exchange rate crowding out of net exports need to be discussed. Both essay titles point to scenarios in which output is very depressed and monetary policy is either being relaxed or has already hit the zero lower bound for the policy rate. How are these conditions likely to affect the practical relevance of Ricardian Equivalence, and crowding out of investment and net exports? Are the various steps in these arguments likely to apply in such cases? The US is special in the world economy given its size, so drawing conclusions from the US experience is something we should do tentatively, but it does fit the bill in that fiscal policy and monetary policy are both very

loose at the moment. Has the US experienced the private savings surge, the hike in 10 year Treasury bond yields and the appreciation of the US\$ that are thought to squeeze the effects of fiscal stimulus? What is the potential relevance of the policy of quantitative easing by the Federal Reserve in explaining low yields and a cheap US\$ despite the debt acceleration?

In most cases, a fiscal expansion raises the ratio of government debt to GDP, and this may trigger adverse macroeconomic adjustments, which are discussed in some of the essay advice below. Some recognition of these points is needed for the first two essay titles, though obviously there are limits to what you can do given the space constraint.

On the supplementary question concerning the openness of the economy, think about the relevance of exchange rate crowding out as the ratio of exports and imports to GDP heads towards zero. Also, thinking about the other end of the spectrum, why may very small, very open economies be better placed to benefit from the effects of exchange rate depreciation when facing a macroeconomic downturn? Do these considerations explain the strongly Keynesian stance of recent US fiscal policy?

Finally, are there ways in which fiscal policy can be used to boost aggregate demand without raising the medium-term debt to GDP ratio? See the SWL lecture slides and article on this. In these scenarios, what is happening to national saving and what are the risks associated with such a trend?

3. 'The UK government is currently trying to stabilize the ratio of national debt to GDP, and its policies for achieving this make greater use of spending cuts than tax increases. The Bank of England will keep the monetary policy interest rate at historic lows for an extended period during this adjustment. Such a policy combination is appropriate given the macroeconomic risks associated with high and rising levels of debt to GDP.' Explain whether you agree or disagree with this statement?

The best starting point here is the Wren-Lewis material. When the private sector desires smoothness in its consumption of state provided goods and services, and in the tax rates it faces from period to period, and assuming that the only downside to debt today is that it implies higher taxes and lower spending on government provided goods in the future, the optimal policy following a surge in debt/income (e.g. following a state bail-out for the banks) is to simply run

a primary surplus large enough to cover the interest on the debt, so that the ratio of debt to income stays the same, i.e. tax and consumption smoothing lead to debt smoothing. To get away from this result, there must be extra costs associated with debt, such as rising risk premia on government borrowing, such that the interest rate paid on debt is inefficiently high (though note that the extent of such inefficiency depends on whether the debt is funded by borrowing from domestic investors or foreign investors, how?), rising inflation expectations, the prospect of unsustainable debt dynamics now or in the future, such that a country is excluded from the bond markets altogether, or a belief that inter-generational equity requires that countries do not pass on to future generations an overall increase in debt. Some of these effects need to be discussed to make a case for debt stabilization.

A vital point in all of this is the extent to which bond markets raise the risk premium on sovereign debt in light of adverse debt positions. But is all debt viewed the same by bond investors? Consider the following:

– Why might it be argued that debt (a government liability) is less dangerous if it is used to generate state assets that will generate a future cash return, or social assets such as a functioning banking system that provides the financing for future economic growth?

– Why might the bond markets be harsher on countries where outstanding debt needs to be repaid in the near future (Greece) rather than in 10 or more years from now (the UK?)

– Why might the bond markets be harsher on countries whose debt is financed from borrowing overseas (Spain) rather than mainly borrowing from domestic investors (the UK?)

On a similar note, debt has to be seen in light of the ability of a country to generate future fiscal surpluses to repay debt (see the discussion of fiscal space in Buiter). States well placed to generate future surpluses will pay a smaller risk premium and are less likely to be excluded from debt markets in the future because the credibility of any commitment to repay debt in the future is higher. In this context, what is the relevance of (i) the size of the black economy, the starting ratio of taxes to income, and the resultant ability to generate future surpluses (i.e. why is Greece in trouble?), (ii) the degree of trade union and broader public opposition to spending cuts (why is Greece in trouble?), (iii) the stability of the government, the ability of the government to push policies through the legislature and the degree of cross-party support for fiscal tightening?

On the bit about the composition of the fiscal tightening, see the reference to Broadbent and Daly (2010) in the IMF chapter above. A popular view is that spending cuts are better for long-term economic performance than tax rises. But spending cuts are regressive – what are the implications for aggregate demand of transferring income from poor to rich?

4. 'In a global recession when interest rates hit a zero lower bound, it is absolutely essential that any fiscal expansion is globally coordinated.' Explain why you agree or disagree with this statement. (2010 exam)

The usual argument for coordinated as opposed to unilateral fiscal expansion is that exchange rate appreciation crowds out net exports in the unilateral case. But can the standard Mundell-Fleming story apply when interest rates are at the ZLB? Can exchange rate appreciation be driven by factors other than interest rate arbitrage across countries? See section IV of Wren-Lewis for an argument based on the behaviour of the medium- and short-run real and nominal exchange rates that draws on the Swan diagram. What is assumed in this argument?

Another risk associated with unilateral fiscal expansion is that it amplifies so called global demand imbalances. To simplify, in the current context, the US government is providing the demand to drive global GDP growth, whilst countries in Europe and Asia save hard. But the problem with such an equilibrium is that the US risks exposure to rising interest rates on its debt in the future as its debt mounts. If such action forces the US to tighten fiscal policy in the future, will the net savers (China, Germany and Japan) start spending to preserve global demand? If not, a global recession is likely. Another way to see this point is to ask: Would Germany have faced the problem of bailing out peripheral Eurozone nations if it had previously adopted a more expansionary fiscal policy that supported demand and growth across the Eurozone?

5. Discuss whether increases in government spending are more effective in stimulating the economy if they are permanent or if they are temporary. Does the same apply for tax cuts? What are the implications for the design of the fiscal stimulus packages recently implemented in the US? What other features of a fiscal stimulus package would maximize the rise in aggregate demand from a given government budget deficit?

This draws on Ricardian Equivalence, the Wren-Lewis discussion of the real exchange rate in (4) and arguments in the Wren-Lewis article concerning the distributional and inter-temporal

effects of fiscal expansions.

6. What factors might account for deficit bias in major OECD economies (the tendency for government budgets to be in deficit more often than surplus so that the ratio of public debt to GDP rises through time)? What are the problems in tackling deficit bias through constraints on the size of national budget deficits such as those proposed as part of the fiscal pact agreed by Eurozone countries in December 2007? Would the creation of independent fiscal watchdogs to monitor fiscal policy help to avoid problems of deficit bias and excessive national debt?

The SWL lecture and the final reference in the reading list cover deficit bias, and the other Wren-Lewis materials cover proposals for fiscal councils.

The following lecture slides contain some discussion of deficit bias

http://www.economics.ox.ac.uk/members/christopher.bowdler/oriel_summer_school/l2_fiscal.pdf

And the following lecture slides contain some discussion of the specific case of Greek deficit bias within a currency union:

http://www.economics.ox.ac.uk/members/christopher.bowdler/oriel_summer_school/l4_op_ec.pdf

Objections to constraints on government budgets are twofold. Firstly, they do not prevent excessive private debt, e.g. in the banking system, but should such debt prove excessive it typically becomes a liability of the state through bank bail-outs and so the problem of heavily indebted sovereigns is not avoided. Secondly, the proposed Eurozone pact prevents high budget deficits but does nothing to prevent excessive budget surpluses, so that across the Eurozone government contributions to demand are negative. This will hamper economic growth in Europe in circumstances in which private sector demand is also weak and it is difficult for the Eurozone to increase net exports. For discussion of this see the following article by Martin Wolf:

http://www.ft.com/cms/s/0/b7b944a0-24fc-11e1-8bf9-00144feabdc0.html?ftcamp=rss#axzz1gzwWoNV

Related to this discussion, consider the following questions: As well as commenting on the credibility of fiscal projections, and whether rises in debt are sustainable/justified, should fiscal councils be asked to comment on the overall state of the government's balance sheet and the balance sheet of the private and public sector's combined, as defined by the net foreign asset position of a country? (See the discussion under essay 3 above.) Should there be a separate authority to comment on the desirability of planned debt repayment given the planned savings

rates of the household and corporate sectors?

8 Models of Sticky Prices

A graph of GDP growth over time (for example Figure 1.1 in CS) indicates recurrent fluctuations around an underlying average growth rate of 2 to 3%. Such episodes are extremely inefficient – rather than periods of boom and bust, policy-makers would prefer to achieve the average long-run growth rate in each period. Explaining cyclical fluctuations is therefore an important task for macroeconomists. The first topic considers the extent to which aggregate demand shocks can explain macroeconomic fluctuations through their effects on the labour market and hence employment and output (recall that the production function establishes a positive relationship between employment and output).[2]

The New Classical Model (Lucas Model) indicates clear limits to the extent to which aggregate demand shocks can explain employment and output fluctuations. In this framework all prices and wages are flexible, and agents' expectations are fully rational. Consequently, anticipated demand shifts will not influence real variables such as output and employment. This is at odds with most of the empirical evidence, e.g. in a famous study of post-war U.S. monetary policy, Romer and Romer (1989) showed that even pre-announced monetary policy contractions resulted in lower output and higher unemployment. The Lucas model also predicts that whilst unanticipated demand shocks can influence real variables such as output and employment, the duration and magnitude of such adjustments will be very small. As such, there is limited scope for demand shocks to account for macroeconomic fluctuations, because the economy rapidly adjusts to a point on the long-run vertical aggregate supply curve. An immediate implication is that policy measures intended to manage the level of aggregate demand are irrelevant to macroeconomic stabilization. This is an unattractive result – if policy is irrelevant, why have governments and central banks been so interventionist during the last 12 months? A lot of the literature to be covered this week basically asks the question – what features of the Lucas model must be changed in order to establish a model of aggregate supply and the labour market that

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[2] An alternative would be to consider fluctuations in the capital input, which also affects GDP via the production function. However, the labour input varies much more than the capital input in the short-run and is therefore the focus – to see the cyclical properties of the labour market, consider Figure 1.2 in CS. Fluctuations in the capital input are much more useful in explaining differences in long-run GDP growth rates across countries, and will be considered as part of the final topic on the the theory of economic growth.

assigns a more important role to demand shocks in explaining aggregate fluctuations.[3]

A simple resolution of all of these questions is provided by models with adaptive expectations. Provided these expectations are the basis for wage- and price-setting decisions, all of the requirements of observers of the real world would be satisfied – pre-announced monetary and fiscal policy changes would exert real effects, positive sacrifice ratios would occur during disinflation episodes and persistence would be seen in the time series data for inflation. The formulation of this approach due to Friedman, and considered in the prelims macro course, encounters two main problems when confronted with the data. Firstly, the short-run variations in the labour supply curve that occur because of real wage mis-perceptions induce a negative correlation between real wages and employment (output), but this is at odds with the data (recall the details of this from last year; the problem also applied to the flexible price version of Keynesian Economics and is often referred to as the Tarshis-Dunlop problem, after the two authors who documented the anomaly for the US and the UK). Secondly, causation runs from inflation to real variables – higher prices reduce real wages and encourage employment and production – but this seems at odds with the observation that buoyant aggregate demand first causes vigorous real activity and later feeds into inflation, i.e. in practice real variables tend to forecast near-term fluctuations in inflation.

At the heart of these two problems is the fact that under perfect competition (assumed by Keynes and Friedman), higher output and employment mean must mean lower real wages

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[3] The literature sometimes poses this question in slightly different ways. For example, you might see reference to the need to explain why sacrifice ratios (which describe the amount of output lost per unit of inflation reduction) are positive rather than zero. This clearly comes down to the question of why there exists a short-run Phillips trade-off (a positive relationship between output and inflation), rather than a vertical relation in output/inflation space. Similarly, discussion of 'inflation persistence' refers to the fact that when inflation is judged too high by policy-makers, it cannot be decreased rapidly by means of just one or two interest rate increases, but often requires several years of tight policy in which inflation reduces gradually (and often non-monotonically). The fact that inflation cannot be instantly reduced reflects a failure of prices to fall in order to clear markets, which means that aggregate demand contractions spill over into lower output and higher unemployment, at least for some period. As such, the inflation persistence debate has the same roots as that concerning the foundations for the existence of the Phillips curve relationship. In the baseline Lucas model there is no Phillips relationship from anticipated policy interventions, and a short-lived Phillips relationship from unanticipated policy changes. The models to be studied reverse this conclusion through changing the assumptions behind the Lucas model in some way.

because real wages equal the marginal product of labour, and the marginal product of labour decreases with employment under the usual assumption of decreasing marginal returns. One simple escape route for advocates of adaptive expectations is to assume imperfect competition in product and labour markets. Under imperfect competition the marginal profit from hiring is positive when starting at equilibrium, so that firms are always prepared to expand employment, even in the absence of lower real wages. This is the central difference between the exposition of the Expectations Augmented Phillips Curve in chapter 3.1 of Carlin and Soskice and that originally proposed by Friedman. One objection to this model of aggregate fluctuations is that it depends on a very specific version of the so called PS schedule in the Carlin and Soskice diagram, e.g. what would happen to the employment/real wage correlation if the PS line were negatively sloped and prices were always set after wages? A more pressing concern, given the impact of New Classical Macroeconomics, is that adaptive expectations is inefficient relative to rational expectations in the sense that available information is left unexploited when making economic decisions. In the rational expectations case, macro models based on imperfect competition look just like those based on perfect competition – Phillips curves are vertical, sacrifice ratios zero and inflation need not exhibit persistence.

The response of New Keynesian economists has been to augment models featuring imperfect competition with price adjustment costs – menu costs. As is shown in the readings listed below, under certain conditions, price-setting firms faced with menu costs find it optimal not to respond to aggregate demand shocks at the time that they occur, but to instead wait until such time as a review of prices was planned anyway. In the interim, quantities must adjust to absorb the change in demand, hence output, employment, consumption and the like all rise at the same time as inflation. In some instances, such models can also be used to rationalise positive sacrifice ratios and inflation persistence. Models combining imperfect competition and menu costs are attractive in that they provide an optimising basis for the nominal inertia that was central to the Old Keynesian Economics, but was left unexplained and which seemed to disappear as soon as the rational expectations hypothesis is imposed. However, questions remain concerning the foundations of such models, the plausibility of the mechanism that they capture and their empirical relevance. Interestingly, and partly in response to criticisms of models based

on price adjustment costs, current research considers how costs of information collection can lead to departures from rational explanations and therefore to real effects of monetary policy – essentially swinging the focus back to something similar to adaptive expectations, but making a case for why such an expectations process is optimal and should be used ahead of full information rational expectations.

In this tutorial the objective is to review the New Classical Model due to Lucas and the Adaptive Expectations Model due to Friedman.[4] The focus then turns to so called New Keynesian models – they are new in the sense that they embed rational expectations (as in the New Classical Model) and imperfect competition (necessary for the reasons discussed above) but Keynesian in the sense that prices adjust sluggishly to give a positive Phillips curve relation in the aftermath of aggregate demand shocks. Finally, note that whilst the New Keynesian model covered in the readings is that based on menu costs, there are other models in the New Keynesian tradition that try to explain the real effects of monetary policy, for example in the Romer book in particular you will see reference to models of overlapping wage and price contracts due to Taylor and Fischer, and there is also a model due to Calvo in which there is a fixed probability of a firm getting the opportunity to adjust prices. These models are not crucial for the essays below or the course in general, and they are arguably more primitive than the menu cost model because nominal inertia is assumed for some period, rather than being derived as an optimal response to the existence of menu costs. However, I will draw attention to them as one way to illustrate the so called New Keynesian Phillips Curve, which shows that current inflation can be a function of expected inflation in future periods (we may not get round to this for the current topic but it will come up again for the first monetary policy topic in week three).

8.1   Readings

The key readings are 1-3 below and provide a good basis for writing the essay (see title below). The other readings are optional at this stage, you may want to read them during the vacation if you choose to follow up this topic in more detail.

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[4]The Prelims course covered the original version of the Friedman model with adaptive expectations and perfect competition in labour and goods markets, see chapter three in the earlier Carlin and Soskice book *Macroeconomics and the Wage Bargain.*

1. Read chapters 2-3 of CS[5], in particular the introduction to the imperfectly competitive labour market in chapter 2, the summary of macroeconomic adjustment in Figure 2.14 and the summary questions at the end of chapter 2, and the section on Phillips curves at the start of chapter 3 (up to page 81).

2. Read parts A and B in chapter 6 of *Advanced Macroeconomics* by David Romer (this refers to the 2006 edition of the book, however earlier editions contain very similar material on the Lucas Model and New Keynesian Economics). In part B, section 7 is optional because it deviates to a separate strand of literature beyond the scope of the course. Some sections of part C are also useful. Section 12 is useful for the empirical bit of the second essay title below (it summarises the applied work in (3) below). Sections 9 and 10 cover the Taylor and Fischer models mentioned above. It is worth reading the implications sub-section in these two sections to build some intuition, but you do not need all of the mathematical details. Section 11 is an interesting challenge to the assumption of time dependent pricing that is used in the Ball, Mankiw and Romer, Taylor and Fischer models and section 13 is related to the work on costs of information collection discussed above.

3. Read *The New Keynesian Economics and the Output-Inflation Trade-off* by Ball, Mankiw and Romer. This article was published in the 1988 volume of the *Brookings Papers on Economic Activity*, pages 1-65, and is reprinted in Volume 1 of *New Keynesian Economics*, edited by Mankiw and Romer, 1991.

4. In the same Mankiw and Romer volume listed in (3) above, it is worth reading the extended introduction written by Mankiw and Romer. The following articles from the edited volume are useful in thinking about aggregate price rigidity as an example of coordination failure: 'Small Menu Costs and Large Business Cycles: A Macroeconomic Model of Monopoly' by Mankiw (originally published in the *Quarterly Journal of Economics* 1985, pages 529-39) and 'Monopolistic Competition and the Effects of Aggregate Demand' by Blanchard and Kiyotaki (originally published in the *American Economic Review*, pages 647-66). Concentrate on the diagrams presented in these papers rather than the mathematical details.

5. Further detail concerning the micro foundations of the New Keynesian approach are

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[5]The first half of chapter two reviews the ISLM model from Prelims, which you could skim quite quickly if you feel happy with that material.

provided in chapter 15 of Carlin and Soskice, sections 4 and 6 (section 6 covers a recent development, the sticky information view of the Phillips curve, which moves away from explanations for price stickiness and focuses on the idea that expectations may be rational but formed from incomplete information sets because agents find it costly to gather all relevant information).

6. For a good concise treatment of aggregate price and output adjustment when price or wage contracts last for more than one period, see the description of the Taylor model in section 3.3 of chapter 5 in *Monetary Theory and Policy* by Carl Walsh (2nd ed., 2003). This part of the book also contains material on related models such as the Calvo model, which you should read if you are interested in this topic. For a summary and discussion of this material, see lectures 1 and 2 on the optional paper in Money & Banking.

8.2 Essay Question

Try to keep your answer to 4-5 sides handwritten, or the corresponding length for a typed essay.

1. 'Models incorporating the Rational Expectations Hypothesis (REH) do not provide a satisfactory explanation for the short-run output-inflation trade-off (the short-run Phillips curve).' Discuss.

2. 'Menu costs are too small and contracts are too short, therefore models of sticky prices cannot be the explanation for prolonger periods of recession.' Discuss.

8.3 Other questions to consider

Whilst doing the reading for this topic and making notes, you may find it useful to think through the following questions, some of which are related to the essay topic. One way to use this set of questions is as a revision check list at the end of the course – it gets at many of the important points but does not provide a comprehensive list.

1. The Lucas model yields a reduced form expression relating the output gap (the deviation of output from trend) to the surprise component of inflation (the Lucas supply function). In what sense is inflation causal for output in the Lucas model? Could output exceed the natural rate in the absence of surprise inflation in the Lucas model? (Hint: Think about the decisions of the perfectly competitive firms that constitute the supply-side in the Lucas model.)

2. What determines the slope of the short-run Phillips curve in the Lucas model? Based on these predictions, what are the conditions under which the Lucas model could explain relatively large output fluctuations from unanticipated demand shifts? Are these conditions likely to hold in practice?

3. How persistent is the output-inflation trade-off in the Lucas model following a surprise demand shift? (Hint: For what period of time is the information imperfection in the Lucas model applicable in practice?)

4. It is often argued that the Lucas model is consistent with a Phillips correlation in the data, but that such a relationship cannot be exploited by policy-makers. What is meant by this?

5. i. Explain how the WS-PS diagram from CS can be used to account for the short-run Phillips curve when inflation expectations are formed adaptively. ii. Describe the adjustment of the model to the long-run vertical Phillips curve following a permanent increase in aggregate demand. iii. How would the adjustment differ in the case of a temporary demand increase? iv. What is the importance of the assumption that wages are set in advance of prices in this framework? If prices were set in advance of wages, and all agents had adaptive expectations, would the adjustment to equilibrium following a rise in aggregate demand be faster or slower?

6. What is the assumption of staggered time dependent pricing in the context of the Ball, Mankiw and Romer model of price rigidity due to menu costs? Do you consider this assumption plausible from a microeconomic perspective?

7. In the menu cost model, what is meant by the aggregate demand externality? How does the elasticity of the labour supply curve influence the size of the aggregate demand externality?

8. In macroeconomic models based on imperfect competition, how can price rigidity be interpreted as a market coordination failure linked to externality problems?

9. Why is there no role for aggregate demand stabilization in the Lucas model? Do models incorporating price or wage rigidities restore the case for stabilising monetary policy (something at the heart of the Old Keynesian view)?