Faculty of Commerce and Economics
School of Economics

ECON6304
BUSINESS CYCLES AND GROWTH

COURSE OUTLINE
SESSION 2, 2006
1. **COURSE STAFF**

This course has been taught recently by Paolo Giordani, Glenn Otto, Adrian Pagan and Bill Schworm.

2. **INFORMATION ABOUT THE COURSE**

**Introduction**

This is a course in advanced macroeconomics. The course assumes a sound prior knowledge of macroeconomics (at the level of Macroeconomic Analysis) and of econometrics (at the level of an intermediate course such as Applied Econometrics).

**Part I. Instructor: Professor Adrian Pagan**

This part of the course aims to provide an introduction to thinking about the business cycle and long-run growth. The material is primarily oriented to quantitative analysis rather than the construction of theoretical models to explain both phenomena. In this course it is impossible to cover the complete range of work that is relevant to either topic. For cycles this is because they are about movements in a variable (or variables) that summarize aggregate economic activity, but that is the outcome of many interactions within a system. Consequently, theories of the business cycle often simply become descriptions of how a macro-economic system functions. Thus one will often see “business cycle” in the title of a paper but one searches in vain for anything relating to that topic. Chief among these offenders are papers involving the role of money in a macro-economic system. Money may have an effect upon output but that scarcely qualifies one to think that papers discussing such an effect are about the business cycle.

Consequently in these lectures we try to focus upon what are the essential ingredients of a business cycle and the methods used to discuss business cycles in applied research. We will also briefly ask what type of complete system models would reproduce them. Given this orientation we are not concerned with questions (say) of the effectiveness of monetary and fiscal policy except insofar as these can potentially be the source of the business cycle. *Prima facie* the latter seems unlikely since the cycle has been around a long time, but it is possible that the rise of active demand management may have modified the cycle in some way even if it is not responsible for it.

There is a bias in the lectures; our orientation is quantitative. An alternative would be to simply recount a series of stories about what could generate a cycle. This means that we will pay attention mainly to those theories that have been subject to quantitative testing. It also explains why early on in the lectures we emphasize the question “What is a business cycle?” The answer to this is rather confused in the literature, with at least three different definitions, all of which are being used at the same time, as if they were actually just re-statements of a single view. We show that there is a connection between the three views but, since it can be very weak, one has to be careful when one is reading the literature in order to be clear about what the author’s concept of the cycle is.
We then proceed to a lecture that deals with the construction of the “facts” of business cycles. How one describes these depends upon your view of the business cycle and whether you have used either a single series to represent economic activity or a number of them. This leads us on to a survey of work done on actual cycles using the techniques acquired earlier and, finally, to looking at some theories that have been developed historically to produce a mechanism for a cycle in activity. The multiplier-accelerator and inventory models were two early attempts to do this and they illustrate the type of interactions that business cycle models need. We also introduce a simplified real business cycle model at this point. Finally we look at some rather general stories about the macro-economy which use minimal amounts of information. Often these are regarded as providing a suitable way of organizing the business cycle facts since they aim to impose minimal assumptions so as to “allow the data to speak”. This literature mostly employs the VAR (Vector Autoregression) representation of multivariate time series. The appeal of a VAR is that it embodies a standard ingredient of modern business cycle models- the role of shocks and how they get propagated. It is how one defines a shock and measures its impact that is really the key to business cycle theories.

One of the features that emerges from our analysis is that business cycles, defined in the way that the National Bureau of Economic Research (NBER) in the U.S. does, depends crucially upon the magnitude of long-run growth. Hence we will proceed to two lectures giving a broad summary of the literature on this phenomenon. Theoretical models due to Solow and Swan have always been the foundation of this work. In their models long-run growth was the outcome of population growth and technical change. These models have been extended in the past 20 years through efforts to endogenize technical change, and we will work through the basic endogenous growth model, although, just as for cycles, there is a huge literature on that topic which is differentiated in a myriad of ways to “produce” technical change. Finally, we look at the quantitative literature on the determinants of long-run growth. This involves a testing of the Solow-Swan and endogenous growth models, as well as providing a summary of the implications of these models for the possible convergence of growth rates across countries.

**Texts:** There are few recent texts on the business cycle. However, most macroeconomics textbooks have some material devoted to the topic, either summarizing empirical evidence or outlining cycle models. A book that has elements of both is


Its problem is that it is rather confusing in its definition of what a business cycle is and often mix up the various definitions proposed in the literature. Consequently, it tends to be better on the theory rather than the empirical side.

For growth quite a good (although elementary) book is


and a comprehensive one is

Because of the problem of suitable texts I will be distributing lecture notes for each lecture. These notes also give a basic set of references either to journal articles or to web pages where some material that is relevant may be found. A reading list is included in the brief description of each of the lectures.

**Web Pages for Growth and Cycle Research**

(a) **Cycles**

The *European Business Cycle Network* at
http://www.eabcn.org/
has quite interesting conferences and references to recent research on business cycle topics.

The *Quantitative Macroeconomics and Real Business Cycles* Homepage at
http://dge.repec.org/
has material on models and quantitative work on cycles.

The *Economic Cycle Research Institute* has reference cycles for many countries and other material at
http://www.businesscycle.com/data.php#intldates

(b) **Growth**

A number of web sites exist for growth related studies among which are:

*Penn World Tables* often used in growth studies is at
http://pwt.econ.upenn.edu/

The *Global Development Network Growth Database* of the World Bank is at

Jonathan Temple has a site on economic growth resources
http://www.bris.ac.uk/Depts/Economics/Growth/index.htm

**Lecture 1: Some Tools**

Difference Equations; VARs; Hodrick-Prescott Filter; the Nature of Macroeconomic Times Series - Permanent and Transitory Shocks; Long-run Growth

Lecture 2: What is a Business Cycle?

Measuring Economic activity and defining cycles: Periodic and turning point cycles and Fluctuations. Univariate and multivariate measures and the statistical models to construct them.

Arnold ch 1


Tutorial: Construction of some basic business cycle features from Australian, US and Euro-area data

Lecture 3: Describing Characteristics of the Business Cycle

(a) Univariate


(b) Multivariate


Tutorial:

Constructing some advanced business cycle features from data – shapes and variability of phases, reference cycles, coincident, forward and leading indicators etc. Examples from Melbourne Institute Indicators and the Chicago Fed National Activity Index (CFNAl) http://www.chicagofed.org/economic_research_and_data/cfnai.cfm

Also some of the coincident indicator work being reported at the 2005 RBA Conference Papers

**Lecture 4**: Studies of actual cycles

There will be no tutorial this day. I will assign some papers to be analysed and discussed including the following


RBA Conference Papers


**Topic 5: Model Structure and Some Basic Stories**

(a) The Structure of Business Cycle Models
(b) Some earlier Theoretical Models- multiplier-accelerator and inventory models
(c) A basic RBC type model
(d) Minimal Theory Models


Tutorial:


**Topic 6: The Basic and Endogenous Growth Models**

Jones ch 2,5,6,8
Barro and Sala –I- Martin Ch 1, 4


Tutorial:


**Topic 7: Empirical Work on Determinants of Growth Rates**

Jones ch 3
Barro and Sal-i-Martin ch 10, 12


(the Handbook has many chapters on growth topics. This paper is a general overview of the empirical literature)
Part II. Instructor: Dr. Paolo Giordani

There is no mandatory textbook for this part of the course. Supporting material will include papers and class notes. However, I can recommend the textbook “Monetary Theory and Policy”, by Carl Walsh, MIT press (either first or second edition).

The second part of the course will analyze in some detail two of the most common classes of microfounded, dynamic, rational expectation models for the study of business cycle fluctuations: real business cycle model and New Keynesian models. Particular attention will be paid to the assessment of the empirical performance of the models. Most classes will consider closed economy models, but toward the end of the course we will consider extensions to the open economy.

Students who have not taken the Macroeconomic Analysis course are encouraged to study the content of Lecture 1 (see below) in advance.

Lecture 1

**Review of the basic New-Keynesian model.**

1) Lecture notes from Macroeconomic Analysis I.
2) Walsh.

**Hints on solving rational expectations models.**

5) Lecture notes from Macroeconomic Analysis I.

Lectures 2 and 3.

**Real Business Cycle models: specification and empirical evaluation.**


Lectures 4 and 5.

**Extensions of the basic New Keynesian model.**

1) Walsh.
2) Lecture notes.

Lecture 6 and 7
Open economy models.

1) Walsh.
4) Gali and Monacelli, 2002, Monetary Policy and Exchange Rate Volatility in a Small Open Economy, NBER WP 8905.

3. COURSE AIMS AND OUTCOMES
This course is ideally suited for students who wish to increase their technical skills and prepare to work as macroeconomic analysts or do their own research. By the end of the course students should be much better equipped to read research papers and conduct autonomous research.

4. STUDENT RESPONSIBILITIES AND CONDUCT

4.1 Workload
It is expected that you will spend at least ten hours per week studying this course. This time should be made up of reading, research, working on exercises and problems, and attending classes. In periods where you need to complete assignments or prepare for examinations, the workload may be greater.

Over-commitment has been a cause of failure for many students. You should take the required workload into account when planning how to balance study with employment and other activities.

4.2 Attendance
Your regular and punctual attendance at lectures and seminars is expected in this course. University regulations indicate that if students attend less than eighty per cent of scheduled classes they may be refused final assessment.

4.3 General Conduct and Behaviour
You are expected to conduct yourself with consideration and respect for the needs of your fellow students and teaching staff. Conduct which unduly disrupts or interferes with a class, such as ringing or talking on mobile phones, is not acceptable and students may be asked to leave the class. More information on student conduct is available at: www.my.unsw.edu.au

4.4 Keeping informed

Comment [marias1]: This whole section (or your own wording of these topics) can be written out in your course outline. Alternatively, it can be referred to with words such as ‘all students are expected to adhere to university policies in relation to class attendance and general conduct and behaviour. In addition, students are expected to understand their obligations in relation to workload and keeping informed. Information and policies on these topics can be found at: www.my.unsw.edu.au The decision about whether to write it out in the course outline, or make reference to it only, is the decision of the lecturer-in-charge and will depend on a number of factors, including the level of the course. For example, first year students may require more advice concerning such matters than third/fourth year students.
You should take note of all announcements made in lectures, tutorials or on the course web site. From time to time, the University will send important announcements to your university e-mail address without providing you with a paper copy. You will be deemed to have received this information.

5. ASSESSMENT

Assessment in this course will be as follows:

The final examination will be 180 minutes in duration. It will be in two parts. Part A on the first part of the course and Part B on the second. Part A will be worth 50% of the final grade. As a partial substitute students can opt to do a project on a topic, to be decided with the instructor, that would be worth 25% of the final grade. For such students Part A of the final exam would be worth 25%. Students must opt for one of these alternatives by November 1.