

Economics 2
Semester 2 2007-8
Team Project Outline

1. A brief overview

This project involves identifying common stylised features of economic fluctuations for a particular country. It is intended to allow you to deepen your understanding of data analysis and of the material on economic fluctuations and growth covered in Economics 2, Semester 2, and Economics 1A, Semester 1. You will work as part of a team to put together a poster presentation on your results for a poster session / mini-conference to be held on the *afternoon of Tuesday March 4th on the ground floor of Adam House.*

The purpose of this document is to provide some general guidelines for this team project.

2. Team organisation

- Tutorial groups will be divided into teams of (normally) 3-4 students. Each team will be assigned a country to analyse.
- As a team, *you* will decide for yourselves how to divide up the tasks involved in researching and presenting the project (exploiting comparative advantage can be helpful, though note the rota arrangements below so beware of overspecialisation).
- You will need to arrange meetings to bring together, analyse, and discuss your interpretation of, the data for the country that you are assigned, to discuss what information to display on the poster and the layout of the poster.
- To assist communication between team members, a ‘private’ discussion-group facility has been set up for each team on WebCT.
- You’ll also need, as a team, to organise a rota of team-members who will be available to discuss your findings at the mini-conference. Since some members of a team may have classes on the day of the mini-conference, it is not necessary for all students in a team to be present throughout. However, a team will be penalised if no member is present to discuss its poster presentation with staff, who will appear at random times. As a result, it may well be the case that each team member has to be able to discuss the entire content of the team’s poster, not necessarily just the component that (s)he is most familiar with.

3. Rubric

Your poster should be A1 size (i.e. 8 pieces of A4 size paper).

4. Topic & Background

You are to examine economic fluctuations and growth in the macroeconomic time series data of the country that you have been assigned.

To make the project manageable, in the light of the potentially large array of data available for any given country, I would like you to restrict your attention to quarterly national income accounting data for GDP(output), consumption, investment and government spending. You should focus mostly on real values (why?), however, nominal values (of GDP) can be used to construct the GDP deflator measure of ‘the’ price level.

In the context of economic growth, it is interesting to know the average growth rate (across a given sample) as well as whether the growth rate is stable. For example, does the trend change if one uses different subsamples (always allowing for a full cycle to be completed)? How do the components of expenditure as a fraction output (the great ratios) behave?

Often, in analysing economic fluctuations (business cycles), researchers first try to identify a set of stylised facts (features of the data) which are to be explained. The researcher's task is then to develop a (theoretical) model that is capable of explaining these observations. In this project you will attempt to assemble some stylised facts for one particular country. This may allow you to speculate on the sort of models that are consistent with these facts.

There are several different approaches to summarising economic fluctuations. One difficulty encountered in analysing fluctuations is that many macroeconomic time series grow over time, so it is necessary to disentangle long-run trend and cyclical components. Several methods exist for identifying the trend and cyclical components. One of the most commonly used is the Hodrick-Prescott filter, you should attempt to use that approach. You can contrast this with the results obtained from assuming (and extracting) a linear trend.

Recommended Readings:

I expect you to read some of the literature to find out about different ways of reporting aspects of economic fluctuations. Possibly the most comprehensive account of economic fluctuations, using the approach we adopt here, is:

Stock, J. H. and M. D. Watson, (1998), "Business Cycle Fluctuations in US Macroeconomic Time Series.", *NBER working paper* 6528. <http://www.nber.org/papers/w6528>

For an intermediate textbook treatment, including discussion of alternative approaches to summarising economic fluctuations you could look at:

Abel, A., B. Bernanke and R. McNabb, *Macroeconomics: European Edition*, Addison Wesley Longman, UK, (Especially Ch. 9). (**In Reserve Section of Main Library**)

Burda M., and C., Wyplosz, (2006), *Macroeconomics: A European Text, 4th Edition*, Oxford University Press, Oxford, UK. (Especially Ch. 14). (**In Reserve Section of Main Library**)

For a discussion and analysis of whether the stylised facts identified using the Hodrick-Prescott filter are robust to the use of alternative approaches to detrending you might look at:

Canova, F., (1998), "Detrending and Business Cycle Facts", *Journal of Monetary Economics*, **41**, (3), pp 475-512.

http://www.sciencedirect.com/science?_ob=PublicationURL&_toctype=%23TOC%235937%231998%23999589996%2354485%23FLA%23&_cdi=5937&_pubType=J&_auth=y&_acct=C000043939&_version=1&_urlVersion=0&_userid=809099&md5=a550211ca33e170e145bdb7450ef365f

For a discussion of the properties of the great ratios you could look at

Attfield, C. L. F. and J. Temple, (2006), "Balanced Growth and the Great Ratios: New Evidence from the US and the UK". University of Bristol Discussion Paper <http://www.efm.bris.ac.uk/ecjrw/abstracts/trend14sep06all.pdf>

There has been a great deal of research on these topics, so don't try to survey the entire literature before you start work on the project. Often original research articles can be difficult to digest (so don't invest too much time in understanding the details).

I am aware that you have not taken formal courses on statistical methods or econometric analysis. For this reason, I am recommending the following introductory books on econometric modelling and statistics.

Koop, G., (2005), *Analysis of Economic Data*, John Wiley Publishers.

Rowntree, D., (1981), *Statistics Without Tears: A Primer for Non-Mathematicians*, Penguin Books.

Aside from the fact that an understanding of statistical analysis is a useful skill in itself, I would hope that this project would give you a solid foundation for later courses in econometrics at Honours level and underpin your knowledge of dynamic decision problems that we studied during the year.

5. Advice on Content

There is no sample poster – you already have experience of creating and presenting posters from Economics 1A.

There are several aspects to this project.

Firstly, you need to demonstrate a level of technical proficiency, in the use of web-based data resources and of Excel, in order to be able to compute the desired business cycle statistics, and to explore robustness in the face of alternative approaches to detrending. (I provide some guidance on downloading data and on implementing a Hodrick-Prescott filter and extracting a linear trend below).

You also need to think carefully about which aspects of economic fluctuations to highlight: which variables / interactions will you consider and why, what measures are you going to use: standard deviations (if so, will these be raw or normalised in some way e.g. expressed relative to the standard deviation of output)? Averages (if so do these have meaning)? Correlations (if so which interaction effects are interesting? Are contemporaneous effects or the lead-lag structure to be highlighted.)? To have some feeling for these issues you need to read around the literature (see above).

Thirdly, you need to consider what the stylised facts suggest about the sort of properties economic models should exhibit. Do any of the models that you have studied so far (in Economics 1A and Economics 2) offer explanations of the stylised facts that you have documented.

Finally, here are some things to bear in mind:

In a poster session environment, communication with the reader takes place by 1) poster content, 2) verbal communication. Try to use the limited space afforded by the poster as effectively as possible. In particular work out the most effective means of conveying the insights that you can offer (graphs/figures/tables/prose text/ bulleted text etc) and which are the least effective. This may well mean putting less than you have found out on the poster but discussing them instead with the assessor, and minimising use of ineffective means of communication

Try to convey as much insight as possible about the implications of the data for the theoretical models of growth, economic fluctuations and dynamic decision problems.

Try to explain the meaning of any statistics you present and be sure to cite any data sources.

6. Accessing and Transforming Economic Data

You can access data for your assigned country through the Economic and Social Data Service (ESDS).

You need to register with ESDS. To do this (and to download data on subsequent occasions) you need to log on to MyEd. Then choose the *Library Channel*. Then click the *Launch Library Resources* box. Then click *A-Z Databases*. Find *ESDS* and click on the *ESDS* link. The data that you require is in *ESDS International*, so click this. If you are asked to register at this stage then do so (see next paragraph). On the right hand panel are the words 'Direct Links to Macro Data'. You need to be able to access the *OECD data* from this list. If this is the first time that you have tried to access the data and you have not yet been asked to register then I expect that you will be asked to do so now (see next paragraph)

The first time that you use any of the ESDS international datasets, you need to register (see the upper right hand panel). My understanding is that as a full time matriculated student at a UK University you are entitled to register as a user of ESDS datasets. Fill in all the required fields (I expect that you have to state that you are an undergraduate student and specify the institution to which you are attached amongst other things) and provided you agree to the terms and conditions you should be able to access the data (when I first did this, several years ago, there was a delay of one day, while my details were processed before I could access the data, but my impression is that you will be able to access stuff immediately). If you are having difficulties with registration, then the University Data Librarians may be able to help you: <http://datalib.ed.ac.uk/contacts.html> .

Once you are in the OECD online database, you need to look at the *Main Economic Indicators*. There are Annual, Quarterly and Monthly versions. For the present analysis you should probably use quarterly data in the first instance – even though the stock price data may be available on a more frequent basis, data on other macroeconomic aggregates (that you may wish to include in your regression) may not be available so readily. (You could look at data with monthly (or annual) frequency as well to see if this affects the results.). Once you have opened the quarterly dataset, you find that the data can be accessed either by country or by series. It won't matter which approach you use, but you may find one more convenient than the other.

It is rather laborious to attempt to describe all the stages required to view and subsequently download a particular data series. I will try below, but if you can work it out for yourself then so much the better.

Imagine that we were interested in the first data series on the list: The Australian Dollar Us Dollar (ASD-USD) exchange rate monthly average.

First select (tick) this series. Now we need to select the range (otherwise we get just one data point): click on *Quarter* (under Columns on left hand side of screen) and select all quarters, then click on *Year* (under Rows on left hand side of screen) and again select all years. To confirm that you haven't just got one data point, look at the 'Table Size' on the left hand side of the screen (it should have 4 columns and many rows). Next click on the 'Table' icon at the top of the screen. You should see data corresponding to each quarter of many years (note there may be a number of missing data points if the data series is not recorded initially).

The tabular form of the downloaded data is inconvenient from the point of view of data analysis. It is easier to work with a single column of consumption data of the form

Date:	Data
1972:3	22
1972:4	23.3
1973:1	23.1
1973:2	23.7
...	

It is a little difficult to transform data in Excel. Given that you are only likely to be working with a few data series you may as well transform the data by hand (copy each cell to the appropriate place). This is laborious, but is probably quicker than devising code to do it automatically.

Using the *Actions* menu it is possible to re-order the series as a column (vector) rather than a row (vector).

To download this data, click on the *Actions* menu, choose *Download Report Data*. It makes sense to choose an Excel format, since that is the simplest package for you to use (even though it is not a specialist econometrics package). Save it to file so that you can work on it at a later date.

There may be several alternative series that you could download for, say, consumption. You should document which you use (e.g. seasonally adjusted data? Real/nominal data? The level of consumption or an index of consumption?) and be prepared to explain and justify your choice.

In addition it is possible to download all (or a selection of) the series for a particular country (at once), or data series for all (or a selection of) the countries for a particular topic (e.g. GDP)

You should describe the basic statistical properties of the data series that you use and graph them. Make sure that you have 'Added In' the Analysis Toolpack and Analysis Toolpack VBA in Excel. It is also important to record the source of the data used.

You may wish to work with the natural logarithms of the data - in order to cope with a data series that is growing exponentially.

The next problem that you face is how to construct a lagged data series (to use as the explanatory variable(s) on the right hand side of the regression). You need to work out and implement the Excel operations that allow you to construct a lagged data series.

Now you are in a position to start to examine the research question that you have been set ... good luck!

Two Filters: The Hodrick-Prescott Filter and Linear detrending

To decompose a time series (for a certain variable) into the cycle and the trend term we need to generate an expression for the trend term. You should consider both a linear (in logs) trend (which imposes a constant rate of growth in the trend) and a Hodrick-Prescott filter, which permits the change to trend (smoothly).

Implementing a linear detrending procedure is simple. Many macroeconomic variables appear to grow (roughly exponentially) over time. If this is the case then the (natural) logarithm of the variable will grow linearly over time. So, under the assumption that a linear trend is a good approximation to the data, take the (natural) log of the variable, y , and run a regression of $\ln(y)$ on a constant and a time trend variable, t .

$$\ln(y_t) = a + b \cdot t + \varepsilon_t$$

Then the estimated constant and slope parameters \hat{a}, \hat{b} can be used, with the time trend to generate the trend component, \hat{y}_t

$$\ln(\hat{y}_t) = \hat{a} + \hat{b} \cdot t$$

The cycle component is then $\ln(y_t) - \ln(\hat{y}_t)$

The Hodrick Prescott filter is somewhat more involved. You don't need to know the details of the formula used to compute the trend, but you do need to be able to use a version of the HP filter to compute detrended data. The website <http://dge.repec.org/codes.html> contains codes to implement the HP-filter. The easiest to use are probably the web-interface version and the Excel version. I shall explain how to use the latter.

The program to implement an HP filter is an "Add-Ins" to the standard Excel tools. You must download the program and place it in the appropriate directory in order for Excel to be able to access it.

First open Excel. On the **Tools** menu, click **Add-Ins**. click **Browse** and identify the (location of) the directory into which Add-Ins should be downloaded.

The Excel Add-Ins and some example spreadsheets are available at <http://ideas.repec.org/c/dge/qmrbcd/165.html>.

Download these (3) files. Save a copy of the of the HP filter add-in (<http://dge.repec.org/codes/annen/HPFilter.xla>) in to the appropriate directory for Add-Ins. The example spreadsheet (<http://dge.repec.org/codes/annen/HP-Example.xls>) should be saved elsewhere.

Now on the **Tools** menu, click **Add-Ins**; click the check box next to the add-in you want to load, and then click **OK**.

The HP-filter Add-In exploits a particular class of excel known as an *array function*. It produces a filtered version of an entire time series, but to do so the function must operate on the whole array of data to be processed simultaneously, in order to produce a filtered time series with the appropriate number of data points, not in a cell by cell manner.

Open the example spreadsheet. Read through the introductory material. Especially the material headed "uses". Notice the structure of the HP filter command requires you to

specify the value of a parameter *lambda*. This parameter determines the smoothness of the trend. A value of lambda of 1600 is typically used when filtering quarterly data. Look at the illustrative examples. It is probably easiest not to try to modify them or re-run them.

Now, imagine that you have a series *jc* (US quarterly job creation, %) which you wish to filter (in order to extract the components of the data that represent business cycle frequencies). This series is in column B of the following table

	A	B	C	D
1	date	jc	jc trend	jc cycle
2	1947Q1	7.95		
3	1947Q2	6.7		
4	1947Q3	6.4		
5	1947Q4	7.05		
6	1948Q1	6.8		
7	1948Q2	5.5		
8	1948Q3	7		
9	1948Q4	6.05		
10	1949Q1	4.85		

Suppose that we wish to put the filtered series in column C. To do this highlight the intended target area C2:C10 (which should be of the same dimensions as the series to be filtered) and, (with this area highlighted) type

=HP(B2:B10,1600)

Then DO NOT press *Enter*. Instead press *Shift* and *Ctrl* and then *Enter*.

(Typing enter alone gives only the filtered data point in C2).

In the above formula, cells B2:B10 contain the series to be filtered and 1600 is the value assigned to the smoothing parameter lambda (for quarterly data).

The above command gives the output:

	A	B	C	D
1	date	jc	jc trend	jc cycle
2	1947Q1	7.95	7.457525	
3	1947Q2	6.7	7.212367	
4	1947Q3	6.4	6.967516	
5	1947Q4	7.05	6.722961	
6	1948Q1	6.8	6.478335	
7	1948Q2	5.5	6.233473	
8	1948Q3	7	5.988416	
9	1948Q4	6.05	5.742742	
10	1949Q1	4.85	5.496665	

As the title of column C indicates, the HP command generates the smoothed trend. For business cycle analysis we would like to look at the cyclical component of the series. That is, we want to analyse the difference between the series in column C and that in column B. Computing this difference (and placing the result in column D) gives:

	A	B	C	D
1	date	jc	jc trend	jc cycle
2	1947Q1	7.95	7.457525	0.492475
3	1947Q2	6.7	7.212367	-0.51237
4	1947Q3	6.4	6.967516	-0.56752
5	1947Q4	7.05	6.722961	0.327039
6	1948Q1	6.8	6.478335	0.321665
7	1948Q2	5.5	6.233473	-0.73347
8	1948Q3	7	5.988416	1.011584
9	1948Q4	6.05	5.742742	0.307258
10	1949Q1	4.85	5.496665	-0.64666

7. Assessment

This team project is worth 10% of the overall mark for Economics 2. The project will be assessed by members of teaching staff at the poster session on Tuesday 4th March (week 9). Teams must be prepared to answer questions on their poster displays. No extensions are possible for the team project. Teams which fail to present a poster at the mini-conference will be assigned a mark of 0 for this component of the course.

Grading will be carried out by members of staff, with normally 2 or 3 members of staff grading each poster presentation independently. Grading will be based on the Extended Common University Marking Scale; for further details see below and also the Economics 2 Handbook. A mark of 0 will be awarded to any team which does not display a poster. For teams which do display a poster, marks will be awarded for each of the criteria listed below. The common mark for the team will then be the average over the criteria and the 2 or 3 graders.

Grading criteria

<i>Criteria</i>	<i>Mark</i>
Responsiveness of the presenter(s). Was a presenter present? If no then grade = 0. If yes, then grade the responsiveness of the presenter(s) to questions e.g. did he/she/they have a reasonable understanding of the content of the poster?	
Quality of economic analysis. Does the poster display a good understanding of the basic economic concepts, models, and techniques relevant to the economic analysis of the chosen issue? How well does the poster use these economic concepts, models, and techniques to analyse the chosen issue?	
Clarity of presentation. Is the poster clear and well presented? Is it easy to read and understand? Are the diagrams (if any) neat, well drawn, properly labelled etc? Is the data (if any) presented informatively and succinctly – e.g. through a good use of charts? Are sources clearly stated? Have appropriate information resources been identified and used effectively?	

8. Free Riding

All members of a team will be awarded the same common mark for the project. If you feel a member of your team is shirking, then you and other members of the team will need to put pressure on the shirker to do his/her fair share of the work. This can at times be difficult but, such difficulties are commonly encountered in many work situations, so that the team project provides a valuable opportunity at building experience and skills for dealing with such

problems. It can also be helpful to bear in mind that if you work hard at the team project this will help you learn, and will benefit your individual performance in other assessments.

If you feel, *after the presentations*, that a member of your team did not pull their weight at all, and was a serious free-rider, then we have instituted the following:

- (i) You may inform the department of economic of the problem, giving your name and that of the person you think has shirked; do this by email to economics@ec.ac.uk . Each active member of the team with this concern should send a separate email. The alleged shirker will not learn the name of any person who has made the allegation.
- (ii) The economics department will make whatever investigations they feel are appropriate: this will include monitoring tutorial attendance/participation and submission of online tests. If necessary, we will request the alleged shirker to give an account of his/her contribution to the group's work.
- (iii) If the economics department feel that the alleged shirker did not make an appropriate contribution to the group's work, he or she will receive a mark of zero.

9. Broader Aims and Objectives of the Project

The team projects are intended to extend your knowledge and understanding of economics beyond the material covered in lectures and to extend your skill-base.

When taken seriously, this team project offers students the opportunity to develop a range of skills. Assembly of data on, and analysis of, macroeconomic performance in a particular country allows students to deepen their knowledge and understanding of economics and develop intellectual skills such as critical analysis and reasoning.

In addition, the team projects nurtures practical and transferable skills such as:

- Acquisition, processing and interpretation of data,
- Independent action and decision-making skills –what to include in (or omit from) the poster and why,
- written communication skills (space constraints make brevity and precision particularly valuable)
- oral communication skills (through discussion of poster contents with others in your team and with teaching staff at the presentation – this may involve coping with stress!)
- computer literacy (e.g. for acquiring and processing data).
- interpersonal and group skills (taking an active part, but not dominating, teamwork towards the project)
- managing tasks and time (planning and organising tasks for the assignment)

Finally, the poster session offers students the chance to meet members of teaching staff and other students. We hope that you find the project to be an enjoyable as well as a useful assignment!

10. The Extended Common Marking Scale

Grade	Marks	Brief Description
A1	90-100	Outstanding: Outstanding work, which demonstrates an exceptional understanding and insight. Marks in this range are rarely awarded for 'judgemental' assessment (e.g. an essay or essay-style exam answer) . They are more likely to be awarded for 'non-judgemental' assessment, e.g. (a maths problem), but still rare.
A2	80-89	Highly Excellent: Excellent: Work which demonstrates authoritative understanding. It may be exceptionally rich in independent insight, sophistication, relevant information, or understanding of the issues involved.
A3	70-80	Excellent: Work which demonstrates excellent understanding by showing evidence of independent insight, sophistication, relevant information, or understanding of the issues involved.
B	60-69	Very Good: Work showing evidence of good and broad-based engagement with and understanding of the relevant material, organised in a clear and logical form.
C	50-59	Good: Work which, though competent, is lacking in focus, organisation or breadth of understanding. Such work may appear 'routine' - merely restating lecture material or limited reading, with little evidence of independent thought.
D	40-49	Satisfactory: Work which shows some evidence of learning, but with some serious misunderstanding and/or limited ability to select material. It may be too short, or make omissions and/or include irrelevant material.
E	30-39	Falls short of the standard expected for a pass: Work which shows some limited awareness of the problem at hand, but is deficient in knowledge of relevant material, understanding of the question set, or the presentation of clear and rational arguments.
F	20-29	Clear Fail: Work showing little or no evidence of learning or understanding of the question and an inability to formulate and communicate ideas. Answers characterised by irrelevance, brevity and/or superficiality.
G	10-19	Bad Fail: Almost no material of value to the question asked. Answers almost completely irrelevant and virtually no evidence that any course material has been properly understood.
H	0-9	Very Bad Fail Marks in this range are generally given for an exam where the candidate did not attempt an answer to a question or the attempt had negligible content.