College of Commerce  
Division of Economic and Financial Studies  
Business Department

BBA315  
BUSINESS FORECASTING

UNIT OUTLINE  
First Semester, 2005

Lectures:  Monday 10-12 pm, W5AT2  
           Monday 4-6 pm, E7BT5

Unit Convenor: Con Korkofingas

Prerequisites: Entry to BBA or BCom-Mktg or BIntBus; STAT170 or STAT171;  
               any 100 level COMP or ISYS unit

Students in this unit should read the Unit Outline carefully at the  
beginning of the semester. It contains important information about  
the unit. If anything in it is unclear, please consult the Unit Convenor.
ABOUT THIS UNIT

BBA315 is a 3 credit point unit.

As much as businesses are involved in activities in the present, they are also involved in planning for the future. The planning process requires strategic input from managers, budgeting, evaluation of the business’s current position, evaluation of the environment both internal and external, and prediction of future circumstances that will impact on the business. Forecasting is an important component of the planning process. Prediction of key variables such as sales and/or market share, external variables such as input prices, interest rates, exchange rates and economic activity are incorporated with strategic input to develop forecasts for key performance indicators of the business. These forecasts are used both as a direction for the business and benchmarks against which actual performance can be compared.

This unit explores business forecasting by considering the planning process of the organisation, the environment in which business forecasts are made, prediction of key variables using qualitative and quantitative information and the practical considerations of forecast implementation. Quantitative predictions will generally make use of spreadsheets and simple statistical procedures that can be easily applied in the business environment.

TEACHING STAFF
Convenor - Con Korkofingas ckorkof@efs.mq.edu.au
Room C5C-329 Ph. 9850 8545
Consultation: Mondays 2pm to 4pm, other times by appointment

CLASSES

Lecture Time: Monday 10-12 pm, W5AT2 or Monday 4-6 pm, E7BT5

Tutorial Times: Monday 12pm C5C-211 or C5C213, Monday 1pm C5C-211, Monday 2pm C5C 211, Monday 6pm C5C 213

REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS

Prescribed Unit Materials

There is no primary text for the course. We hope to have some course notes finalised by the second or third week of the term. These will be able to be purchased from the co-op bookshop

Recommended Reading

Additional Texts
Hanke J.E., Reisch A.G. “Business Forecasting” Prentice Hall (5th edition)


Wilson J.H., Keating B “Business Forecasting” Irwin (2nd edition)

UNIT WEB PAGE:

There is a webpage associated with this unit that is under construction. It will hopefully build as the semester progresses. The website address is:

http://online.mq.edu.au/public/BBA315/

LEARNING OUTCOMES

The learning outcomes of this unit are:

- an understanding of the need for, and uses of, forecasting in a business context
- an understanding of simple quantitative forecasting techniques used in business
- application of simple forecasting techniques using EXCEL and simple statistical programs
- an understanding of qualitative forecasting techniques in a business environment.

In addition to the discipline-based learning objectives, all academic programs at Macquarie seek to develop students’ generic skills in a range of areas. Students should develop skills in the following:

- working in teams
- taking responsibility for the students own learning

TEACHING AND LEARNING STRATEGY

This unit is taught using lectures and tutorials. Students are expected to read in advance of lectures, and participate in tutorials.
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics Covered</th>
<th>Other Information</th>
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<tbody>
<tr>
<td>1</td>
<td>28 February</td>
<td>• Outline the forthcoming series of lectures and tutorials and advise the basis on which students will be judged.</td>
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<td></td>
<td></td>
<td>• The meaning of forecasting. The philosophy of forecasting.</td>
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<td>• Exploring the way it is used by business organisations today.</td>
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<td></td>
<td></td>
<td>• Organisations, planning and budgeting.</td>
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<td>2</td>
<td>7 March</td>
<td>• The forecast environment.</td>
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<td>• Evaluation of forecasting tasks.</td>
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<td>• Definition of time series.</td>
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<td>• Sources of data for prediction.</td>
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<td></td>
<td>• Errors of prediction. Costs of errors.</td>
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<td>3</td>
<td>14 March</td>
<td>• Simple predictor models-</td>
<td>Tut1-Introduction Quantitative Prediction</td>
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<td></td>
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<td>• Naïve, Moving averages, Simple Exponential Smoothing.</td>
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<td>4</td>
<td>21 March</td>
<td>• Prediction of trends, Holts smoothing model, Trend extrapolation.</td>
<td>Tut2-Elementary smoothing</td>
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<td>• Desseasonalising data</td>
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<td>5</td>
<td>28 March</td>
<td>NO LECTURE - EASTER MONDAY</td>
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<td>6</td>
<td>4 April</td>
<td>• Seasonal models. Decomposition.</td>
<td>Workbook collection ERIC by 2pm 04/04</td>
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<td>• Winters smoothing model.</td>
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<td>7</td>
<td>11 April</td>
<td>• Regression models.</td>
<td>Tut 3 – Smoothing-trends and seasonality</td>
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<td>• Functional Forms</td>
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<td>• Ways to evaluate models.</td>
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RECESS: ASSIGNMENT 1 DUE ON Monday 2nd MAY, BY 2.00PM (ERIC)
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics</th>
<th>Notes</th>
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<tbody>
<tr>
<td>8</td>
<td>2 May</td>
<td>- Regression Modelling in Practice</td>
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<td>- Ways to build models.</td>
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<td>9</td>
<td>9 May</td>
<td>- Cycles, predicting cycles.</td>
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<td>- Leading indicators-business indicators</td>
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<td>- Anticipatory surveys.</td>
<td>Mid semester test between 12 and 1 pm will cover all material weeks 1-7 inclusive</td>
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<td>10</td>
<td>16 May</td>
<td>- Judgmental methods-management, sales force forecasts.</td>
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<td>- Formal surveys and market research based assessments.</td>
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<td>- Individual subjective probability assessments.</td>
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<td>- The role of judgmental prediction in the organisation.</td>
<td>Tutorial 4 - Regression, leading indicators</td>
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<td>11</td>
<td>23 May</td>
<td>- Scenario development methods</td>
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<td>- DELPHI approaches</td>
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<td>- Cross impact matrices</td>
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<td>- Analogy methods</td>
<td>Workbook collection ERIC by 2pm 23/05</td>
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<td>12</td>
<td>30 May</td>
<td>- Using all the information to forecast.</td>
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<td>- Actions based on forecasts.</td>
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<td>- Combining Forecasts</td>
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<td>13</td>
<td>6 June</td>
<td>- Putting it all together.</td>
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<td>- Forecasting in practice.</td>
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<td>- Case studies of forecasting.</td>
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<td>- Evaluation of Forecast performance in general.</td>
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<td></td>
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<td>- The future of forecasting.</td>
<td>ASSIGNMENT 2 DUE ON Monday 6th June by 2.00PM (ERIC)</td>
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ASSESSMENT AND RELATIONSHIP BETWEEN ASSESSMENT AND LEARNING OUTCOMES

Assessment:

Raw marks in this unit will be allocated on the following basis -

- Workbook: 15%
- Mid-semester test: 15%
- Assignments (2 assignments): 20%
- Final Examination: 50%

**Workbook:** There will be exercises assigned almost every week relating to forecasting and/or the material in the course. There are certain key questions (marked in the Workbook questions) that should be submitted for assessment. Students are expected to attempt these exercises and keep a workbook of their attempts and answers. The workbook will be collected twice during the semester at times indicated on the class schedule. The workbooks should be handed in to ERIC before the time indicated. There will be no provision for late submission under any circumstances. The purpose of the workbooks is to ensure that students work steadily through the unit and allow for feedback on student progress. *(Note: you will not be judged on the quantity of computer output nor strictly on the correctness of answers. The logic and justification of your answers with evidence will be of paramount importance. Presentation of answers and output will also be regarded).* Students are advised to buy an exercise book or maintain a folder with the relevant answers and related and necessary output as questions will build output and results from earlier questions. Working together on computing and exercises can be beneficial, however students should ensure that all work reported in the workbook relating to answers and conclusions is their own. There will be heavy penalties for plagiarism (zero marks for this assessment component at a minimum).

**Mid-semester test:** There will be one mid-semester test to be held in tutorials on the Monday May 9th in your tutorial time. Students must attend the tutorial time to which they have been allocated at enrolment. Failure to do so without prior permission may result in loss of marks for the test. The test will cover all material from weeks 1-8 inclusive and will consist of multiple choice questions.

**Assignments:** There will be two assignments; the first assignment will be concerned with quantitative prediction and will be due on Monday 2nd May at 2.00pm. The second assignment will be a quantitative/essay type assignment on qualitative forecasting issues and is due on Monday June 6th at 2.00pm. Details of these assignments will be given at a later stage.

Assignments should be placed in the correct assignment box in The Economics Reference and Information Centre (ERIC). Note that it is the student's responsibility to place the assignment in the correct assignment box. Students should also note that no excuses such as computer breakdown or loss of files or floppy discs will be accepted for late assignments. Penalties for late assignments will be 20% of the potential marks for each day late.

**Final Examination:** The final examination will be held during the normal first semester examination period in June and July. Students are advised to check the relevant noticeboards at around approximately week 7 or 8 to find out the time and location of the final examination. The final examination will be a three hour examination which may consist of multiple choice, True or False
questions and/or short answer questions. **All material in the unit is examinable.** Further details about the final examination will be given later in the semester. **You must perform satisfactorily the final exam to pass the unit.**

*In the examination components of the unit, most complex formulae will be provided however students will be expected to memorise simpler formulae. Statistical tables will be provided. All examinations are closed book. Students will also be required to perform calculations requiring a calculator so they should bring one to all examinations.*

**Raw Mark and Grade Meanings**

To assist students to interpret the meaning of the raw mark on assignments the following information is provided:

**Range of Marks**

(max 20)

- **0-8** Work is below the required standard. A major effort should be made to improve the quality of the work.
- **9** A marginal effort, has important weaknesses which require further attention.
- **10-13** A sound level of work with no major shortcomings. Meets the expected level of work at this unit level.
- **14-16** Displays academic excellence in some areas, but with limitations in scope and ability to sustain a position.
- **17-20** Work is among the highest quality produced by students at the level of this unit.

**Final Grades:**

The final mark and grade awarded to students will be assessed on the following criteria:

- **HD.** Denotes performance which meets all unit objectives in such an exceptional way and with such marked excellence that it deserves the highest level of recognition.
- **D.** Denotes performance which clearly deserves a very high level of recognition as an excellent achievement in the subject.
- **CR.** Denotes performance which is substantially better than would normally be expected of competent students in the unit.
- **P.** Denotes performance which satisfies unit objectives.
- **PC.** Denotes performance which meets unit objectives only marginally, and which is therefore unlikely to be adequate preparation for further study in the area.
- **F** denotes performance which does not meet unit objectives.
The raw mark will not necessarily be exactly the same as the final mark awarded. Raw marks may be scaled according to normal statistical procedures.

***Note that the total raw mark a student has achieved will not necessarily be indicative of the grade the student obtains. At the final tabulation stage, consideration will be given to individual student performance in all aspects of assessment but especially in the examination components and the above criteria for a grade will apply. Student raw marks may then be adjusted to reflect the grade awarded***

All students are required to perform satisfactorily in the final examination to obtain a passing grade for the unit. The combined performance of the student in the examination components of the course will be a prime determinant of the student's final grade in this unit. In the case that a student has not achieved a satisfactory performance in the examination components, then the final mark awarded will be indicative of that examination performance ie marks in other assessment tasks will be weighted differently in the final mark.

FORMAL EXAMINATION PROCEDURES:

The University examination period in First Half Year 2005 is from 15 June to 29 June.

You are expected to present yourself for examination at the time and place designated in the University Examination Timetable. The timetable will be available in Draft form approximately eight weeks before the commencement of the examinations and in Final form approximately four weeks before the commencement of the examinations.

http://www.timetables.mq.edu.au/exam

The only exception to not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these circumstances you may wish to consider applying for Special Consideration. Information about unavoidable disruption and the special consideration process is available at http://www.reg.mq.edu.au/Forms/APSCon.pdf

If a Supplementary Examination is granted as a result of the Special Consideration process the examination will be scheduled after the conclusion of the official examination period.

You are advised that it is Macquarie University policy not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, that is the final day of the official examination period

PLAGIARISM

The University defines plagiarism in its rules: "Plagiarism involves using the work of another person and presenting it as one's own." Plagiarism is a serious breach of the University's rules and carries significant penalties. You must read the University's practices and procedures on plagiarism. These can be found in the Handbook of Undergraduate Studies or on the web at: http://www.student.mq.edu.au/plagiarism/
The policies and procedures explain what plagiarism is, how to avoid it, the procedures that will be taken in cases of suspected plagiarism, and the penalties if you are found guilty. Penalties may include a deduction of marks, failure in the unit, and/or referral to the University Discipline Committee.

UNIVERSITY POLICY ON GRADING

Academic Senate has a set of guidelines on the distribution of grades across the range from fail to high distinction. Your final result will include one of these grades plus a standardised numerical grade (SNG).

On occasion your raw mark for a unit (i.e., the total of your marks for each assessment item) may not be the same as the SNG which you receive. Under the Senate guidelines, results may be scaled to ensure that there is a degree of comparability across the university, so that units with the same past performances of their students should achieve similar results.

It is important that you realise that the policy does not require that a minimum number of students are to be failed in any unit. In fact it does something like the opposite, in requiring examiners to explain their actions if more than 20% of students fail in a unit.

The process of scaling does not change the order of marks among students. A student who receives a higher raw mark than another will also receive a higher final scaled mark.

For an explanation of the policy see


STUDENT SUPPORT SERVICES

Macquarie University provides a range of Academic Student Support Services. Details of these services can accessed at http://www.student.mq.edu.au.
Tutorials
BBA315 – Tutorial 1 (14<sup>th</sup> March)

Introduction to the data environment and computer applications.

The tasks that are set below should be used as examples to show you the data and computing environment. Feel free to browse and do some exploring at any stage of the process. You should however attempt to complete the sheet early in the course preferably in the tutorial. The notes will be a good companion to have with you during tutorials.

Task 1

Open up the DX Data for Windows option by using the menu hierarchy. *(Use START< Programs< Student Lab Programs< Economics)*

Check out the Databases on offer

You may have to change the directories in DX (Use the Options > Directories on the toolbar to obtain the Databases, Workfiles and Template directories. Modify the given directories and browse through the available drives to find appropriate Dxdata directories.

Open up the ABS Time Series database. Check out the range of options.

a) Go to **Business Surveys** and find a measure of company profits (original) for the following broad industries- Property and Business Services, Other Services, Retail Trade and Construction Check out the company profit options available. (any option will do) Which option did you use? What was the frequency of collection and length of available data? *(Toggle across using the arrow keys)*. View a graph of each of the industry company profits separately and comment on the type of components visible in each time series. (Use the **View** option on the Toolbar to view the Data and then a **Graph** of the data)

b) (i) Suppose we wish to obtain data for production in certain parts of the retail industry. The data that we seek is data for the dollar amount spent on grocery and supermarket purchases in monthly or quarterly periods. Find appropriate data on the database. (You will need to go to another category in the ABS Time Series)

What was the frequency of collection and length of available data?

(ii) Having found the data above for **Retail Turnover**:Food retailing: Supermarkets & groceries use the **View** option on the Toolbar to view the Data and then a **Graph** of the data. Comment on the nature of the graph.

(iii) Suppose we do not wish to utilise the entire time series but some relevant section of the time series. Dx allows the user to alter the timeframe to be used in the active window. Use **Options** on the Toolbar to alter the timeframe to:

- (1) the last 60 observations
- (2) Data from Jan-90 to Dec-98
(c) Return to the window marked “ABS Time Series Statistics” ensuring that you have the variable Retail Tunover:Food retailing:Supermarkets& groceries highlighted

Use the Series option on the Toolbar to create three new series which represent;

(1) The natural logarithms of the retail variable

(2) The % change in the retail variable (period on period)!!! (What is the difference between period on period and year on year change?)

(3) Yearly aggregated retail sales

(Dx will create a workfile for manipulations of data series. Be careful that you create the correct variables. Search the Series menu for the correct transformations. Before you do the second transformation make sure the highlight is on the original time series)

(i) View the data for all the above series together. (Highlight all variables in your workfile together and then View)

(ii) Copy the data to the clipboard. (Make sure that you have the Data in the active window otherwise you will copy only the time series headings). Open up EXCEL by using the Microsoft Office menu options. Paste the data into EXCEL.

(iii) Use EXCEL to make separate time series plots of the original retail sales variable, the logarithm of the retail sales variable, the % change of the retail sales variable and the yearly aggregated retail variable. (Use the chart wizard in EXCEL and the line chart option. You can also use the scatter plot option if the dates are included in the data region). Ensure that the charts you create allow the user to identify the main characteristics of the data.

(iv) Comment on the characteristics of each of the time series. Compare the aggregated retail sales variable with the disaggregated variable. What differences do you see? Why would one aggregate data?

Task 2

(a) Open up MINITAB. (MINITAB is found on the Student Programs>Statistics menu)

(b) Using the Copy/Paste option in EXCEL paste the above variables with headings into the data window of MINITAB. (Be careful here to paste only the data and headings to the Data window in MINITAB. Make sure the data window is the active window before you paste)

(c) Use the Statistics>Time Series> menu to create a time series plot of the logarithm of retail sales and the percentage change in retail sales. Explore the options for modifying the time series plots.
BBA315 –Tutorial 2 (21st March)
The notes will be a good companion to have with you during all tutorials

Task 1

(a) Open up the data Aus:Total Establishments: Employment in the category T of the ABS Time Series Statistics in Dx

(b) Comment on the nature of the data. What is the frequency of collection, the units of measurement and the length of the series?

(c) (i) Open up EXCEL. Create a naive forecast of the above series using EXCEL. (This period’s forecast is last period’s actual data. Refer to your notes). Calculate the errors of your forecast method for every forecast made. (Use the spreadsheet to do this). What are your one period and two period ahead forecasts?

(ii) Use the errors to calculate the MAE (Mean Absolute Error), MSE (Mean Square Error), RMSE and MAPE (Mean Absolute % Error) for the naive forecast.

(iii) Create a three period moving average forecast for the % change in retail variable. Calculate the MAE and MAPE for this forecast method. Compare the results of the naive method with the three period moving average. Which forecast method seems preferable? What are your one period and two period ahead forecasts?

(d) For the employment series create a simple exponential smoothing (SES) forecast for the entire series with alpha values of 0.2 and 0.7. Determine the errors of forecast with each method by calculating the MAE, MSE and MAPE. What are your one period and two period ahead forecasts?

(e) Compare the performance of the SES models with the above smoothing models. Which forecast method is preferable?

(f) Use the SOLVER sub routine in EXCEL to determine the optimal value of alpha if minimisation of MSE is required.

Task 2

(a) Open up MINITAB. (MINITAB is found on the Student Programs<Statistics menu)

(b) Paste the original data series from EXCEL with heading into MINITAB.

(c) Use the Stat > Time Series options to create a three period moving average for the employment variable. Generate forecasts for the next three periods. (Use the forecast option in the dialog box.) What do you observe about the forecasts?

(d) Discard the % change in Retail data. Open up the worksheet TRACK15.MTW on the MTBWIN\DATA directory. (you will need to search for this on the EFS02 directory. Open the file as a WORKSHEET not a PROJECT). Plot the data. Comment on the nature of the data. Use the Stat > Time Series option to estimate a simple exponential smoothing model for the data. (Use α =0.5) Generate a forecast for the next period.
BBA315- Tutorial 3 (11th April)

Smoothing and Decomposition

Task 1
From the Dx Econ Data retrieve the variable Lending and Credit Aggregates:credit:Housing in the database RBA Bulletin.

(a) Plot the data. Comment on the nature of the data. What factors influence the nature of the data?

(b) Copy data for the last 60 observations into EXCEL. (including the dates)

(c) Use the spreadsheet to create a HOLT smoothing model by reproducing the formulae below in the adjacent columns to the data. (You will need to think carefully about what you are doing!!)

\[ L_t = \alpha X_t + (1-\alpha) (L_{t-1} + T_{t-1}) \]
\[ T_t = \beta (L_t - L_{t-1}) + (1-\beta) (T_{t-1}) \]
\[ H_{t+1} = L_t + T_t \]

For the initial run of the model choose \( \alpha = .1, \beta = .3 \) (Set up the model with alpha and beta in two dedicated cells in the spreadsheet)

(It would be worthwhile to read your notes pages on the Holt model)

(d) From the third equation you should be able to generate in sample forecasts. Generate in adjacent columns the errors of forecast and calculate the MAD, MSE and MAPE using the spreadsheet.

(e) Alter the values of \( \alpha, \beta \) and see what effect it has on the model and the error criteria.

(f) Use the Solver tool on EXCEL to find the "optimum" values of \( \alpha, \) and \( \beta \)

Task 2
Retrieve the data Domestic Sales of Australian wine and Table wine:Original:Wine Red and rose wine:Total from the DX data. (You will find it in the ABS Time Series Database in the category Business Surveys)

(a) Comment on the nature of the data plot. What factors influence the nature of the data?

(b) Copy the data into MINITAB (you will find it easier when copying data into MINITAB to eliminate the identifier information in DX when copying to the clipboard.)

(c) Using MINITAB generate a Winters' model for the data. Generate forecasts for the next 12 months. (Use the default values of \( \alpha, \gamma, \delta \) \( \delta = \gamma, \gamma = \beta \) in the notes)

(d) Try a few alternate combinations of \( \alpha, \gamma, \delta \) and see what effect it has on the error criteria.

(e) Use the decomposition routine in MINITAB to generate forecasts for the next 12 months. Compare
the performance of the Decomposition model with that of the preferred Winters’ model.

Task 3

Retrieve the data Original:Production:Beer (including ale and stout) from the Dx Econ Data. (You will find it in the ABS Time Series database in Manufacturing)

Refer to your notes on Decomposition for this task.

(a) Copy the data for the last 24 observations and dates into EXCEL. (Don’t copy the identifier information)

(b) We will create a decomposition model on the spreadsheet. In the next column to the data create a 4 period moving average for the data. Place the first moving average value next to the second period and the final value next to the third last period.

(c) In the next column create a centred moving average by using a two period moving average of the moving average data. Place the first observation of the centred moving average at the third period and the final value at the third last period. Plot the centred moving average. What components of the data are evident?

(d) Use the original data and the centred moving average to create the seasonal relatives (=Original/Centred M.A.)

(e) From the seasonal relatives create 4 seasonal indexes by averaging the seasonal relatives for each relevant quarter.

(f) Apply the Seasonal Indexes created above to all of the data. (You might need to use the Paste Special (Values) function when copying)

(g) Create the deseasonalised data by dividing the original data by the seasonal indexes. Plot the original data and the deseasonalised data on the same plot.

(h) Copy the deseasonalised data into the next column by using the Paste Special (values) option.

(i) Highlight the data and use the drop and drag facility to create linear trend projections for the next 4 quarters.

(j) Using the seasonal indexes and the linear trend projections create forecasts for the next 4 quarters.
Workbook
Exercises
BBA315- WORKBOOK

PURPOSE: The purpose of the workbook is to provide additional questions to help your learning in BBA315-Business Forecasting. These questions are designed to be less of a regurgitation of lecture material but more in-depth into the topics and concepts. The workbook for the most part will take a problem solving approach to learning with students given minimal guidance. Some parts of the workbook are designed to give you additional practice on generation of forecast spreadsheets and forecasts using real world data. The main idea is to enhance your learning of the concepts in the unit. Students who will obtain the most benefit from the workbook will be those who consider the workbook exercises as opportunities to reinforce lecture and reference material concepts and explore further issues rather than a collection of questions resembling assignments.

ASSESSMENT: Selected questions from your workbook will be marked as assignment questions. These questions must be handed in at the appropriate times as indicated in the class schedule in the main handout.

Workbook collection 1 due 4th April (2 pm in ERIC)
Workbook collection 2 due 23rd May (2 pm in ERIC)

The questions for assessment are clearly marked.

There will be no provision for late submission under any circumstances. Students should also note that no excuses such as computer breakdown or loss of files or floppy discs will be accepted for late assignments.

Assessment of workbooks will be on a number of criteria including whether a reasonable attempt has been made at answering the workbooks questions, presentation of results and conclusions and quality of answers. *(Note: you will not be judged on the quantity of computer output nor strictly on the correctness of answers. The logic and justification of your answers with evidence will be of paramount importance).*

Students are advised to keep a copy of relevant answers and related and necessary output as questions will build output and results from earlier questions.

Working together on computing and exercises can be beneficial, however students should ensure that all work reported in the workbook relating to answers and conclusions is their own. There will be heavy penalties for plagiarism (zero marks for this assessment component at a minimum).
1. INTRODUCTION TO FORECASTING

1. Think of 2 things that you need to forecast in each of these horizons;
   a. Immediate-short-term
   b. Medium Term
   c. Longer Term

   (i) In answering the exercise above, how did you define each of the periods? Would the definition you used be the same for all businesses? Why or Why not?
   (ii) For each of the forecasts needed to be made above (6 of them) characterise each one by describing the importance of the forecast to you, the factors that are likely to influence the forecasts and the availability of data for forecasting.

2. Think of a company like VirginBlue (Australian domestic airline). What main forecasts will it need to make in the short-term, medium term and longer term. How would you imagine it would make forecasts in each of these situations. Describe the type of forecasting likely for each situation.

Collection 1 Question A

3. Forecast how long it will take you to get to university next Monday or to your place of work next time you work. Think through the process of how you arrived at the forecast. What factors were important in determining the forecast? What level of uncertainty do you have about the forecast?

4.

   (i) Forecast your mark in this unit (call this FF1). On what factors did you base your forecast? What is the level of uncertainty with your forecast?

   (ii) Forecast the mark of the person sitting next to you in your next lecture. Are there any differences in the information you have to make forecasts? How did the process of making forecasts alter, if at all, from part (i)?

2. FORECASTING ENVIRONMENT, ERROR EVALUATION

1. Consider Macquarie University and the task of forecasting student numbers in 2005.

   (i) For what purpose would Macquarie need the forecasts? How important would the forecasts be for the organisation?

   (ii) What internal and external data will be used to forecast student numbers?
(iii) Consider Macquarie wanted to make forecasts of student numbers for the 5 years after 2005 (ie. 2006-2010). What would be the strategic implications? What external factors may impact on the forecasts?

2. Consider the following situations;

   (i) You getting money from an ATM
   (ii) A business launching a new product

   In each of these situations forecasts are needed in the decision process. What forecasts? What are the implications of cost of errors involved in forecasting in each situation. Do the guidelines of properties of error cost functions likely to hold in these situations?

3. Search through journals and relevant literature and find information on errors of forecasting and methods of evaluating errors of forecasting. Provide 2 alternative measures for evaluating forecast errors other than those given in lectures or in the business forecasting text. What are the advantages of these error evaluation methods and in what circumstances do they apply?

4. Other than strict evaluation of error functions, what makes a forecast a “good” forecast? What criteria can be applied? (A relevant literature search would be of benefit)

Collection 1 question B
5. Find data on the on the following;

   (i) The SUS/$AU exchange rate on a daily basis since 01/01/04
   (ii) Daily Dow-Jones stock market index value since 01/01/04
   (iii) A rural commodity price index (monthly $A from July 2000)
   (iv) Quarterly data on the value of total residential building in NSW from 1990.
   (v) Monthly data on the number of passenger motor vehicle sales for NSW (1994 onwards)
   (vi) Number of tourist arrivals (monthly) into Australia in the last 10 years.

For each data set found provide a graphical representation that highlights the main characteristics. What are the main characteristics of the data sets? What factors are likely to have caused the characteristics?

3. SIMPLE SMOOTHING MODELS

1. Consider the data sets in q5 of the last section. For data set (iii) and (v) perform a naïve forecast on the available data (separately). Forecast the following 4 periods (from the end of the data) with the naïve forecast. Evaluate errors of forecast with the naïve model in both cases and provide some statistical measures of overall forecast accuracy. Provide some graphical evaluation of errors. If there is a noticeable difference in the forecast accuracy between the two data sets, explain why it has occurred.

2. Use data set (i) in q5 of the last section. For this data design a spreadsheet showing a 3, 5, and 7 period moving average forecast for the entire data. Forecast the next 5 days exchange rate with each method. Select one of the methods to provide the forecasts for the next 5 days. Which method was selected and why?
Collection 1 question C

5. Use data set (ii) in q5 of the last section. Provide SES forecasting spreadsheets for the entire data using alpha =0.3 and alpha =0.8 separately. Forecast for the next 5 periods from the end of the data. Evaluate the forecasting performance of both SES forecast methods. Which method is preferred? Exclude the first 15 periods of forecast errors and re-evaluate the forecast error performance. Why would a forecaster exclude observations when determining forecast accuracy in this case?

4. For q3 above, determine using SOLVER the optimum value of alpha for this data. Does the optimum value of alpha vary depending on what criterion was used? Provide some evidence.

5. For data set (i) in q5 of the last section, use an ARRSES model with beta=0.3 and forecast for the entire data set and the next 5 days. Evaluate forecast performance. Use SOLVER to determine the “optimum” value of beta. Compare the performance of the ARRSES model for this data with the MA methods in q2. Explain any differences. From the 4 methods (3, 5, 7 MA and ARSSES) which would be your preferred method for forecasting the next 5 days?

4. TRENDS AND DESEASONALISING

1. Refer back to the data of q5 of the forecasting environment and error evaluation section. For data set (v), provide a trend forecast using HOLT’s method. Optimise the values of alpha and beta and determine forecast performance of the “optimised” model. For the optimised model forecast for the next 12 months from the end of the data.

Collection 1 question D

2. Use a trend extrapolation method to make predictions for the next 12 months using the same data as in q1. Determine a linear trend equation for the data. Determine the forecast accuracy of applying a linear trend extrapolation to the data. Compare the accuracy of the “optimised” Holt’s and the linear trend extrapolation. What may explain the difference in performance of the two models?

3. For data set (iv) of section 2 q5, investigate seasonality in the model. Provide evidence, graphical and statistical that shows the presence of seasonality or not. Based on what you have found suggest what type of models may be appropriate to forecast the data.

4. Investigate the various methods of deseasonalising data. How does the ABS (Australian Bureau of Statistics) deseasonalise data? What differences are there from the deseasonalising mentioned in the text?

5. For data set (v) deseasonalise the data. Compare the deseasonalised data with the original data. What is revealed if anything? Compare your deseasonalised data with the seasonally adjusted data for data (v) provided by the source agency where data (v) was obtained. Are there differences?
* Collection 2 questions will come from the following sections*

5. SEASONALITY

**Collection 2 question A**

1. For data (vi) in section 2, q5, provide a spreadsheet with a Winter’s model. Optimise the values of alpha, beta and gamma. Forecast for the next 12 months. For this model provide some out of sample forecasts. Evaluate the out of sample forecast performance of the model.

**Collection 2 question B**

2. For the data in q1, provide a spreadsheet showing a multiplicative decomposition forecast. Forecast for the next 12 months. For this model, calculate a cycle and random component. Of what use would the cycle component be to your forecasting? Of what use the random component? For the decomposition determine using the spreadsheet the in-sample errors of forecasting. Evaluate the out of sample forecast performance of the model.

3. Considering the answers to q1 and q2 which of the above methods do you prefer to forecast the arrivals data? Why would the performance of the models differ if at all?

4. Suppose tourist arrivals fluctuated in concert with economic activity in the US. Search and find some “expert” predictions of the economic activity in the US and incorporate those predictions into your preferred forecast method above.

5. Investigate the additive model of decomposition. How does it differ from the multiplicative model? Find data on production of cheese in Australia (tonnes). Provide an additive model spreadsheet to forecast for the next 4 quarters.

6. REGRESSION

1. Refer to data (v) in section 2 q5. Do some preliminary investigation of the factors that are likely to influence the data by searching the literature and relevant websites. Given that certain factors may influence the motor vehicle sales find the relevant data if possible. Is the data you found compatible with the original time series? If the frequency needs to be changed, how could this be done? What are the issues involved in aggregation or disaggregation?

2. For the above data, what functional form would you suggest would be appropriate? Why did you suggest this type of functional form? Why would a logarithmic functional form be useful, if at all, in general regression modelling?

3. Search for information on dynamic models. What are the various functional form options? What are the strengths and weaknesses of each?
Collection 2 question C
4. Suppose my organisation is a motor vehicle insurer and as you would expect one of the factors that affects the demand for motor vehicle insurance is the sales of motor vehicles. My organisation would like to implement a forecasting model to predict sales of motor vehicle insurance. Your organisation, statistical consultants specialising in regression models, has been asked to provide advice. Outline briefly, in this context, the value of a regression modelling approach versus the value of other approaches.

5. What are the assumptions that underly the typical regression model? What are the consequences of violation of these assumptions? Are these assumptions likely to be violated in a real world business context? Give an example.

7. REGRESSION IN PRACTICE

Collection 2 question D
Suppose you are asked to make regression based forecasts for the total passenger numbers on Qantas on the route from Australia to London in 2005. Outline carefully how you would undertake this task. Provide some preliminary research about the route and likely possible variables. Discuss the likely effects of the causal variables and the considerations in establishing the likely functional form of the regression model. Outline any statistical considerations and testing that would need to be undertaken. Explain how forecasts would be generated. Include some discussion about how possible future scenarios could be incorporated into the forecasts.

8. LEADING INDICATORS, CYCLES

1. For the Australian economy find series for the following three leading indicators (for the last 15 years if applicable)
   (a) WESTPAC/MI
   (b) NAB Business Expectations
   (c) ANZ job vacancy series

   (i) Explain briefly why each of the indicators in theory may provide early warning of changes in levels of economic activity.
   (ii) Graph each series and comment on its characteristics
   (iii) Compare each of the leading indicators with broad economic activity. Do the indicators provide information about likely economic activity? Does each of the indicators perform reasonably well?

2. Find a Coincident Index for Australia. Graph the time series with a series representing GDP for a common period (last 15 years if applicable). Comment on the value of the Coincident Index as a proxy for GDP.

Collection 2 question E
3. Apart from the broad context of economic activity and indexes that represent economy wide economic variables, explain what series a business is likely to use as a leading indicator of its sales and demand. Give examples.