

# Economics 201: Economic Data Analysis

Wake Forest University, Department of Economics

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## 1 About this course

The purpose of this course is to provide students with basic skills relating to the finding, downloading, displaying, graphing and analysis of economic data.

We will be concerned with two aspects of the use of data in economics: data exploration and (in a beginning way) the testing of theories against data. By data exploration we mean the probing of the known facts concerning some domain (for example, the working of the health insurance market or the level of consumer spending in the economy as a whole), in search of interesting relationships and problems. This is generally the first stage in the construction of economic theories.

The testing of theory against data can be done in various ways, from casual investigation of simple data all the way up to sophisticated econometric analysis (econometrics is the formal application of statistical method in economics). To carry out such testing we must be able to collect from scratch, or find from publicly available sources, numbers that measure the variables suggested as important by the theory. Such data are more often the result of observation rather than experiment, given the limits of experimentation in economics (although experimental economics is a growing field). Furthermore, most economists are not themselves producers of data; statistics are difficult and expensive to collect and maintain.

Hopefully, this course will help you to become more comfortable and familiar with both data sources and the techniques for using data. This should make it easier for you to read the economics literature, and add sophistication to papers you will write for other classes in the major. We also hope that the basic statistics requirement for the major, Math 109, will gain greater relevance and context via this course.

For students who wish to pursue data analysis and the testing of theories in greater depth the department offers Economics 215, Introduction to Econometrics.

## 2 Grading

An essential element of your learning in this course is your faithful and timely attendance to all classes and assignments. We will be exploring software, data sets and various forms of data manipulation and display in class. If you miss class this material cannot be repeated and no easy substitutes will be found. Likewise the assignments are designed to give you a cumulatively increasing insight into economic data, thus missing assignments is a serious hindrance to your learning. Since we will be going over assignments on the day they are due, it will not be possible to turn things in late (except in medical emergencies).

In addition to two substantial data projects (each counting for 40 percent of the grade) there will be short quizzes at the start of some class periods, based on previously assigned reading, plus some smaller data-based assignments. Collectively, these count for 10 percent of the grade; the remaining 10 percent will be based on your preparation for, and participation in, class discussion.

Data project 1	40%
Data project 2	40%
Quizzes and short assignments	10%
Participation	10%

## 3 The Data Projects

The two data projects will focus on economic applications of publicly available data and will give you a chance to practice software skills, the analysis and display of data, and the presentation of results in a final report. Both assignments are detailed and the guidelines should be followed precisely. Your final reports will

include tables, graphs and answers to specific questions about the area under study. You should strive to make this final hard-copy as clear, neat and presentable as possible. All work should be done alone for maximum learning potential. The first project will deal with cross-sectional data on the health systems of the OECD countries and the second concerns macro data from the U.S. on consumption and national income.

## 4 Required Text, Website and Readings

The required book for the course is: Edward R. Tufte, *The Visual Display of Quantitative Information*, second edition, 2001, Cheshire, Connecticut: Graphics Press.

Other readings and assignments are reference below, and can be found on the class website

<http://ricardo.ecn.wfu.edu/ecn201/>

either on the main page or in the “Other Documents” folder. You should print the articles out and bring them to class on the dates indicated.

## 5 Office Hours

Carswell 106 (758-5762): Thursday 9–12 and 2–4.

You are free to drop by any other times, but might call ahead first.

## 6 Course units

### 1. Introduction, Housekeeping

In-class reading and quiz: What are Data?<sup>1</sup>

### 2. Introduction to the Philosophy of Science and the Theory of Data Analysis

**Topics:** The nature of empirical science, the problem of induction, deductive testing of theories, demarcation of science, “verifiability” and “falsifiability” of theories, scientific objectivity.

Reading: Karl Popper, *The Logic of Scientific Discovery*, Chapter 1, “A Survey of Some Fundamental Problems.”<sup>2</sup> Come to class having read the Popper chapter, the prepared focus questions,<sup>3</sup> and the short supplementary essay, *Popper for the Beginning Economics Student*.<sup>4</sup> be ready to discuss them. For background, to better understand the references in Popper to David Hume on induction, you should also read a short (2-page) excerpt from Hume.<sup>5</sup>

Reading: Tufte, *The Visual Display of Quantitative Information*, Part I, Introduction, Chapters 1, 2 and 3, pages 1–87. (Note: there are a lot of pictures!) Plus the relevant section of the Reader’s guide.<sup>6</sup> Bring Tufte to class, have the assignment read and be prepared to discuss it and the focus questions.

### 3. Exploring Cross Sectional Data: The Comparative Health and Health Spending of Nations

**Topics:** Assembling cross sectional data series, the OECD Health Database, means, bar graphs, line graphs, scatter plots, regression lines, interpretation of data, the relationships of health spending to GDP and of health spending and health workforce to health status.

Exploring The OECD Health Database. Reading: the health-spending unit description.<sup>7</sup>

<sup>1</sup>[http://ricardo.ecn.wfu.edu/ecn201/docs/what\\_are\\_data.pdf](http://ricardo.ecn.wfu.edu/ecn201/docs/what_are_data.pdf)

<sup>2</sup><http://www.wfu.edu/academics/economics/documents/popper.pdf>

<sup>3</sup>[http://ricardo.ecn.wfu.edu/ecn201/docs/popper\\_guide.pdf](http://ricardo.ecn.wfu.edu/ecn201/docs/popper_guide.pdf)

<sup>4</sup>[http://ricardo.ecn.wfu.edu/ecn201/docs/Popper\\_for\\_the\\_econ\\_student.pdf](http://ricardo.ecn.wfu.edu/ecn201/docs/Popper_for_the_econ_student.pdf)

<sup>5</sup><http://ricardo.ecn.wfu.edu/ecn201/docs/hume.pdf>

<sup>6</sup>[http://ricardo.ecn.wfu.edu/ecn201/docs/tufte\\_guide.pdf](http://ricardo.ecn.wfu.edu/ecn201/docs/tufte_guide.pdf)

<sup>7</sup>[http://ricardo.ecn.wfu.edu/ecn201/docs/health\\_spending\\_unit.doc](http://ricardo.ecn.wfu.edu/ecn201/docs/health_spending_unit.doc)

A broader analysis of health-care spending in the OECD Countries. Reading: Gerard F. Anderson, Uwe E. Reinhardt, Peter S. Hussey, and Varduhi Petrosyan, "It's The Prices, Stupid: Why The United States Is So Different From Other Countries," *Health Affairs* May/June, 2003.<sup>8</sup> Print the article and bring your copy to class so we can look at the data tables together.

**"Intermission": Library Resources and Databases**

**Sep 17** Data Project 1 DUE. Turn in assignment and discuss in class.

**4. Variance in Data: How to Measure It, Use It, and Display It**

**Topics:** Hypothesis testing, variance, the area under the standard normal curve, differences in means, t-statistics and the use of MS Excel.

Reading and Assignment: Distribution of Cholesterol Levels in Women and Men (a handout will be given to you).

Print out the document, "Analysis of Variance Homework,"<sup>9</sup> The material needed to complete this homework includes the reading assignment on cholesterol (above), the class discussion of it, MS Excel, and the document *Some Basic Statistical Formulas*,<sup>10</sup> containing all the necessary formulas. This homework assignment will probably be due on September 24.

**5. More on data graphics**

Reading: Tufte, *The Visual Display of Quantitative Data*, part II, "Theory of Data Graphics, pages 91–177. **Note:** There is also a homework assignment on the last page of your reader's guide to Tufte, concerning bringing to class one example each of graphs that are "good" and "bad" according to Tufte's standards.

Come to class with the Tufte text, having read the assignment and focus questions, and be prepared to discuss them.

**6. Exploring Times Series Data and Testing Economic Theory: The Consumption Function**

**Topics:** The nature of time series data, macro relationships, the theory of the consumption function, the data of the national accounts, real versus nominal values, percentage change, regression. The software packages utilized will be GRET and Excel. We will be starting with a reading from Keynes's *General Theory*, the origin of the idea of the consumption function. As listed below, we have posted a reader's guide to this text.

In order to explore Keynes's ideas from a data standpoint we will be utilizing data from the Federal Reserve Bank of St. Louis database and the GRET econometrics software. The assignment titled "Macroeconomic Time Series: The Consumption Function"<sup>11</sup> will be our initial foray into this area. Print it out and bring it to class, where it will form the basis of our class discussions.

Finally, we have created a data project, "Consumption Function Assignment."<sup>12</sup> In completing it, you will utilize your knowledge of GRET and Excel, as well as of the theoretical interpretation of the consumption function. In presenting your analysis, you should also use the insights into the visual display of data that you learned from Tufte.

Readings: John Maynard Keynes, *The General Theory of Employment, Interest and Money*, excerpts from chapters 4 and 8,<sup>13</sup> and the *Reader's Guide to Keynes*.<sup>14</sup> Print out these readings, read them and come to class prepared to discuss them.

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<sup>8</sup>[http://www.wfu.edu/academics/economics/documents/health\\_affairs\\_article.pdf](http://www.wfu.edu/academics/economics/documents/health_affairs_article.pdf)

<sup>9</sup>[http://ricardo.ecn.wfu.edu/ecn201/docs/variance\\_homework.pdf](http://ricardo.ecn.wfu.edu/ecn201/docs/variance_homework.pdf)

<sup>10</sup>[http://ricardo.ecn.wfu.edu/ecn201/docs/basic\\_stats.pdf](http://ricardo.ecn.wfu.edu/ecn201/docs/basic_stats.pdf)

<sup>11</sup>[http://ricardo.ecn.wfu.edu/ecn201/docs/macro\\_unit.pdf](http://ricardo.ecn.wfu.edu/ecn201/docs/macro_unit.pdf)

<sup>12</sup>[http://ricardo.ecn.wfu.edu/ecn201/docs/macro\\_assignment.pdf](http://ricardo.ecn.wfu.edu/ecn201/docs/macro_assignment.pdf)

<sup>13</sup>[http://ricardo.ecn.wfu.edu/ecn201/docs/keynes\\_gt.pdf](http://ricardo.ecn.wfu.edu/ecn201/docs/keynes_gt.pdf)

<sup>14</sup>[http://ricardo.ecn.wfu.edu/ecn201/docs/keynes\\_guide.pdf](http://ricardo.ecn.wfu.edu/ecn201/docs/keynes_guide.pdf)

Assignment: “Macroeconomic Time Series: The Consumption Function.” Print out this document, read it and bring it to class the rest of the semester. You might get started on it early in order to ask questions in class before it is due.

7. **Final Assignment Due Monday, Oct 15.** (Oct 17: Discussion session on the consumption function exercise)