



COLLEGE OF MANAGEMENT AND ECONOMICS
Department of Economics and Finance

ECON*2100
ECONOMIC GROWTH AND ENVIRONMENTAL QUALITY
FALL 2013

ASSIGNMENT 1

DUE: SEPTEMBER 30, 2013

Part I (36 marks)

The object of the first part of this exercise is to see how the quality of the environment changes (or doesn't change) as the economy grows and contracts. You will look at changes over time as well as comparisons across countries at specific points in time.

On the Course link page you can download a file called EPEQ2013.zipx. (EPEQ stands for Economic Performance and Environmental Quality, which is the name of an old data base I constructed many years ago). This should extract itself when you double click on it and create a folder called EPEQ2013, which contains a set of Microsoft Excel spreadsheets.

Some of the graphs you will construct are Index Graphs. This is a technique which allows visual comparisons of variables which are measured in very different units. For instance: suppose we have a measure of the concentration of goopium in Lake Blue from 1985 to 1995, measured in parts per million, and a measure of Real GDP (Gross Domestic Product), measured in \$billions, in the country in which Lake Blue sits:

| Year | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---------|------|------|------|------|------|------|------|------|------|------|------|
| Goopium | 1.1 | 1.2 | 1.1 | 1.3 | 1.4 | 1.1 | 0.9 | 0.9 | 0.8 | 0.6 | 0.6 |
| GDP | 478 | 488 | 495 | 484 | 485 | 503 | 511 | 523 | 534 | 544 | 556 |

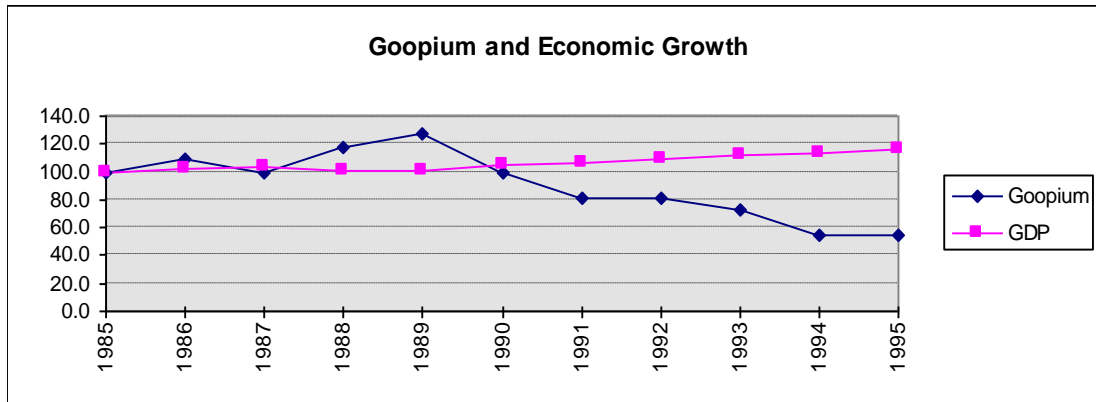
We could not put these two series on the same graph, since they are not in the same units. But we can transform them into indexes which allows for easy comparison. For each series, multiply each number by 100 and divide by the first entry in the series. So the Goopium series will become:

$$(1.1 \times 100)/1.1 = \mathbf{100.0}; (1.2 \times 100)/1.1 = \mathbf{109.1}; (1.1 \times 100)/1.1 = \mathbf{100.0}; \text{ etc.}$$

The transformed series are then:

| Year | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Goopium | 100.0 | 109.1 | 100.0 | 118.2 | 127.3 | 100.0 | 81.8 | 81.8 | 72.7 | 54.5 | 54.5 |
| GDP | 100.0 | 102.1 | 103.6 | 101.3 | 101.5 | 105.2 | 106.9 | 109.4 | 111.7 | 113.8 | 116.3 |

We can then graph these numbers on the same chart:



Looking at the above graph we see that there does not seem to be an obvious relationship between Goopium concentrations and economic activity. Over the 1985-1989 period, output is stalled and even dips slightly, while Goopium levels trend upwards. Then from 1989-1995, output begins to grow steadily, while Goopium levels drop rapidly. We might suspect that in 1989 there was some major policy initiative, or possibly a change in industrial technology which made some applications of Goopium obsolete.

Now it is your turn to construct some graphs. All the data you need are in the EPEQ2013 spreadsheets. In some of them the data are already indexed for you – look at the tab names on the bottom.

| Number | Filename* | Graph |
|--------|-----------|-------|
|--------|-----------|-------|

** Note all files start with EPEQ and end with .xlsx, so only the in-between part is given here.*

| | | |
|----|--------------|--|
| A1 | CanadaTrends | For the 1985-2011 interval construct an index graph (1985=100.0) showing total industrial emissions of Total Particulate Matter (TPM), SOx, NOx, VOC, CO and Ammonia (NH3) |
| A2 | CanadaTrends | For the 1985-2011 interval construct a graph showing the fraction of TPM coming from industry |
| A3 | CanadaTrends | For the year 2011, make a bar graph showing the distribution of non-natural PM2.5 emissions by source, for the following categories: Total Industrial Sources, Total Non-Industrial Sources, Total Mobile Sources, Total Incineration, Total Open Sources. |
| B1 | Europe | Make an index graph showing the total emissions of SOx, NOx, Ammonia, VOCs, PM10 and Real Income (GDP per capita) from 2002 to 2011 in the European Union. |
| B2 | Europe | Compute the % change in emissions of PM10 between 2002 and 2011 for all individual countries in the European Union. Also |

| | | |
|----|-------------|---|
| | | compute the % change in Real Income between 2002 and 2011 for all individual countries in the European Union. Construct a scatter plot with the % change in PM10 emissions on the vertical axis and the % change in real income on the horizontal axis. |
| B3 | WorldCities | Make a scatter plot of Total Suspended Particulates against Real GDP per capita for the listed cities around the world. |
| B4 | WorldCities | Do the same as B3 but for Nitrogen dioxide. |
| C1 | China2011 | Construct a scatter plot showing proportion of bad air quality days (days equal to or above Grade II) versus per capita income (measured in US \$) across cities of China. |
| D1 | Amazon | Graph the Mean Rate of Gross Amazon Deforestation in square km from 1989 to 2011. |
| E1 | USAir | Draw an index graph showing total US emissions of CO, NO _x , VOC, SO ₂ and PM ₁₀ , as well as Real GDP, from 1947 to 1998. |
| E2 | USvmt | Draw an index graph showing US energy consumption, Vehicle Miles Traveled (VMT), CO emissions and PM ₁₀ emissions from 1970 to 2011. |
| F1 | Price | Draw an index graph showing real prices** of Copper, Nickel, Silver, Zinc, Aluminum, Tungsten and Magnesium from 1970 to 2011. |

** real prices are constructed by dividing the nominal price by the Consumer Price index to remove the effect of inflation.

Note: each graph is worth 3 marks. 1 mark is for the quality of presentation (colour scheme, clarity, etc.) 1 mark is for correct use of data, and 1 mark is for the labeling.

Part II [14 marks]

Write a brief note (2-3 pages) answering the following three questions:

- (a) [4] Do any of the graphs surprise you? Explain why or why not.
- (b) [5] Are there any clear trends over time for high-income countries (Canada, US, Europe)?
- (c) [5] Are there any clear differences between rich and poor countries?