

ECON 222 Winter 2009: Assignment 1

Due: January 23, 2009, Noon.

- * SHOW ALL YOUR STEPS FOR FULL MARKS. Be precise yet concise in your answers.
- * NO LATE SUBMISSIONS WILL BE ACCEPTED.
- * NO GROUP SUBMISSIONS WILL BE ACCEPTED.

Question 1 – Empirical Application (35 marks)

This question will require you to use CANSIM II to retrieve data from Statistics Canada. For instructions on how to access CANSIM II, please refer to the course website or ask the instructor.

Part I – GDP, Net Exports, and the \$US-\$CAN Exchange Rate

- a) [10 MARKS] Retrieve the following series (quarterly data) for the period 1986Q1 to 2000Q4: exports (v498728), imports (v498745), and nominal GDP (v498918). Put them in a spreadsheet, and derive a series for net exports. Then, compute the ratio of net exports to nominal GDP. Plot it against time in a line diagram. Print the figure. What trend(s) do you observe? Are there any significant historical events in the period considered that could underlie such trends?
- b) [10 MARKS] Retrieve the exchange rate (\$US/\$CAN: v37426, monthly data) for 2002M1 to 2007M12. Compute quarterly averages (i.e., for each three-month period) to obtain a quarterly series of the exchange rate. Plot net exports (vertical axis) against the *inverse of the exchange rate* series (horizontal axis, \$CAN/\$US) in a scatter plot for data ranging from 2002Q1 to 2007Q4. Print the figure. What happened as the Canadian dollar appreciated vis-à-vis the US dollar during this period (a move to the right along the horizontal axis)? Explain the two possible mechanisms that could generally lead to this outcome.

Part II – Is the Price Level a Counter-cyclical Variable?

There is strong empirical evidence that the price level is a *counter-cyclical* variable: it increases when output falls, and vice-versa. The goal of this section is to establish whether prices are counter-cyclical in two Canadian provinces for 1981 to 2007. Using CANSIM II (series numbers in brackets), find series the total gross domestic product (GDP) by province, nominal (current prices) and real (base year 2002), calculated using the expenditure approach. Use data for two provinces: Quebec (nominal: v687511 ; real: v41975207), and Ontario (v687545; v41975249).

- c) [5 MARKS] Find the implicit GDP deflator series by taking the ratio of nominal GDP to real GDP. Keep the GDP deflator series and the real GDP series (you should have 4 series). Print the output.
- d) [5 MARKS] Compute the year-to-year growth rate series of real GDP and of the GDP deflator for each province. Note that you will lose one data point in each series. For each province, plot *one* line diagram with the two growth rate series against time. Print the figures. What can you conclude in terms of co-movement from these graphs?
- e) [5 MARKS] For each province, draw a scatter plot (one series on each axis, with the growth in real output on the horizontal axis) for the two growth rates. What can you conclude in terms of co-movement from these graphs? Does the data on hand allow you to conclude that the price level is a counter-cyclical variable, and if so, for which province(s)?

Question 2 – National Accounts (25 marks)

Consider the following two-industry, closed economy.

The wheat industry (W) produces wheat with the help of 70 workers, each paid \$10,000 a year. Each worker's total yearly output is 150 tonnes of wheat, priced at \$600 per tonne. Five sixths ($5/6$) of the wheat industry's production is bought by the bread industry (B), at the market price, to be used as an input in bread production. The remaining sixth ($1/6$) is used as an input for next year's production, and is thus stored as an inventory.

The bread industry hires 30 workers, each of them also paid \$10,000 a year. They each produce 90 tonnes of bread per year, priced at \$2,500 a tonne before taxes. A sales tax of 10% is collected by the government on sales of bread, but not on sales of wheat. Due to depreciation, some bread machines had to be replaced during the year at the cost of \$150,000. All the output of the bread industry was sold to the households and to the government, so no inventories were kept.

Moreover, 25% of the industries' profits are returned to households as dividends. There is no tax on retained earnings by the industries, but a flat income tax of 20% of total household earnings is collected by the government. Finally, the government purchased 1,200 tonnes of bread for its lavish dinners.

- a) [10 MARKS] Compute the Gross Domestic Product (GDP) of the economy using (i) the product/value added approach, (ii) the income approach, and (iii) the expenditure approach. Show all steps.
- b) [5 MARKS] What is the Net National Income? What is the Net Domestic Product?
- c) [5 MARKS] What is the government's total income? What is the government's surplus/deficit?
- d) [5 MARKS] What is the private disposable income? What are the national savings?

Question 3 – Real GDP Growth and Inflation (15 marks)

An economy consists of three goods: bread, cheese and wine. In 2007, the economy produced 1,200 loaves of bread, 5,000 kilos of cheese, and 600 litres of wine. The unit prices (per loaf, kilo or litre) in 2007 were \$2, \$12 and \$25, respectively. During 2008, a severe drought caused agricultural production to sharply decline. Demand remained the same due to subsistence concerns. As a result of these conditions, in 2008,

the economy produced 800 loaves of bread, 4,000 kilos of cheese and 400 litres of wine, which sold at \$3, \$18 and \$27 per unit, respectively.

- a) [5 MARKS] Fill in the table below based on the information above.
- b) [5 MARKS] What is the rate of inflation between 2007 and 2008 using 2007 as a base year? What is the growth rate of real GDP between 2007 and 2008, using 2007 dollars?
- c) [5 MARKS] What is the rate of inflation between 2007 and 2008 using 2008 as a base year? What is the growth rate of real GDP between 2007 and 2008, using 2008 dollars?

Year	2007	2008
Nominal GDP		
Real GDP (2007 dollars)		
Real GDP (2008 dollars)		
GDP deflator (2007 dollars)		
GDP deflator (2008 dollars)		

Question 4 – Aggregate Labour Market and Production (25 Marks)

Suppose we have an economy with only one aggregate production function, given by:

$$Y = AK^\alpha N^\beta$$

where A is TFP, K represents capital and N represents labour. Set $\alpha = 1/4$, $\beta = 3/4$, $A = 4$, and $K = 81$. Labour supply is given by

$$N^S = w^2$$

where w denotes the real wage rate.

- a) [5 MARKS] Holding capital and TFP constant at the values above, use a spreadsheet to graph the relationship between GDP (Y) and labour (N). Use values of N within the interval $[0, 25]$, and increments of 1. Print the figure. What phenomenon do you observe? Does it depend on the different values of α or β ?
- b) [10 MARKS] Find an equation for labour demand, and find the equilibrium wage rate and employment level in this economy.
- c) [10 MARKS] Now, suppose that a minimum wage is imposed, such that $w_{min} = 4.5$. What is the new equilibrium level of employment? What is the rate of unemployment? What happens to the aggregate income of workers in the economy as a result of the policy?