

**Assignment 1****Economics 222, Winter 2006****Due: Drop Box 3<sup>rd</sup> floor Dunning Hall by noon January 27, 2006****Maximum Group Size: 4 people****1. Working With Data (30 marks)**

This question requires you to retrieve and manipulate data. To get the data go to the 'data sources' link on the 222 course webpage. Then go to 'CANSIM', then 'CANSIM II @ CHASS'. If you try this from off-campus use the Queen's library webpage and read 'help with off-campus access' if you haven't already set up a 'web-proxy'.

Retrieve the following 3 series: Canadian Real GDP (v3860085); Canadian Nominal GDP (v646937); U.S. Real GDP (v21581591). We only need 3 observations for each series: the values for 1980, 1990, and 2000. Because the U.S. series is at quarterly frequency, take the first observation (*i.e.* 1980Q1) for 1980, and similarly for 1990 and 2000.

Once you have the data, a spreadsheet program such as Microsoft Excel will work well for these purposes.

(a) Display the arranged data in a table.

(b) Compute the growth rates for each series for the 1980s (*i.e.* the change in the level of the series from 1980-1990) and 1990s. Did Canada or the U.S. have a faster real growth rate in each decade?

(c) Why was the difference between the growth rates of Canadian nominal GDP and Canadian real GDP much larger in the 1980s than the 1990s?

(d) The formula for the compound growth of a series is:

$$x_{t+n} = x_t(1 + g)^n \quad (1)$$

where:  $x$  is the value of the series; the subscripts indicate the year,  $g$ =the growth rate and  $n$ = the number of years. Using this formula, compute the average annual growth rate of Canadian real GDP over the 1980s.

(e) Graph Canadian nominal and real GDP against time (with the axes labeled and units indicated). Where do the two series appear to cross? Why?

(f) If, for some reason, you lost the labels for the nominal and real GDP series (or forgot which CANSIM “v series numbers” denoted which series), how could you distinguish the two series over a period of sustained deflation (falling nominal prices)?

2. **True/False/Uncertain** (15 marks)

Briefly explain/defend your answer in each of the following:

(a) The belief that equilibrium in the economy is restored relatively rapidly through adjustments in wages and prices is what characterizes the Keynesian (as opposed to the classical) approach in macroeconomics. As such, Keynesians’ believe there is a role for government policy in the economy.

(b) The three approaches to measuring GDP - income, expenditure, and product - should yield the same answer.

(c) If the number of unemployed people increases, then it follows that the unemployment rate will also rise.

3. **Real Interest Rates and the Risk of Deflation** (25 marks)

(a) If the nominal interest rate is 5% and people expect an inflation rate of 2%, what is the expected real interest rate?

(b) After the fact, it turns out that inflation was only 1%. What was the real interest rate?

(c) Based on your answers to (a) and (b), does lower-than-expected inflation benefit borrowers or lenders?

(d) A few years ago in the U.S., nominal interest rates were set to very low levels to spur the economy and combat low and falling inflation. In describing his fears of *deflation* (a falling price level), Ben Bernanke, the new Federal Reserve Chairman, remarked, “with nominal interest rates stuck at zero and deflation intensifying, the real interest rate becomes higher”. Prove or disprove this claim with your own numerical example.

4. **Assessing Canada's Immigration Strategies** (30 marks)

Suppose the production function for Canada's auto industry is:

$$Y = A(10N - N^2)$$

( $Y$  = industry output,  $A$  = total factor productivity and  $N$  = labour.)

(a) Using calculus derive an expression for aggregate labour demand.

(b) Aggregate labour supply responds to the real wage,  $w$ , in the following manner:

$$N^S = 1 + \frac{w}{10}$$

For  $A = 2.5$ , find the real wage,  $w^*$ , and level of employment,  $N^*$ , that clear the labour market.

(c) The government decides to increase immigration. If they maintain their current general screening mechanism, aggregate labour supply will increase to:

$$N^{S'} = 2 + \frac{w}{10}$$

What would be the new equilibrium values for employment and the real wage (for  $A = 2.5$ )? Based on his/her individual wage, would an auto worker originally employed be better or worse off under this new policy? Based on the wage bill (the total amount paid to all workers), would the auto *employers* be better or worse off?

(d) The government proposes a new screening process that will bring in the same amount of workers (given by the  $N^{S'}$  equation above), but instead specifically targets allowing only the best and brightest auto workers from other countries into Canada. If this program is successful, the resulting higher productivity would dramatically increase  $A$  to 10.

Once again find the new market-clearing wage and employment. Based on the same criteria, would the original workers and the employers change their opinion relative to the non-targeted immigration policy of part (c)?

(e) If you have not already done so, illustrate the alternative policies graphically (be sure to label the axes).

**Answers:**

**(1a)**

Year	CAN Nominal GDP	CAN Real GDP	U.S. Real GDP
1980	314,390	579,907	5,221
1990	679,921	765,311	7,112
2000	1,076,577	1,020,488	9,696

Note: Canadian data in \$Millions CAD; US data in \$Bill USD.

**(1b)**

	Decade	CAN Nominal GDP	CAN Real GDP	U.S. Real GDP
Growth	1980s	116.3%	32.0%	36.2%
	1990s	58.3%	33.3%	36.3%

So the American economy grew faster in both decades.

**(1c)** Inflation was much higher in the 1980s. (See Figure 2.2 in the text).

**(1d)** Canadian real GDP grew by 2.8% a year, on average, during the 1980s. We obtain this answer by solving equation (1) for the average annual growth rate:

$$g = \left(\frac{x_{t+n}}{x_t}\right)^{\frac{1}{n}} - 1 = \left(\frac{Y_{1990}}{Y_{1980}}\right)^{\frac{1}{10}} - 1 = .02813.$$

**(1e)** Nominal and Real GDP are always equal in the base year (in other words the GDP deflator is one by definition in the base year). In our data the base year is 1997 and so this is where the two series cross. Even if this wasn't clear from your graph, this info was contained in the CANSIM data labels.

**(1e)** In the usual case with inflation, nominal GDP is higher than real GDP after the base year (the GDP deflator is  $> 1$ ). Therefore, in the case of deflation the opposite would be true. So, the real series would be higher than the nominal, after the base year with a GDP deflator of less than 1.

**(2a)** False. Keynesians are more likely to favor government intervention (so the last bit is true). However, they believe this precisely because the slow adjustment of prices allows the economy to remain out-of-equilibrium for prolonged periods of time.

this is the basis of the classical approach. See the text Section 1.3 for a discussion.

**(2b)** True. Conceptually they all measure the same thing, but from different perspectives. The amount buyers spend equals the income sellers receives. Furthermore, this is, by definition, the market value of production (assuming sellers ‘buy’ their unsold inventories). See Section 2.1 in the text.

**(2c)** Uncertain / False. Consider the following counter-example:

The unemployment rate in some unfortunate economy is  $50\% = \frac{50}{100}$ . There are two individuals who are not working during the survey period, *and importantly* are not actively seeking employment. They are classified as not in the labour force ( $N$ ). If both people look for a job next period, the labour force ( $LF$ ) increases by two people. Other things equal, if only one is successful in her job hunt, there is one more employed person ( $E$ ) and one more unemployed person ( $U$ ). In this example, the unemployment rate in this second period is unchanged, despite the rise in the number of unemployed:  $= \frac{U}{LF} = \frac{51}{102} = 50\%$ .

**(3a)** Following equation (2.13)  $r^e = i - \pi^e = 5\% - 2\% = 3\%$ .

**(3b)** Following equation (2.12)  $r = i - \pi = 5\% - 1\% = 4\%$ .

**(3c)** The real interest rate was higher (4%) than the expected real interest rate (3%). This situation benefits lenders because they received a higher return than they expected; conversely, borrowers have to pay back more in real terms on their loan than they expected. So with lower-than-expected inflation, lenders win and borrowers lose.

**(3d)** As you might expect, the Fed Chairman is indeed correct. With deflation of, say, 2%, or equivalently  $\pi = -2\%$ , when  $i = 0\%$ , then  $r = 0\% - (-2\%) = 2\%$ . When deflation “intensifies”, to say, 4%, then the real interest rate rises to 4%.

*Additional information:* One problem with deflation is that a vicious cycle can emerge. Because prices have been falling, people expect prices to fall. Therefore, they wait to spend their money because they figure things will be cheaper in the future. This lack of demand may cause retailers to cut their prices, and so the falling prices that consumers expected are realized and so they may delay their purchases even further, etc... At the same time it is difficult for (conventional) monetary

policy to lower nominal interest rates to spur demand once nominal interest rates hit zero (their logical lower bound). And finally, as we demonstrated above, the real burden for debtors to repay their loans increases so people's finances and debt burdens can also spiral out of control.

**(4a)**  $w = \frac{\partial Y}{\partial N} = 10A - 2AN^D$ . Or equivalently:  $N^D = 5 - \frac{w}{2A}$ .

**(4b)** In equilibrium  $N^D = N^S = N^*$ . From part (a) we have  $w = \frac{\partial Y}{\partial N} = 10A - 2AN^D$ . When  $A = 2.5$ , then the demand for labour is:  $w = 25 - 5N^D$ . The two linear equations solve for our two unknowns, to give:  $N^* = 2.33, w^* = 13.33$ .

**(4c)** The increase in labour supply causes equilibrium employment to increase to  $N^{*'} = 3$  but drives down the real wage to  $w^{*'} = 10$ . The original workers are clearly worse off because their wage fell from \$13.33 to \$10. Employers, however, are better off because they now pay less to their workers (from \$31.11 to \$30).

**(4d)** In this case the productivity increase more than offsets the downward wage pressure from the increase in workers. The real wage rises to \$20, and there are now  $N = 4$ . So workers prefer the immigration policy in (d), while employers would rather (c) because the wage bill is higher now at \$80.