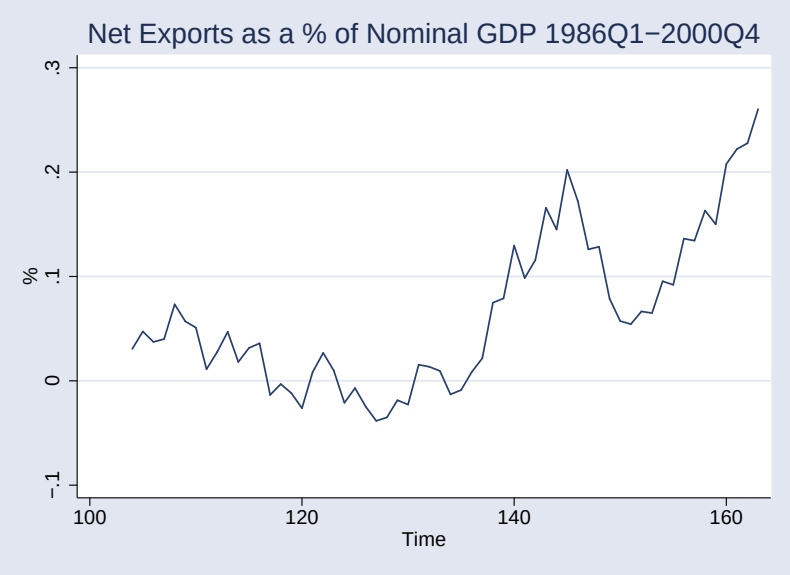
ECON 222: Solutions to Assignment 1

January 23, 2009

Question 1

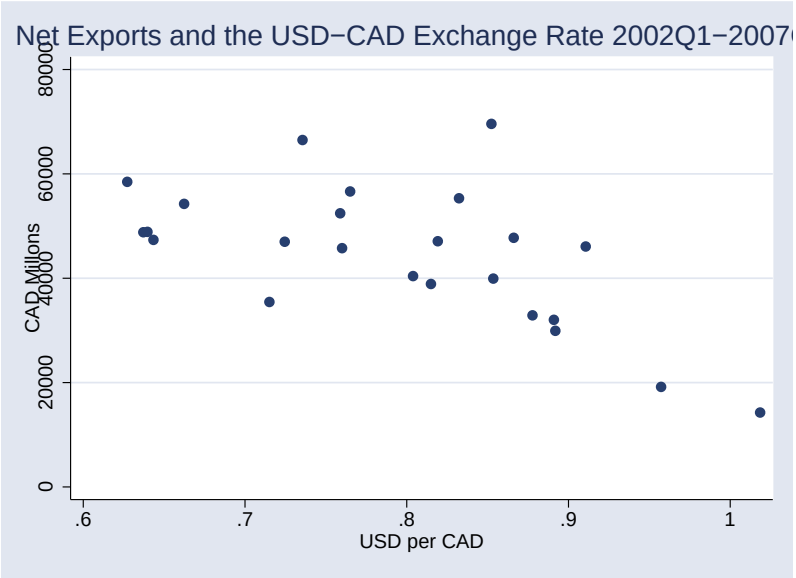
Part I

a)



Generally, the ratio of net exports to GDP has followed an upward trend in the period considered, with a few fluctuations. Some important dates:
1988Q4 (t=115): Canada-US FTA, no clear effect initially. Could either be lagged or mitigated due to the early 1990s recession.
1994Q1 (t=136): NAFTA – upward trend follows, with a trough around t=150 (1997Q2). Upward trend continues further in time.

b)



Negative relationship between the $CAN/$US exchange rate and the net exports: as the Canadian dollar appreciated in the period vis-à-vis the US dollar, net exports fell. Generally speaking, the two mechanisms that could be at work are either (i) a decrease in exports since they cost more to foreigners (notably US firms and customers); or (ii) an increase in imports due to the appreciation of the Canadian dollar, since imported goods and services (notably from the US) cost less to Canadians; or (iii) both at once. It would appear here that exports were still growing while imports grew at faster rate, thus reducing net exports as the Canadian dollar appreciated over time.

Part II

c)

	A	B	C	D	E
1	year	qcrealgdp	onrealgdp	qcgdpdef	ongdpdef
2	1981	149202	246327	.5394968	.5320732
3	1982	144144	239684	.5912005	.5788497
4	1983	147172	251233	.6239774	.6156914
5	1984	154205	272340	.650381	.6346552
6	1985	158830	285809	.676138	.6617181
7	1986	164198	296197	.7135044	.7037883
8	1987	171261	310074	.7499548	.7442675
9	1988	179027	326863	.7867249	.7845519
10	1989	180749	337869	.8211995	.8251452
11	1990	181628	333471	.844198	.8481517
12	1991	177549	320992	.873877	.8819348
13	1992	178948	323898	.884961	.8845161
14	1993	181965	327507	.8915396	.895874
15	1994	189390	347251	.9001426	.8958822
16	1995	192782	360017	.9198525	.9147263
17	1996	195716	363967	.9223875	.9291309
18	1997	202062	381846	.9325058	.941094
19	1998	208763	400374	.9400995	.94386
20	1999	222090	430921	.9492053	.9491763
21	2000	231860	457538	.9701027	.9633276
22	2001	235111	463840	.9851687	.9781412
23	2002	241447	477763	1.000004	1
24	2003	244316	484748	1.026343	1.01719
25	2004	250578	496358	1.049134	1.041168
26	2005	255171	509633	1.068585	1.053519
27	2006	259269	519792	1.090917	1.073091
28	2007	264116	530157	1.128887	1.097824

d)

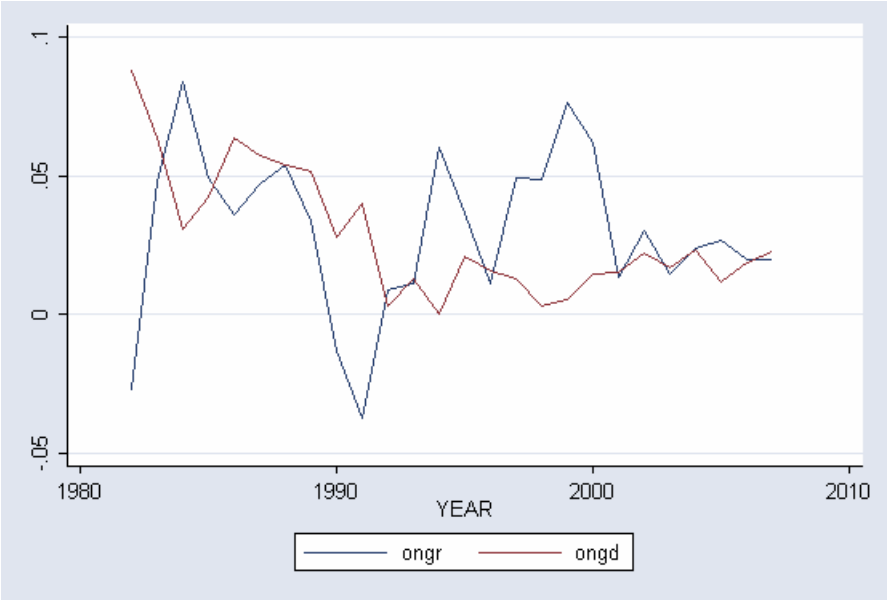


Figure 1: Ontario

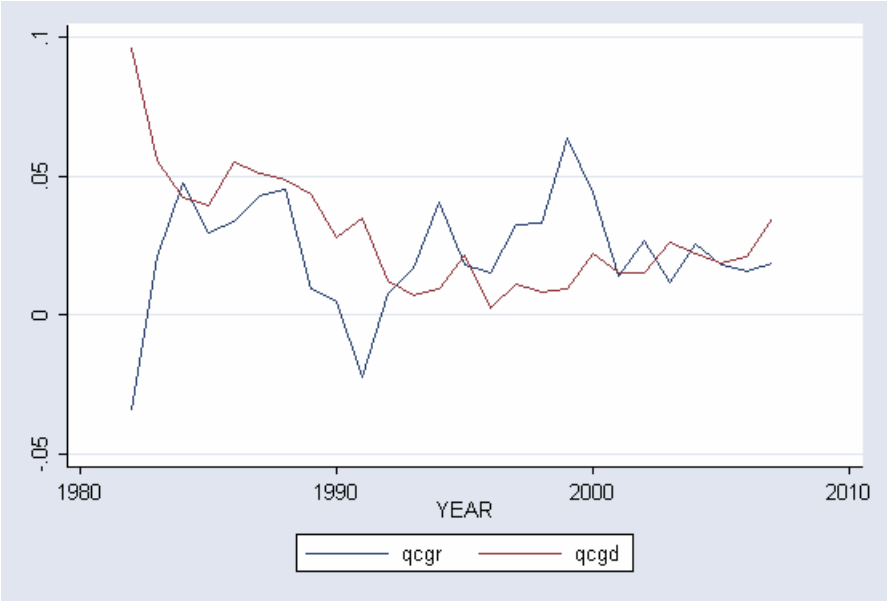


Figure 2: Quebec

e)

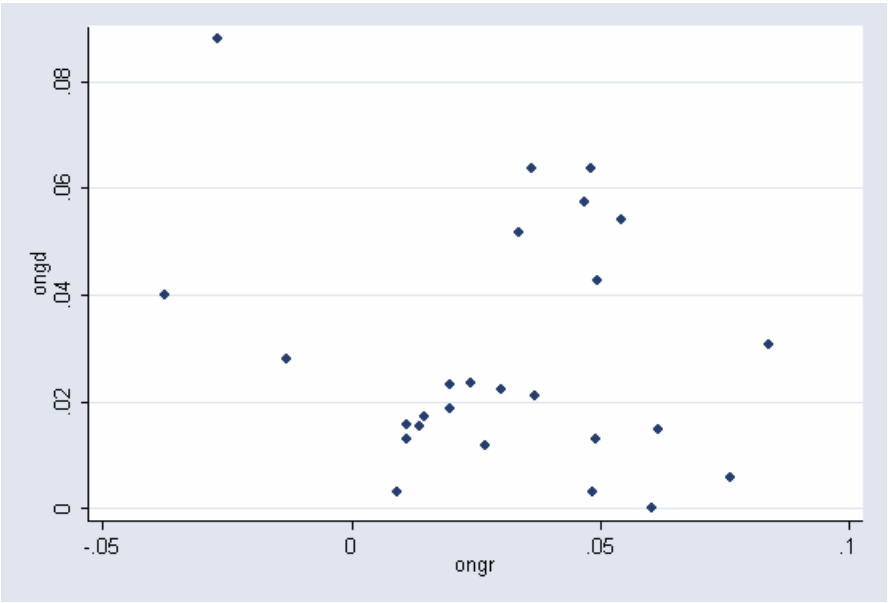


Figure 3: Ontario

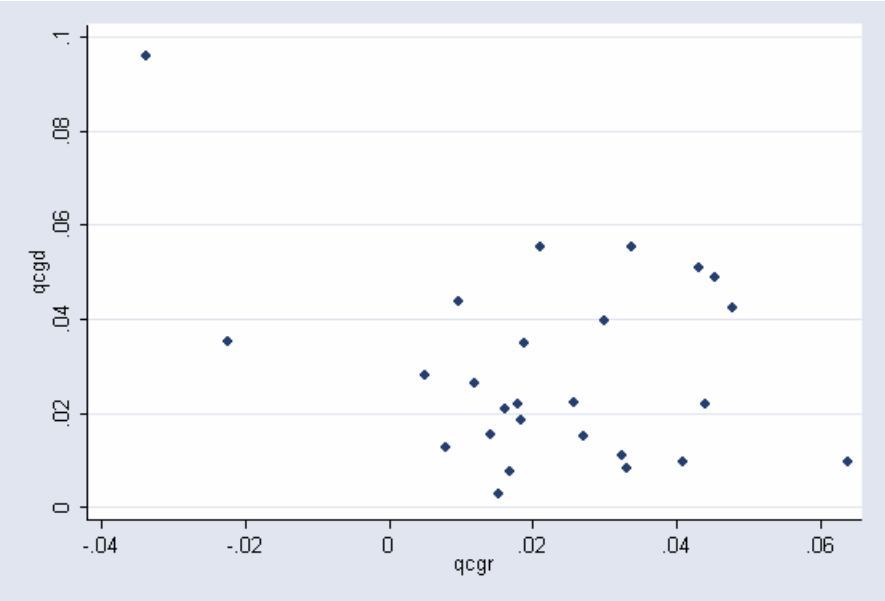


Figure 4: Quebec

Graphically, we thus notice counter-cyclical behaviour of the price level (GDP deflator) for all provinces.

Question 2

Part I

a) National Accounts:

Wheat	Sales to the Bread Industry	5 250 000
	Inventory Investment	1 050 000
	Wages	700 000
	Profits (Sales to B + Inventories - Wages)	5 600 000
	Retained Earnings	4 200 000
Bread	Gross Sales (including Sales Tax)	7 425 000
	Intermediate Goods (-)	5 250 000
	Wages (-)	300 000
	Indirect Taxes (-)	675 000
	Depreciation (-)	150 000
	After-tax profits	1 050 000
	Retained earnings	787 500

GDP:
(i) Product approach: Total value added in the wheat industry + total value added in the bread industry = 5 250 000 + 1 050 000 + 7 425 000 - 5 250 000 = 8 475 000.
(ii) Income approach: Wages + After-tax profits + Indirect taxes + Depreciation = 1 000 000 + (5 600 000 + 1 050 000) + 675 000 + 150 000 = 8 475 000.
(iii) Expenditure approach: Total amount spent on final goods + Inventory Investment = 7 425 000 +1 050 000 = 8 475 000.

b) Net National Income = Wages + After-tax profits = 1 000 000 + (5 600 000 + 1 050 000) = 7 650 000
Net Domestic Product = GDP - Depreciation = 8 325 000.

c) Government's total income = Indirect taxes + Direct taxes = 675 000 + 0.20*(Total Household Income) = 675 000 + 0.20*(Wages + Dividends) = 675 000 + .20*(1 000 000 + 1 400 000 + 262 500) = 1 207 500.
Government's total expenditure on goods and services = 1 200*2 500*1.1 = 3 300 000.
Government's deficit = 1 207 500 - 3 300 000 = - 2 092 500.

d) Private disposable income = Y - T = GDP - direct taxes - indirect taxes = 8 475 000 - 532 500 - 675 000 = 7 267 500.
National savings = Y - C - G = 8 475 000 - 4 125 000 - 3 300 000 = 1 050 000.

Question 3

a)

Year	2007	2008
Nominal GDP	77,400	85,200
Real GDP (2007 dollars)	77,400	59,600
Real GDP (2008 dollars)	109,800	85,200
GDP deflator (2007 dollars)	1	1.43
GDP deflator (2008 dollars)	0.705	1

b) Inflation: 43%; Real growth: -23%
c) Inflation: 42%; Real growth: -22%

Question 4

a) The process at work is that the production technology exhibits diminishing returns to labour. To the contrary of *returns to scale*, this phenomenon does not depend on the sum

of exponents, and therefore not on the value of α. It depends however on β: if $\beta < 1$, the production technology satisfies the law of diminishing returns with respect to labour, while returns are constant if $\beta = 1$, an increasing if $\beta > 1$.

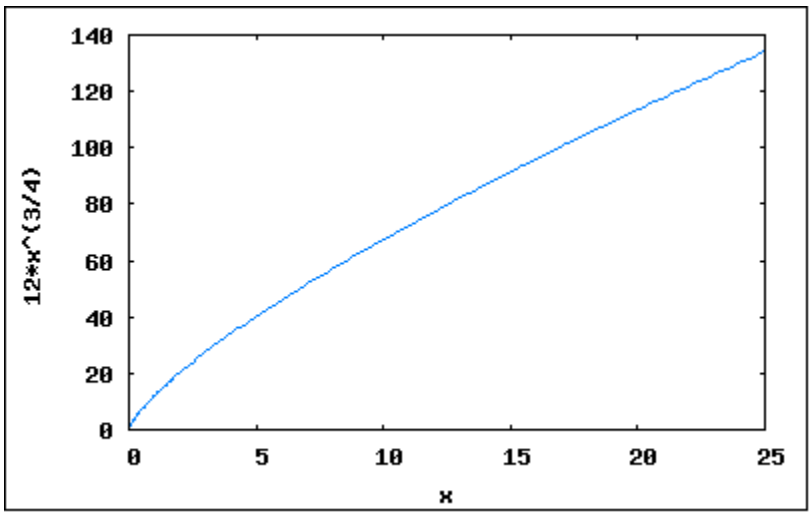


Figure 5: Production function exhibiting diminishing returns to labour

b) Labour demand:

$$w \equiv MPN = \beta A K^{\alpha} N^{\beta-1} = 9N^{-\frac{1}{4}}$$

Explicitly:

$$N^D = \left(\frac{9}{w}\right)^4$$

Equilibrium wage rate:

$$\begin{aligned} N^D = N^S &\iff 9(w^2)^{-\frac{1}{4}} = w \\ &\iff w^* = 3^{\frac{4}{3}} \approx 4.33 \end{aligned}$$

Employment level:

$$N^* = (w^*)^2 \approx 18.72$$

c) Employment level: determined by the *demand side*.

$$N^{**} = \left(\frac{9}{4.5}\right)^4 = 16$$

Labour supply (labour force):

$$N^S = 20.25$$

Unemployment:

$$N^S - N^{**} = 4.25$$

Unemployment rate:

$$u = \frac{20.25 - 16}{20.25} \cdot 100 \approx 21\%$$

Aggregate labour income before the minimum wage:

$$N^* \cdot w^* = (w^*)^3 = (3^{\frac{4}{3}})^3 = 81$$

Aggregate labour income after the minimum wage:

$$N^{**} \cdot 4.5 = 72$$

Thus, while those working earn more after the minimum wage comes into effect, the aggregate labour income falls due to a greater fall in employment levels than the rise in individual wages.