Economics 302
Prof. Kelly

Problem Set 1

Answer Key

Exercise 1

a Total income is just the wage in Home times the number of workers:

$$I_H = w * L$$

b The percent of income spent on Home-produced goods is just the sum of the percentages from p_1 to p_k :

$$\begin{aligned} h(k) &= p_1 + p_2 + ... + p_k \\ &= \sum_{i=1}^{k} p_i \end{aligned}$$

c In Foreign, they spend $h(k)$ of their total income, w^*L^*, on Home goods:

$$E_{H,F} = h(k)w^*L^*$$

d In Home, they spend $1 - h(k)$ of their total income, wL, on Foreign goods:

$$E_{F,H} = (1 - h(k))wL$$

e The total expenditure on Home goods is :

$$\begin{aligned} E_H &= E_{H,F} + E_{H,H} \\ &= h(k)w^*L^* + h(k)wL \\ &= h(k)\left[w^*L^* + wL\right] \end{aligned}$$

f Equating expressions, we have:

$$\begin{aligned} w * L &= h(k)\left[w^*L^* + wL\right] \\ w * L(1 - h(k)) &= h(k)w^*L^* \\ \frac{w}{w^*} &= \left(\frac{h(k)}{1 - h(k)}\right)\frac{L^*}{L} \end{aligned}$$

g For imports to equal exports, we need:

$$\begin{aligned} h(k)w^*L^* &= (1 - h(k))wL \\ \frac{w}{w^*} &= \left(\frac{h(k)}{1 - h(k)}\right)\frac{L^*}{L} \end{aligned}$$

h The expressions are the same.

i We can rewrite (g) as:

$$\frac{w_C}{w_{US}} = \frac{GDP_C}{GDP_{US}} = \left(\frac{h(k)}{1-h(k)}\right)\frac{L_{US}}{L_C}$$

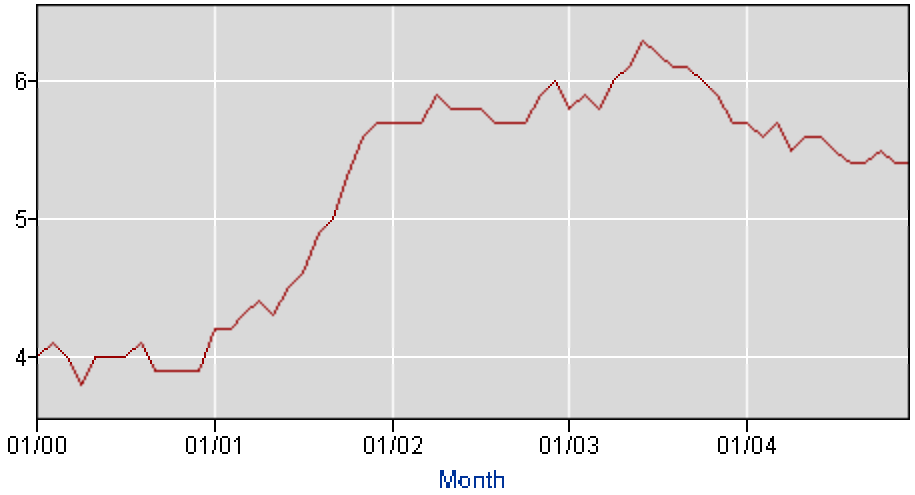
where GDP is GDP per capita. To solve for $h(k)$:

$$\begin{aligned} h(k)L_{US}GDP_{US} &= GDP_C\left[1-h(k)\right]L_C \\ h(k)L_{US}GDP_{US} + h(k)L_CGDP_C &= GDP_CL_C \\ h(k) &= \frac{GDP_CL_C}{L_{US}GDP_{US} + L_CGDP_C} \\ &= \frac{29,000(16.5)}{35,000(146) + 29,000(16.5)} \\ &= 7.9\% \end{aligned}$$

The model predicts that Canada spends only 8% of its income on home goods and 92% on US goods. In reality, US imports account for 22% of Canada's GDP. The model also predicts (you can check this, it's not hard) that the US spends 8% of its income on Canadian goods. In the data, the US spends about 3% of GDP on Canadian imports. Clearly, this model fails to explain US, Canadian trade patterns. Why?

Excerise 2

US Unemployment Rate 2000-2004 (Seasonally Adjusted)

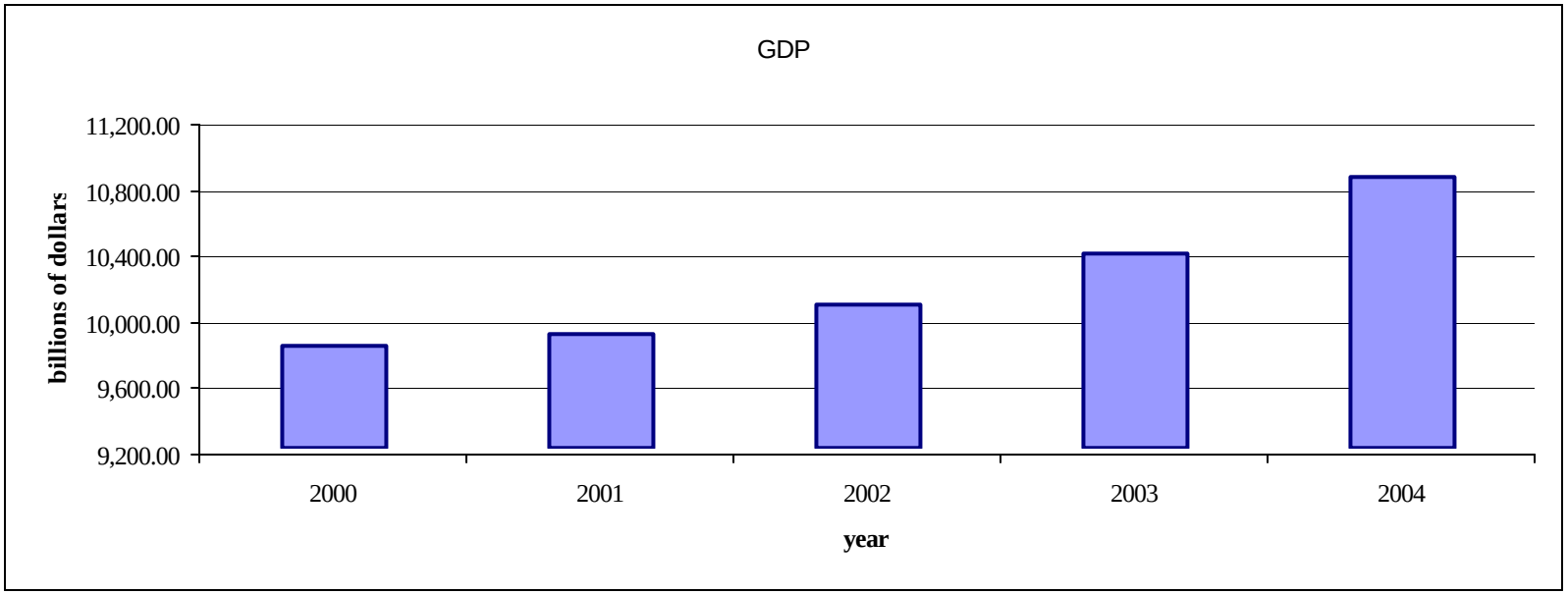


Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average Annual
2000	4	4.1	4	3.8	4	4	4	4.1	3.9	3.9	3.9	3.9	4.0
2001	4.2	4.2	4.3	4.4	4.3	4.5	4.6	4.9	5	5.3	5.6	5.7	4.8
2002	5.7	5.7	5.7	5.9	5.8	5.8	5.8	5.7	5.7	5.7	5.9	6	5.8
2003	5.8	5.9	5.8	6	6.1	6.3	6.2	6.1	6.1	6	5.9	5.7	6.0
2004	5.7	5.6	5.7	5.5	5.6	5.6	5.5	5.4	5.4	5.5	5.4	5.4	5.5

Data Source: US Department of Labor, Bureau of Labor Statistics. Access Jan 2005 http://www.bls.gov/cps/home.htm

Chain-weighted Real GDP (billions of dollars)

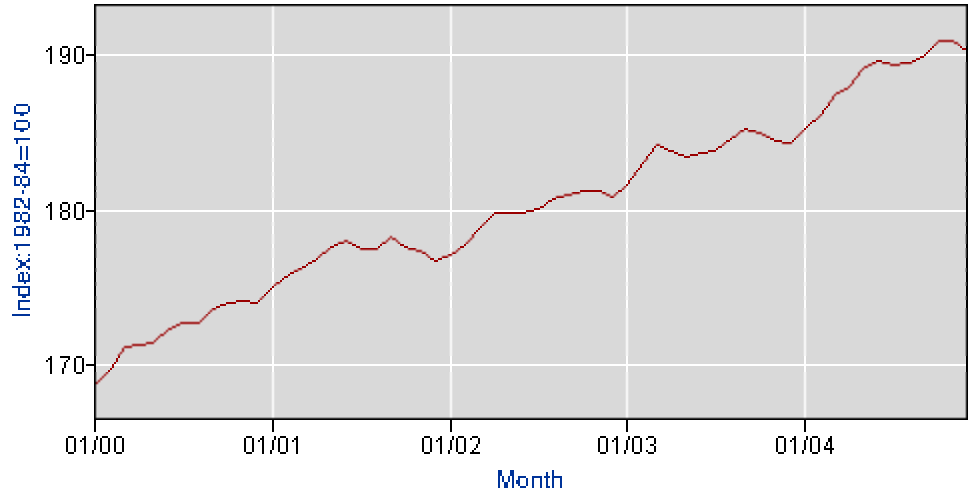
	2000	2001	2002	2003	2004
GDP	9,817.00	9,890.70	10,074.80	10,381.30	10,837.20



Data Source: US Department of Commerce, Bureau of Economic Analysis. Access: Jan 2005 http://www.bea.gov/bea/dn/home/gdp.htm

US CPI 2000-2005 (1982-84=100)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2000	168.8	169.8	171.2	171.3	171.5	172.4	172.8	172.8	173.7	174	174.1	174	172.2
2001	175.1	175.8	176.2	176.9	177.7	178	177.5	177.5	178.3	177.7	177.4	176.7	177.1
2002	177.1	177.8	178.8	179.8	179.8	179.9	180.1	180.7	181	181.3	181.3	180.9	179.9
2003	181.7	183.1	184.2	183.8	183.5	183.7	183.9	184.6	185.2	185	184.5	184.3	184
2004	185.2	186.2	187.4	188	189.1	189.7	189.4	189.5	189.9	190.9	191	190.3	188.9



Data Source: US Department of Labor, Bureau of Labor Statistics. Access Jan 2005 http://www.bls.gov/cpi/home.htm

Okun's Law: % change Real GDP=3-2* change unemployment

	2000	2001	2002	2003	2004
GDP	9,817.00	9,890.70	10,074.80	10,381.30	10,837.20
Unemployment	4.0	4.8	5.8	6.0	5.5
% change in GDP		0.75%	1.86%	3.04%	4.39%
change in Unemp.		0.8	1.0	0.2	-0.5
Okun's Law prediction		1.4%	0.9%	2.6%	3.9%
Prediction-Actual		0.7%	-0.9%	-0.5%	-0.5%

It appears that Okun's Law tends to underpredict GDP growth during this period, of course, the sample size is too small to say much else.