Economics 352
Fall 2009
Saunders

Assignment 2 Solution

Chapter 1

8. Throughout the 1990s, imports rose dramatically. Although exports also increased, exports grew less rapidly than imports. Thus, net exports (NX) fell, Since CA=NX+NFP, and NFP is small relative to NX, this explains most of the drop in the current account.

Chapter 2

4. Price and quantity data are given as the following.

Good	Quantity	Price
Computers	20	$1,000
Bread	10,000	$1.00

Year 2

Good	Quantity	Price
Computers	25	$1,500
Bread	12,000	$1.10

(a) Year 1 nominal GDP $= 20 \times \$1{,}000 + 10{,}000 \times \$1.00 = \$30{,}000$.

Year 2 nominal GDP $= 25 \times \$1{,}500 + 12{,}000 \times \$1.10 = \$50{,}700$.

With year 1 as the base year, we need to value both years' production at year 1 prices. In the base year, year 1, real GDP equals nominal GDP equals $30,000. In year 2, we need to value year 2's output at year 1 prices. Year 2 real GDP $= 25 \times \$1{,}000 + 12{,}000 \times \$1.00 = \$37{,}000$. The percentage change in real GDP equals ($37,000 – $30,000)/$30,000 = 23.33%.

We next calculate chain-weighted real GDP. At year 1 prices, the ratio of year 2 real GDP to year 1 real GDP equals g_1 = ($37,000/$30,000) = 1.2333. We must next compute real GDP using year 2 prices. Year 2 GDP valued at year 2 prices equals year 2 nominal GDP = $50,700. Year 1 GDP valued at year 2 prices equals (20 × $1,500 + 10,000 × $1.10) = $41,000. The ratio of year 2 GDP at year 2 prices to year 1 GDP at year 2 prices equals g_2 = ($50,700/$41,000) = 1.2367. The chain-weighted ratio of real GDP in the two years therefore is equal to $g_c = \sqrt{g_1 g_2} = 1.23496$. The percentage change chain-weighted real GDP from year 1 to year 2 is therefore approximately 23.5%.

If we (arbitrarily) designate year 1 as the base year, then year 1 chain-weighted GDP equals nominal GDP equals $30,000. Year 2 chain-weighted real GDP is equal to (1.23496 × $30,000) = $37,048.75.

(b) To calculate the implicit GDP deflator, we divide nominal GDP by real GDP, and then multiply by 100 to express as an index number. With year 1 as the base year, base year nominal GDP equals base year real GDP, so the base year implicit GDP deflator is 100. For the year 2, the implicit GDP deflator is ($50,700/$37,000) × 100 = 137.0. The percentage change in the deflator is equal to 37.0%.

With chain weighting, and the base year set at year 1, the year 1 GDP deflator equals ($30,000/$30,000) × 100 = 100. The chain-weighted deflator for year 2 is now equal to ($50,700/$37,048.75) × 100 = 136.85. The percentage change in the chain-weighted deflator equals 36.85%.

(c) We next consider the possibility that year 2 computers are twice as productive as year 1 computers. As one possibility, let us define a "computer" as a year 1 computer. In this case,
the 25 computers produced in year 2 are the equivalent of 50 year 1 computers. Each year 1 computer now sells for $750 in year 2. We now revise the original data as:

Year 1

Good	**Quantity**	**Price**
Year 1 Computers	20	$1,000
Bread	10,000	$1.00

Year 2

Good	**Quantity**	**Price**
Year 1 Computers	50	$750
Bread	12,000	$1.10

First, note that the change in the definition of a "computer" does not affect the calculations of nominal GDP. We next compute real GDP with year 1 as the base year. Year 2 real GDP in year 1 prices is now $50 \times \$1{,}000 + 12{,}000 \times \$1.00 = \$62{,}000.$ The percentage change in real GDP is equal to ($62,000 – $30,000)/$30,000 = 106.7%.

We next revise the calculation of chain-weighted real GDP. From above, g_1 equals ($62,000/$30,000) = 206.67. The value of year 1 GDP at year 2 prices equals $26,000. Therefore, g_2 equals ($50,700/$26,000) = 1.95. 200.75. The percentage change chain-weighted real GDP from year 1 to year 2 is therefore 100.75%.

If we (arbitrarily) designate year 1 as the base year, then year 1 chain-weighted GDP equals nominal GDP equals $30,000. Year 2 chain-weighted real GDP is equal to (2.0075 × $30,000) = $60,225. The chain-weighted deflator for year 1 is automatically 100. The chain-weighted deflator for year 2 equals ($50,700/$60,225) × 100 = 84.18. The percentage rate of change of the chain-weighted deflator equals −15.8%.

When there is no quality change, the difference between using year 1 as the base year and using chain weighting is relatively small. Factoring in the increased performance of year 2 computers, the production of computers rises dramatically while its relative price falls. Compared with earlier practices, chain weighting provides a smaller estimate of the increase in production and a smaller estimate of the reduction in prices. This difference is due to the fact that the relative price of the good that increases most in quantity (computers) is much higher in year 1. Therefore, the use of historical prices puts more weight on the increase in quality-adjusted computer output.

9. $S^p - 1 = CA + D$

(a) By definition:

$$S^p = Y^d - C = Y + NFP + TR + INT - T - C$$

Next, recall that $Y = C + I + G + NX$. Substitute into the equation above and subtract I to obtain:

$$\begin{aligned} S^p - I &= C + I + G + NX + NFP + INT - T - C - I \\ &= (NX + NFP) + (G + INT + TR - T) \\ &= CA + D \end{aligned}$$

(b) Private saving, which is not used to finance domestic investment, is either lent to the domestic government to finance its deficit (*D*), or is lent to foreigners (*CA*).

10. Computing capital with the perpetual inventory method.

(a) First, use the formula recursively for each year:

$K_0 = 80$

$K_1 = 0.9 \times 80 + 10 = 82$

$K_2 = 0.9 \times 82 + 10 = 83.8$

$K_3 = 0.9 \times 83.8 + 10 = 85.42$

$K_4 = 0.9 \times 85.42 + 10 = 86.88$

$K_5 = 0.9 \times 86.88 + 10 = 88.19$

$K_6 = 0.9 \times 88.19 + 10 = 89.37$

$K_7 = 0.9 \times 89.37 + 10 = 90.43$

$K_8 = 0.9 \times 90.43 + 10 = 91.39$

$K_9 = 0.9 \times 91.39 + 10 = 92.25$

$K_{10} = 0.9 \times 92.25 + 10 = 93.03$

(b) This time, capital stays constant at 100, as the yearly investment corresponds exactly to the amount of capital that is depreciated every year. In (a), we started with a lower level of capital, thus less depreciated than what was invested, as capital kept rising (until it would reach 100).

11. Assume the following:

$$D = 10$$
$$INT = 5$$
$$T = 40$$
$$G = 30$$
$$C = 80$$
$$NFP = 10$$
$$CA = -5$$
$$S = 20$$

(a)

$$\begin{aligned} Y^d &= S^p + C \\ &= S + D + C \\ &= 20 + 10 + 80 = 110 \end{aligned}$$

(b)

$$D = G + TR + INT - T$$
$$TR = D - G - INT + T = 10 - 30 - 5 + 40 = 15$$

(c)

$$S = GNP - C - G$$
$$GNP = S + C + G = 20 + 80 + 30 = 130$$

(d)

$$GDP = GNP - NFP = 130 - 10 = 120$$

(e)

$$\text{Government Surplus} = S^g = -D = -10$$

(f)

$$CA = NX + NFP$$
$$NX = CA - NFP = -5 - 10 = -15$$

(g)

$$GDP = C + I + G + NX$$
$$I = GDP - C - G - NX = 120 - 80 - 30 + 15 = 25$$