

NAME: ANSWER KEY

Intermediate Macroeconomic Theory

Economics 232-002

Summer, 2008

Midterm Exam #1

1. (30 points) Assume an economy in which only broccoli and cauliflower are produced. In year 1, 500 million pounds of broccoli are produced and consumed, and its price is \$0.50 per pound, while 300 million pounds of cauliflower are produced and consumed and its price is \$0.80 per pound. In year 2, 400 million pounds of broccoli are produced and consumed and its price is \$0.60 per pound, while 350 million pounds of cauliflower are produced and its price is \$0.85 per pound.
 - a. (15 points) Using year 1 as the base year, calculate the GDP price deflator in years 1 and 2, and calculate the rate of inflation between years 1 and 2 from the GDP price deflator. Explain your answer in detail.
 - b. (15 points) Using year 1 as the base year, calculate the Consumer Price Index (CPI) in years 1 and 2, and calculate the CPI rate of inflation. Explain your answer in detail

ANSWER:

Price and quantity data are given as the following:

Year 1		
Good	Quantity (million lbs.)	Price (per lb.)
Broccoli	500	\$0.50
Cauliflower	300	\$0.80

Year 2		
Good	Quantity (million lbs.)	Price (per lb.)
Broccoli	400	\$0.60
Cauliflower	350	\$0.85

(a) Year 1 nominal GDP = Year 1 real GDP = 500 million × \$0.50 + 300 million × \$0.80 = \$490 million.

Year 2 nominal GDP = 400 million × \$0.60 + 350 million × \$0.85 = \$537.5 million

Year 2 real GDP = 400 million × \$0.50 + 350 million × \$0.80 = \$480 million.

Year 1 GDP deflator equals 100.

Year 2 GDP deflator equals $(\$537.5/\$480) \times 100 = 112$.

The percentage change in the deflator is around 12%.

(b) Year 1 production (market basket) at year 1 prices equals year 1 nominal GDP = \$490 million. The value of the market basket at year 2 prices is equal to 500 million × \$0.60 + 300 million × \$0.85 = \$555 million

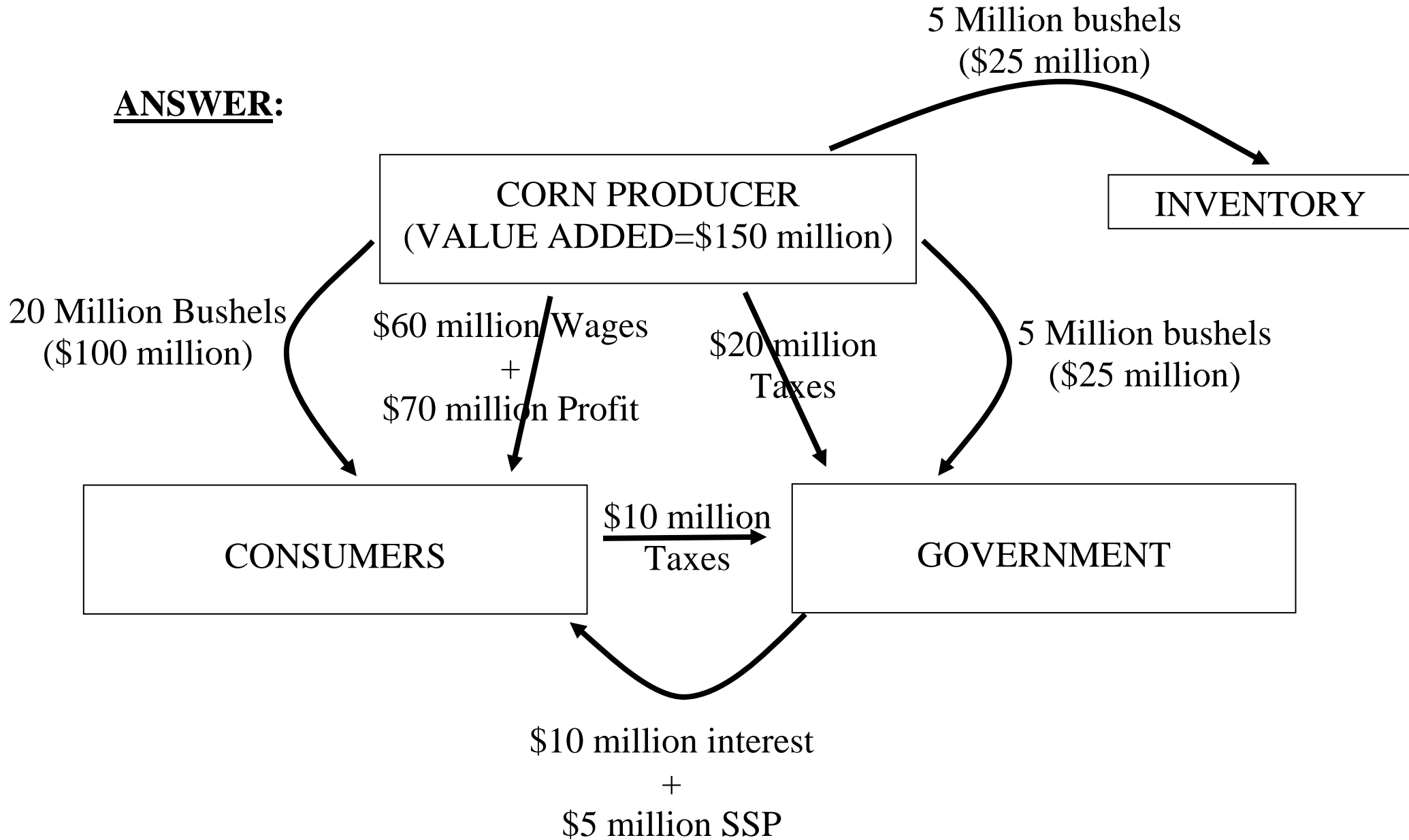
Year 1 CPI equals 100.

Year 2 CPI equals $(\$555/\$490) \times 100 = 113.3$.

The percentage change in the CPI is around 13.3%.

2. (30 points) Consider an economy with a corn producer, some consumers, and a government. In a given year, the corn producer grows 30 million bushels of corn and the market price for corn is \$5 per bushel. Of the 30 million bushels produced, 20 million bushels are sold to consumers, 5 million are stored in inventory, and 5 million are sold to the government to feed the army. The corn producer pays \$60 million in wages to consumers and \$20 million in taxes to the government. Consumers pay \$10 million in taxes to the government, receive \$10 million in interest on the government debt, and receive \$5 million in Social Security payments from the government. The profits of the corn producer are distributed to consumers.
- a. (15 points) Calculate GDP using (i) the product approach, (ii) the expenditure approach, (iii) the income approach. Explain your answer in detail
 - b. (15 points) Calculate private disposable income, private sector saving, government saving, national saving, and the government deficit. Is the government budget in deficit or surplus? Explain your answer in detail

ANSWER:



Corn producer, consumers, and government.

(a) (i) Product approach: There are no intermediate goods inputs. The corn producer grows 30 million bushels of corn. Each bushel of corn is worth \$5. Therefore, GDP equals \$150 million.

(ii) Expenditure approach: Consumers buy 20 million bushels of corn, so consumption equals \$100 million. The corn producer adds 5 million bushels to inventory, so investment equals \$25 million. The government buys 5 million bushels of corn, so government spending equals \$25 million. GDP equals \$150 million.

(iii) Income approach: Wage income is \$60 million, paid by the corn producer. The corn producer's revenue equals \$150 million, including the value of its addition to inventory. Additions to inventory are treated as purchasing one owns output. The corn producer's costs include wages of \$60 million and taxes of \$20 million. Therefore, profit income equals \$150 million – \$60 million – \$20 million = \$70 million. Government income equals taxes paid by the corn producer, which equals \$20 million. Therefore, GDP by income equals \$60 million + \$70 million + \$20 million = \$150 million.

(b)

- Private disposable income equals GDP (\$150 million) plus net factor payments (0) plus government transfers (\$5 million is Social Security benefits) plus interest on the government debt (\$10 million) minus total taxes (\$30 million), which equals \$135 million.

$$\begin{aligned} Y^d &= GDP + NFP + TR + Int - T \\ &= 150 + 0 + 5 + 10 - 30 \\ &= 135 \end{aligned}$$

- Private saving equals private disposable income (\$135 million) minus consumption (\$100 million), which equals \$35 million.

$$\begin{aligned} S^P &= Y^d - C \\ &= 135 - 100 \\ &= 35 \end{aligned}$$

- Government saving equals government tax income (\$30 million) minus transfer payments (\$5 million) minus interest on the government debt (\$10 million) minus government spending (\$5 million), which equals \$10 million.

$$\begin{aligned} S^g &= T - TR - Int - G \\ &= 30 - 5 - 10 - 25 \\ &= -10 \end{aligned}$$

- National saving equals private saving (\$35 million) plus government saving (\$10 million), which equals \$45 million.

$$\begin{aligned} S &= S^g + S^P \\ &= -10 + 35 \\ &= 25 \end{aligned}$$

- The government budget surplus equals government savings (-\$10 million). Since the budget surplus is positive, the government budget is in surplus. The government deficit is therefore equal to (\$10 million).

3. (25 points) Suppose that the government deficit is 10, interest on the government debt is 5, taxes are 40, government expenditures are 30, consumption expenditures are 80, net factor payments are 10, the current account surplus is -5 , and the national saving is 20. Calculate the following. Explain your answer in detail
- a. (3 points) Private disposable income
 - b. (3 points) Transfers from the government to the private sector
 - c. (2 points) Gross national product
 - d. (3 points) Gross domestic product
 - e. (3 points) The government surplus
 - f. (3 points) Net exports
 - g. (3 points) Investment expenditures

ANSWER:

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)

$$\begin{aligned} D &= G + TR + INT - T \\ TR &= D - G - INT + T = 10 - 30 - 5 + 40 = 15 \end{aligned}$$

(c)

$$\begin{aligned} S &= GNP - C - G \\ GNP &= S + C + G = 20 + 80 + 30 = 130 \end{aligned}$$

(d)

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

(e)

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

(f)

$$\begin{aligned} CA &= NX + NFP \\ NX &= CA - NFP = -5 - 10 = -15 \end{aligned}$$

(g)

$$\begin{aligned} GDP &= C + I + G + NX \\ I &= GDP - C - G - NX = 120 - 80 - 30 + 15 = 25 \end{aligned}$$

4. (15 points) Suppose that the unemployment rate is 5%, the total working age population is 100 million, and the number of unemployed is 2.5 million. Determine: (i) the participation rate; (ii) the labor force; (iii) the number of employed workers. Explain your answer in detail

ANSWER:

$$\text{Unemployment rate} = \frac{\text{Number unemployed}}{\text{Labor force}}$$

$$\text{Participation rate} = \frac{\text{Labor force}}{\text{Total working age population}}$$

$$0.05 = \frac{2,500,000}{\text{Labor force}} \qquad \text{Labor force} = \frac{2,500,000}{0.05} = 50,000,000$$

$$\text{Participation rate} = \frac{\text{Labor force}}{100,000,000} = \frac{\text{Employed} + \text{Unemployed}}{100,000,000}$$

$$\text{Participation rate} = \frac{\text{Labor force}}{100,000,000} = \frac{50,000,000}{100,000,000} = \frac{1}{2}$$

$$\text{Labor force} = \text{Employed} + \text{Unemployed}$$

$$\text{Employed} = \text{Labor force} - \text{Unemployed} = 50,000,000 - 2,500,000 = 47,500,000$$

BONUS QUESTION

5. (10 points) Fill in the blanks in the following table that is related to the business cycle facts. For your convenience, the properties of Money Supply have already been given in the table.

	Cyclical	Lead/Lag	Variability Relative to GDP
Consumption	Procyclical	Coincident	Smaller
Investment	Procyclical	Coincident	Larger
Price Level	Countercyclical	Coincident	Smaller
Monetary Supply	Procyclical	Leading	Smaller
Employment	Procyclical	Lagging	Smaller
Real Wage	Procyclical	?	?
Average Labor Productivity	Procyclical	Coincident	Smaller