

Name:
Section:
T.A. Name:

180.101 ELEMENTS OF MACROECONOMICS

Fall, 2011

First Term Examination

Prof. Louis J. Maccini

Time Allotment for the Exam: 60 Minutes

Total Points on the Exam: 180 Points

Answer Key

INSTRUCTIONS

(a) At the top of this page, write your name, section number and TA name. You will get a bonus of 5 points if both the section number and TA name are completed correctly.

(b) The exam contains **five pages**. Writing is permitted on both sides of each page. Answer each question on the side of the page specified. There will be instructions on where to place answers to questions on each side of each page. Answers that are placed on the wrong page or the wrong side of a page will not be graded.

QUESTIONS

NB: You may answer Question 1 on both sides of this page.

Question 1. (Total: 20 Points) Answer the questions below regarding the following events in U.S. economic history:

(a) **(10 Points)** The Great Moderation: Over what period of time did the Great Moderation occur? Why is the period referred to as the Great Moderation?

(b) **(10 Points)** The Great Recession: What is the official period of time over which the Great Recession occurred? Why is the period referred to as the Great Recession?

NB: You may continue your answer to Question 1-on this side of this page.

Answer to Question 1:

(a) The Great Moderation: The Great Moderation occurred roughly from the mid-eighties to the mid-2000's. The period is referred to as the Great Moderation because the growth rate of real GDP was much less volatile over this period than it had been over the prior 40 years.

(b) The Great Recession: The official dates of the Great Recession are from January, 2008 through June, 2009, or from the 1st quarter, 2008 through the 2nd quarter, 2009. It is referred to as the Great Recession because real GDP exhibited its sharpest decline (of approximately 5%) in the last 60 years.

NB: You may answer Question 2 on both sides of this page.

Question 2. (Total: 40 Points). Consider a small economy with only three producers in a particular year: Sunni, Cubbi, and Grammi. Sunni gathers sixty bushels of wild gummi berries, which sell for ten copper coins each. She sells fifty bushels to Grammi and ten bushels to Tummi, who likes to consume gummi berries. Cubbi scoops mud from the riverbank to make two hundred clay jars, which sell for five copper coins each. He sells one hundred clay jars to Grammi and sells the remainder to households in the village who use them as flower pots. Grammi makes one hundred jars of gummy berry juice, which she sells for twenty copper coins each to people in the village.

Compute GDP for this economy according to each of the following approaches:

- (a) **(20 Points)** The Value Added Approach: Show the details of your calculations as well as total GDP.
- (b) **(20 Points)** The Expenditure Approach: Show the details of your calculations as well as total GDP. In this case, indicate which of the components are consumption and which are investment.

Answer to Question 2:

Denote cc = copper coins. Then,

(a) GDP by the Value Added Approach is calculated by summing the value added at each stage of production. Value Added is sales, assuming all production is sold, minus intermediate purchases. Value Added for each producer is as follows:

Sunni: Sales = 60 bushels of gummy berries at 10cc = 600cc. Of these, 50 bushels were sold to Grammi and 10 bushels were sold to Tummi. Intermediate Purchases = 0. Value Added = 600cc.

Cubbi: Sales = 200 clay jars valued at 5cc per jar = 1000cc. Of these, 100 clay jars were sold to Grammi at 5cc = 500cc. And 100 jars were sold to households in the village at 5cc per jar = 500cc. Intermediate Purchases = 0. Value Added = 1000cc.

Grammi: Value of Production = 100 jars of gummy berry juice at 20cc = 2000cc. All 200 jars were sold to people in the village. Intermediate Purchases = 50 bushels of gummy berries at 10cc = 500cc plus 100 clay jars at 5cc = 500cc; Total Intermediate Purchases = 1000cc. Value Added = 2000cc – 1000cc = 1000cc.

Total Value Added = 600cc + 1000cc + 1000cc = 2600cc

NB: You may continue your answer to Question 2-on this side of this page.

(b) GDP by the Expenditure Approach: GDP by the Expenditure Approach is computed by summing expenditures on final output in the form of consumption and investment.

Consumption: Expenditures on final output or final sales to consumers include:

Sales by Sunni of 10 bushels of gummy berries to Tummi at 10cc = 100cc

Sales by Cubbi of 100 clay jars to households in the village at
5cc = 500cc

Sales by Grammi of 100 jars of gummy berry juice to people in the
village at 20cc = 2000cc

Total Consumption = 100cc + 500cc + 2000cc = 2600cc

Investment: Expenditures on final output to business firms is Investment: None

Total GDP-Expenditure Approach = Consumption + Investment
= 2600cc + 0 = 2600cc

NB: You must answer Question 3-a on this side of this page alone.

Question 3. (Total: 80 Points) Consider a closed economy operating under slack economic conditions with no government. An economist writes a report that estimates that the marginal propensity to consume for households in the economy is $2/3$. His estimates also indicate that autonomous consumption spending by households is \$300 billion, and that autonomous investment spending by business firms is \$500 billion.

Question 3-a. (20 Points) Write down a model that captures the essential features of this economy. Explain briefly each of the relationships of the model.

Model

$$Y = E$$

$$E = C + I$$

$$C = 300 + (2/3)Y$$

$$I = 500$$

Explanation

- (i) The first equation is the equilibrium condition which requires aggregate planned spending to equal aggregate income or output in equilibrium.
- (ii) The second equation is a definition of aggregate planned expenditure, which is the sum of consumption and investment in a closed economy with no government.
- (iii) The third equation is the consumption function where \$300 billion is the level of autonomous consumption spending and $2/3$ is the marginal propensity to consume.
- (iv) The last equation is the investment function which states that investment is entirely autonomous at \$500 billion

NB: You must answer Question 3-b on this side of this page alone.

Question 3-b. (20 Points) In his report, the economist claims that the current equilibrium level of real income in this economy is \$2400 billion. Evaluate the economist's claim by calculating the true equilibrium. Show your work. Construct a diagram that pictures the determination of the equilibrium level of real income, being sure to label all curves and axes appropriately, and explain carefully why it is an equilibrium.

Calculations

$$Y^* = \frac{1}{1-b} [\bar{C} + \bar{I}] = \frac{1}{1-\frac{2}{3}} [300 + 500] = 3 \times [800] = 2400$$

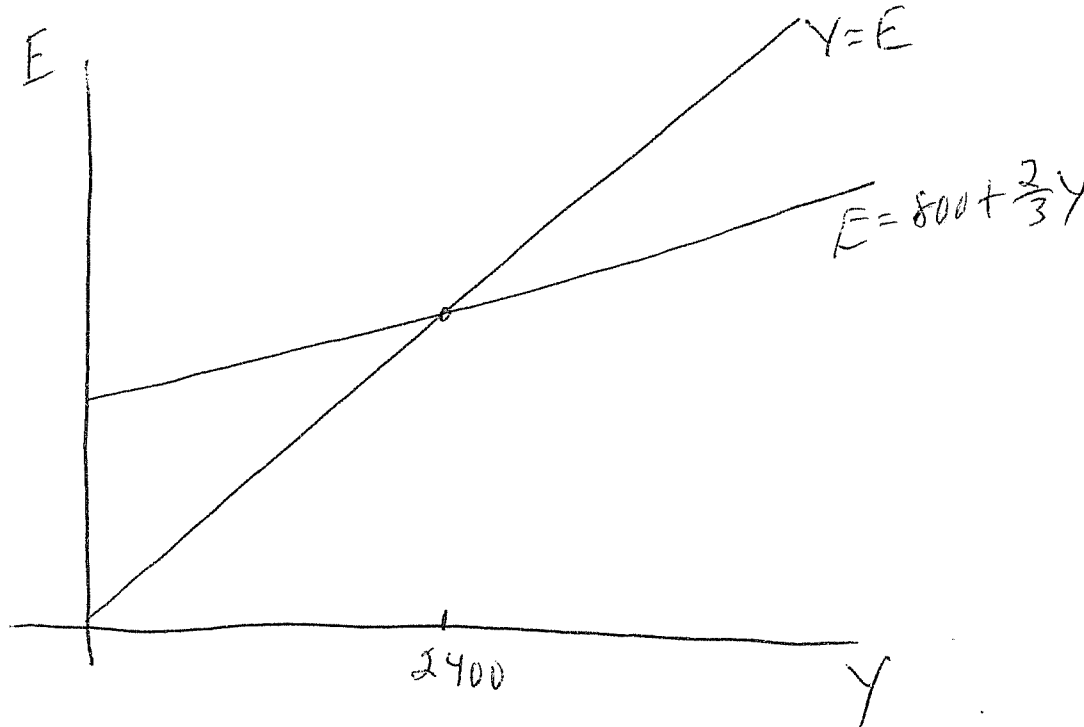
The economist is correct. The equilibrium level of real income is \$2400 billion.

Graph

To construct a diagram, the Expenditure Schedule is calculated as

$$E = C + I = 300 + (2/3)Y + 500 = 800 + (2/3)Y$$

and the Equilibrium Schedule is $Y = E$. The level of real income of \$2400 billion is an equilibrium because, at that level of real income, aggregate planned expenditure of \$2400 billion ($C + I = 800 + 1600 = 2400$) equals aggregate real output of \$2400 billion.



NB: You may answer Question 3-c on both sides of this page.

Question 3-c. (40 Points) In his report, the economist estimates that the standard of living of the society would improve if the equilibrium level of real income were \$2550 billion. He undertakes a survey of the society and discovers that both households and business firms have become optimistic about the future. The survey indicates that households plan to increase their autonomous consumption spending by \$50 billion, and that business firms plan to increase autonomous investment spending by \$100 billion. This is a total increase in autonomous spending of \$150 billion. The economist thus claims that the planned increase in autonomous spending will exactly achieve the increase in real income that is needed to achieve the desired level of real income of \$2550 billion.

Is the claim of the economist correct? If so, explain carefully why. If not, explain carefully why not, and calculate the correct new equilibrium level of real income. In either case, show your calculations and provide a detailed explanation of why the claim of the economist is correct or incorrect.

Calculations:

The claim is not correct. To see why mathematically, one approach is to use multipliers which are

$$\frac{\Delta Y}{\Delta \bar{C}} = \frac{1}{1-b} = \frac{1}{1-\frac{2}{3}} = 3$$

$$\frac{\Delta Y}{\Delta \bar{I}} = \frac{1}{1-b} = \frac{1}{1-\frac{2}{3}} = 3$$

Hence,

$$\Delta Y = 3 \times \Delta \bar{C} = 3 \times (\$50 \text{ billion}) = \$150 \text{ billion}$$

$$\Delta Y = 3 \times \Delta \bar{I} = 3 \times (\$100 \text{ billion}) = \$300 \text{ billion}$$

$$\text{Total } \Delta Y = \$150 \text{ billion} + \$300 \text{ billion} = \$450 \text{ billion}$$

NB: You may continue your answer to Question 3-c-on this side of this page.

Hence, an increase in autonomous consumption spending of \$50 billion will increase real output and thus real income by \$150 billion. And an increase in autonomous investment spending of \$100 billion will increase real output and thus real income by \$300 billion. This results in a total increase in real output and thus real income of \$450 billion. Given that the original equilibrium level of real income was \$2400 billion, and that the desired level of real income is \$2550 billion, the increase in autonomous consumption spending and autonomous investment spending of a total of \$150 billion will result in an over-all increase in real income by \$450 billion. That is, the new equilibrium level of real income would be \$2850 billion. This overshoots the desired level of real income of \$2550.

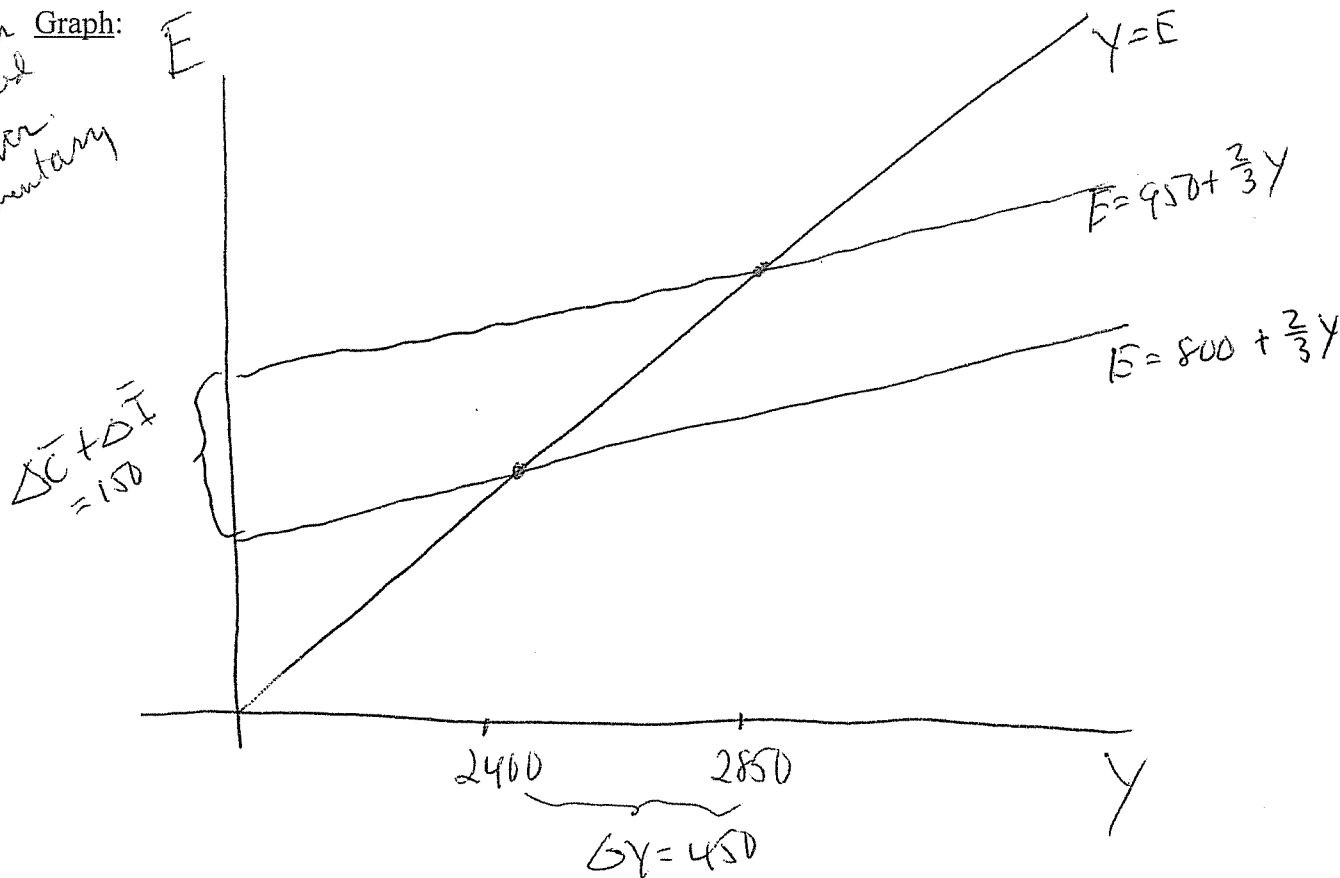
An alternative calculation is to calculate the new equilibrium level of real income, Y^{**} , at the higher level of autonomous consumption spending of \$350 billion and the higher level of autonomous investment spending of \$600 billion. That is,

$$Y^{**} = \frac{1}{1-b} [\bar{C} + \bar{I}] = \frac{1}{1-\frac{2}{3}} [350 + 600] = 3[950] = 2850$$

which again shows that the new equilibrium level of real income of \$2850 billion is higher than the desired level of real income which is \$2550.

Graph:

B: A graph not needed. This answer is supplementary & for extra.



Explanation: The effect on real income is larger than the increase in autonomous consumption spending and the increase in autonomous investment spending because the increase in autonomous consumption spending plus the increase in autonomous investment spending leads to an increase in induced consumption spending. This can be explained through the stages of the multiplier process:

Primary Stage: Captures the effect of the increase in autonomous consumption spending plus the increase in autonomous investment spending. The increase in autonomous consumption expenditure of \$50 billion plus the increase in autonomous investment spending of \$100 billion causes an increase in aggregate planned expenditure of \$150 billion, which causes business firms to increase output by \$150 billion and thereby pay out \$150 billion more income in wages, salaries, profits, etc. Hence an increase in autonomous consumption spending plus the increase in autonomous investment spending by a total of \$150 billion causes an increase in income of \$150 billion in the primary stage.

Secondary Stages: Captures the effects of the increase in induced consumption spending. The increase in income of \$150 billion in the primary stage causes households to further increase consumption expenditures due to the consumption function. This is due to the induced increase in consumption spending that arises from the increase in income in the primary stage. Since consumption depends on income with a marginal propensity to consume of $(2/3)$, the increase in income in the primary stage will increase consumption expenditures in the secondary stages. This further raises aggregate expenditures, which causes business firms to increase output and thus income further, etc.

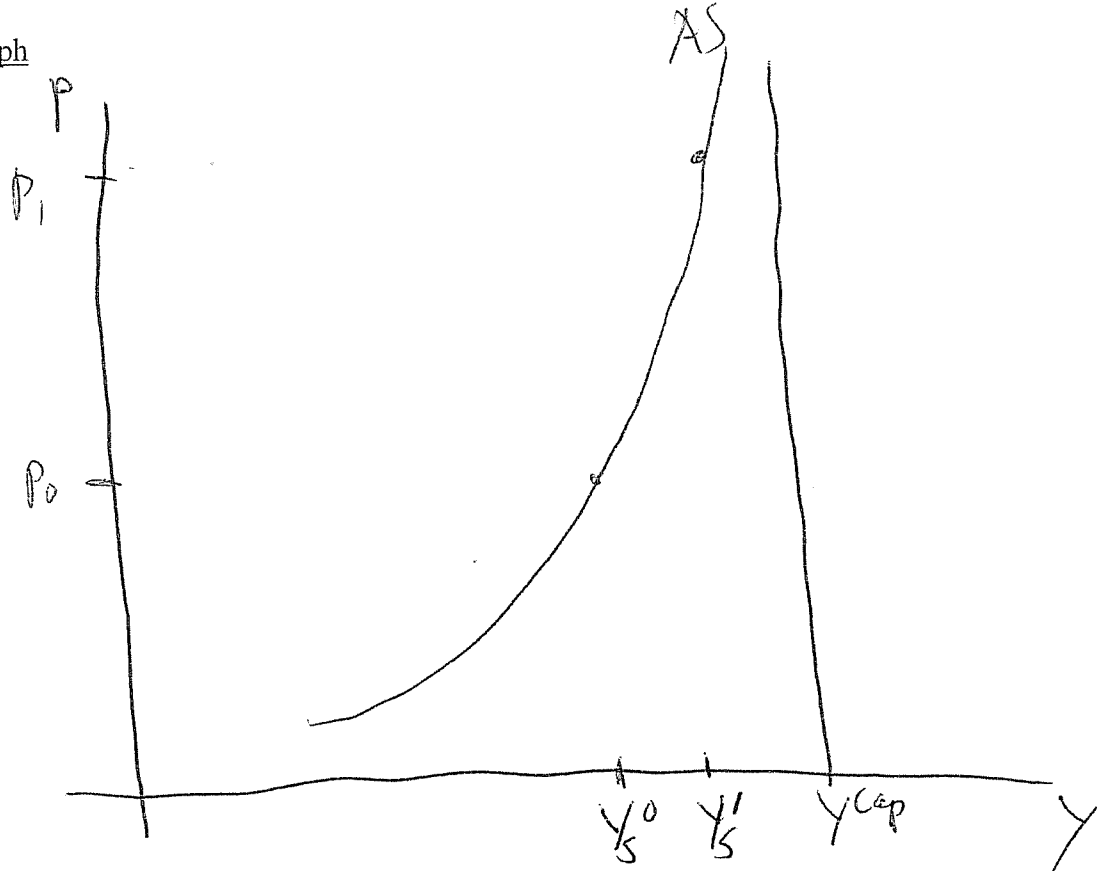
NB: You may answer Question 4 on both sides of this page.

Question 4. (40 Points). “When conditions on the Supply-Side of the economy are ‘tight’, even small increases in prices bring forth substantial increases in the supply of output”. True, false, or uncertain. Use a carefully drawn diagram to illustrate your results, and explain your answer carefully and in detail in intuitive economic terms.

Explanation

The statement is false. When Aggregate Supply Conditions are “tight”, the aggregate supply curve is very steep. Hence, in this case, even very large increases in prices bring forth small increases in the supply of output. The intuition is that, under “tight” supply conditions, unemployment is very low (less than 3%) and excess capacity is very low (under 10%). Hence, business firms cannot easily increase output by hiring more workers, working them more hours, utilizing capital more intensely, etc. Thus, even very large increases in prices generate small increases in the supply of output.

Graph



$Y^{Cap} = \text{Capacity Output}$

NB: You may continue your answer to Question 4-on this side of this page.