

Name:
Section:
T.A. Name:

180.101 ELEMENTS OF MACROECONOMICS

Fall, 2011

Problem Set #3

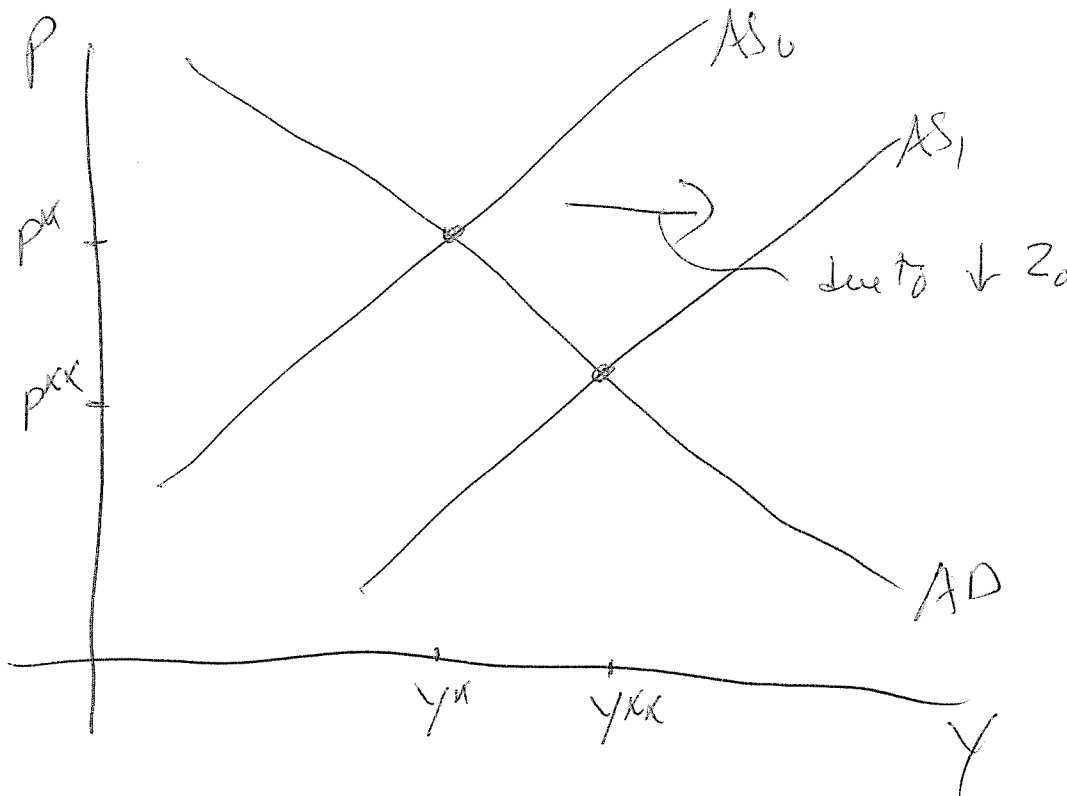
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Solutions

INSTRUCTIONS: Above, write your name, section number and T. A. name. Answer each question in the space provided, or on the back of the same sheet.

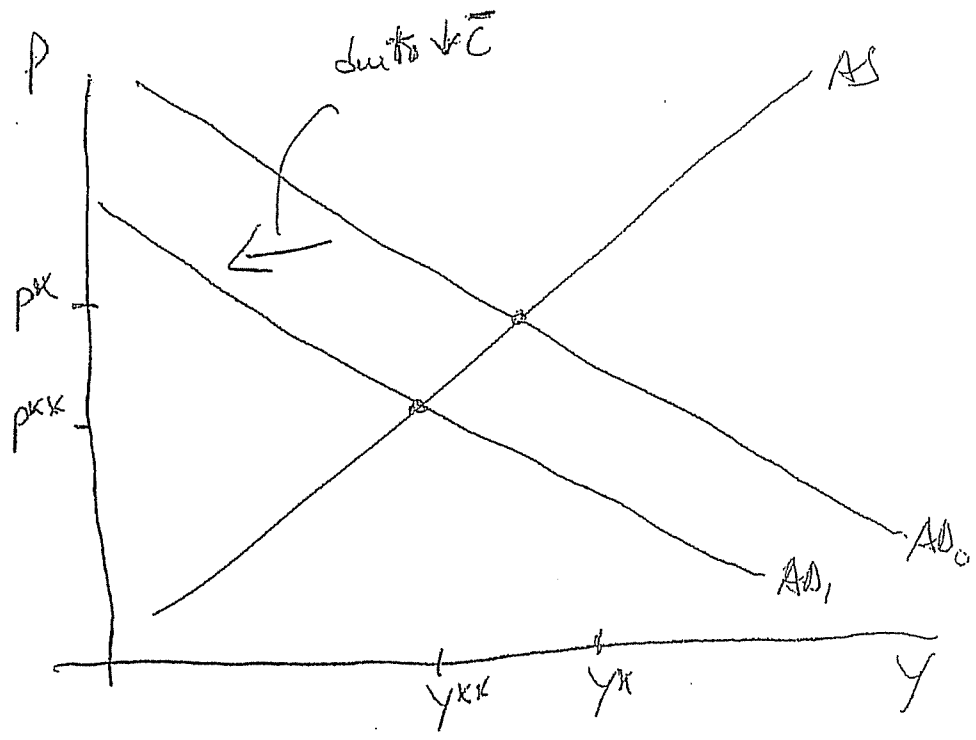
1. A decline in energy prices should reduce the average price level but otherwise leave the economy unaffected. True, false, uncertain. Explain in depth.

False. A decline in energy prices, that is, $\downarrow Z_0$, reduces the cost of production for business firms. Given prices, and assuming ordinary supply conditions, this shifts the aggregate supply curve to the right. In an aggregate demand-aggregate supply framework, the new equilibrium (See the diagram below) will be at a lower price level and a higher level of output and income. A decline in energy prices is therefore a favorable supply shock. It not only lowers the price level but also raises output and income.



2. A country is at war, and the war is going badly. A politician argues that the fact that the war is not going well has caused a "crisis of confidence" among consumers and this will cause a recession. Is this possible? If so, how? Use an aggregate demand-aggregate supply analysis to answer the question. Explain intuitively what is going on.

Yes, it is possible. A "crisis of confidence" among consumers could cause consumers to spend less on consumption goods. This would be represented by a decline in autonomous consumption spending, that is, a $\downarrow \bar{C}$, which would shift the aggregate demand curve downwards or to the left. See the diagram below. In an aggregate demand-aggregate supply framework, the new equilibrium would be at a lower price level and a lower level of output and income. When consumers spend less on goods and services, this reduces the aggregate level of planned spending. Business firms respond to the reduction in planned spending by lowering prices and reducing the level of output. The latter implies that firms pay out less in income in the form of wages and salaries, profits, etc. Defining a recession as a decline in output and income, then the "crisis of confidence" can cause a recession.



2. Consider the following macroeconomic model of the economy operating under "slack conditions":

$$Y = E$$

$$E = C + I + G$$

$$C = 200 + (3/4)Y_{dis}$$

$$Y_{dis} = Y - TX + TR$$

$$TX = 240 + (1/3)Y$$

$$TR = 80$$

$$I = 220$$

$$G = 400$$

where Y is real income or output, E is aggregate real expenditure, C is real consumption expenditure, I is real investment expenditure, G is real government spending, Y_{dis} is real disposable income, TX is real tax revenues, TR is real transfer payments. Expenditures are measured in billions of dollars, so that, e.g., autonomous investment expenditures, is \$220 billion.

- a. Provide a brief explanation of each of the relationships of the model.

The first equation is the equilibrium condition where equilibrium requires aggregate planned spending to equal output or income.

The second equation is a definition of aggregate planned spending which is the sum of planned consumption, investment and government spending.

The third equation is the consumption function which states that consumption rises with disposable income where the marginal propensity to consume is $3/4$. There is also an autonomous level of consumption spending of \$200 billion.

The fourth equation defines disposable income to be national income less taxes plus transfer payments.

The fifth equation states that taxes consist of an autonomous component, \$240 billion, and income taxes which are the product of the marginal tax rate, $1/3$, and national income.

The sixth equation specifies that transfer payments are completely autonomous at \$80 billion.

The sixth and seventh equations specify respectively that investment expenditures are autonomous at \$220 billion and that government purchases are autonomous at \$400 billion.

- b. Calculate the equilibrium level of income. Show your work, explain why it is an equilibrium, and draw a graph that describes the equilibrium. Be sure to label properly the relevant axes and curves.

Substitute transfer payments and taxes into disposable income, and then substituting the latter into the consumption function, yields

$$\begin{aligned} C &= 200 + \frac{3}{4} \left[Y - 240 - \frac{1}{3}Y + 80 \right] \\ &= 200 - 180 + 60 + \frac{3}{4} \left(1 - \frac{1}{3} \right) Y \\ &= 80 + \left(\frac{3}{4} \right) \left(\frac{2}{3} \right) Y = 80 + \frac{1}{2}Y \end{aligned}$$

Then, in equilibrium, aggregate planned expenditure must equal income, or

$$Y = E = C + I + G$$

or, substituting for C, I and G,

$$Y = E = 80 + \frac{1}{2}Y + 220 + 400 = 700 + \frac{1}{2}Y$$

or, solving for Y,

$$Y \left(1 - \frac{1}{2} \right) = 700$$

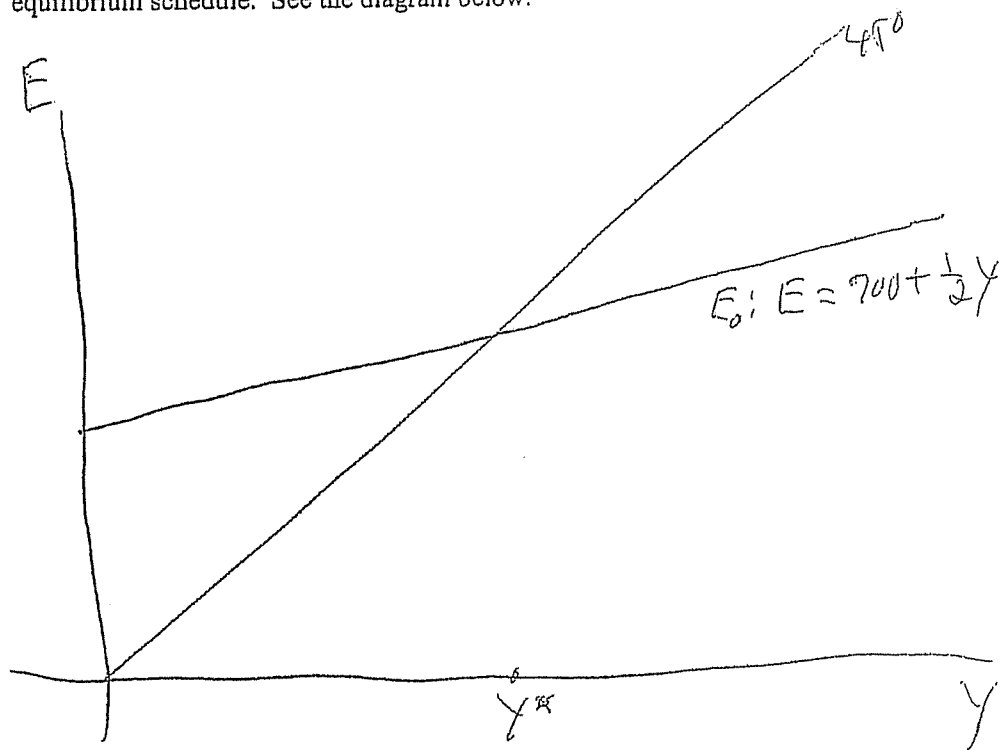
or

$$\frac{1}{2}Y = 700$$

or

$$Y = (2)700 = 1400$$

An equilibrium is achieved where aggregate planned expenditure equals income. This occurs when the aggregate planned spending schedule intersects the equilibrium schedule. See the diagram below.



c. Suppose that Congress is concerned about the cost of sending children to college. It thus passes a bill that grants each family a \$500 tax credit for each child that is in college, no matter what the household's income is. When aggregated over all families that have children in college, this amounts to an aggregate of \$40 billion in tax credits. How can this policy be captured in the above model? Calculate the effect of this policy on real income. Draw a diagram to illustrate your answer. And explain carefully what is going on.

(i) The policy of granting \$40 billion in tax credits to households with children in college is in effect a tax cut, which can be captured in the above model by a decline in autonomous taxes, that is, $\downarrow \overline{TX}$, of \$40 billion.

(ii) One acceptable approach to calculating the effect on real income is to set $\overline{TX} = 200$, which captures the decline in autonomous taxes from \$240 billion to \$200 billion. Then,

$$\begin{aligned} C &= 200 + \frac{3}{4} \left[Y - 200 - \frac{1}{3}Y + 80 \right] \\ &= 200 - 150 + 60 + \frac{3}{4} \left(1 - \frac{1}{3} \right) Y \\ &= 110 + \left(\frac{3}{4} \right) \left(\frac{2}{3} \right) Y = 110 + \frac{1}{2}Y \end{aligned}$$

Then, in equilibrium,

$$Y = E = C + I + G$$

or, substituting for C, I and G,

$$Y = 110 + \frac{1}{2}Y + 220 + 400$$

or

$$Y \left(1 - \frac{1}{2} \right) = 730$$

$$\frac{1}{2}Y = 730$$

$$Y = (2)730 = 1460$$

Hence, real income rises by \$60 billion.

A alternative acceptable approach is to state the multiplier for a change in autonomous taxes, which is

$$\frac{\Delta Y}{\Delta TX} = -\frac{b}{1-b(1-t)}$$

which in the above model is

$$\frac{\Delta Y}{\Delta TX} = -\frac{\frac{3}{4}}{1-\frac{3}{4}\left(1-\frac{1}{3}\right)} = -\frac{\frac{3}{4}}{1-\frac{3}{4}\left(\frac{2}{3}\right)} = -\frac{\frac{3}{4}}{\frac{1}{2}} = -\left(\frac{3}{4}\right)(2) = -\frac{3}{2}$$

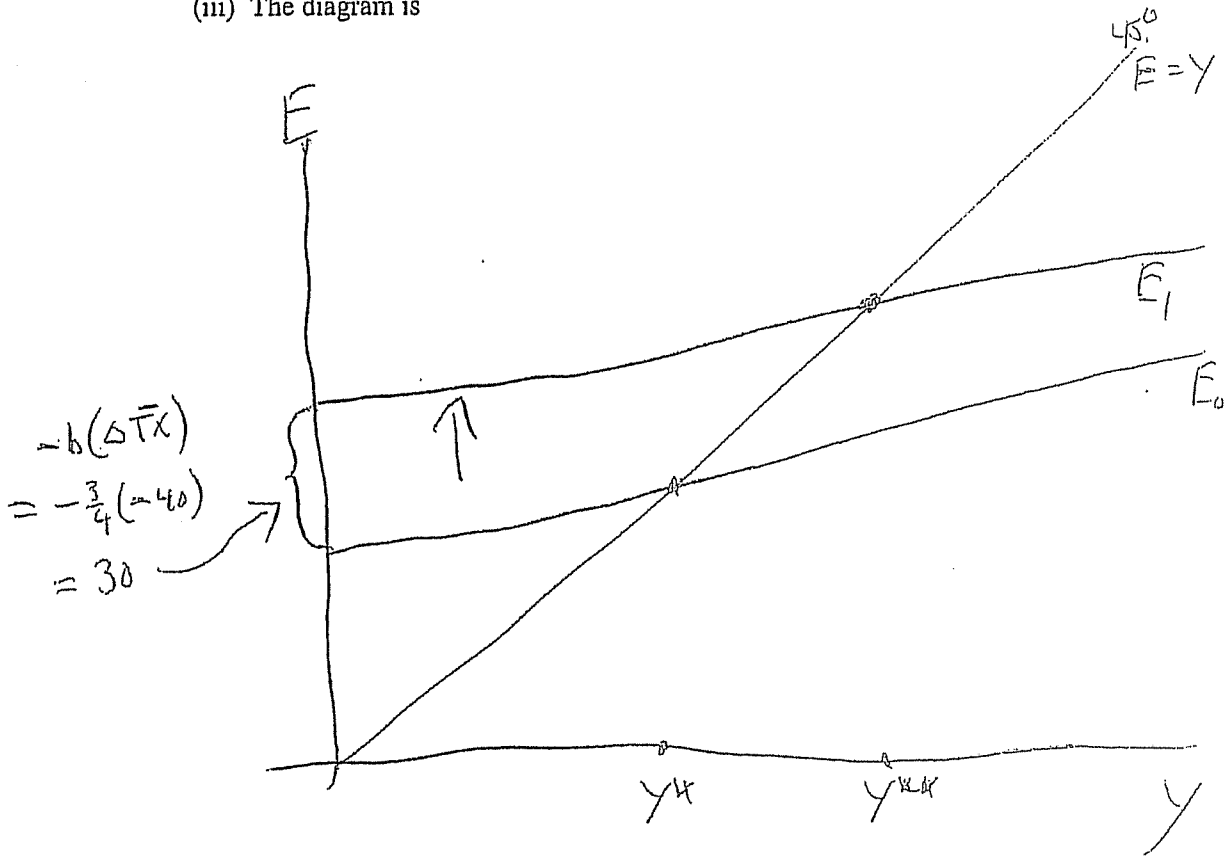
Hence,

$$\Delta Y = -\frac{3}{2}\Delta TX = -\frac{3}{2}(-40) = 60$$

Thus, real income rises by \$60 billion.

NB: Either approach would be a complete answer to the calculation part of the question.

(iii) The diagram is



(iv) A tax credit of \$40 billion is effectively a tax cut of \$40 billion. This raises real disposable income of households by \$40 billion. This in turn causes households to increase consumption by the marginal propensity to consume times the increase in disposable income. Since the marginal propensity to consume is $\frac{3}{4}$, consumption spending and thus aggregate planned spending in the primary stage of the multiplier process rises by \$30 billion. This causes business firms to raise output and income by \$30 billion. The increase in income in the primary stage of the multiplier process further raises consumption spending in the secondary stages of the multiplier process, causing ultimately a total increase in output and income of \$60 billion.