Econ 101: Problem Set 6

The mythical kingdom of Philhill is ruled by a philosopher-king who donates his time as mediator of all domestic disputes. Since there are no external enemies, there is no need for government spending or taxes. There are also no economic transactions with other countries. The result is that the macroeconomic environment in Philhill can be shown in terms of only consumption (C) and investment (I) spending, as in the table below.

1	2	3	4	5	6	7	8	9	10	11
At a GDP of:	Disposable Income	C1	I1	Y2=C1+I1	I2	Y3=C1+I2	I3	Y4=C1+I3	I4	Y5=C1+I4
0	0	100	200		100		50		150	
500	500	500	200		100		100		200	
1,000	1,000	900	200		100		150		250	
1,500	1,500	1,300	200		100		200		300	
2,000	2,000	1,700	200		100		250		350	
2,500	2,500	2,100	200		100		300		400	

Part A:

1. Note the relationship between GDP and disposable income in the data of columns 1 and 2. What (admittedly unrealistic) situation is being assumed?

2. Note the relationship between consumption and disposable income shown in the data of columns 2 and 3. What kind of cause-and-effect is being described? Calculate the nation's marginal propensity to consume (MPC) from the data given.

Part B:

3. If the only type of demand in this country's economy came from consumers (as shown in the C1 column) so that aggregate demand would equal C1, what would be the equilibrium level of GDP?

4. Note the relationship between GDP and investment demand as indicated by the data in columns 1 and 4. What kind of cause-and-effect is being indicated?

5. If C1 and I1 represent the current demand patterns of the household and business sectors of the economy, calculate the aggregate demand (Y2) at the various levels of GDP (Column 5). What will the equilibrium level of GDP be in this case? Note the level of consumer spending and investment spending once this new macroeconomic equilibrium is reached. What has been the effect of this increase in investment demand?

6. Now let investment demand fall to I2 because of higher interest rates. Calculate the new aggregate demand (Y3) pattern and the new GDP equilibrium. Note the levels of consumption and investment spending at this next equilibrium. Given the change in investment demand that brought about this new equilibrium, how big is the multiplier? (Check this out by using the multiplier formula provided in class and the data for Y3.) Why is there a multiplier effect working in this economy?

7. Next, switch to the third investment demand pattern, I3 (column 8). This column is assumed to be related to the first (GDP) column. What cause-and-effect is being implied in the data in columns 1 and 8? Does this make sense? Calculate Y4 (column 9) from C1 and I3 and find the new equilibrium. Note the levels of consumption and investment spending at this equilibrium.

8. Now, assume that technological breakthroughs occur (e.g., some sort of feasible superconductivity) which boost investment demand to I4 (column 10). Calculate the new Y5 and the new GDP equilibrium. What multiplier seems to be working in this case? Does this match up with the slope of the aggregate demand line indicated by the Y5 data? Note the new amounts of consumption and investment spending that occurs with this Y5 equilibrium and compare them with the corresponding amounts with Y4.

Part C:

Extra! Extra! Read All About It! Military Coup Overthrows Philosopher King!

Yes, the generals are now in control and the Kingdom of Philhill has been replaced by the Republic of Hawk Heaven. And, of course, a lot of military government spending will be necessary to ensure domestic tranquility (?) and deter foreign invasions. The public budget will rely on **income taxation** for financial support. The following macroeconomic picture results from these changes:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
At a GDP of :	T1	Yd1	C1	I1	G1	C1+I1+G1= Y1	G2	C1+I1+G2= Y2	T3	Yd3	C3	I3 (=I1)	G3 (=G1)	C3+I3+G3= Y3
0	0	0	100	100	1,000							100	1,000	
600	200	400	460	100	1,000							100	1,000	
1,200	400	800	820	100	1,000							100	1,000	
1,800	600	1,200	1,180	100	1,000							100	1,000	
2,400	800	1,600	1,540	100	1,000							100	1,000	
3,000	1,000	2,000	1,900	100	1,000							100	1,000	
3,600	1,200	2,400	2,260	100	1,000							100	1,000	
4,200	1,400	2,800	2,620	100	1,000							100	1,000	

9. Note the portion of GDP that the T1 tax system absorbs. What cause-and-effect relationship is being described in the data of columns 1 and 2?

10. Note that the households have changed the amount of consumption demand (Eat, drink, and be merry for tomorrow ... ?) they show at each level of GDP (compared to the situation in Parts A and B). Calculate the country's MPC now.

11. Note the data in columns 1 and 6 (G1). What cause-and-effect is being assumed between government spending and GDP? Does this sound plausible to you? (Why?/Why Not?)

12. Use aggregate demand Y1 (= C1+I1+G1) to determine the republic's initial equilibrium level of GDP. Indicate what the levels of consumer spending, investment spending, government spending, and the government's budget deficit (G1 - T1) will be at this equilibrium.

13. Calculate the multiplier for this economy.

14. Suppose that defense spending increases by 240 because of an increased threat of invasion. Show this change as G2 in the table above and calculate the new equilibrium level of GDP (Y2). At the new equilibrium what are the values of consumption spending, investment spending, taxes, government spending and the government's budget deficit. Does this result match up with the multiplier you just calculated?

15. The government's economists have estimated that this economy would be at "full employment (or natural level)" if GDP was 3,450. Return to the initial equilibrium of question 12, based on the original G1. Given the multiplier that you estimated above (question 13), how big an *autonomous* change in aggregate demand would be needed to move this economy from the question 13 equilibrium to an equilibrium at 3,450?

T = -200 + (1/3)*3,450 = 950.

Y_d = 3,450 - 950 = 2,500.

C = 100 + .9*3,450 = 2,350.

I = 100 and G = 1,000 -- no change.

Government deficit = G - T = 1,000 - 950 = 50.

16. Suppose that a change in government spending is used *instead* of the above tax change to achieve full employment. How big must the government spending change be? How large will C, I, G, and the government's budget deficit be at the 3,450 equilibrium, when adjustment is made in this fashion?

ΔY = multiplier * ΔG ☾ ΔG = ΔY / multiplier.

ΔG = 450 / 2.5 = 180.

C = 100 + .9 * (3,450 - 1,150) = 2,170,

where 1,150 = 3,450*(1/3) - income tax on the old schedule (T1 when Y = 3,450).

I = 100 and G = 1,000 -- no change.

Government deficit = G - T = 1,000 - 1,150 = -150 -- it is a surplus