IAS 107: Spring 2011: Problem Set 4

Due at the start of lecture on Th Feb 17

1. Roughly, what is the gap between real per capita GDP in Qatar today, real per capita in Venezuela, and real GDP per capita in Nigeria?

   From gapminder.org: Qatar--$74138 ; Venezuela-- $10,986; Nigeria--$2,159.

2. NIPA: Explain whether or not, why, and how the following items are included in the calculation of GDP:

   a. The sale for $25,000 of an automobile that cost $20,000 to manufacture that had been produced here at home last year and carried over in inventory.
   b. The sale for $35,000 of an automobile that cost $25,000 to manufacture newly-made at home this year.
   c. The sale for $45,000 of an automobile that cost $30,000 to manufacture that was newly-made abroad this year and imported.
   d. The sale for $25,000 of an automobile that cost $20,000 to manufacture that was made abroad and imported last year.

   a. Last year it was $20,000 of inventory investment. This year it is +$25,000 of consumption spending and -$20,000 of inventory investment, for a net this year of $5,000
   b. This year it is $25,000 of consumer goods production and $10,000 of consumer services production, for a total consumer spending of $35,000.
   c. This year it is $45,000 of consumer spending and $35,000 of imports, for a net of $10,000.
   d. Last year it was $20,000 of inventory investment and $20,000 of imports, for a net of zero. This year it is -$20,000 of inventory investment and $25,000 of consumer spending, for a net of $5,000

3. In 1960, Argentina has a level of output per worker of $14,000/year. In the 1940s and 1950s it had had a savings-investment share of 24% and a labor-force growth rate of 2% per year. Since 1960 Argentina has averaged a savings-investment share of 15% and a labor force growth rate of 1%/year. Assume that Argentina in the 1940s and 1950s had an efficiency of labor growth rate g of 1%/year. Assume $\alpha = \frac{2}{3}$. Assume the depreciation rate δ is 5%/year. Assume that Argentina in 1960 was on its 1940s and 1950s steady-state balanced-growth path, and that Argentina today is on its post-1960 balanced growth path.

a. What was Argentina's capital-output ratio in 1960?
b. What was Argentina's efficiency of labor E in 1960?

c. If the efficiency-of-labor growth rate had been 1%/year since 1960, what would Argentina's efficiency of labor, capital-output ratio, and level of output per worker be today?
d. If the efficiency of labor growth rate had been 2%/year since 1960, what would Argentina's efficiency of labor, capital-output ratio, and level of output per worker be today?
e. If the efficiency of labor growth rate had been 3%/year since 1960, what would Argentina's efficiency of labor, capital-output ratio, and level of output per worker be today?
f. If the efficiency of labor growth rate had been 4%/year since 1960, what would Argentina's efficiency of labor, capital-output ratio, and level of output per worker be today?
g. If the efficiency of labor growth rate had been 5%/year since 1960, what would Argentina's efficiency of labor, capital-output ratio, and level of output per worker be today?
h. Argentina's level of output per worker today is $27000/year. What do you guess its growth rate of the efficiency of labor has been on average since 1960?

a. .24/(.08) = 3
b. 14000/(3^2) = $1555
c. $1555 x 1.01^{50}= $2558; .15/.07 = 2.14 ; $11715
d. $1555 x 1.02^{50}= $4187; .15/.08 = 1.875; $14719
e. $1555 x 1.03^{50}= $6819; .15/.09 = 1.67; $19017
f. $1555 x 1.04^{50}= $11054; .15/.10 = 1.5; $24871
g. $1555 x 1.04^{50}= $17838; .15/.11 = 1.36; $32993
h. Greater than 4% per year, less than 5%--and probably a little bit closer to 4% per year than 5%, say 4.4%/year

4. In the simple income-expenditure model with real GDP Y equal to the sum of consumption spending by households C, investment spending by businesses I, government purchases G, and with net exports NX; with consumption spending C given by the equation: where Y = C + O and $C = c_o + c_yY(1-t)$; and with imports IM given by the equation: $IM = im_yY$...

a. Suppose C = $10.25 trillion, I = $1.68 trillion, G = $2.97 trillion, GX = $1.66 trillion, the tax rate t=0, and IM = $2.10 trillion. What is GDP Y?
b. Suppose C = $3.83 trillion, the tax rate t=0, I = $0.86 trillion, G = $1.18 trillion, GX = $.55 trillion, and Y = $5.80 trillion. What is gross imports IM?
c. Suppose Suppose IM = $0.29 trillion, the tax rate t=0, I = $0.48 trillion, G = $0.57 trillion, GX = $.28 trillion, and Y = $2.79 trillion. What is consumption spending C?
d. Suppose Suppose IM = $0.02 trillion, the tax rate t=0, I = $0.08 trillion, G = $0.11 trillion, GX = $0.03 trillion, and C = $0.33 trillion. What is GDP Y?

a. $14.46 = Y
b. -$.62 = IM
c. $1.75 = C

d. $.53 = Y

5. In the simple income-expenditure model with real GDP Y equal to the sum of consumption spending by households C, investment spending by businesses I, government purchases G, and with net exports NX; with consumption spending C given by the equation: $C = c_o + c_yY(1-t)$; and with imports IM given by the equation: $IM = im_yY$...

a. Suppose I = $1.7 trillion, G = $3 trillion, GX = $1.7 trillion, c_o = $3 trillion, c_y = 0.5, the tax rate t=0, and im_y = .15. What is GDP Y?
b. Suppose I = $1.7 trillion, G = $3.5 trillion, GX = $1.7 trillion, c_o = $3 trillion, c_y = 0.5, the tax rate t=0, and im_y = .15. What is GDP Y?
c. Suppose I = $1.7 trillion, G = $4 trillion, GX = $1.7 trillion, c_o = $3 trillion, c_y = 0.5, the tax rate t=0, and im_y = .15. What is GDP Y?
d. Suppose I = $1.7 trillion, G = $2.5 trillion, GX = $1.7 trillion, c_o = $3 trillion, c_y = 0.5, the tax rate t=0, and im_y = .15. What is GDP Y?

a. Y = [c0+I+G+GX]/[1-cy+imy]; [3+1.7+3+1.7]/[1-.5+.15] = 14.46
b. Y = [c0+I+G+GX]/[1-cy+imy]; [3+1.7+3.5+1.7]/[1-.5+.15] = 15.23
c. Y = [c0+I+G+GX]/[1-cy+imy]; [3+1.7+4+1.7]/[1-.5+.15] = 16
d. Y = [c0+I+G+GX]/[1-cy+imy]; [3+1.7+2.5+1.7]/[1-.5+.15] = 13.69

6. In the simple income-expenditure model with real GDP Y equal to the sum of consumption spending by households C, investment spending by businesses I, government purchases G, and with net exports NX; with consumption spending C given by the equation: where Y = C + O and $C = c_o + c_yY(1-t)$; and with imports IM given by the equation: $IM = im_yY$...

a. Suppose c_y = 0.5, the tax rate t=0, im_y = 0.5, and G increases by $100 billion. What happens to GDP Y?
b. Suppose c_y = 0.5, the tax rate t=0, im_y = 0.16667, and G increases by $100 billion. What happens to GDP Y?
c. Suppose c_y = 0.9, the tax rate t=0, im_y = 0.1, and G increases by $100 billion. What happens to GDP Y?
d. Suppose c_y = 0.25, the tax rate t=0, im_y = 0.25, and G increases by $100 billion. What happens to GDP Y?

a. Change in Y = 100/[1-cy+imy]; 100/[1-.5+.5] = +$100 billion
b. Change in Y = 100/[1-cy+imy]; 100/[1-.5+.167] = +$150 billion
c. Change in Y = 100/[1-cy+imy]; 100/[1-.9+.1] = +$500 billion
d. Change in Y = 100/[1-cy+imy]; 100/[1-.25+.25] = +$100 billion

7. In the simple income-expenditure model with real GDP Y equal to the sum of consumption spending by households C, investment spending by businesses I, government purchases G, and with net exports NX; with consumption spending C

given by the equation: $C = c_o + c_yY(1-t)$; and with imports IM given by the equation: $IM = im_yY$...

a. Suppose $c_y = 0.5$, the tax rate t=0, $im_y = 0.5$, and I increases by $100 billion. What happens to GDP Y?
b. Suppose $c_y = 0.5$, the tax rate t=0, $im_y = 0.16667$, and GX increases by $100 billion. What happens to GDP Y?
c. Suppose $c_y = 0.8$, the tax rate t=0, $im_y = 0.05$, and I increases by $100 billion. What happens to GDP Y?
d. Suppose $c_y = 0.25$, the tax rate t=0, $im_y = 0.25$, and c_0 increases by $100 billion. What happens to GDP Y?

a. Change in Y = 100/[1-cy+imy]; 100/[1-.5+.5] = +$100 billion
b. Change in Y = 100/[1-cy+imy]; 100/[1-.5+.167] = +$150 billion
c. Change in Y = 100/[1-cy+imy]; 100/[1-.9+.1] = +$500 billion
d. Change in Y = 100/[1-cy+imy]; 100/[1-.25+.25] = +$100 billion

8. In the simple income-expenditure model with real GDP Y equal to the sum of consumption spending by households C, investment spending by businesses I, government purchases G, and with net exports NX; with consumption spending C given by the equation: $C = c_o + c_yY(1-t)$; and with imports IM given by the equation: $IM = im_yY$...

a. Suppose $c_y = 0.6$, the tax rate t=0, $im_y = 0.1$, and I falls by $250 billion. What happens to GDP Y?
b. Suppose $c_y = 0.6$, the tax rate t=0.2, $im_y = 0.1$, and I falls by $250 billion. What happens to GDP Y?
c. Suppose $c_y = 0.6$, the tax rate t=0.4, $im_y = 0.1$, and I falls by $250 billion. What happens to GDP Y?
d. Suppose $c_y = 0.6$, the tax rate t=0.6, $im_y = 0.1$, and I falls by $250 billion. What happens to GDP Y?
e. Since the 1930s, left-wing economists have argued that an economy with a higher share of government spending and taxes in GDP is less vulnerable to business cycle downturns. Why might this be so?

a. Change in Y = -250/[1-cy+imy]; -250/[1-.6+.1] = -$500 billion
b. Change in Y = -250/[1-cy+imy]; -250/[1-(1-.2).6+.1] = -$403 billion
c. Change in Y = -250/[1-cy+imy]; -250/[1-(1-.4).6+.1] = -$338 billion
d. Change in Y = -250/[1-cy+imy]; -250/[1-(1-.6).6+.1] = -$291 billion
e. Because as the tax rate rises the effect of a collapse of investment on spending and GDP becomes smaller. These are called "automatic stabilizers": with proportional and even more so progressive taxes declines in income do not have effects on spending as large as they otherwise would.

9. In the simple income-expenditure model with real GDP Y equal to the sum of consumption spending by households C, investment spending by businesses I,

government purchases G, and with net exports NX; with consumption spending C given by the equation: $C = c_o + c_y Y(1-t)$; and with imports IM given by the equation: $IM = im_y Y$...

a. Suppose $c_y = 0.6$, the tax rate t=0.2, $im_y = 0.0$, and G rises by $250 billion. What happens to GDP Y?
b. Suppose $c_y = 0.6$, the tax rate t=0.2, $im_y = 0.1$, and G rises by $250 billion. What happens to GDP Y?
c. Suppose $c_y = 0.6$, the tax rate t=0.2, $im_y = 0.2$, and G rises by $250 billion. What happens to GDP Y?
d. Suppose $c_y = 0.6$, the tax rate t=0.2, $im_y = 0.3$, and G rises by $250 billion. What happens to GDP Y?
e. Since the 1940s, economists have argued that as world trade and the propensity to import rise, government spending becomes less effective as a tool for boosting production and fighting depressions. Why might this be so?

a. Change in Y = +250/[1-cy+imy]; +250/[1-(1-.2).6+.0] = +$481 billion
b. Change in Y = +250/[1-cy+imy]; +250/[1-(1-.2).6+.1] = +$403 billion
c. Change in Y = +250/[1-cy+imy]; +250/[1-(1-.2).6+.2] = -$347 billion
d. Change in Y = +250/[1-cy+imy]; +250/[1-(1-.2).6+.3] = -$304 billion
e. Because as the import share rises the effect on GDP of a government spending boost becomes smaller. These are called "leakages": the effects on production and employment of a government stimulus "leak" outside of the economy to other countries

10. In the simple income-expenditure model with real GDP Y equal to the sum of consumption spending by households C, investment spending by businesses I, government purchases G, and with net exports NX; with consumption spending C given by the equation: $C = c_o + c_y Y(1-t)$; and with imports IM given by the equation: $IM = im_y Y$...

a. Suppose $c_y = 0.4$, the tax rate t=0.2, $im_y = 0.2$, and I falls by $200 billion. What happens to GDP Y?
b. Suppose $c_y = 0.6$, the tax rate t=0.2, $im_y = 0.2$, and I falls by $200 billion. What happens to GDP Y?
c. Suppose $c_y = 0.8$, the tax rate t=0.2, $im_y = 0.2$, and I falls by $200 billion. What happens to GDP Y?
d. Suppose $c_y = 1.0$, the tax rate t=0.2, $im_y = 0.2$, and I falls by $200 billion. What happens to GDP Y?
e. In 1986 your lecturer Brad DeLong and Lawrence Summers wrote a paper in which they argued that the coming of more sophisticated financial markets—in which households could borrow and repay easily and did not have to respond to a $1 decline in their incomes by cutting their consumption spending by a large fraction of $1—would be less vulnerable to business cycle downturns. It now looks as though we were catatrophically wrong. But why did we think this back then?

a. Change in Y = -200/[1-cy+imy]; +250/[1-(1-.2).4+.2] = -$227 billion
b. Change in Y = -200/[1-cy+imy]; +250/[1-(1-.2).6+.2] = -$278 billion
c. Change in Y = -200/[1-cy+imy]; +250/[1-(1-.2).8+.2] = -$357 billion
d. Change in Y = -200/[1-cy+imy]; +250/[1-(1-.2)1.0+.2] = -$500 billion
e. Because as the marginal propensity to consume falls the effect on GDP of a collapse in investment spending boost becomes smaller. People borrow to maintain their spending, rather than being forced to cut their spending dollar-for-dollar with incomes