National Income Accounting:

1. Explain whether or not, why, and how fees earned by real estate agents on selling existing homes are included in GDP.

2. Explain whether or not, why, and how unemployment insurance checks written by the government are included in GDP.

3. Explain whether or not, why, and how the value of not having to pay rent because you own the house you live in are included in GDP.

4. Explain whether or not, why, and how purchases of foreign-made airplanes by American airlines that then use them to fly intercontinental routes are included in GDP.

5. When you calculate real GDP, you do so by dividing nominal GDP by the price level; when you calculate the rate of change of real GDP you do so by subtracting the inflation rate from the growth rate of nominal GDP; why this difference in procedure?

6. When you calculate the real interest rate, do you do so by dividing the nominal interest rate by the inflation rate or by subtracting the inflation rate from the nominal interest rate? Why?

7. Suppose that the appliance store buys a refrigerator from the manufacturer on December 15, 2008 for $700, and that you then buy that refrigerator on February 15, 2009 for $1200; what is the contribution to GDP in 2008—both the amount and the classification of the transaction?

8. Suppose that the appliance store buys a refrigerator from the manufacturer on December 15, 2008 for $700, and that you then buy that refrigerator on February 15, 2009 for $1200; what is the contribution to GDP in 2009—both the amount and the classification of the transaction?

10. What are the principal flaws in using GDP per worker as a measure of material welfare? Given these flaws, why do we use it anyway?

11. Suppose a quantity grows at a steady proportional rate of 4% per year. How long will it take to double? Quadruple? Grow 1024-fold?

12. Which do you think is a more important macroeconomic variable, real GDP per capita or the unemployment rate? Why?

The Quantity Theory of Money:

Start with the quantity theory of money equation:

$$M_t V_0 e^{-v_i i_t} = P_t Y_t$$

with M equal to the nominal money stock, Y the level of output, V_0 the "baseline" velocity of money when the nominal interest rate is equal to zero, P the price level, and Y the real level of output. Let Y be constant, and let the nominal interest rate i be equal to a constant real interest rate r plus the current inflation rate—which is the same thing as the proportional rate of change of the price level.

13. Taking logs and using other algebraic steps, transform the quantity theory equation into an equation with just the inflation rate on the left-hand side and other variables from the quantity equation on the right hand side.

14. Interpret the equation—that is, tell us what economic insights you get out of the equation you have derived.

15. Assume that the money stock M is constant. Solve the equation—that is, get a family of possible time paths that may depend on initial conditions or on unspecified constants of integration for the price level and the inflation rate.

16. Interpret your solutions: what do they tell us about how the price level behaves over time with a constant money stock?

17. Assume that the money stock is growing at a constant proportional rate of 1% per year. Solve the equation—that is, get a family of possible time paths that may depend on initial conditions or on unspecified constants of integration for the price level and the inflation rate.

18. Interpret your solutions: what do they tell us about how the price level behaves over time with a constant money stock?

Solow Growth Model:

Consider a Solow growth model economy with positive labor force growth at 1% per year and zero technological progress that is on its steady-state growth path. Suddenly the rate of growth of technology undergoes a discrete, upward jump and thereafter remains constant.

19. Draw a graph sketching out, qualitatively, the path of output per worker.

20. Draw a graph sketching out, qualitatively, the path of capital per worker.

21. Draw a graph sketching out, qualitatively, the path of consumption per worker.

22. Draw a graph sketching out, qualitatively, the path of the capital-output ratio.

23. Draw a graph sketching out, qualitatively, the path of the efficiency of labor.

Suppose that we have a standard Solow economic growth model with one difference. Instead of the capital accumulation equation being $dK/dt = sY - \delta K$, instead the capital accumulation equation is $dK/dt = (s/p)Y - \delta K$, where p is the relative price of capital goods. Suppose that the savings rate s = 20% of GDP, the labor force growth rate n=1% per year, the depreciation rate δ=3% per year, the efficiency-of-labor growth rate g=1% per year, the efficiency of labor E_0 is $20,000 per year, and the diminishing returns to investment parameter α is 1/2.

24. Suppose that the price of capital goods p_k=1. What is the economy's balanced-growth steady-state capital-output ratio?

25. Suppose that the opening up of world trade with more advanced economies reduces p_k by half, so that the new p_k =0.5. What is the effect of such a reduction in the price of capital on the economy's balanced-growth steady-state capital-output ratio?

26. Write down an algebraic expression for the steady-state capital-output ratio as a function of the price of capital goods p, the savings rate, the population growth rate n, the depreciation rate δ, and the rate of growth of the efficiency of labor g.

27. Suppose that the economy had been on its balanced-growth path before the sudden drop of 50% in the price of capital. What is the approximate growth rate of output per worker in the first year after the sudden drop in the price of capital?

28. What is the long-run proportional boost in the level of output per capita that will eventually be created by the opening-up of international trade and the fall in the price of capital goods?

29. On which continent, mostly, are the world's poorest economies located?

Open-Economy Macroeconomics:

Start with the consensus open-economy business cycle model, in differences form:

$$\Delta Y = \Delta C + \Delta I + \Delta G + \Delta GX - \Delta IM$$
$$\Delta C = (2/3)(1-1/4)\Delta Y$$
$$\Delta I = -3000\Delta r$$
$$\Delta G = 0$$
$$\Delta GX = 150\Delta\varepsilon$$
$$\Delta IM = 0.1\Delta Y$$
$$\Delta\varepsilon = \Delta\varepsilon_0 - 10\Delta r$$

30. Suppose that in the flexible-price version of the model—with Y fixed at potential output—foreign exchange speculators panic and the price of foreign currency ε jumps upward by an amount $\Delta\varepsilon_0$=20%=0.2. What happens to consumption spending C?

31. What happens, in the flexible-price model, to investment spending I?

32. What happens, in the flexible-price model, to gross exports spending GX?

33. What happens, in the flexible-price model, to the interest rate r?

34. Now consider the sticky-price version of the model, in which the level of output can change and the Federal Reserve sets the real interest rate r. Suppose that the Federal Reserve keeps the interest rate r constant as foreign exchange speculators panic and the price of foreign currency ε jumps upward by an amount $\Delta\varepsilon_0$=20%=0.2. What happens to consumption spending C?

35. What happens, in the sticky-price model, to gross exports spending GX?

36. What happens, in the sticky-price model, to the interest rate r?

Government Budgets and National Saving

Recall our Solow growth model:

$$Y_t = K_t^{\alpha} L_t^{1-\alpha} E_t^{1-\alpha}$$

$$\frac{d}{dt}\ln(L_t) = n$$

$$\frac{d}{dt}\ln(E_t) = g$$

$$\frac{d}{dt}\ln(K_t) = sY_t - \delta K_t$$

steady-state growth capital-output ratio:

$$\kappa^* = \left(\frac{K_t}{Y_t}\right)^* = \frac{s}{n+g+\delta}$$

net rate of return:

$$r = \frac{\partial Y_t}{\partial K_t} - \delta$$

37. Suppose that the economy is on its steady-state growth path with $\alpha = 1/4$, $\delta = 0.05$, $n = 0.02$, $g = 0.02$, and $s = 25\%$. What is the net social rate of return on investment?

38. Is the savings rate "too high," "too low," or just right, according to the Golden Rule?

39. What kind of long-run surplus or deficit fiscal policy would you recommend that the government run?

Moral Hazard: Suppose that the demand for mortgage loans by "good borrowers" is given by:

$D = 60000(0.2 - r)$

where D is total demand in billions of dollars and an r of 5% means r=0.05. Suppose further that the demand for mortgage loans by "bad borrowers" is simply some parameter y. Banks earn a net rate of interest of 0 on the loans they make to bad borrowers. Banks earn the posted rate of interest on the loans they make to good borrowers. Assume that the banking industry is competitive: banks make loans at a posted interest rate that gives them an average return equal to their cost of funds.

40. Suppose y = 6000 and the cost of funds to banks is perfectly elastic at 1%. What volume of loans are made in equilibrium?

41. How many loans go to good borrowers?

42. How many loans go to bad borrowers?

43. Suppose y = 4000 and the cost of funds to banks is perfectly elastic at 5%. What volume of loans are made in equilibrium?

44. How many loans go to good borrowers?

45. How many loans go to bad borrowers?

Financial Crises:

Start with the open-economy business cycle model, in differences form:

$$\Delta Y = \Delta C + \Delta I + \Delta G + \Delta GX - \Delta IM$$
$$\Delta C = (0.75)(1 - 1/3)\Delta Y$$
$$\Delta I = -2000\Delta r - 10\chi$$
$$\Delta G = 0$$
$$\Delta GX = 100\Delta\varepsilon$$
$$\Delta IM = 0.1\Delta Y$$
$$\Delta\varepsilon = \Delta\varepsilon_0 - 10\Delta r$$
$$\chi = \phi(\Delta\varepsilon)^2$$

where χ is the intensity of financial crisis, determined by the square of the upward jump in the price of foreign currency do to mismatch (i.e., banks that have loaned at home but borrowed abroad in foreign currency) and the parameter ϕ.

47. Suppose that there is a collapse of confidence by foreign exchange speculators that makes $\Delta\varepsilon_0 = 0.5$, with $\phi = 0$. What does the model say might happen in a flexible-price scenario (with the change in output equal to zero)?

48. What does the model say might happen in a sticky-price scenario (with the central bank being able to affect the interest rate and the exchange rate)?

49. Suppose that there is a collapse of confidence by foreign exchange speculators that makes $\Delta\varepsilon_0 = 0.5$, with $\phi = 0$. What does the model say might happen in a flexible-price scenario (with the change in output equal to zero)?

50. What does the model say might happen in a sticky-price scenario (with the central bank being able to affect the interest rate and the exchange rate)?

Business Cycle Macro:

51. What is the *flexible-price short-run model*?

52. What is the *sticky-price short-run model?*

53. What is the *Phillips Curve*?

54. What is the *monetary policy reaction function?*

55. What is a *financial crisis?*

56. What is the *IS Curve?*

Suppose that we have the following sticky-price income-expenditure model of the economy:

$Y = C+I+G+NX$ (national income identity)
$C = C_0 + 0.8(1-t)Y$ (consumption function)
$T = tY$ (taxes)
$NX = GX - IM$ (net exports)
$IM = 0.1 \times Y$ (imports)
$t=0.25$ (tax rate)

And suppose that I, G, and GX are determined outside this model.

57. Solve, algebraically, for Y as a function of the outside variables I, G, GX, and C_0.

58. What is the value of the *multiplier* in this model?

59. Give a question that you need to know the value of the *multiplier* to answer.

60. Suppose that the sum $C_0 + I + G + NX$ increases by $200 billion. By how much does equilibrium real GDP Y change?

61. Suppose that the tax rate were to go up from 25 to 62.5 percent. What then would the value of the multiplier be?

62. If you can restore the economy to full employment either by cutting interest rates so as to increase investment I or by increasing government spending G, what considerations would lead you to favor one such policy move over another?

63. If you can restore the economy to full employment either by cutting taxes or by increasing government spending, what considerations would lead you to favor one such policy move over another?

Suppose that the sticky-price model has:

$$Y = C + I + G + NX$$
$$C = C_0 + C_y(1 - t)Y = \$3000 + 0.5(1 - .4)Y$$
$$I = I_0 - I_r r = \$1200 - \$100r$$
$$GX = X_f Y^f + X_\varepsilon \varepsilon = 0.1Y^f + \$4\varepsilon$$
$$IM = IM_y Y = .2Y$$
$$NX = GX - IM$$
$$\varepsilon = 100 + 10(r^f - r)$$

64. Suppose further that the foreign interest rate r^f is 5%, that total foreign income Y^f is \$10000, and that government spending G is \$3000. Derive the IS Curve for the economy: real GDP as a function of the interest rate.

65. Suppose that the Federal Reserve thinks that potential output Y* is \$7000. At what level should it try to set the interest rate r?

66. Suppose that the foreign interest rate were to increase to 10%. What would be the equation for the IS curve then?

Monetary Policy:

On April 30 the Federal Reserve issued this press release:

> The Federal Open Market Committee decided today to raise its target for the federal funds rate by 25 basis points to 4 percent. Elevated energy prices and hurricane-related disruptions in economic activity have temporarily depressed output and employment. However, monetary policy accommodation, coupled with robust underlying growth in productivity, is providing ongoing support to economic activity that will likely be augmented by planned rebuilding in the hurricane-affected areas. The cumulative rise in energy and other costs has the potential to add to inflation pressures; however, core inflation has been relatively low in recent months and longer-term inflation expectations remain contained. The Committee perceives that, with appropriate monetary policy action, the upside and downside risks to the attainment of both sustainable growth and price stability should be kept roughly equal. With underlying inflation expected to be contained, the Committee believes that policy accommodation can be removed at a pace that is likely to be measured. Nonetheless, the Committee will respond to changes in economic prospects as needed to fulfill its obligation to maintain price stability. The Federal Open Market Committee decided today to lower its target for the federal funds rate 25 basis points to 2 percent.
>
> Recent information indicates that economic activity remains weak. Household and business spending has been subdued and labor markets have softened further. Financial markets remain under considerable stress, and tight credit conditions and the deepening housing contraction are likely to weigh on economic growth over the next few quarters.
>
> Although readings on core inflation have improved somewhat, energy and other commodity prices have increased, and some indicators of inflation expectations have risen in recent months. The Committee expects inflation to moderate in coming quarters, reflecting a projected leveling-out of energy and other commodity prices and an easing of pressures on resource utilization. Still, uncertainty about the inflation outlook remains high. It will be necessary to continue to monitor inflation developments carefully.
>
> The substantial easing of monetary policy to date, combined with ongoing measures to foster market liquidity, should help to promote moderate growth over time and to mitigate risks to economic activity. The Committee will continue to monitor economic and financial developments and will act as needed to promote sustainable economic growth and price stability.
>
> Voting for the FOMC monetary policy action were: Ben S. Bernanke, Chairman; Timothy F. Geithner, Vice Chairman; Donald L. Kohn; Randall S. Kroszner; Frederic S. Mishkin; Sandra Pianalto; Gary H. Stern; and Kevin M. Warsh. Voting against were Richard W. Fisher and Charles I. Plosser, who preferred no change in the target for the federal funds rate at this meeting.

> In a related action, the Board of Governors unanimously approved a 25-basis-point decrease in the discount rate to 2-1/4 percent. In taking this action, the Board approved the requests submitted by the Boards of Directors of the Federal Reserve Banks of New York, Cleveland, Atlanta, and San Francisco.

67-75. Using the tools and models of this course, explain what the Federal Reserve thinks that it is doing.