

- 1.
- a) The following variables are trending over time: CPI, Real GDP, and M1 money stock. The Unemployment rate and Federal Funds Rate appear to revert to a well-defined mean. The fed funds rate does have large positive deviations throughout the 1970s and 1980s, but has a mean of roughly 5%. The unemployment rate fluctuates around a mean of roughly 5.5%.
 - b) See figures on last page.
 - c)
 - 1973-75: Real GDP growth was negative; the inflation rate increased; M1 money growth declined slightly; unemployment increased; fed funds rate increased.
 - 1981-82: Real GDP growth was negative; the inflation rate decreased; M1 growth declined sharply at onset of recession then steady; unemployment increased; fed funds rate increased.
 - 2001: Real GDP growth was negative; the inflation rate decreased; M1 money growth increased sharply at the onset of recession; unemployment increased; fed funds rate decreased.
 - d) Procyclical: Real GDP, perhaps M1 growth? Countercyclical: Unemployment rate. We can see that interest rates and inflation (and perhaps M1 growth) do not have a clear relationship with the business cycle. This suggests more than one possible cause of recession.
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- 2.
- a) C increases, NX decreases, GDP unchanged.
 - b) No effect (intermediate good).
 - c) G and GDP increase.
 - d) I and GDP increase.
 - e) No change in GDP, financial assets are not included in GDP.
 - f) No change in GDP, it only includes new final goods.
 - g) I and GDP increase.
 - h) G and GDP increase.
 - i) NX increases (exports increase) and GDP increases.
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- 3.
- a) Not in the labor force because not seeking work.
 - b) Not in the labor force (discouraged worker).
 - c) In the labor force, employed.
 - d) Not in the labor force (while on maternity leave) because not seeking work.
 - e) In the labor force because seeking a job. This individual is unemployed.
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- 4.
- a)
 - i. Nominal GDP = $(\$4 \times 300) + (\$250 \times 25) + (\$30 \times 0) = \mathbf{7450}$
 - ii. Real GDP = $(\$3 \times 300) + (\$200 \times 25) + (\$10 \times 0) = \mathbf{5900}$
 - iii. GDP deflator = $100 \times \text{nominal GDP} / \text{real GDP} = 100(7450/5900) = 126$
 - iv. CPI = $100 \times \frac{(\$4 \times 200) + (\$250 \times 30) + (\$30 \times 40)}{(\$3 \times 200) + (\$200 \times 30) + (\$10 \times 40)} = 100 \left(\frac{9500}{7000} \right) = \mathbf{136}$
 - b)
 - i. $\pi^{\text{GDP Deflator}} = \frac{126-100}{100} = 0.26 = \mathbf{26\%}$
 - ii. $\pi^{\text{CPI}} = \frac{136-100}{100} = 0.36 = \mathbf{36\%}$

- c) The CPI suggests that prices have risen much more because it gives taxicab rides more weight than the GDP deflator, even though no taxicab rides were purchased in 2001. Usually the CPI provides a better measure for the cost of living because it excludes the prices of producer goods. The problem with the CPI is that it overstates the cost of living because it ignores substitution effects. When prices of taxicab rides increased in this economy, clearly individuals simply substituted away from taxicabs in favor of some other mode of transportation not counted here.

The GDP deflator may be a better measure because it reflects changes in quantities, adjusting for the substitution effects mentioned above. The problem with the GDP deflator is that it includes all goods, not just consumption goods. For instance, if producer prices increased significantly, the GDP deflator would reflect a large increase in prices, even though households may not be affected by the change in producer prices.

5.

- a) Show $F(zK, zL) = zF(K, L)$
 $z10K^{0.25}L^{0.75} = 10(zK)^{0.25}(zL)^{0.75}$
 $zY = 10z^{0.25}K^{0.25}z^{0.75}L^{0.75}$
 $zY = z10K^{0.25}L^{0.75}$
 $zY = zY \Rightarrow$ the production function has constant returns to scale.

- b) Payment to workers = $MPL \times L = (7.5 K^{0.25} L^{-0.25}) \times L$
 $= 7.5 K^{0.25} L^{1-0.25} = 7.5 K^{0.25} L^{0.75} = 7.5 (Y/10) = 0.75Y \Rightarrow$ **workers get 75% of output**

Payment to owners of capital = $MPK \times K = (2.5K^{-0.75}L^{0.75}) \times K$
 $= 2.5K^{1-0.75}L^{0.75} = 2.5 K^{0.25}L^{0.75} = 2.5(Y/10) = 0.25Y \Rightarrow$ **owners of capital get 25% of output**

Workers get the larger share of output.

- c) As the U.S. labor force increases, each worker has less capital to work with. Therefore, MPL will fall (recall diminishing marginal returns) and consequently, the real wage must fall. Given more labor, each unit of capital becomes more productive, so the MPK increases. This means the real rental rate of capital must increase.

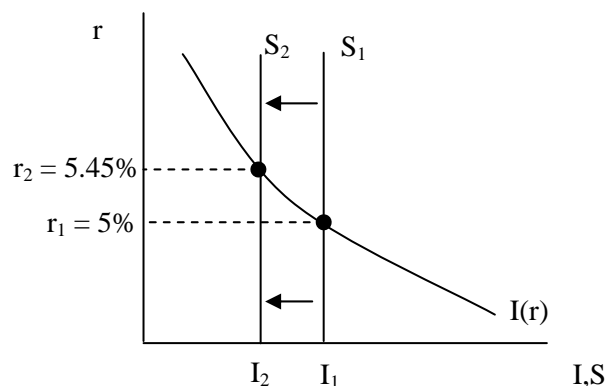
The workers and owners of capital receive the same shares of output as before, but the prices paid to these inputs change. The real rental rate of capital increases, while the real wage falls. This means that each individual worker will be worse off (while workers as a whole receive the same share of output) in terms of the real wage he receives.

6.

a) $Y = C + I + G$
 $1650 = 200 + 0.6(1650 - 150) + 400 - 2000r + 250$
 $-100 = -2000r$
 $r = 0.05 \Rightarrow r = 5\%$

$C = 200 + 0.6(1650 - 150) = 1100$
 $I = 400 - 2000(0.05) = 300$

b) $S_g = T - G = -100$
 $S_p = Y - C - T = 1650 - 1100 - 150 = 400$
 $S = S_g + S_p = -100 + 400 = 300 = I$



c) $1650 = 200 + 0.6(1650 - 135) + 400 - 2000r + 250$
 $-109 = -2000r$
 $r = 0.0545 \Rightarrow r = 5.45\%$

$C = 200 + 0.6(1650 - 135) = 1109$
 $I = 400 - 2000(0.0545) = 291$
 C increases by 9 and I decreases (crowding out) by 9.

d) $S_g = T - G = -115$
 $S_p = Y - C - T = 1650 - 1109 - 135 = 406$
 $S = S_g + S_p = -115 + 406 = 291 = I$

e) The tax cut causes total savings to decrease, decreasing the supply of funds in the financial market. This causes the interest rate to rise, and investment to fall.