

Econ 105: Final Exam Postmortem

PART 1: MULTIPLE CHOICE: 1B; 2B; 3C; 4D; 5C; 6D; 7D; 8B; 9E; 10C

PART 2:

2.1 Suppose that in SimpleLand,

$$(1) \quad Y = C + I + G + X - M$$

$$(2) \quad C = c_0 + c_1 Y_d$$

$$(3) \quad M = m_0 + m_1 Y$$

$$(4) \quad Y_d = d_0 + d_1 Y$$

Here Y is GDP, C is consumption, I investment, G government spending on goods and services, X exports, M imports and Y_d disposable income.

a. The reduced form equation explaining Y in terms of the exogenous variables of the

$$\text{model is } Y(I, G, X) = \frac{1}{1 - c_1 d_1 + m_1} [c_0 + c_1 d_1 + I + G + X - m_0].$$

b. The government spending multiplier is $\frac{\partial Y}{\partial G} = \frac{1}{1 - c_1 d_1 + m_1}$

c. A simultaneous \$10 billion increase in government spending on goods and services coupled with a \$10 billion lump sum tax increase involves changes $\Delta G = -\Delta d_0 = \10 billion. Since the reduced form equation is linear, the resulting change in Y

$$\text{is } \Delta Y = \frac{1 - c_1}{1 - c_1 d_1 + m_1} 10$$

2.2 The Phillips curve for Simpleland is

$$\dot{p}(U) = \frac{0.0012}{U - 0.03} - 0.02$$

Here \dot{p} is the rate of inflation and U is the unemployment rate.

a. \dot{p} (4%) = $0.0012/0.01 - 0.02 = 0.12 - 0.02 = 10\%$.

b. At the full-employment unemployment rate, $\dot{p} = 0$, implying $U = 9\%$

c. If Econoland has the following expectations augmented Phillips Curve

$$\dot{p}(U, \hat{p}) = \frac{0.0012}{u - 0.03} - 0.02 + \hat{p}, \text{ where } \hat{p} \text{ is the expected rate of inflation then the natural}$$

unemployment rate (NAIRU - non-accelerating inflation rate of unemployment),

characterized by $\dot{p} = \hat{p} = 0$, is again 9%.

d. What is the significance of the difference between the two alternative formulations of the Phillips Curve?

The Simpleland formulation of the Phillips Curve asserts that there is a permanent tradeoff between inflation and unemployment, as argued by Samuelson-Solow in their infamous 1959 paper.

The Econoland formulation of the Phillips Curve says there is no long run tradeoff.

Because \hat{p} responds to the experience of inflation, the long run effect of holding U

below its natural rate is an accelerating rate of inflation – prices rise faster and faster.

- 2.3 If the demand function for widgets is $q = 10p^{-.5}Y^{.75}$, then $\eta_p = 1/2$ because $\partial q/\partial p = q/2p$. Also, $\eta_y = 3/4$.

If a 20% rise in train fare from New Haven to New York caused ridership to drop off by 10%, the elasticity of demand is $10\%/20\% = 1/2$.

- 2.4 If the Central Bank purchases \$1 billion worth of government securities on the open market, this transaction will increase the reserves of the commercial banks by \$1 billion (the Central Bank pays for the open market purchase by adding \$1 billion to the banks' deposits at the Fed)

If the banks were initially loaned up, the open market operation has given the commercial banks excess reserves. The banks will want to put these reserves to work earning interest by making more loans to businesses and consumers.

Because the required reserve ratio is $1/10^{\text{th}}$, an increase in demand deposits of \$10 billion must be generated by the banking system in order to put the \$1 billion of additional reserves to work, avoiding idle excess reserves. In this way the \$1 billion open-market operation generates a \$10 billion increase in the money supply.

The increase in the money supply would be expected to push down interest rates because it pushes the LM curve to the right. The fall in interest rates will stimulating private investment spending, $I(r)$. Output will expand as the economy slides down the IS curve. The expanding output may lead to higher prices.

- 2.5 Consider the following price data for the United States

Year	CPI (1982-84=100)	Price of motor fuel (1982-84=100)	Real price of motor fuel (1982-84=100)	Real price of motor fuel (1999=100)
1970	38.8	27.9	71.9	119.0
1980	82.4	97.4		
1990	130.7	101.2		
1999	166.6	100.7	60.4	100.0

Show your computations:

- a. Compute the real price of motor fuel for 1970 and 1999 twice, once with 1982-94 = 100 and again with 1999=100.

The real price of motor fuel is the price of motor fuel divided by the CPI; since both those indices have 1982-94 = 100, so will the resulting real price index.

To normalize so as to have 1999 = 100, one multiplies every entry in the 1982-84=100 index by the appropriate conversion factor, which is the reciprocal of the level of the real price index in 1999.

- b. At what rate per annum was the general price level increasing from 1990 to 1999.
 $166.1/130.7 = 1.27467 = (1 + \dot{p})^{10}$ or $1 + \dot{p} = 1.27^{1/10} = 1.02456$. Therefore, $\dot{p} = 2.46\%$

Remember, inflation compounds, just like compound interest on money in the bank.

- c. If prices continue to increase in the future at the same rate as they had in the 1990s, how long will it take for prices to double?

Solve $(1+2.72\%)^t = 2$ for t by taking logs of both sides: $t \times \ln(1.0272) = \ln 2$, or use the shortcut rule of 70 approximation: $t = 70/2.72$

- d. If you arranged a loan from your bank at 10% interest in 1999, and you expected the same rate of inflation to prevail in the future as from 1990 to 1999, what would be your *ex ante* real rate of interest? Explain

$r_r = 10\% - 2.456\% = 7.54\%$ is a close enough approximation to $r^r = (r - \dot{p}) / (1 + \dot{p}) = 7.1\%$

- 2.6 Our firm's total cost function is $C(q) = q^2 + 4q + 4$.

- a. If you could sell your output on a competitive market at a price of \$10, how many units would you sell in order to maximize total profits?

Since $R = 10q$, profits are $\pi = 10q - (q^2 + 4q + 4)$; therefore, $d\pi/dq = 0$ implies $q = 3$.

- b. Determine the equation for average total cost; then find the level of output at which average total cost will be at a minimum.

$C(q)/q = q + 4 + 4q^{-1}$. To minimize average cost, set $d[C(q)/q]/dq = 1 - 4q^{-2} = 0$, yielding $q^2 = 4$ or $q = 2$. To verify we have a minimum note that $d^2[C(q)/q]/dq^2 = +4q^{-3} > 0$. The minimum value of average total cost is $C(2)/2 = 2 + 4 + 2 = \$8$.

- c. Suppose the price falls to \$5. How much will you market in the short run and what will you do in the long run?

If the price falls to \$5 your profit function will be $\pi = 5q - (q^2 + 4q + 4)$; solving, $\partial\pi/\partial q = 5 - 2q - 4 = 0$ yields profit maximizing output level $q = 1/2$. Your revenue is \$2.50, your costs are \$6.25, and $\pi = -\$3.75$. That is terrible, but if you shut down your plant you would do even worse, losing \$4.00 in the short run!

In the longrun you will terminate the business (Retailer Montgomery Wards is closing its doors after more than 128 years. Bradleys recently declared bankruptcy)

- d. If there is free entry and exit from this industry, all firms having the same cost function, what will be the long run competitive price and how much will our representative firm sell?

Firms will exit the industry in the long run until the remaining stores at least break even. This involves each firm operating at the minimum point of the average total cost curve found in 2.5b. Each firm sells 2 units at a price of \$8.

Note: Some students suggested the firm should work more efficiently or invest in better machinery in order to turn itself around. But if the firm is already maximizing profits, there is no scope for operating with lower costs. That is the answer of mainstream economists. Some economists argue that firms usually don't work hard to minimize costs and go on to explain that when times get tough firms cut costs by getting rid of "organizational slack."

PART 3: (20 points) Consider the table of data on the next page for the U.S. economy during the Great Depression of the 1930's.

- 3.1 Show your mastery of macroeconomic indicators by defining 4 (only 4) of the following concepts: 1. Disposable Income, 2. Implicit Price Deflator (IPD), 3. M1, 4. Real Interest Rate, 5. Unemployment rate

Students who only identified the concepts did not receive as much credit as those who provided a clear and concise definition.

- 3.2 Write a brief essay explaining the most intriguing and surprising economic aspects of the Great Depression. How severe was the depression? On the basis of the evidence presented in the table, to what would you attribute the collapse of the economy. Was it mistaken policy of the Federal Reserve System? Was it errors in fiscal policy? What policy would you prescribe in order to get the economy rolling again? What additional evidence would you like to have in resolving these issues?

The essays were interesting. In response to a number of suggestions I will try to construct a better table of data describing the Great Depression of the 1930s. I will paste the enlarged table in the version of the Final on the Web.