

Midterm Examination

October 28, 2005

Instructions. Answer all the questions in your bluebook. You have 90 minutes to complete the exam, which consists of 5 problems. The first problem is worth 34 points, the second 35 points, the third 6 points, the fourth 9 points, and the fifth problem is worth 16 points, for a total of 100 points. This exam has 3 pages. Good luck!

Overview: Hurricane Katrina and the resulting floods destroyed large sections of the Gulf Coast. A large rebuilding effort has already begun, and will probably continue for some time. In this exam, we will consider the effects of both the hurricane and the reconstruction.

1. (34 points) On October 7, 2005, Gannett News Service Reporter Brian Tumulty wrote:

The September unemployment rate ticked upward to 5.1 percent from August's four-year low of 4.9 percent mostly because of Hurricane Katrina, Labor Department officials said Friday. How fast the Gulf Coast area recovers and rebuilds will determine whether employment recovers in the coming month.

Let's analyze this statement with the one-period macroeconomic model, where consumers choose labor supply and firms choose labor inputs.

- (a) Suppose that the Gulf Coast is rebuilt by contractors hired by the government. Using the social planner's framework, determine how this action will affect aggregate output, consumption, employment and the real wage. For the moment, assume the reconstruction occurs in isolation; ignore the effects of the hurricane itself. Use a graph to illustrate your findings and briefly explain your results.
- (b) In contrast to the assumption behind part (a), the rebuilding effort was a response to the destruction of capital caused by the hurricane. Using the labor demand-labor supply framework, determine how the capital loss and an ongoing government-purchased reconstruction will jointly affect aggregate output, consumption, employment and the real wage. Use a graph to illustrate your findings and briefly explain your results.
- (c) Is your answer to part (b) consistent with Mr. Tumulty's discussion? Briefly explain.

2. (35 points) Next, let's use the Solow model. Total output (Y , measured in billions of year-2000 U.S. dollars) is given by

$$Y = zK^{0.35}N^{0.65},$$

where K is the aggregate capital stock, N denotes the work force (measured in millions), and z denotes total factor productivity. Assume that $z = 14$, and N equals 150. Investment is equal to 20 percent of output. Capital depreciates at a rate of 8 percent per year, while the work force is constant.

- (a) Derive the per worker production function, $y = zf(k)$, where y and k are output and capital per worker, respectively.
- (b) In the Solow model, the steady-state capital stock, k^* , will satisfy

$$s \cdot y^* = (n + d)k^*,$$

where s denotes the saving rate, n denotes the growth rate of the labor force, and d denotes the depreciation rate. Find the steady state quantities k^* , y^* , i^* and c^* .

- (c) Suppose that the hurricane leads homeowners and businesses to use more-flood-resistant facilities and procedures, which permanently reduces total factor productivity (TFP) from 14 to 13. Find the revised values of k^* , y^* , i^* and c^* .
- (d) Use a graph to illustrate how k^* , y^* , i^* and c^* have moved from their values in part (b).
- (e) Suppose that in addition to lowering TFP, Hurricane Katrina reduces the per worker capital stock, k , to 150 (in thousands of year-2000 U.S. dollars). In the period following the hurricane (as opposed to the long term), will k increase or decrease? Briefly explain.

3. (6 points) Now let's consider an endogenous growth model. Output per worker, y , is given by

$$y = Ak,$$

where k denotes capital per worker and A is a constant. Future capital per worker, k' , follows

$$k' = Bk,$$

where B is a constant depending on A and the savings, population growth and depreciation rates. Suppose that Hurricane Katrina lowers k by 50 percent, but has no effect on A or B . How will this affect output per worker in both the short- and long-run? How will this affect output growth? Briefly explain.

4. (9 points) Consider how the resources spent on the rebuilding effort would appear in the National Accounts. Note that some of the rebuilding will be paid for by the government, and some will be paid for privately.

- (a) Which expenditure categories would the rebuilding effort appear in? Be succinct.
- (b) What is likely to be the **joint** effect of the hurricane and the rebuilding expenditures on national wealth? Contrast short- and long-term effects. Briefly explain.

5. (16 points) While many parts of New Orleans were devastated, the tourist district received relatively little damage. Suppose this unbalanced effect meant that fast food became much scarcer and more expensive, but the quantity and price of fancy dinners did not. Consider how this might affect measured real output, by completing the following table

	<u>Year 1</u>	<u>Year 2</u>
Quantity Fast Food (meals)	1,000	400
Quantity Fine Dinners (meals)	200	150
Price Fast Food (\$/meal)	5	15
Price Fine Dinners (\$/meal)	50	75
Nominal GDP (\$)		
Real GDP Using Year-1 Prices (year-1 \$)		
Gross Growth Rate	NA	
Real GDP Using Year-2 Prices (year-2 \$)		
Gross Growth Rate	NA	
2-year Geometric Averages	NA	
Chain-Weighted Real GDP (year-2 \$)		