

Midterm Examination

October 28, 2008

Instructions. Answer all the questions in your bluebook. You have 90 minutes to complete the exam, which consists of 6 problems. The first problem is worth 32 points, the second 15 points, the third 5 points, the fourth 21 points, the fifth 19 points, and the sixth problem is worth 8 points, for a total of 100 points. This exam has 3 pages. Good luck!

Overview: Most of world is currently immersed in a financial crisis. Financial assets have lost significant fractions of their value, and financial institutions have become much less willing (or able) to lend.

1. (32 points) On October 10, 2008, Ron Scherer of the Christian Science Monitor wrote:

The dramatic changes in the US financial system - the debt write-downs and consolidation of corporate balance sheets - are now mirrored at kitchen tables around the United States ... Americans are now trying to live within their incomes. If they succeed, it would boost (increase) the anemic US savings rate and signal a shift in the way Americans view their finances.

Let's analyze the effect of a higher saving rate with the Solow model. Total output (Y , measured in millions) is given by

$$Y = zK^{0.36}N^{0.64},$$

where K is the aggregate capital stock, N denotes the work force (measured in millions), and z denotes total factor productivity. Assume that $z = 11$, and N equals 200. Saving/investment is equal to 15 percent of output. Capital depreciates at a rate of 8 percent per year, while the work force grows at a rate of 2 percent a year.

- (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 financial crisis permanently increases the saving rate from 15 to 20 percent. 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).

2. (15 points) Consider the following version of an endogenous growth model. Output per worker (y) is given by

$$y = Ak,$$

where k denotes capital per worker, and $A = 0.7551$ is a constant. Continuing, it can be shown that capital per worker follows.

$$k'(1 + n) = s \cdot y + (1 - d)k,$$

where s denotes the saving rate, n denotes the growth rate of the labor force, and d denotes the depreciation rate. Consistent with problem 1, suppose that capital depreciates at a rate of 8 percent per year and the work force grows at a rate of 2 percent a year.

- (a) Derive an expression for the gross growth rate of capital, $G_k = k'/k$.
 - (b) Suppose that the saving rate is 15 percent. What is the net growth rate of per worker capital (and output, investment and consumption)?
 - (c) Suppose that the saving rate increases from 15 to 20 percent. What happens to the net growth rate?
 - (d) Would the increase in the saving rate make consumers better or worse off, or is the effect uncertain? Briefly explain.
3. (5 points) The models considered in problems 1 and 2 are for closed economies, where investment equals saving. The U.S., however, has an open economy. In fact, the data show that U.S. investment has fallen in recent months. If private saving is rising, and investment is falling, what must happen to government saving and/or the current account balance? Briefly explain.
4. (21 points) The quote in problem 1 also suggests that consumers will purchase fewer luxury goods, and a recent article by the Associated Press claims that the “luxury goods industry faces hard times”. Consider how this might affect measured real output, by completing the following table:

	<u>2007</u>	<u>2008</u>
Quantity Peanut Butter (billions of jars)	15	20
Quantity Caviar (billions of cans)	2	1
Price Peanut Butter (\$/jar)	3	3.5
Price Caviar (\$/can)	25	15
Nominal GDP (\$billions)		
Real GDP Using Year-2007 Prices (billions of year-2007 \$)		
Gross Growth Rate	NA	
Real GDP Using Year-2008 Prices (billions of year-2008 \$)		
Gross Growth Rate	NA	
2-year Geometric Averages	NA	
Chain-Weighted Real GDP (billions of year-2008 \$)		
Chain-Weighted GDP Deflator		
Inflation per Deflator	NA	

5. (19 points) In the past 6 months, the Dow Jones Industrial Average, an index of stock prices, has fallen from 13,000 to around 8,500. Let's analyze this event with the one-period macroeconomic model, where consumers choose labor supply and firms choose labor inputs. Assume that there is **no** change in the economy's physical capital stock.
- (a) In terms of its effects on labor supply, would a decrease in stock prices be analogous to an increase in (unproductive) government spending (funded by lump-sum taxes), or a decrease? Briefly explain.
- (b) How would a decrease in stock prices affect the economy? Use the labor demand-labor supply framework to find out how aggregate output, consumption, employment and the real wage change. Use a graph to illustrate your findings and briefly explain your results.
6. (8 points) The Emergency Economic Stabilization Act of 2008, better known as the "financial sector bailout", authorized the U.S. Department of the Treasury to purchase unsound assets from financial firms. The Act funds both the purchases themselves and their administrative costs. Which part of these expenditures would appear in the U.S. national accounts? Where would they appear? Briefly explain.