

Final Examination
December 19, 2005

Instructions. Answer all the questions in your bluebook. You have 2 hours to complete the exam, which consists of 6 problems. The first problem is worth 20 points, the second 44 points, the third 27 points, the fourth 52 points, the fifth 15 points, and the sixth problem is worth 42 points, for a total of 200 points. This exam has 3 pages. Good luck!

Overview: In a CNN.com article posted December 8, 2005, the Associated Press writes:

Voting mostly along party lines, the [U.S.] House [of Representatives] narrowly passed a \$56 billion, five-year package of tax cuts that retains reduced tax rates on capital gains and dividends in 2009 and 2010. The vote was 234-197.

Republicans said their record of tax cutting revitalized a sluggish economy, and the White House praised the bill. “These extensions are necessary to provide certainty for investors and businesses and are essential to sustaining long-term economic growth,” the president’s budget office said in a statement.

In this exam, we will analyze the Republican comments. To simplify the analysis, assume that the tax cut takes the form of a cut in the future corporate income tax rate—a cut in corporate income taxes will have the same practical effects as a cut in taxes on capital gains and dividends.

1. (20 points) Consider an investment decision with corporate income taxes. The firm’s future output is given by

$$Y' = z' (K')^{0.4} (N')^{0.6},$$

where: Y' is future output; K' is future capital; $N' = 2154.4$ is future labor; and $z' = 0.1$ is future total factor productivity. Capital evolves according to:

$$K' = (1 - d) K + I,$$

where: $K = 311.83$ is current capital; $d = 0.07$ is the depreciation rate and I denotes investment. The firm chooses future capital to maximize

$$\Pi = \frac{1}{1+r} [(1-x)Y' + (1-d)K'] - [K' - (1-d)K],$$

where $r = 0.03$ is the real interest rate, and $x = 0.2$ is the *future* corporate income tax rate.

- (a) Show that the optimal value of K' is 322.54, by verifying the optimality condition $(1-x)MP'_K = r + d = uc$. What is desired investment?
- (b) Now suppose that x decreases to 0.1. Show that the optimal value of K' is now 392.5. What is the new value of desired investment?

2. (44 points) Because corporate income taxes eventually reduce dividend income and capital gains, a reduction in the corporate income tax rate decreases consumers' taxes. Let's analyze the effect of a cut in *future* corporate taxes in the two-period consumption model.

The consumer's preferences over current and future consumption (c and c') are:

$$U(c, c') = \ln(c) + \ln(c').$$

Recalling that we denotes lifetime wealth, it can be shown that with these logarithmic preferences the optimal consumption allocation is

$$c = \frac{1}{2}we; \quad c' = \frac{1}{2}(1+r)we.$$

The consumer's budget parameters are given by

$$\begin{aligned} y &= 220; & t &= 40, \\ y' &= 216; & t' &= 48, \\ r &= 0.2, \end{aligned}$$

where y and y' are current and future income, t and t' are current and future lump-sum taxes—from the consumer's perspective, corporate income taxes are lump-sum—and r is the real interest rate

- Find lifetime wealth. Using the formula for logarithmic preferences, find the optimal levels of current consumption, future consumption and saving.
 - Confirm that the allocation you found is in fact optimal, by checking the budget constraint and the tangency condition.
 - Now suppose that the government reduces future taxes, t' , from 48 to 42, but leaves t at its current value of 40. Using the new values of taxes, find the updated value of lifetime wealth. Find the new optimal values of current consumption, future consumption and saving. Briefly explain the changes.
 - Using a graph, plot/illustrate any changes in consumption and saving. Be sure to indicate the amounts of any budget line shifts (horizontally and vertically).
 - The tax cut bill proposes no changes in *current* government spending. In order to maintain budget balance, what must happen to *future* government spending, G' ?
3. (27 points) Now let's analyze the effects of a cut in the *future* corporate tax rate in the classical version of our intertemporal model, building upon your answers to questions 1 and 2. Assume that the government balances its budget in accordance with your answer to Question 2(e). Show graphically how the future tax cut would affect current output, employment, real wages, the real interest rate and the price level. What happens to consumption, investment and average labor productivity?

4. (52 points) Next, let's analyze the future tax cut from a Keynesian perspective.
- (a) Using the standard sticky wage IS-LM/AD-AS framework, show graphically how the future tax cut would affect output, employment, real wages, the real interest rate and the price level. What happens to consumption, investment and average labor productivity? Your answers should be for the short run, with nominal wages held fixed. Although this is not necessary, you can assume that the government balances its budget in accordance with your answer to Question 2(e).
 - (b) Now suppose that the economy is driven by shocks to future corporate tax rates. In such an economy, is consumption procyclical, i.e., when there is a tax shock that increases output, does consumption increase as well? Continuing in this fashion, complete the following table.

Variable	Data	Model
Consumption	Procyclical	
Investment	Procyclical	
Price Level	Countercyclical	
Employment	Procyclical	
Real Wage	Procyclical	
Avg. Labor Productivity	Procyclical	

- (c) Does this model do a good job of replicating the observed business cycle correlations? Why or why not?
 - (d) How might you modify this model to improve its predictions regarding the labor market?
5. (15 points) Let's consider whether these tax cuts are merited on stabilization grounds.
- (a) Which version of our intertemporal model, the classical one analyzed in question 3, or the Keynesian one analyzed in question 4, is most consistent with the Republican claim that the tax cuts "revitalized a sluggish economy"? Why do the two versions deliver different results?
 - (b) If you are an economist who holds the classical perspective, would you support changing tax rates to stabilize the economy? Briefly explain.
6. (42 points) Many people believe that an alternative way to "revitalize" an economy is for the central bank to increase the nominal money supply.
- (a) First, analyze this event from a Keynesian perspective. Using the sticky wage IS-LM/AD-AS framework, show graphically how an increase in the nominal money supply would affect output, employment, real wages, the real interest rate and the price level. Your answers should be for the short run, with nominal wages held fixed.
 - (b) Next, analyze this event from a real business cycle perspective. Using the intertemporal model, show graphically how an increase in the nominal money supply would affect output, employment, real wages, the real interest rate and the price level. Assume that the classical dichotomy applies.