

## Midterm Exam

*Directions: Answer all questions; point totals for each question are given in parentheses. For full credit, you must provide **complete** explanations for your answers.*

1. (10) True or False: Federal Government expenditures, as a percentage of GDP, have been growing over time. Support your answer with relevant data and statistics.
2. (20) In his model on the time inconsistency problem, Stanley Fischer examines optimal tax policy when there is no commitment mechanism. Provide a verbal description of how he solves for the time consistent solution in this setting. What characterizes the optimal level of taxes in the time consistent equilibrium. Why does the time inconsistent solution (which is NOT an equilibrium) produce higher utility?
3. (20) President Obama is faced with the Ramsey problem of choosing a sequence of excise taxes so that the utility of U.S. households is maximized. He uses this revenue to pay for a new stimulus package that, because of policy lags, will be implemented in the second period of the economy. The government knows that since households have logarithmic preferences and that  $\beta = 1/(1+r)$ , households' optimal consumption is given by:

$$c_t^* = \frac{\frac{r}{1+r} \left( \sum_{t=0}^{\infty} \frac{Y_t}{(1+r)^t} \right)}{1 + \tau_t} \quad (1)$$

$Y_t$  denotes income and it is assumed that  $Y_t = \$100,000$  in every period. The government plans to stimulate the economy by making a one-time purchase of President Obama's favorite cigarettes (rumored to be American Spirit) of \$110,000 in the second period (that is,  $G_1 = \$110,000$ ) and nothing in all other periods; that is,  $G_t = 0$  for  $t = 0; t \geq 2$ . Many politicians are saying that taxes need to be raised next period in order to cover the entire cost of this stimulus package. Their argument is that it is unfair to burden future generations with this one-time expense. You have been invited to give your expert opinion on the matter and adroitly demonstrate that, given the interest rate of 10%, the optimal tax (note, this is not the tax rate) is simply \$10,000 every period. Present your proof and demonstrate that it is optimal for  $\tau^* = r$ . (Hint: Use the conditions that the tax smoothing hypothesis implies taxes are constant,  $\tau_t = \tau^*$ , and the government's intertemporal budget constraint implies that the present discounted value of tax revenues (given by  $c_t \tau_t$  in every period) equals the present discounted value of government expenditures. You do not have to solve for the indirect utility function.)

4. (20) Do you agree with the following quote: “In a closed economy (i.e. no international trade), Ricardian equivalence implies that national savings will be invariant to a deficit financed tax cut.” Be precise in your answer.
5. (20) Nordhaus criticizes the Stern Review on the grounds that the Ramsey optimal growth model places restrictions on the choice of households’ subjective discount rate, the curvature of the utility function, the rate of consumption growth and the rate or return on capital (i.e. savings). Do you agree with Nordhaus’s criticism? A good answer will use the necessary condition associated with households’ optimal consumption/savings decision to motivate the analysis.
6. (10) Provide the dates (roughly) of three post-World War II recessions. Compare and contrast features of post-WWII and pre-WWI features of the business cycle as detailed in C. Romer’s article.