

Midterm Exam

*Directions: Answer all questions; the questions are weighted equally. For full credit, you must provide **complete** explanations for your answers.*

1. Greece is currently experiencing a severe public finance crisis. In particular, some analysts argue that the combination of high interest rates on Greek debt combined with a low growth rate of GDP for Greece imply that the path of Greek debt is not sustainable. Using the government budget constraint (and abstracting from money and inflation) provide an argument supporting this forecast.
2. In his model of optimal taxes without a commitment mechanism, S. Fischer solved the economy backwards in time. That is, he first solved for optimal choices in the last period of the economy and then solved for optimal choices in the first period. From this perspective, answer the following:
 - (a) In the second period of the economy, what determined the optimal tax rates on capital and labor. Explain.
 - (b) The time consistent equilibrium was characterized by the intersection of two functions that summarized the backwards solution procedure. Explain what these functions describe and why their intersection implies a time-consistent equilibrium. (It is not necessary to write down the functions - simply give a verbal description of the relationships represented by the two functions.)
3. Assume that a household lives for two periods and has preferences given by

$$U(c_0, c_1) = -c_0^{-1} - \beta c_1^{-1}$$

where c_0 denotes first period consumption, c_1 is second period consumption, and $0 < \beta < 1$ represents the time discount factor. The household receives no income in the first period and an income of Y_1 in the second period. Consumption in the first period must be financed by borrowing - the interest rate is $(1+r)$. Assume that $\beta(1+r) = 1$

- (a) Set up the household's maximization problem as a Lagrangian and show that the intertemporal marginal rate of substitution is equal to $(1+r)$. Interpret this result.
 - (b) Derive the household's demand function for c_1 . How responsive is c_1 to a change in r ? Interpret your result.
 - (c) Solve for the household's indirect utility function.
4. The government of Finlandia is faced with the Ramsey problem of choosing a sequence of excise taxes so that the utility of its citizens is maximized. It uses this revenue to pay for a war in the first period of the economy. The government knows that households' optimal consumption is given by:

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

Y_t denotes income and it is assumed that $Y_t = 10$ in every period. The government has expenditures of $G_0 = 2$ in the very first period (this is the war expenditures) and nothing thereafter; that is, $G_t = 0$ for $t \geq 1$. Given this environment, answer the following

- (a) Find the optimal excise tax, τ^* . (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.)
- (b) Find the implied path of government debt. Does this satisfy the transversality condition?