

Economics 602
Macroeconomic Theory and Policy
Midterm Exam
Professor Sanjay Chugh
Fall 2008
October 20, 2008

NAME: _____

The Exam has a total of five (5) problems and pages numbered one (1) through twelve (12) (with the last three pages blank). Each problem's total number of points is shown below. Your solutions should consist of some appropriate combination of mathematical analysis, graphical analysis, logical analysis, and economic intuition, but in no case do solutions need to be exceptionally long. Your solutions should get straight to the point – **solutions with irrelevant discussions and derivations will be penalized.** You are to answer all questions in the spaces provided.

You may use one page (double-sided) of notes. You may **not** use a calculator.

Problem 1	/ 25
Problem 2	/ 20
Problem 3	/ 10
Problem 4	/ 15
Problem 5	/ 30
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TOTAL	/ 100

Problem 1: Consumption and Savings in the Two-Period Economy (25 points). Consider a two-period economy (with no government), in which the representative consumer has no control over his income. The lifetime utility function of the representative consumer is $u(c_1, c_2) = \ln c_1 + \ln c_2$, where \ln stands for the natural logarithm. We will work here in purely real terms: suppose the consumer's **present discounted value of ALL lifetime REAL income is 26**. Suppose that the real interest rate between period 1 and period 2 is zero (i.e., $r = 0$), and also suppose the consumer begins period 1 with zero net assets.

- a. **(17 points)** Set up the lifetime Lagrangian formulation of the consumer's problem, in order to answer the following: i) is it possible to numerically compute the consumer's optimal choice of consumption in period 1? If so, compute it; if not, explain why not. ii) is it possible to numerically compute the consumer's optimal choice of consumption in period 2? If so, compute it; if not, explain why not. iii) is it possible to numerically compute the consumer's real asset position at the end of period 1? If so, compute it; if not, explain why not.

Problem 1 continued

b. **(8 points)** To demonstrate how important the concept of the real interest rate is in macroeconomics, an interpretation of it (in addition to the couple of different interpretations we have already discussed in class) is that it reflects the rate of consumption growth between two consecutive periods. Using the consumption-savings optimality condition for the given utility function, **briefly** describe/discuss (**rambling essays will not be rewarded**) whether the real interest rate is **positively related to, negatively related to, or not at all related to the rate of consumption growth between period one and period two**. For your reference, the definition

of the rate of consumption growth rate between period 1 and period 2 is $\frac{c_2}{c_1} - 1$ (completely

analogous to how we defined in class the rate of growth of prices between period 1 and period 2). (**Note:** No mathematics are especially required for this problem; also note this part can be fully completed even if you were unable to get all the way through part a).

Problem 2: European and U.S. Consumption-Leisure Choices (20 points). Europeans work fewer hours than Americans. There are likely very many possible reasons for this, and indeed in reality this fact arises from a combination of many reasons. In this question, you will consider two reasons using the simple (one-period) consumption-leisure model.

- a. **(10 points)** Suppose that both the utility functions and pre-tax real wages W/P of American and European individuals are identical. However, the labor income tax rate in Europe is higher than in America. In a **single** carefully-labeled indifference-curve/budget constraint diagram (with consumption on the vertical axis and leisure on the horizontal axis), show how it can be the case that Europeans work fewer hours than Americans. Provide any explanation of your diagram that is needed.

Problem 2 continued.

- b. (10 points) Suppose that both the pre-tax real wages W/P and the labor tax rates imposed on American and European individuals are identical. However, the utility function $u^{AMER}(c,l)$ of Americans differs from that of Europeans $u^{EUR}(c,l)$. In a **single** carefully-labeled indifference-curve/budget constraint diagram (with consumption on the vertical axis and leisure on the horizontal axis), show how it can be the case that Europeans work fewer hours than Americans. Provide any explanation of your diagram that is needed.

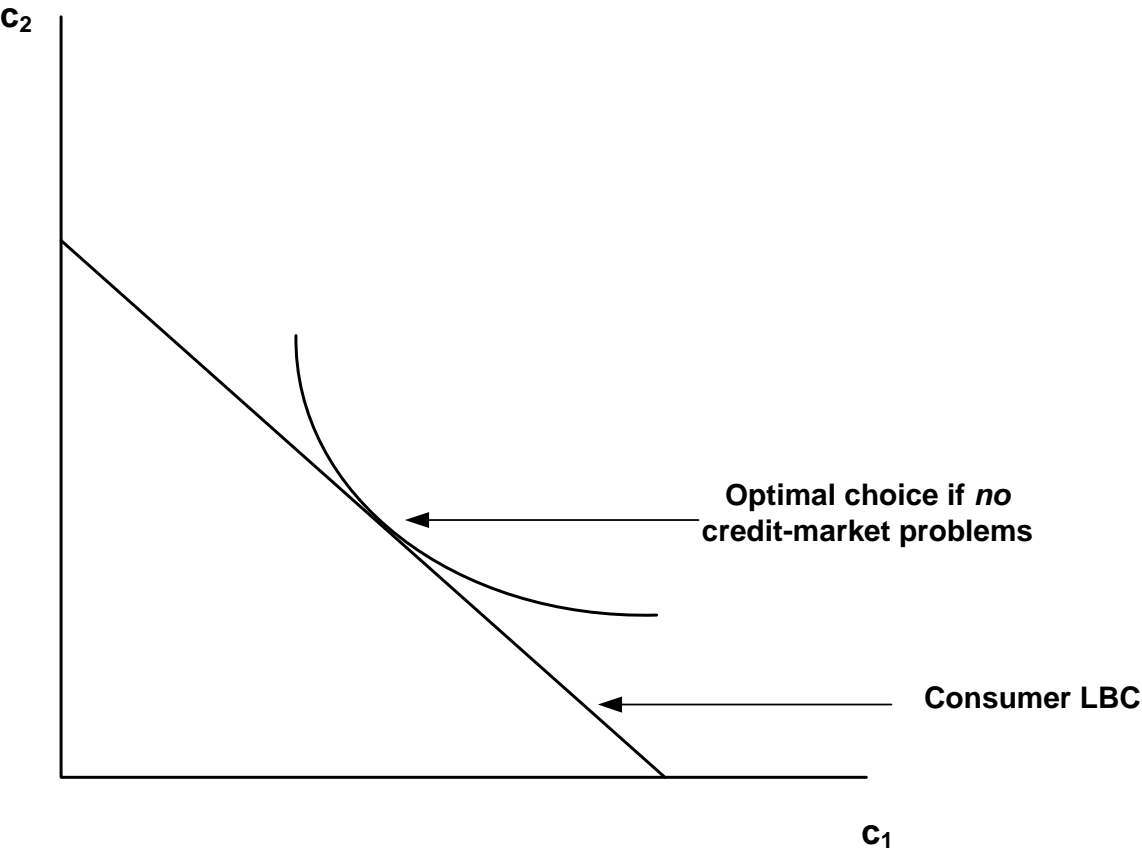
Problem 3: Government Budgets and Government Asset Positions (10 points). Just as we can analyze the economic behavior of consumers over many time periods, we can analyze the economic behavior of the government over many time periods. **Suppose that at the beginning of period t , the government has zero net assets.** Also assume that the real interest rate is **always $r = 0$.** The following table describes the **real** quantities of government spending and **real** tax revenue the government collects starting in period t and for several periods thereafter.

Period	Real government expenditure (g) during the period	Real tax collections during the period	Quantity of net government assets at the END of the period
t	10	12	
$t+1$	8	14	
$t+2$	15	10	
$t+3$	10	10	
$t+4$	8	12	

- a. **(6 points)** Complete the last column of the table based on the information given. **Briefly** explain the logic behind how you calculate these values.

- b. **(4 points)** Suppose instead the government ran a balanced budget every period (i.e., every period it collected in taxes exactly the amount of its expenditures that period). In this balanced-budget scenario, what would be the government's net assets at the end of period $t+4$? **Briefly** explain/justify.

Problem 4b continued



Problem 5b continued (if you need more space)

- c. **(15 points – Harder)** Suppose in addition to the dividend tax described above, there is also a proportional tax on consumption (a sales tax). The consumption tax rate in period t is t_t^C . Suppose that t_t^C rises, but **all** other tax rates (including those beyond period t) remain unchanged. Show algebraically (i.e., using a Lagrangian) how this one-time consumption-tax hike policy change affects the period- t stock price, assuming all else is equal? (i.e., this is a usual *ceteris paribus* exercise) Also provide brief economic interpretation/logic for your finding.

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