Department of Economics University of Maryland

Economics 325
Intermediate Macroeconomic Analysis
Midterm Exam – Part 2
Professor Sanjay Chugh
Fall 2010
October 14, 2010

NAME: _____

Part 2 of the Exam has a total of two (2) problems and pages numbered one (1) through six (6). 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 3	**/ 25**
Problem 4	**/ 25**
TOTAL PART 2	**/ 50**

Problem 3: Two-Period Economy (25 points). Consider a two-period economy (with no government and hence no taxes), in which the representative consumer has no control over his income. The lifetime utility function of the representative consumer is $u(c_1, c_2) = \ln c_1 + c_2$, where ln stands for the natural logarithm (that is not a typo – it is only c_1 that is inside a ln(.) function, c_2 is **not** inside a ln(.) function).

Suppose the following numerical values: the **nominal** interest rate is $i = 0.05$, the nominal price of period-1 consumption is $P_1 = 100$, the nominal price of period-2 consumption is $P_2 = 105$, and the consumer begins period 1 with zero net assets.

a. **(3 points)** Is it possible to numerically compute the **real** interest rate (r) between period one and period two? If so, compute it; if not, explain why not.

b. **(14 points)** Set up a **sequential** 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.

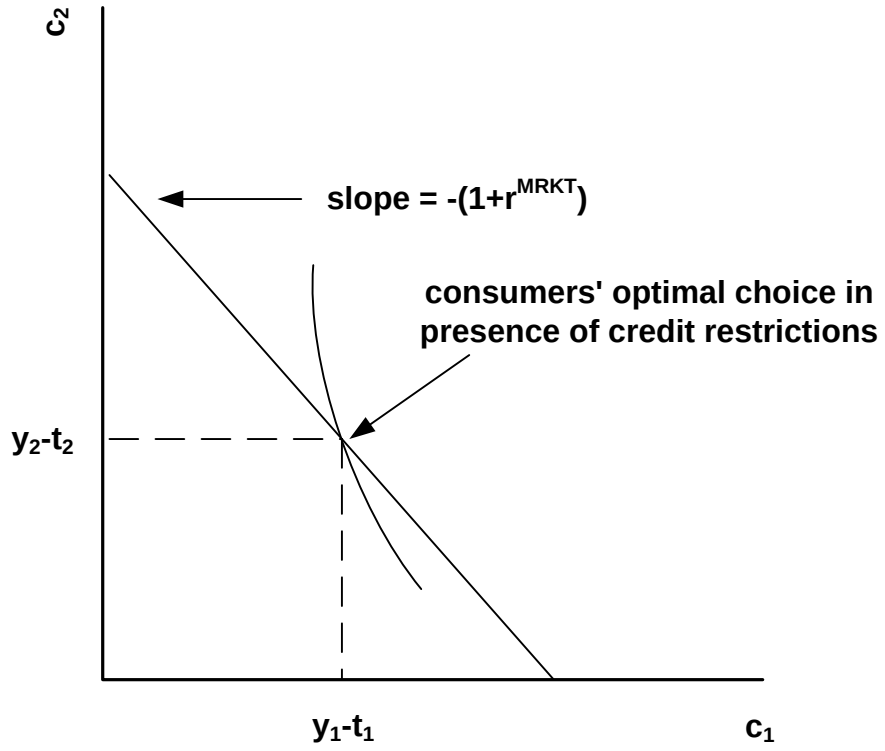
Problem 3b continued (if you need more space)

c. **(8 points)** The rate of consumption growth between period 1 and period 2 is defined as $\frac{c_2}{c_1} - 1$ (completely analogous to how we have defined, say, the rate of growth of prices between period 1 and period 2). Using **only** 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.** (**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 b).

Problem 4: The Credit Crunch and Government Loan Programs (25 points). Consider the two-period framework of fiscal policy from Chapter 7, in which both the representative consumer and the government live for the entire two periods. In real terms, the government spends g_1 and g_2 in periods 1 and 2, and collects from the representative consumer total tax revenues t_1 and t_2 (which are collected lump-sum). The **market** real interest rate is r^{MRKT}, which is the slope of the **consumer's LBC** shown in the diagram below. Note that the diagram below is NOT of the economy-wide resource frontier – for the analysis in this problem, you are to use the consumer's LBC.

There is a credit crunch going on, which **prevents consumers from borrowing from private-market lenders at all** during period 1. (If consumers could borrow from private market lenders, the real interest rate on private-market loans would be r^{MRKT}.) For simplicity, suppose that at the beginning of period 1, both the representative consumer and the government have zero net assets – that is, $a_0 = 0$ and $b_0 = 0$. And, as usual in analysis of the two-period framework, assume that both the government and the representative consumer end period 2 with zero net assets – that is, $a_2 = 0$ and $b_2 = 0$.

Fiscal policy makers are considering various policy options to try to ease the consequences of the credit crunch. Suppose, perhaps for political reasons, that one option that is NOT being considered at all is changing government spending in either or both period 1 or period 2.



(OVER)

Problem 4 continued

a. **(4 points)** One option Congress is considering is to lower lump-sum taxes in period 1. Would this cause taxes in period 2 (t_2) to rise, decline, or remain unchanged? Or is it impossible to determine? Briefly explain (you may refer to the diagram above if necessary).

b. **(6 points)** If Congress does enact the fiscal policy reform described in part a, would the economy's consumption in period 1 (c_1) rise, fall, or remain unchanged? Or is it impossible to determine? Briefly explain (you may refer to the diagram above if necessary).

An alternative proposal (besides the fiscal reform described in part a) being considered by Congress is to **directly lend to consumers.** Denote by L the quantity of **loans** that Congress would/could make directly to consumers in period 1 **(which are distinct from consumers' assets that are measured in the variables a_0, a_1, and a_2)**, and suppose that the government would be willing to charge a real interest r^{GOV} **lower** than would be available on private markets – that is, $r^{GOV} < r^{MRKT}$. If consumers did borrow from the government in period 1, they would have to repay these loans, inclusive of interest at the rate r^{GOV}, in period 2. The period-1 and period-2 budget constraints of the representative consumer and the government under this direct lending facility would read:

$$c_1 + a_1 = y_1 - t_1 + L$$
$$c_2 + a_2 + (1 + r^{GOV})L = y_2 - t_2 + (1 + r^{MRKT})a_1$$
$$g_1 + b_1 + L = t_1$$
$$g_2 + b_2 = t_2 + (1 + r^{GOV})L + (1 + r^{MRKT})b_1$$

Problem 4 continued

c. **(5 points)** In the diagram in the statement of the problem (above), **clearly and carefully sketch how the consumer's LBC is modified** by the introduction of the government loan program. Provide any (brief) explanation for your sketch that is required, and clearly **label** the element(s) you sketch. (**Hint:** before sketching the modified LBC, think about how the "usual" derivation of the LBC from Chapter 3 and 4 gets modified in this case?)

d. **(Harder – 10 points) Based only on your analysis in parts a, b, and c,** which of the two fiscal policy options (the tax reform of part b or the direct lending program of part c) would make the representative consumer better off in a lifetime utility sense (i.e., in terms of welfare)? Carefully describe the logic behind your conclusion, referring, if necessary, to the diagram above.

Problem 4d continued (if you need more space)

END OF PART 2 OF EXAM