Department of Applied Economics Johns Hopkins University

Economics 602
Macroeconomic Theory
Final Exam
Professor Sanjay Chugh
Fall 2011
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NAME: _____

The Exam has a total of four (4) problems and pages numbered one (1) through sixteen (16). 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.**

In particular, some of the questions state explicit WORD COUNT limits – respect these limits.

You are to answer all questions in the spaces provided.

You may use two pages (double-sided) of notes. You may **not** use a calculator or any other aids.

Problem 1	**/ 30**
Problem 2	**/ 30**
Problem 3	**/ 25**
Problem 4	**/ 15**
TOTAL	**/ 100**

Problem 1: The Consumption-Leisure Framework (30 points). In this question, you will use the basic (one period) consumption-leisure framework to consider some labor market issues.

Suppose the representative consumer has the following utility function over consumption and **labor,**

$$u(c,n) = \ln c - An,$$

where, as usual, c denotes consumption and n denotes the number of hours of labor the individual chooses to work. The constant $A > 0$ is outside the control of the individual. (As usual, $\ln(\cdot)$ is the natural log function.)

Suppose the budget constraint (expressed in real, rather than in nominal, terms) the individual faces is $c = (1-t)\cdot w \cdot n$, where t is the labor tax rate, w is the **real** hourly wage rate, and n is the number of hours the individual works.

Recall that in one week there are 168 hours, hence $n + l = 168$ must always be true.

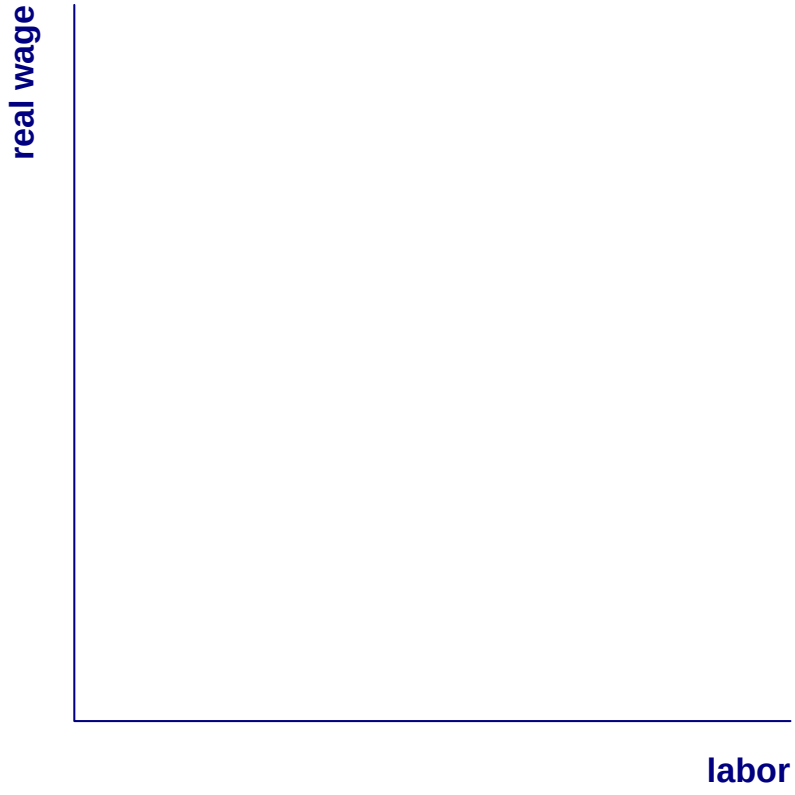
a. **(4 points)** Construct the Lagrangian for the consumer's utility maximization problem, defining any new notation you need to include.

b. **(4 points)** Based on the Lagrangian in part a, compute the representative consumer's first-order conditions with respect to consumption and with respect to labor. Clearly present the important steps and logic of your analysis.

Problem 1 continued

c. **(6 points)** Based on **ONLY** the first-order condition with respect to labor computed in part b, **qualitatively** sketch two things in the diagram below **and briefly address** one question.

First, sketch the general shape of the relationship between *w* and *n* (perfectly vertical, perfectly horizontal, upward-sloping, downward-sloping, or impossible to tell). **Second,** sketch how changes in *t* affect the relationship (shift it outwards, shift it in inwards, or impossible to determine). **And, briefly (in no more than 10 words!)** describe the **economics** of how you obtained your conclusions. (**IMPORTANT NOTE:** In this question, you are **not** to use the first-order condition with respect to consumption nor any other conditions.)

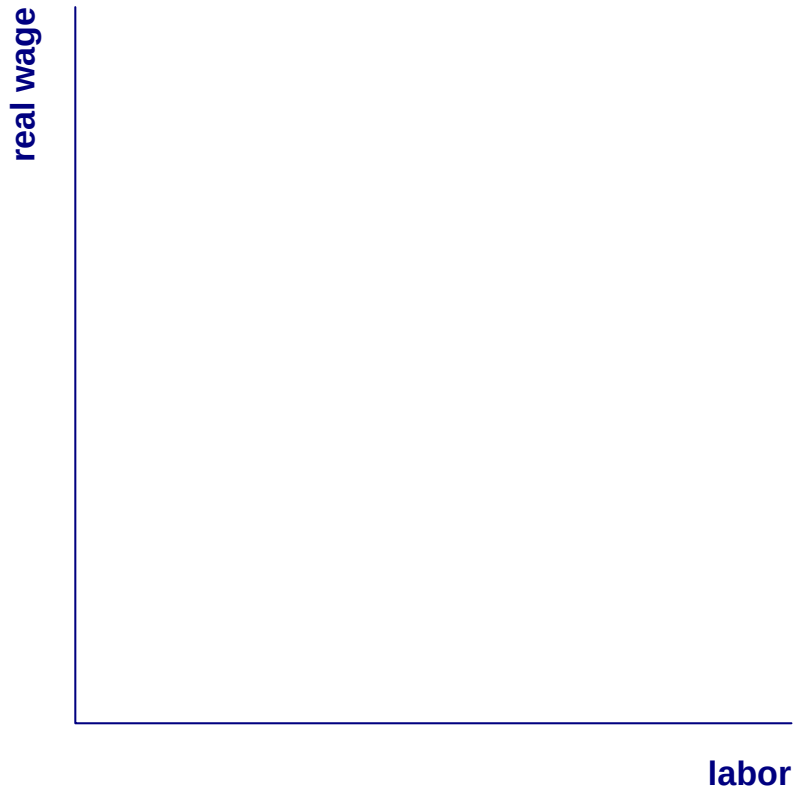


Problem 1 continued

d. **(4 points)** Now based on **both** of the two first-order conditions computed in part b, construct the consumption-leisure optimality condition (which technically in this question is the "consumption-labor" optimality condition, but that is a minor detail). Clearly present the important steps and logic of your analysis.

e. **(6 points)** Based on both the "consumption-leisure" optimality condition obtained in part d and on the budget constraint, **qualitatively** sketch two things in the diagram below **and briefly address** one question.

First, sketch the general shape of the relationship between *w* and *n* (perfectly vertical, perfectly horizontal, upward-sloping, downward-sloping, or impossible to tell). **Second,** sketch how changes in *t* affect the relationship (shift it outwards, shift it in inwards, or impossible to determine). **And, briefly (in no more than 10 words!)** describe the **economics** of how you obtained your conclusions.



Problem 1e continued (more work space)

f. **(6 points)** How do the conclusions in part e compare with those in part c? Are they broadly similar? Are they very different? Is it impossible to compare them? **In no more than 80 words,** describe as much as you can about the **economics (not simply restating the mathematics)** when comparing the pair of diagrams.

Problem 2: Two-Period Consumption-Savings Analysis with "Risk" (30 points). Consider a variation of the two-period consumption-savings model. The representative consumer begins period one with zero stock holdings ($a_0 = 0$) and zero bond holdings ($B_0 = 0$) (Note: all bonds in this problem are riskless, one-period, face-value = 1 bonds). Also, suppose there is zero inflation in nominal goods prices between period one and period two.

During period one, the consumer can purchase a_1 units of stock, each at the market price of $S_1 > 0$ dollars, and he can also purchase B_1 units of bonds, each at the market price of $P_1^b = 1$ dollars. At the start of period two, each unit of bond will pay off one dollar. Note that there is no risk regarding the bond's nominal payoff in period two, and no risk that the bond's price in period one is anything other than one dollar.

However, there is "risk" regarding stock prices in period two. Specifically, each unit of stock will turn out to have market price of $S_2 > S_1$ dollars in period two, **or** it will turn out to have market price $S_2 = S_1$ in period two. For simplicity, suppose there is zero dividend in period two ($D_2 = 0$) no matter what the price of S_2 turns out to be.

There are no other assets besides stocks and bonds, and suppose that any savings left "under the mattress" will completely disappear (e.g., all resources to be saved have to be put into either stock purchases or bond purchases, or both). Finally, there is no "impatience" discounting between periods.

For your **reference** only, the two consumption-savings optimality conditions (one for stock, and one for bonds) are

$$\frac{u_1(c_1,c_2)}{u_2(c_1,c_2)} = \frac{S_2}{S_1} \quad \text{and} \quad \frac{u_1(c_1,c_2)}{u_2(c_1,c_2)} = \frac{1}{P_1^b}.$$

These are meant to JUST help you think about the problems below, they are NOT necessarily meant to hold exactly in any of the analysis. You should **not** construct any Lagrangians in this problem.

(OVER)

Problem 2 continued

For parts a and b of this problem, suppose the consumer's lifetime utility function **(to which you should pay attention!)** is

$$u(c_1, c_2) = \ln c_1 + \ln c_2$$

a. **(6 points)** Suppose the consumer at the start of period one somehow knows for sure that the stock price will be $S_2 > S_1$ dollars in period two. In this case, solve **qualitatively** for the following, briefly justifying (through a combination of logical and/or mathematical arguments **that should not exceed 20 words each!**) each response. **If you need to make additional reasonable assumptions beyond those provided above, state them clearly as part of the 20 words.**

   i) Does the consumer purchase any bonds during period one?

   ii) Does the consumer purchase any stock during period one?

   iii) How does the consumer's optimal choices of c_1 and c_2 compare to each other? (i.e., Are they equal to each other? Is one larger than the other? Is it impossible to tell?)

Problem 2 continued

b. **(6 points)** Suppose the consumer at the start of period one somehow knows for sure that the stock price will be $S_2 = S_1$ dollars in period two. In this case, solve qualitatively for the following, briefly justifying (through a combination of logical and/or mathematical arguments **that should not exceed 20 words each!**) each response. **If you need to make additional reasonable assumptions beyond those provided above, state them clearly as part of the 20 words.**

i) Does the consumer purchase any bonds during period one?

ii) Does the consumer purchase any stock during period one?

iii) How does the consumer's optimal choices of c_1 and c_2 compare to each other? (i.e., Are they equal to each other? Is one larger than the other? Is it impossible to tell?)

Problem 2 continued

For parts c and d of this problem, suppose the consumer's lifetime utility function **(to which you should pay attention!)** is

$$u(c_1, c_2) = c_1 + c_2 .$$

c. **(6 points)** Suppose the consumer at the start of period one somehow knows for sure that the stock price will be $S_2 > S_1$ dollars in period two. In this case, solve **qualitatively** for the following, briefly justifying (through a combination of logical and/or mathematical arguments **that should not exceed 20 words each!**) each response. **If you need to make additional reasonable assumptions beyond those provided above, state them clearly as part of the 20 words.**

i) Does the consumer purchase any bonds during period one?

ii) Does the consumer purchase any stock during period one?

iii) How does the consumer's optimal choices of c_1 and c_2 compare to each other? (i.e., Are they equal to each other? Is one larger than the other? Is it impossible to tell?)

Problem 2 continued

d. **(6 points)** Suppose the consumer at the start of period one somehow knows for sure that the stock price will be $S_2 = S_1$ dollars in period two. In this case, solve qualitatively for the following, briefly justifying (through a combination of logical and/or mathematical arguments **that should not exceed 20 words each!**) each response. **If you need to make additional reasonable assumptions beyond those provided above, state them clearly as part of the 20 words.**

i) Does the consumer purchase any bonds during period one?

ii) Does the consumer purchase any stock during period one?

iii) How does the consumer's optimal choices of c_1 and c_2 compare to each other? (i.e., Are they equal to each other? Is one larger than the other? Is it impossible to tell?)

Problem 2 continued

e. **(6 points)** How do your responses to part b compare to your responses to part d? Are they identical? Do they differ? Is it impossible to tell? Discuss/describe as thoroughly as possible **in terms of economics in no more than 100 words (and do not simply restate the mathematics, unless it clearly brings new insight).**

Problem 3: The Dynamics of Fiscal and Monetary Policy (25 points). The U.S. debt commission recently "failed" in their attempt to cut government spending and/or raise taxes sufficiently in coming years to balance the lifetime government budget. We'll see how these issues play out in the future; but it is interesting to think that just a few years ago, the lifetime government budget was viewed in a potentially different way.

Let's scroll back the calendar to early 2009, at which point large fiscal **stimulus** in the U.S. was just starting to come on line, and would continue to come on line over the next few years. The precise details broadly included **both tax cuts (or potentially delayed tax hikes, which is effectively the same thing) as well as increased government spending in the next few years**.

Specifically, in early 2009, the new administration was just seated. At the beginning of 2009, the lifetime consolidated budget constraint of the government was:

$$\frac{B_{2008}}{P_{2009}} = (t_{2009} - g_{2009}) + \frac{t_{2010} - g_{2010}}{1 + r_{2010}} + \frac{t_{2011} - g_{2011}}{(1 + r_{2010})(1 + r_{2011})} + \frac{t_{2012} - g_{2012}}{(1 + r_{2010})(1 + r_{2011})(1 + r_{2012})} + \ldots$$

Line 1: PDV of fiscal deficits

$$+ sr_{2009} + \frac{sr_{2010}}{1 + r_{2010}} + \frac{sr_{2011}}{(1 + r_{2010})(1 + r_{2011})} + \frac{sr_{2012}}{(1 + r_{2010})(1 + r_{2011})(1 + r_{2012)}} + \ldots$$

Line 2: PDV of seignorage

The notation here is as in Chapter 15: t denotes real lump-sum tax collections, g denotes real government spending, sr denotes real seignorage revenue, r denotes the real interest rate, B denotes nominal (one-period) government bonds, and P denotes the nominal price level of the economy (i.e., the nominal price of one basket of consumption). Subscripts indicate time periods, which we will consider to be calendar years. Note, of course, the ellipsis (…) in each line of the above equation.

As indicated above, the first line of the right-hand side is the present discounted value of all fiscal deficits the government will ever run starting from 2009 onwards, and the second line of the right-hand side is the present-discounted value of all seignorage revenue that will ever result from the monetary policy actions of the Federal Reserve starting from 2009 onwards.

The then-newly-named primary economic advisers to President Obama were Treasury Secretary Timothy Geithner, National Economic Council Chairman Lawrence Summers, and Council of Economic Advisers Chairwoman Christina Romer.

Problem 3 continued

In addressing each of the following issues, no quantitative work is required at all; the following questions all require only conceptual analysis, and it is possible that there is more than one "correct" analysis of each.

Two very important points as you address these issues:

1. **You should adopt an EX-ANTE view of the questions, NOT an EX-POST view. That is, if YOU are sitting in early 2009 considering the following questions, you would NOT know what ACTUALLY happens during 2009-2011.**

2. **EACH ISSUE SHOULD BE ADDRESSED IN NO MORE THAN 50 WORDS!**

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a. **(5 points)** Geithner, because of his background as President of the New York Federal Reserve, implicitly advocated that no matter what fiscal policy actions the new administration takes, they should be designed in such a way as to have no effects on the conduct of monetary policy whatsoever. If this is so, what type of fiscal policy – a Ricardian fiscal policy or a non-Ricardian fiscal policy – did Geithner advocate?

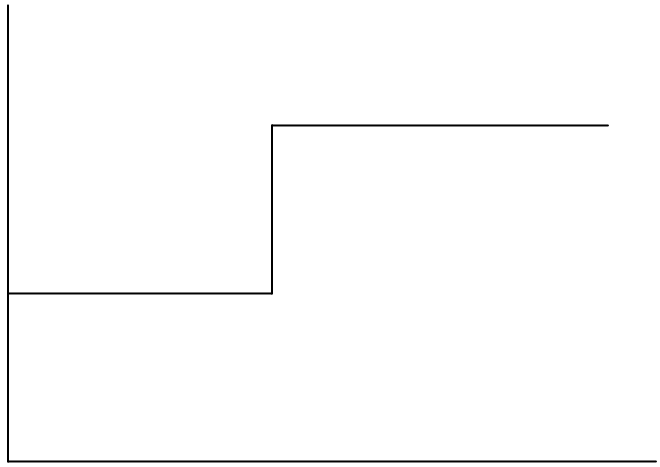
Problem 3 continued

b. **(5 points)** The less even-keeled that he is, Summers' comments sometimes seem to imply that fiscal stimulus measures should **not** take into account any consequences they may have for the conduct of monetary policy. If the combination of tax cuts and government spending that ultimately pan out over the next few years follow Summers' advice, what are likely to be the consequences for the Federal Reserve's monetary policy in future years? **In particular, will the Fed likely have to expand or contract the nominal money supply?**

c. **(5 points)** The objective academic macroeconomist that she is, Romer typically points outs in her remarks that because fiscal policy plans (for both taxes and government spending) will almost surely be revised as the years unfold (that is, fiscal policy plans adopted in 2009 can be revised in later years), it may be impossible to know beforehand what the eventual consequences for monetary policy of a particular fiscal policy action adopted at the start of 2009 might be. Use the government budget constraint presented above to interpret what Romer's statements mean.

Problem 3 continued

d. **(5 points)** If, later in 2009 and/or in subsequent years after the new fiscal plans are (supposedly) clarified further, the nominal price level of the economy behaves as shown in the following diagram (the price level, *P*, is plotted on the vertical axis), which of the following is the most relevant explanation: the fiscal theory of the price level, the fiscal theory of inflation, or the financial accelerator mechanism?



e. **(5 points)** Some Federal Reserve officials, including Chairman Ben Bernanke, have recently made statements indicating that Congress must take action to lower the fiscal deficit in the coming years. Even though these are statements by **monetary** policy officials, what type of **fiscal** policy – a Ricardian fiscal policy or a non-Ricardian fiscal policy – are they advocating?

Problem 4: The Keynesian-RBC-New Keynesian Evolution (15 points). Here you will briefly analyze aspects of the evolution of macroeconomic theory over the past 25 years. Address each of the following.

a. (5 points) Describe **briefly (in no more than 40 words!)** what the Lucas critique is and how/why it led to the demise of (old) Keynesian models.

b. (5 points) In writing down utility functions and production functions for use in "RBC-style" macro models, the assumed functions are typically "estimated" using data (i.e., a common assumption is the logarithmic utility function we have often used, based on some statistical evidence that it is consistent with observed microeconomic and macroeconomic evidence). Is this practice subject to a "Lucas-type critique?" **Briefly (in no more than 40 words!)** explain why or why not?

Problem 4 continued

c. (5 points) Briefly define and describe the neutrality vs. nonneutrality debate surrounding monetary policy. And, as specifically as you can state, which type of shock does this debate concern? **(Your TOTAL response should not exceed 40 words!)**

END OF EXAM