Exam 2. Econ520. Spring 2012

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UNC

Instructions:

- Answer all questions.

- Clearly number your answers. Write legibly.

- Do *not* write your answers on the question sheets.

- *Explain* your answers – do not just state them.

- *Show* your derivations – do not just state the final result.

- Do not refer to any notes or books. You may use a calculator.

- The total time is 75 minutes.

- The total number of points is 100.

1 Life-cycle Model

Consider a two-period life-cycle model. When young, the agent earns wage w and consumes c. When old, the agent earns w' and consumes c'. The twist is that the interest rate for borrowers is *lower* than that for savers. The budget constraints are given by

$$w + b = c + s \tag{1}$$
$$w' + R_s s - R_b b = c' \tag{2}$$

where s is saving, b is borrowing, and $R_s > R_b$ are the gross interest rates on saving / borrowing. We restrict $s, b \geq 0$.

1. Consider the case where the household has to choose between borrowing and saving. If he saves $s > 0$ then he cannot borrow ($b = 0$) and vice versa.

   (a) [12 points] Draw the lifetime budget constraint. Explain what you draw.

   (b) [7 points] Illustrate the optimal consumption choice of a person who saves.

2. Now allow the household to borrow and save at the same time. Borrowing is limited to $b \leq \bar{b}$.

   (a) [7 points] What can you say about the household's borrowing, regardless of preferences and earnings? Explain.

   (b) [12 points] Draw the lifetime budget constraint. If you could not answer (a), set $b = \bar{b}$ and proceed.

2 International Trade

1. Consider the two-country two-good world summarized in Table 1.

   (a) [7 points] In autarky (closed economies), find the prices of apples and computers in both countries.

   (b) [8 points] Under free trade, which country would specialize in which good? Explain.

   (c) [8 points] Imagine that labor productivity rises in the South to 2.5 computers per worker. What would you expect to happen? Explain.

	North	South
Population	100	100
Productivity: apples per worker	200	50
Productivity: computers per worker	10	1

Table 1: International trade

3   Short Questions

1. [15 points] Certain policies in China increase the saving rate. How do these policies affect the U.S. trade balance? Explain.

2. [12 points] Some argue that stimulating aggregate demand increases the trade deficit. Explain the logic underlying this statement. Start from a NIPA identity.

3. [12 points] Explain why Pay-as-you-go Social Security reduces the aggregate capital stock and why it is affected by demographic trends in the age composition of the population, while the same is not true for Fully Funded Social Security.
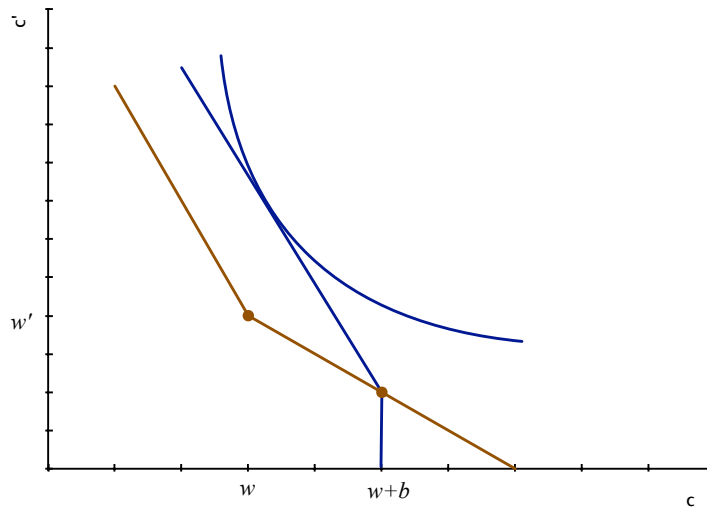

End of exam.

Figure 1: Life-cycle model

4 Answers

4.1 Life-cycle Model

1. Household chooses between borrowing and saving.

   (a) The budget constraint goes through the endowment point (w, w'). To its left the household saves and the slope is $-R_s$ as usual. To the right the household borrows and the slope is $-R_b$. See Figure 1

   (b) This is standard: tangency of budget constraint and indifference curve (which should, of course, not cross the budget constraint in the flat portion).

2. Household can borrow and save.

   (a) The household always sets $b = \bar{b}$. There is an arbitrage opportunity. Increasing b and s by 1 earns a profit of $R_s - R_b$.

   (b) We now have a household with endowment $w + \bar{b}$ when young and $w' - \bar{b}R_b$ when old. So the endowment point moves along the budget constraint to the south-east. Otherwise, this is the standard household problem, except that s cannot be negative. See Figure 1.

4.2 International Trade

1. Two-country model.

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(a) Autarky prices are inverse labor productivities. We can pick a numeraire: apples. Then the price of computers is given by [apple productivity] / [computer productivity]. South: 50/1. North: 200/10=20.

(b) Free trade: The price will be between 20 and 50. At this price, companies in the South cannot profitably produce computers and companies in the North cannot profitably produce apples.

(c) Now relative productivities are 20/1 in both countries. They revert to autarky. The South gains, while the North loses (at least weakly, because free trade is better than autarky).

5 Short Questions

1. Start from $Y - C - T + (T - G) + (IM - EX) = I$. If private saving $(Y - C - T)$ rises in China without a corresponding increase in investment, the Chinese trade balance goes into surplus (which is exactly what we have observed between 2000 and 2010). The "global savings glut" shows up as demand for U.S. assets (especially treasuries), which pushes up the dollar exchange rate, drives down U.S. interest rates, stimulates U.S. investment, and contributes to the U.S. trade deficit.

2. Again, start from the NIPA identity. Stimulating consumption or government spending worsens the trade balance (unless I falls, in which case there is no stimulus).

   It is less appealing to start from $Y = C + G + I + NX$. Then it would be tempting to say: I can stimulate exports (e.g. through a subsidy) which improves the trade balance and aggregate demand. However, this only works if domestic saving rises or investment falls, which undoes (part of) the stimulus.

3. Fully funded Social Security is labelling. Take a portion of everybody's savings and label it a Social Security contribution. It only affects people who would otherwise save less than the mandatory contribution and is therefore approximately neutral. If a cohort is large, it does not matter because each person saves for himself.

   Pay-as-you-go Social Security diverts savings into transfers to the current old. If individual saving remained constant, including Social Security contributions, aggregate saving would decline and so would the capital stock. If a cohort is very large, when it retires, a small number of workers must support a large number of retirees.

End of answers.