2.5 HOURS

## RENMIN UNIVERSITY OF CHINA

# Advanced Micro- and Macro-Economics

Semester 2, Academic Year 2013-2014

16 June, 2014

Electronic calculators and dictionaries may be used, provided that they cannot store text or allow you to access to the internet.

P.T.O.

**Please choose ONE to answer from Questions 1-3.**

1. A utility function is quasi-linear (in the first commodity) if it has the form



for a function .

(a) Use the Lagrange approach to write down the first order conditions for a solution  of the consumer’s problem. [20 marks]

(b) Use the first order conditions to argue that for  the demand function  does, in fact, not depend on income . [30 marks]

（a）令收入和商品价格为I和p

则最优化问题为maxst

构造拉格朗日函数，以此对x和λ求偏导数可得



由（1）式可知，然后将λ的值代入到（2）式，字啊后再将Pi的结果代入到（3）式可得，于是

(b)由上题可知，，代入到（a）问题中的（2）式可知

将上问所得的以及代入到（3）式可得到恒等式无法求出，也就是说在中可以将解出，而有题目中可知偏导数的结果是不含收入项I的，故当i>1时的需求函数与收入无关。

~~2. Consider the utility function~~

~~~~

~~where the vector or parameters  satisfies  and .~~

~~(a) Use the Lagrange approach to solve for the Marshallian demand function. [15 marks]~~

~~(b) Determine the indirect utility function and verity Roy’s identity. [10 marks]~~

~~(c) Determine the expenditure function (without solving the expenditure minimisation problem) and use Shepard’s lemma to obtain the Hicksian demand function. [20 marks]~~

~~(d) Check whether your answer to (c) satisfies the relation . [5 marks]~~

3. Consider a two-period utility function of the form:



where  enters into the second period utility function, too. The utility of consumption in the second period depends not simply on , but also on . The higher is first-period consumption, the higher  must be to provide a given level of utility. Economists use utility functions of this form to capture *habit formation*. When you consume more, you get used to it, and it creates a strong distaste for consuming less in future periods.

(a) Set up the standard two-period intertemporal consumption optimisation problem, and derive the Euler equation for this utility function. Assume no assets or bonds. The first- and second-period incomes are denoted by  and , respectively. [20 marks]

(b) Assume that . What does the Euler equation say about the ratio of  to ? [10 marks]

(c) Assume that . What is the ratio of  to  if the utility function is a standard one, ? [10 marks]

(d) Based on your answers to (b) and (c), compare the magnitude of the ratios of  to  in the case of habit formation and in the standard case? Explain your answer given the economic intuition. [10 marks]

1. 假设折现因子为α，对于最大化跨期效用函数的约束条件为



构造拉格朗日函数，分别对c和λ求偏导数



**2Please answer the Question 4.**

1. Consider a closed economy in which the production function is given by, where *Y* = output, *K* = capital, *L* = land, *A* = labour effectiveness, population (also known as labour or employment), , and . Aggregate savings in the economy is given by *S = sY*, where *s* = savings rate and . Capital depreciates at the rate  where . Population grows at the rate  and labour effectiveness grows at the rate  where the dot denotes the changes between  and . Assume strict exogeneity in parameters. Denote per capita values as  and . (a) Show that  can be written as a function of ; and derive the expression of . [10 marks]
2. 由于，将等式的两边同时除以有



由题可知，两边同时除以有

(b) Derive the steady-state income per capita and capital per capita. Draw diagrams to demonstrate whether they are stable and provide reasons. [10 marks]

（b）由题可知，当达到稳定状态时有，于是，同时除以即可得到

(c) What is the impact of increasing savings rate on the steady-state values in (b)? [5 marks]

（c）提高储蓄率时，会使得，会使稳态的均衡值增加

(d) In the balanced growth, calculate the growth rates of income per capita  and capital per capita . [10 marks]

(e) Further assume that this economy is a developing country where agriculture dominates. Based on your answers to (c) and (d), discuss whether technological progress (i.e., ) can guarantee long-term increases in income per capita and capital per capita. [5 marks] When population grows, how would the growth rates of  and  change in the balanced growth? [5 marks] Based on what you have answered to (e), discuss the role of agriculture for this developing country. [5 marks]