

Exercises for Macroeconomics 1.1

Problem Set 3

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1 Capital taxation in the Ramsey model

Consider a Ramsey economy that is on its balanced growth path. Suppose that at some time, which we will call time t_0 , the government switches to a policy of taxing investment income at rate τ . Thus the real interest rate that households face is now given by $r_t = (1 - \tau) f'(k_t)$. Assume that the government returns the revenue it collects from this tax through lump-sum transfers. Finally assume that this change in tax policy is unanticipated.

1. How does the tax affect the $\dot{c} = 0$ locus? The $\dot{k} = 0$ locus?
2. How does the economy respond to the adoption of the tax at time 0? What are the dynamics after time t_0 ?
3. How do the values of c and k on the new balanced growth path compare with their values on the old balanced growth path?
4. Does your answer to 3) imply that a policy of subsidizing investment (that is, making $\tau < 0$), and raising the revenue for this subsidy through lump-sum tax, increase welfare? Why or why not?
5. How, if at all do the answers to parts 1) and 2) change if the government does not rebate the revenue from the tax but instead uses it to make government purchases?

2 Anticipated Changes

Consider the policy described in problem 1), but suppose that instead of announcing and implementing the tax at time 0, the government announces at time t_0 that at some later time, time t_1 , investment income will begin to be taxed at rate τ .

1. Draw the phase diagram showing the dynamics of c and k after time t_1 .

2. Can c change discontinuously time t_1 ? Why or why not?
3. Draw the phase diagram showing the dynamics of c and k before t_1 .
4. In light of your answer to part 1), 2) and 3), what must c do at time t_0 ?
5. Summarize your results by sketching the paths of c and k as functions of time

3 Unanticipated Changes

Analyze the following two variations on the previous problem.

1. At time t_0 , the government announces that it will tax investment income at rate τ from time t_0 until some later date t_1 ; thereafter investment income will again be untaxed.
2. At time t_0 the government announces that from time t_1 to some later time t_2 it will tax investment at rate τ ; before t_1 and after t_2 , investment income will not be taxed.