

1) Households live and consume in each of two periods. During their youth, they can invest in a local project or in a distant project, or both, but distant investment requires a travel cost to make the investment and later recoup the (deterministic) returns. Neither project's rate of return (gross of travel costs) depends on the amount invested.

Households differ from each other in terms of the endowment they have to consume or invest during youth. Neither period's consumption is an inferior good.

- a) Ignore for the moment income effects on future consumption. Is it possible that a uniform increase in the two gross rates of return would increase the amount consumed during youth? Relate your answer to the household's Marshallian or Hicksian demand functions.
- b) In past generations, a flat-rate tax on local investment was implemented and its effects on investment in both local and distant projects were carefully measured. How would those findings help predict the effect of a new tax on both projects on old-age consumption? Does it matter whether the data and predictions are individual-level or aggregate?
- c) Would income effects on future consumption change your answers to (a) or (b)?
- d) How are the cross-household patterns of consumption and investment related to Marshallian and Hicksian demand functions?
- e) Now consider taste variation too, perhaps as simply as splitting the population into two groups, with common tastes within groups. The endowment distribution is the same for the two groups. Could taste variation be more important than endowment variation for learning about the demand functions?
- f) What, if any, comparative statics in this model cause old-age consumption and its share coming from local projects to be positively correlated?

- 2) Here we look at potentially costly cooperation between mothers and fathers for the purpose of investing in children.  $q$  denotes the quantity of human capital investments, with price normalized to one. Each parent perceives a value of  $u(q)$  in units of money, regardless of how the investment is financed between the parents. That is,  $q$  is a household-level public good.  $u$  is increasing and strictly concave.
- a) What would be the equilibrium  $q$  if each parent acted independently, taking as given the resources the other parent puts toward investment?
  - b) How does your previous answer compare to the Pareto-optimal quantity? [Let's not consider the child as a third party; the child's welfare is already reflected as part of  $u$ ].
  - c) How does the gap  $g$  between one parent's marginal cost of  $q$  and the same parent's marginal benefit vary with  $q$ ? You can focus on the two values of  $q$  you found in (a) and (b)?
  - d) Suppose that, in addition to the resource costs of  $q$ , a couple that coordinates their contributions does so at a cost  $c(g)$ , where  $c()$  is strictly convex. If  $c'(0)$  were zero, how is that related to the nudge hypothesis from Chapter 5 of *CPT*?
  - e) Does your answer from (c) suggest that  $c'(g) > 0$  for  $g > 0$ ?
  - f) A coordination equilibrium is a quantity  $q$  and gap  $g$  that maximizes the total surplus, taking into account the coordination costs. Assuming that  $c'(g) > 0$  for  $g > 0$ , how does the coordination equilibrium value of  $q$  compare to the two values you found in (a) and (b)?
  - g) Under a positive externality, we observe the market quantity  $q$  that is less than the Pareto-efficient quantity  $q_P$ . True, false or uncertain: the difference  $u(q_P) - u(q)$  measures the opportunity cost of the market failure.
  - h) It is sometimes claimed that living as a two-parent family can be stressful and otherwise more costly than a single-parent household. Others claim that the two-parent family arrangement increases the human capital of children. What does the model say about the mutual consistency, or lack thereof, of these two claims?