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Time and Persons in the Economics of Climate Change

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- Time is discrete: $t = 0, 1, \dots$
- If C is a composite good that is a source of social well-being, U , then we can write social well-being at t as $U(C(t))$.
- Imagine an economic forecast $\{C(0), C(1), \dots, C(t), \dots\}$.
- We will call that forecast “business as usual.”

Consumption Discount Rates

- We now conduct a thought experiment on that forecast by asking how much additional consumption society should demand on behalf of tomorrow's people in payment for a reduction in today's consumption by one unit.

- We say that the "social rate of discount", or the *consumption rate of interest*, between today's and tomorrow's consumptions is that additional consumption demanded, less unity. If ρ is that rate, society would demand $(1+\rho)$ units of additional consumption tomorrow as a price for giving up one unit of consumption today; meaning that society regards an additional unit of consumption tomorrow to be worth $1/(1+\rho)$ units of additional consumption today.

- Question: What is the justification for supposing, as we almost always do, that ρ should be positive?

- Response: There are two reasons. (A) An additional unit of consumption “tomorrow” would be of less value than an additional unit of consumption today if society is impatient to enjoy that additional unit now. (B) Considerations of equality demand that consumption should be evenly spread across the generations, other things being equal. So, if future generations are likely to be richer than us, there is a case for valuing an extra unit of their consumption less than an extra unit of our consumption, other things being equal.

The Ramsey-Koopmans-Harsanyi Formulation

- Under the economic forecast, intergenerational well-being is:
- $W = U(C(0)) + U(C(1))/(1+\delta) + \dots$
 $+ U(C(t))/(1+\delta)^t + \dots$

- If the Ramsey-Koopmans-Harsanyi formulation is used in the definition of consumption discount rates, then
- $\rho(t) = \delta + \eta g(C(t))$, where g is the percentage rate of change in C between dates t and $t+1$.
- η is an index of inequality/risk aversion that is reflected in U .

- Examples from the Economics of Climate Change:
- Cline (1992): $\delta = 0$; $\eta = 1.5$
- Nordhaus (1994): $\delta = 3\%$ a year; $\eta = 1$
- Stern (2006): $\delta = 0.1\%$ a year; $\eta = 1$
- NB: The authors are close in their choice of inequality aversion. Notice also how close Cline and Stern are in their specifications of δ .

- The point estimate of consumption growth under business as usual in Stern (2006) is $g(C(t)) = 1.3\%$ *a year*:
- $\rho(t) = 2.05\%$ *a year for Cline*
- $\rho(t) = 4.30\%$ *a year for Nordhaus*
- $\rho(t) = 1.40\%$ *a year for Stern*
- That is why Cline and Stern arrive at similar conclusions and why they differ in their recommendation from Nordhaus.

- The Ramsey-Koopmans-Harsanyi formulation, as we have expressed it in an earlier slide, suffers from a deep shortcoming. None of them accommodates a conception of *personhood*. The formulation sees the person as a wholly *unintegrated being*. In both *formulations* future momentary selves and momentary future others are interchangeable without affecting the moral calculus. We are not told how the demands of personal projects and purposes can be accommodated by someone who is also anxious that on public matters or on matters concerning her descendents, future people should be given the same consideration as she and her contemporaries are given.

- Suppose people, as a matter of fact, do make a distinction between the self and others when deliberating over personal matters, but on public matters treat others with the impartiality that is ethically demanded of them. In that case any reliance on the standard formulation would mislead; it would give rise to incorrect estimates of δ for use in economic decisions that have implications for the long run.

- Imagine a world where individuals, when deliberating over their own lives, have a desire for early over delayed experiences. Formally, we are to imagine that people regard their lifetime welfares to be the *discounted sum of their personal* utilities. But each individual is also a concerned person and interprets intergenerational welfare to be the *undiscounted sum of the lifetime welfares of all her* descendents.