

Evaluation of Public Policies and Social Programs

Session 11: Social Discounting — Why the Social Rate Differs from the Private Rate

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Today

1. Private vs. social discount rates: what decision are we making?
2. What the social discount rate is meant to capture
3. Ramsey, calibration, and Chile's official rate
4. Reflective exercise: who should count the future, and how?
5. Paper presentations (close today's session)

This session is the central reference point for the discount-rate decision your team must make.

Learning Objectives

By the end of today's session, you will be able to:

- Distinguish a funder's private opportunity cost from the social value of resources over time
- Explain the Ramsey formula and what its parameters mean
- Compare Chile's official appraisal rate with the ethical and descriptive arguments behind Stern and Nordhaus
- Explain how the discount rate can change a long-horizon project's evaluation and defend a transparent choice

Private and Social Discounting

Opening question: whose return matters?

A school costs \$500 million now. Its benefits arrive to students and communities over decades.

- A private foundation asks: what return could we earn by using this money elsewhere?
- A government asks: what is society giving up now, and how should we compare that with benefits to people in the future?
- These questions may imply different discount rates even when they concern the same project.

First distinguish the decision-maker's financing constraint from society's intertemporal tradeoff.

The private rate answers a funder's question

- A private discount rate reflects the funder's alternative use of its capital: the return forgone by funding this project rather than another investment or program
- It is appropriate for asking whether the project is worthwhile *for that funder*, given its own budget, horizon, and risk
- A philanthropic or NGO rate may be relatively high; a government's borrowing rate may be lower. Neither alone tells us the social value of future benefits.

Quick discussion

If the government can issue a 30-year bond at 4%, should every public project be discounted at 4%? What would that answer leave out?

What is the social discount rate trying to capture?

How much current social welfare are we willing to give up for a unit of social welfare in the future?

- It expresses society's intertemporal tradeoff, including how consumption and welfare may differ across generations
- It is not a moral price tag on future people; it is an explicit rule for comparing streams of costs and benefits occurring at different dates
- Its level depends on the evaluation perspective, the opportunity cost of real resources, distribution across time, and the treatment of uncertainty

Public money is not free: opportunity cost and financing

- **Opportunity cost:** labor, land, and capital used here cannot be used elsewhere; public investment may displace other investment.
- **Taxes have costs:** raising revenue can change work, saving, and investment decisions; the fiscal cost may exceed the transfer itself.
- **Bonds shift payment through time:** they fund spending now but create future debt service. Their yield is a financing price, not automatically the social discount rate.
- Ramsey gives a welfare-based consumption rate. Public appraisal may also account for displaced capital and the marginal cost of public funds; these need not coincide when markets are distorted.

Avoid double-counting: resource costs, fiscal effects, and discounting are distinct parts of the appraisal.

Ramsey and Calibration

The Ramsey formula: a welfare-based benchmark

$$r = \delta + \eta g$$

- δ : pure time preference — the ethical weight placed on later utility purely because it occurs later
- η : how quickly the marginal value of consumption falls as consumption rises; it governs the weight on richer future generations
- g : expected growth in per-capita consumption
- The formula derives a welfare-based consumption discount rate; it does not automatically equal the state's borrowing rate, the return on displaced private capital, or the marginal cost of public funds

If future generations are expected to be richer ($g > 0$), ηg lowers the marginal welfare value of an extra dollar to them; that is distinct from impatience (δ).

Where does the Ramsey rule come from?

Ramsey's 1928 question was: how much should a society save today to maximize welfare over time?

$$\max_{\{c_t\}} \int_0^{\infty} e^{-\delta t} u(c_t) dt \quad \text{subject to the economy's resource constraint.}$$

With isoelastic utility, $u'(c) = c^{-\eta}$, the planner's optimality condition (Euler equation) is

$$\frac{\dot{c}}{c} = \frac{r - \delta}{\eta} \quad \Longleftrightarrow \quad r = \delta + \eta g, \quad g \equiv \frac{\dot{c}}{c}.$$

- At the optimum, the social return to investing resources must balance the welfare cost of less consumption now against the welfare gain from more consumption later.
- Ramsey's original paper is the foundation; this compact formula is the modern continuous-time expression under particular assumptions, not a universal identity.

Ramsey (1928), "A Mathematical Theory of Saving," *Economic Journal*, 38(152), 543–559.

How do we calibrate the formula?

- **δ is mainly normative:** how much pure discrimination against future utility is ethically acceptable?
- **η draws on evidence and judgment:** how strongly should an extra dollar count less when it goes to a richer person or generation?
- **g is forecast:** what consumption growth should we expect over the horizon, and how uncertain is that forecast?
- Change any of these inputs and the implied rate changes; calibration makes value judgments and empirical assumptions visible rather than eliminating them.

Illustrative calibrations: Stern (2006), $\delta = 0.1\%$, $\eta = 1$, $g = 1.3\% \Rightarrow r \approx 1.4\%$; Nordhaus (2007), $\delta = 1.5\%$, $\eta = 2$, $g = 2\% \Rightarrow r \approx 5.5\%$.

Stern: make the ethical choices explicit

- Stern's 2006 Review uses $\delta = 0.1\%$: almost no pure discounting of future welfare. The small residual is associated with the annual chance of global catastrophe/extinction, not ordinary impatience.
- It uses $\eta = 1$, a normative judgment about how the marginal value of consumption falls as consumption rises, and projects per-capita consumption growth of about $g = 1.3\%$.
- Hence $r = 0.1\% + 1 \times 1.3\% = 1.4\%$. The low rate gives substantial weight to distant climate damages.
- These inputs are not all estimated from market data: the ethical weight on future generations is a central premise; growth is an empirical projection.

Stern, N. (2006), *The Economics of Climate Change: The Stern Review*, Chapter 2.

Nordhaus: discipline the rate with observed returns

- Nordhaus's conventional comparison uses $\delta = 1.5\%$, $\eta = 2$, and consumption growth around $g = 2\%$: $r = 1.5\% + 2 \times 2\% = 5.5\%$.
- This is a more descriptive, market-consistency approach: the implied consumption rate is closer to observed real returns and saving behavior.
- The parameters still involve assumptions; matching market behavior is a calibration strategy, not direct proof that observed choices are ethically correct for future generations.
- The contrast with Stern is therefore about both evidence and values: should the social rate largely reflect ethical welfare weights, or be disciplined by observed opportunity returns?

Nordhaus, W.D. (2007), "A Review of the Stern Review on the Economics of Climate Change," *Journal of Economic Literature*, 45(3), 686–702.

Chile: an official benchmark for public investment

- The Chilean Sistema Nacional de Inversiones (SNI) publishes social prices and appraisal parameters for public investment projects
- Its 2025 *Precios Sociales* document lists a social discount rate of **5.5%** and describes it as the social opportunity cost of capital
- This is the operational rate used in Chilean project appraisal — it is not the same thing as a bond yield, nor proof that every project or ethical question has one universally correct rate
- The formula's role is to clarify the logic and assumptions; a country's adopted appraisal rate also reflects institutional methodology and policy choices

Source: Chilean Sistema Nacional de Inversiones, *Precios Sociales 2025*. Verify the latest annual version before applying the rate.

Stern vs. Nordhaus — and Weitzman's caution

- **Stern (2006):** a prescriptive, ethical approach; very low pure time preference (δ) gives substantial weight to future generations and a low rate
- **Nordhaus (2007):** a more descriptive calibration, closer to observed market behavior; higher inputs imply a higher rate and less weight on distant benefits
- **Weitzman (2007):** questions Stern's assumptions and emphasizes uncertainty about future rates; uncertainty can support a rate that declines with the horizon

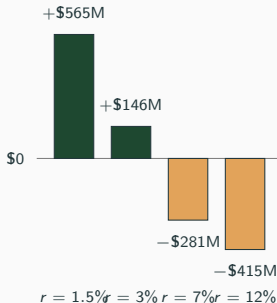
The disagreement is not just arithmetic: it reflects competing ethical commitments, evidence, and views about uncertainty. Stern (2006); Nordhaus (2007); Weitzman (2007), "A Review of the Stern Review," *JEL*.

Sensitivity and Reflection

One project, very different NPVs

Illustration: a long-horizon school investment

Construction cost: \$500M today. Benefits ramp up as cohorts graduate: \$10M/year in years 5–15, \$30M/year in years 16–40, and \$50M/year in years 41–60.



At 1.5%, NPV is about +\$565M; at 3%, +\$146M; at 7%, -\$281M; at 12%, -\$415M. The same cash flows flip from strongly positive to strongly negative as the rate changes.

What does the NPV comparison teach us?

- Nothing about the project changed; only the weight assigned to future net benefits changed
- Long horizons magnify even modest differences in rates: the year-30 value of \$1 is about 64 cents at 1.5%, 20 cents at 5.5%, and 3 cents at 12%
- This is not a calculator puzzle. It reveals that the discount rate embeds judgments about opportunity cost, public finance, and the relative standing of future people

For Astoreca: show sensitivity, but justify the rate on its economic and ethical grounds.

Rate-setting council: who should bear the tradeoff?

A 10-minute discussion, no calculation required

You advise on the \$500M school investment. The cost is borne by current taxpayers or bondholders; benefits accrue to students and communities over several decades. The official Chilean SNI benchmark is 5.5% (2025).

- Take a perspective: current taxpayers, future students, the Ministry of Finance, or the project evaluator
- What should the rate reflect from that perspective: the return on displaced investment, the cost of raising funds, the welfare weight on future generations, or some combination?
- Would you use 5.5%, a different rate, or a range? State the assumption you are least comfortable making.

Report one unresolved disagreement, not just a group-selected number.

What We Learned Today

- The Ramsey formula ($r = \delta + \eta g$) decomposes the social discount rate into pure time preference, inequality aversion, and expected growth — each a separate, defensible (or disputable) judgment call
- Stern and Nordhaus reach very different rates from different ethical and empirical starting points; neither is simply “wrong”
- The private rate answers a funder’s opportunity-cost question; the social rate evaluates society’s intertemporal tradeoff and public resource costs
- For long-horizon projects like a school, the discount rate can flip the recommendation entirely — pick it deliberately, not by default

Before Session 12

- Problem Set 3 (self-study checkpoint: by Session 14)
- Teams: settle on a discount-rate approach for the project

Paper Presentations (75–90 min)

M. Emilia Neut & Felix Gimeno

Angelucci, M. & De Giorgi, G. (2009), “Indirect Effects of an Aid Program: How Do Cash Transfers Affect Ineligibles’ Consumption?” *AER*, 99(1)

Emilia Perez & Javiera Hasbun

Chay, K.Y. & Greenstone, M. (2003), “The Impact of Air Pollution on Infant Mortality: Evidence from Geographic Variation in Pollution Shocks Induced by a Recession,” *QJE*