Resolving intertemporal conflicts: Economics vs. Politics

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- **Many assets are owned in common**: household's savings, firm's capital, community's natural resources, sovereign wealth fund, etc.

- Resource management decisions often taken **centrally**.

- **Values/preferences** are important inputs to these decisions, but are often **heterogeneous**.

- How can we resolve **conflicts** that arise when people have **different attitudes to time**?

"Even the most vigorous critical examination can still leave conflicting arguments that are not eliminated by impartial scrutiny."

– Amartya Sen, 'The Idea of Justice'.

**Attitudes to time are captured by the
Pure Rate of Time Preference:**

Welfare: $W_\tau = \int_\tau^\infty U(c_t)e^{-\delta(t-\tau)}dt.$

Pure rate of time preference: δ

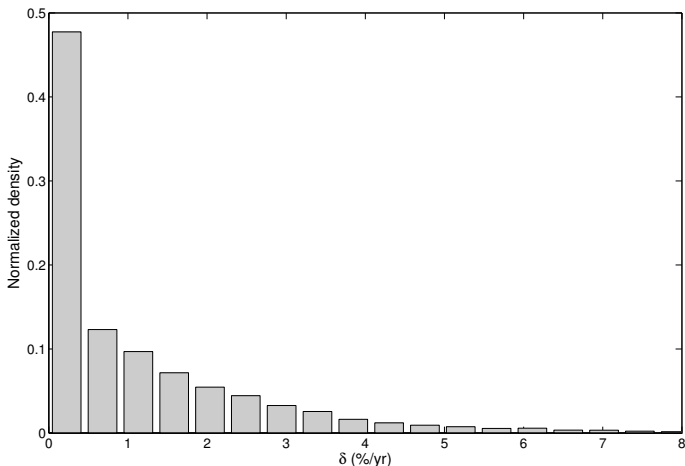# Disagreements about pure rate of time preference, δ

Figure: Economists' recommended values of δ for public project evaluation, from Groom et. al. (2014). N=180, kernel density fit.

Impossibility theorem: Jackson & Yariv (AER, 2014)
Methods of aggregating time preferences for collective decisions that
are *both*:

1. Pareto Efficient
2. Time Consistent

   - TC $\sim$ 'stationarity': $V(\vec{x}, \vec{C}) \succ V(\vec{x}, \vec{C}') \iff V(\vec{C}) \succ V(\vec{C}')$.

DO NOT EXIST.

Results build on classic papers of Strotz (1955); Koopmans (1960).

- What should we do?!?

This paper...

- We study two approaches to *resolving* intertemporal conflicts:

  1. **Economics**: Collective decision rule seeks <u>efficient</u> allocations.
  2. **Politics**: Agents <u>vote</u> over aggregate consumption plans.

- We compare these methods across two dimensions:

  - Can the group **commit** to evaluate intertemporal allocations with respect to preferences at $\tau = 0$ for all times?
  - Are agents' discount rates **known**?

	Full Info	Hidden Info
Commitment	e.g. GZ, HM	?
No Commitment	?	?

GZ = Gollier & Zeckhauser (JPE, '05)
HM = Heal & Millner (NBER WP, '13).

- **Commitment**: 'Technocratic' Economics approach unambiguously dominates Politics, under full and hidden information.

- **No Commitment**: Horse-race between inter-temporal (Politics) and intra-temporal (Economics) efficiency.

- We characterize which 'second-best' mechanism does best analytically, and obtain a partial reversal of the results under commitment.

- Application to empirical distribution of discount rate recommendations suggests Politics often trumps Economics.

The setting

- A common asset S grows at rate r.

- Assume away all sources of heterogeneity expect time preferences: Infinitely-lived agents have common iso-elastic utility function

$$U(c) = \begin{cases} \frac{c^{1-\eta}}{1-\eta} & \eta \neq 1 \\ \ln c & \eta = 1 \end{cases}$$

- To avoid uninteresting complications, assume $\eta \geq 1$.

- N agents. **Agent i has (idiosyncratic) discount rate δ_i.**

- Consumption allocated to i at time t is c_{it}.

- Resource evolves according to

$$\dot{S} = rS - \sum_i c_{it}; \ S(0) = S_0.$$

Economics: Commitment

- Suppose welfare weight w_i on agent i's welfare (with $\sum_i w_i = 1$). All efficient allocations are solutions of:

$$\max_{c_{it}} \sum_i w_i \int_0^\infty U(c_{it}) e^{-\delta_i t} dt \ \text{ s.t. } \ \dot{S} = rS - \sum_i c_{it}$$

- Can solve for optimal allocations, and agents' welfare.

- The 'representative' discount rate is declining, and tends to the lowest rate:

$$\hat{\delta}_\eta(t) = \frac{\sum_i \delta_i w_i^{1/\eta} e^{-\delta_i t/\eta}}{\sum_i w_i^{1/\eta} e^{-\delta_i t/\eta}}$$

- Commitment to evaluate allocations with date $\tau = 0$ social preferences is **essential** for this solution to be implemented. Allocations are efficient, therefore **cannot** be time consistent.

Economics: Commitment + Hidden Info

- If $\{\delta_i\}$ are known any efficient allocation is implementable.

- If the $\{\delta_i\}$ are hidden, agents will have incentives to **lie**, and allocations will be inefficient/infeasible.

- Example: If $w_i = 1/N$, consumption allocations are **Pareto ranked**.

- Can allocation rule deter cheating, while still being Pareto efficient? Yes!

Proposition

*Pareto efficient allocations are **incentive compatible in dominant strategies** iff welfare weight*

$$w_i \propto (\delta_i + (\eta - 1)r)^{\eta}$$
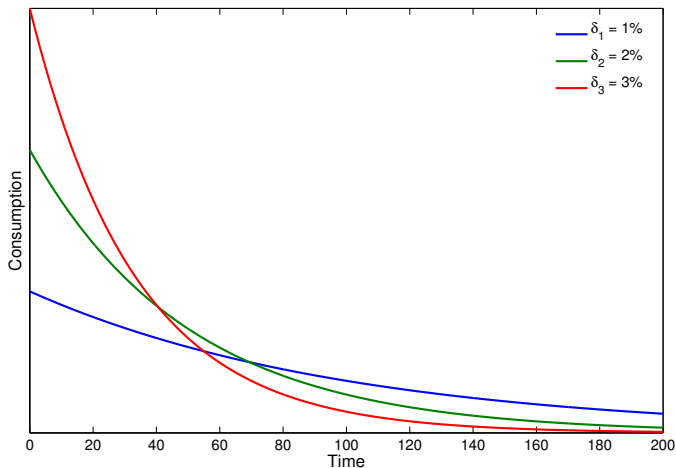
is assigned to an agent who announces δ_i.

Figure: Allocations for incentive compatible welfare weights

Economics: No commitment

- In the absence of commitment, efficient allocations at $\tau = 0$ are not implementable, or indeed welfare optimal at later times.

- Traditional 'Economics' approach to resolving time inconsistency problem is to treat this as a **dynamic game** between 'current and future selves' (e.g. Phelps & Pollak, 1968, Laibson, 1997).

- Current decision-maker does the best she can, given what future decision-makers will do.

- We characterize **Markov Perfect Equilibrium** of this game.

- This equilibrium is time consistent and *intratemporally efficient*, but *intertemporally inefficient*.

- To ensure equilibrium allocations in this dynamic game are incentive compatible (for large N), just set $w_i = 1/N$.

Proposition

1. *In equilibrium* **aggregate** *consumption is chosen according to the rule*

$$C_t = \sigma(S_t) = AS_t$$

where A satisfies

$$\left\langle \frac{A}{\delta_i + (\eta - 1)(r - A)} \right\rangle_{\tilde{w}_i} = 1$$

2. *Agent i receives a* **constant share** $\tilde{w}_i$ *of aggregate consumption.*

3. *The equilibrium aggregate consumption plan is equivalent to the optimal plan of a time-consistent agent with discount rate*
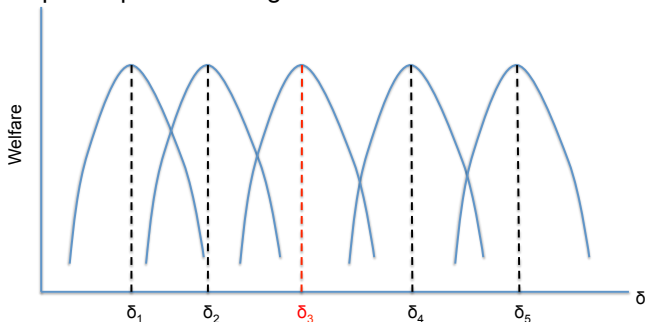
$$\delta_{NC} = r + \eta(A - r).$$

Politics: Voting & single peaked preferences

What if agents vote over optimal aggregate consumption plans?

- If the policy space is *one dimensional*
- All agents have *single peaked preferences*

The unique voting equilibrium is:

The optimal plan of the agent with the **median** discount rate

- This equilibrium will be **time consistent** but **inefficient**.

Politics: The voting equilibrium

Theorem

Fix a constant income share s_i for agent i. Then if:

- *Agents vote over the full aggregate consumption plan.*

OR

- *Agents vote over aggregate consumption in every period.*

*The optimal aggregate consumption plan of the **median** agent wins all pair-wise majoritarian votes between plans.*

This equilibrium is *intertemporally* efficient, but *intratemporally* inefficient.

Politics & Information

- Under **full information**, the planner can choose any income shares $\{s_i\}$.

- We will assume that s_i chosen so that Politics is **As Efficient As Possible** (AEAP):

$$s_i^*(\{w_i\}) = \text{argmax}_{s_i} \sum_i w_i W_i^v(s_i)$$

- $W_i^v(s_i)$ is the welfare agent i achieves under the political equilibrium, as a function of s_i.

- We can solve explicitly for s_i^*, given a set of welfare weights $\{w_i\}$.

- The s_i^* are **constants** $\Rightarrow$ AEAP income shares are **time consistent**.

- Under **hidden information**, the only way to make Politics incentive compatible is to have **equal** income shares:

$$s_i = \frac{1}{N}$$

Summary of models

- Economics approach: Specify welfare weights w_i.

- Politics approach: Specify income shares s_i.

- We will compare these mechanism using two measures:

  1. Ordinal: Which mechanism does the **majority** prefer?

  2. Cardinal: Which mechanism leads to higher group welfare, given a choice of welfare weights?

	Full Info	**Hidden Info**
Commitment	$w_i, s_i = s_i^*(w_i)$	$w_i \propto (\delta_i + (\eta - 1)r)^\eta, s_i = 1/N$
No commitment	$w_i, s_i = s_i^*(w_i)$	$w_i = s_i = 1/N$

Economics vs. Politics: Commitment + Full Info

- Under **full information**, trivially true that group welfare is always higher under Economics than AEAP Politics. Economics implements 'first best' under full info with commitment.

- However, we show something stronger:

Proposition

Commitment + Full Info:
*Economics **strictly Pareto dominates** Politics with AEAP income shares*

- The group unanimously prefers Economics to AEAP Politics, for **any** set of welfare weights.

Economics vs. Politics: Commitment + Hidden Info

- Under **hidden information**, incentive compatibility tightly constrains both mechanisms. Perhaps some planners with *evaluation weights* y_i will prefer Politics?

Proposition

Commitment + Hidden Info:
All agents strictly prefer Economics to Politics (except the median agent, who is indifferent).

- Economics still unanimously preferred $\Rightarrow$ group welfare always higher under Economics.

Economics vs. Politics: No commitment + Full info

- Analytic results are possible with $\eta = 1$ (i.e. log utility).

- Pick **equitable welfare weights** $w_i \propto \delta_i$: ensures *equal treatment on constant paths*.

- AEAP income shares are $s_i^* = 1/N$.

- Define $z_i := \delta_i/\delta_m$:

Proposition

When the planner uses 'equitable' welfare weights, and $\eta = 1$:

1. *Majority prefers Politics iff $\{\delta_i\}$ positively skewed (i.e. $\langle z_i \rangle > 1$).*

2. *Group welfare is higher under Politics iff*

$$\langle \ln z_i \rangle \leq (\langle z_i \rangle - 1)\langle z_i^{-1} \rangle.$$

3. *If $\{\delta_i\}$ **log-symmetrically** distributed, both these conditions satisfied.*

- Having a 'long upper tail' of discount rates favors Politics...

E vs. P: No commitment + Hidden Info

- Agents are allocated **equal shares** of consumption under both mechanisms.

- $\Rightarrow$ agents' preferences depend only on **aggregate** consumption path.

- We know that:

    - Politics: aggregate consumption is the optimum of median agent.

    - No-commitment: equilibrium path $\equiv$ optimum of agent with discount rate δ_{NC}.

    - Agents' preferences over optimal plans are single peaked...

Proposition

No commitment, hidden info:
*The majority of agents **always** prefers Politics to Economics*
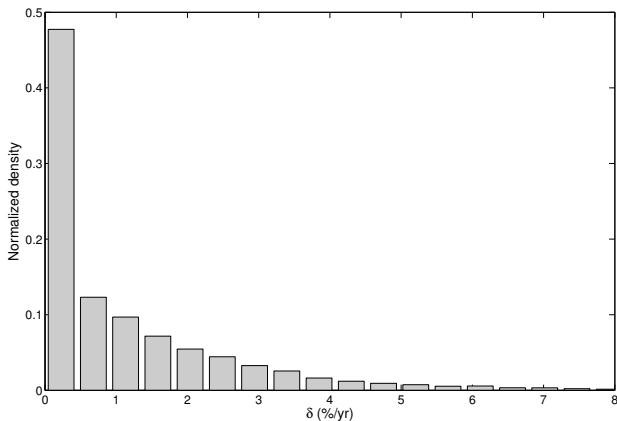
Figure: Survey of economists who have published on social discounting in a 'top' journal since ≈ 2000. $N = 180$ in this sample, kernel density fit applied to smooth out dataset.
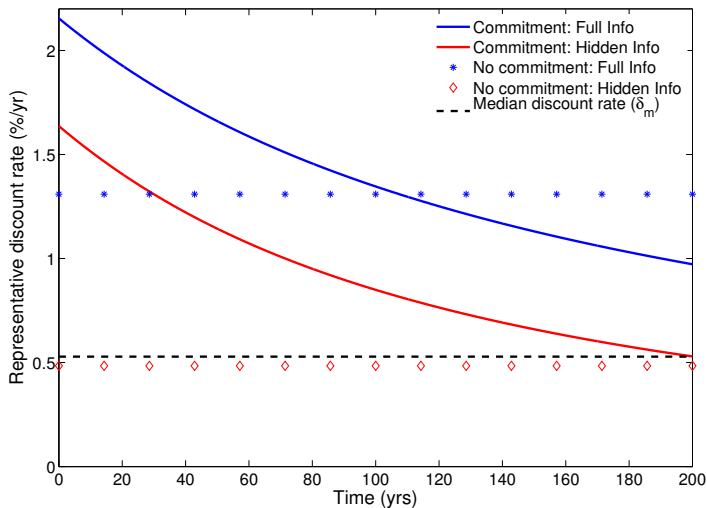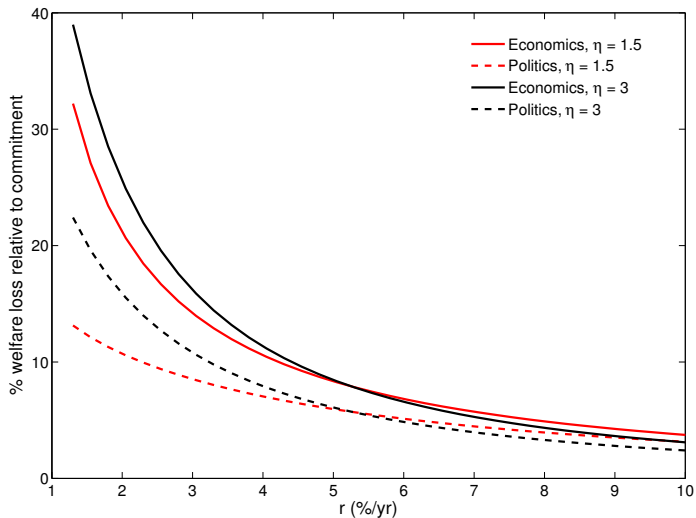
Figure: Representative discount rates for aggregate consumption decisions in each of the 4 versions of our model. ($\eta = 2, r = 2\%/\text{yr}$, equitable weights).

- Politics yields higher group welfare for **all** values of η, r.

- Recall, majority **always** prefers Politics in this case. What about welfare?
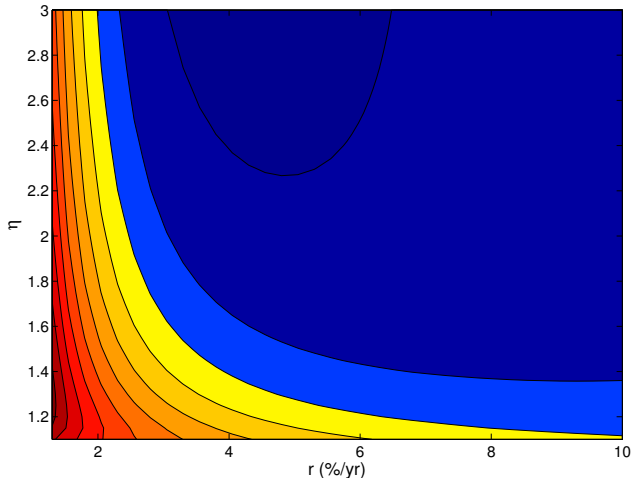

Figure: Warm colours: Politics preferred, Cool colours: Economics preferred.

Conclusions

- In a world **with commitment**, message is clear: take the **Economics** approach!

- **Without commitment**, we must trade off two inefficiencies:

  - Economics approach: Intratemporally efficient, intertemporally inefficient
  - Politics approach: Intratemporally inefficient, intertemporally efficient

- Large political economy literature: Economic plans $\succ$ Political outcomes. By contrast, we may be better off establishing a political institution for resolving intertemporal conflicts, rather than taking a 'technocratic' Economic approach.

- Empirically, **Politics seems to do better** without commitment.

- Applications to social discounting, natural resource management, etc.

References

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