INTERGENERATIONAL DISCOUNTING:

PRESCRIPTIVE AND DESCRIPTIVE APPROACHES

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1. Introduction

The standard objective in growth theory and cost benefit analysis over time (with and without pollution and natural resource depletion) is

Discounted Utilitarianism DU

(1) $$\int_0^{\infty} u(c_t)e^{-\rho t}dt \rightarrow \max$$

c_t $\hat{=}$ consumption $\hat{=}$ instantaneous welfare in monetary terms at time t

$u(c)$ $\hat{=}$ utility function

ρ $\hat{=}$ rate of pure time preference

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Given (1) along an optimal path the Ramsey rule holds

(2) $$r(t) = \eta(c(t))g(t) + \rho$$

$r(t) \hat{=}$ instantaneous interest rate w.r.t. consumption at time t

$g(t) = \dfrac{\dot{c}(t)}{c(t)} \hat{=}$ growth rate of consumption at t

$\eta(c) = -\dfrac{u''(c)c}{u'(c)} \hat{=}$ elasticity of marginal utility

Despite its common application $\rightarrow$ There is much ambiguity about the meaning of (1) in the literature.

Two interpretations of (1) exist:

(i) the *descriptive* ("positive") interpretation →
(1) describes intertemporal utility maximization of actual people over their own lifespan who also might show altruism towards their descendants in a dynastical chain: The "infinitely lived consumer" or the "altruistic parent" approach (Roemer 2008).

(ii) the *prescriptive* ("normative") interpretation →
(1) describes welfare maximization of a fictitious social planner across generations.

Both positions are

- held by eminent economists
  (i) → Nordhaus, Weitzman, Sinn, etc.
  (ii) → Pigou, Dasgupta, Heal, Stern, etc.

- part of "mainstream economics"

> Concerning intertemporal evaluation there are two opposing schools centered around interpretations (i) and (ii).

The debate on the Stern Review on the Economics of Climate Change

- has brought this controversy to the fore.

- has revealed the difficulties of the two schools to communicate.

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The aim of my presentation is to

- clarify and assess these two positions.
- to discuss the role of normative thinking for intertemporal evaluation.

The structure of my talk is as follows:

- In Section 2 the prescriptive approach focusing on the parameters η and ρ is considered.
- In Section 3 the descriptive approach focusing on the potential role of market interest rates as a benchmark for the social discount rate is discussed.
- In Section 4 I try to bridge the gap between the two positions.

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2. The Prescriptive Ethical Approach

The basic question in this context is:

Which *specific choices* for ρ and $u(c)$ are normatively appealing?

Traditionally attention has been on ρ suggesting that a strictly positive ρ is required. The Stern Review (cf. also Olson & Bailey 1981, Asheim & Buchholz 2003) has shifted the focus to $u(c)$ because

- assuming $\rho = 0$ and varying $u(c)$ avoids unequal treatment of different generations which is often considered to be ethically questionable and purely ad hoc (cf. Sidgwick, Ramsey, Harrod, etc.).

- the curvature of $u(c)$ reflects different degrees on inequality aversion
  $\rightarrow$ Value judgments on distributional equity are taken into account in a systematic way (cf. Atkinson 1970).

Apart from these ethical objections:

- The arguments for strictly positive values of ρ given in the literature are rather complex and abstract.
- Criteria for choosing specific values of ρ are hard to detect.

Therefore I start the analysis with $u(c)$, assuming a constant elasticity of marginal utility η.

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2.1 The Ethics of η

a) Some Methodological Preparation

The key question just in the debate on the Stern Review has been:
What can be understood as a "normatively appealing" choice of η?

Clearly: Being part of a welfare judgment η cannot be determined in an objective way $\rightarrow$ "Wertfreiheit" à la M. Weber.

BUT: Different values of η have effects that may conform more or less to explicit ethical values or "ethical intuition".

The common practice in ethical social choice theory therefore is:
Check the consequences of different choices of η and their compatibility with certain normative criteria by thought experiments looking for a "reflective equilibrium" in the sense of Rawls (1972)!

Even though adopting the prescriptive approach Stern (2006) has *not* conducted such theoretical exercises to justify his preferred value $\eta = 1$:

- There is only some short reference to "leaky bucket" effects.
- More weight is instead laid upon empirical estimates of η from various sources.

$\rightarrow$ In Stern's otherwise deliberate treatment of the ethical approach there is some gap and inconsistency.

Dasgupta (2008) instead "test(s) the robustness of ethical assumptions … by putting them to work in stark artificial models".

In the framework of a simple Ramsey growth model Dasgupta shows that Stern's choice $\eta = 1$ would imply a savings rate close to 100%.
$\rightarrow$ This is not a "palatable" figure consistent with ethical intuition!

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BUT: Also Dasgupta stops short with his ethical reasoning as he does not consider *explicit* normative criteria.

THEREFORE: I will add some further thought experiments to assess which values of η fulfill some ethically appealing conditions.

The growth model underlying this analysis is the same as in Dasgupta (2008)!

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b) The Linear Growth Model with Constant Productivity

The *assumptions* of the model are:

There is discrete time and an infinite number of generations $t = 1, 2, \ldots$

k_t is the *capital stock* given to generation t.

c_t is the *consumption level* of generation t.

$\alpha \geq 1$ is the *productivity parameter* being constant over time
$\hat{=}$ *marginal rate of transformation* between consumption in period t and period $t+1$.

Given k_t and c_t generation t then bequeaths the capital stock

(3) $$k_{t+1} = \alpha(k_t - c_t)$$

to the next generation $t+1$.

k_1 is the exogenously given *initial capital stock* of generation 1.

A consumption path $(c_1, c_2, ...)$ then is technically feasible if and only if

(4) $$\sum_{t=1}^{\infty} \alpha^{-(t-1)} c_t \leq k_1$$

The social planner/"evaluator" maximizes the intertemporal Bentham-Samuelson Social Welfare Function SWF

(5) $$W_{\eta,\delta}(c_1,c_2,\ldots)=\sum_{t=1}^{\infty}\delta^{t-1}u(c_t)=\sum_{t=1}^{\infty}\delta^{t-1}\frac{c_t^{1-\eta}}{1-\eta}$$

This is the discrete time version of (1) with $\delta=\frac{1}{1+\rho}\leq 1$ as the social time discount factor.

The f.o.c.'s for maximizing (5) w.r.t. (4) for any $t=1,2,\ldots$ are:

(6) $$\alpha\delta u'(c_{t+1})=u'(c_t) \quad\Leftrightarrow \frac{c_{t+1}}{c_t}=(\alpha\delta)^{\frac{1}{\eta}}.$$

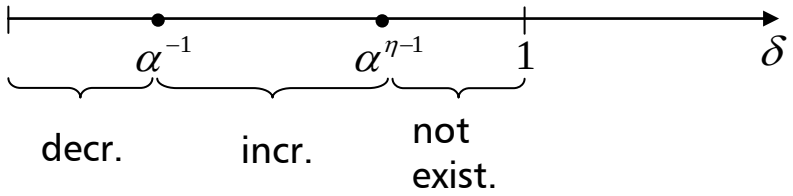
An optimal path

- exists if and only if $\delta < \alpha^{\eta-1}$
- is weakly increasing and thus sustainable if and only if $\delta \geq \alpha^{-1}$

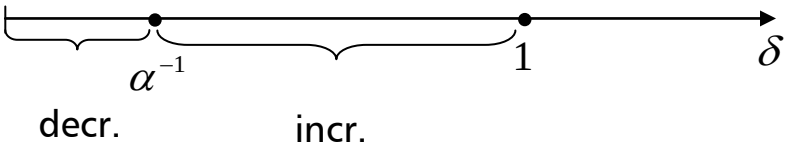
The different cases are depicted in Figure 1.

Figure 1

$\eta < 1$



$\eta > 1$



Applying (4) and (6) the optimal paths are as follows:

(7) $$c_1 = \left(1 - \alpha^{\frac{1}{\eta}-1}\delta^{\frac{1}{\eta}}\right)k_1$$

(8) $$c_t = (\alpha\delta)^{\frac{t-1}{\eta}} c_1 \qquad \text{for all } t = 1,2,\ldots$$

The saving rate along an optimal path is constant over time and equal to

(9) $$s = \alpha^{\frac{1}{\eta}-1}\delta^{\frac{1}{\eta}}$$

If an optimal path exists $s < 1$ is always obtained.

As the next step we now consider the implications of three different normative postulates in this model.

c) Circumstance Solidarity between Generations

We first check how the savings rate s varies if productivity α changes.

The *basic result* from eq. (9) is: The savings rate s decreases with growing α if and only if $\eta > 1$

$\rightarrow$ Every generation benefits from an increase in productivity if and only if $\eta > 1$ (see Figure 2).

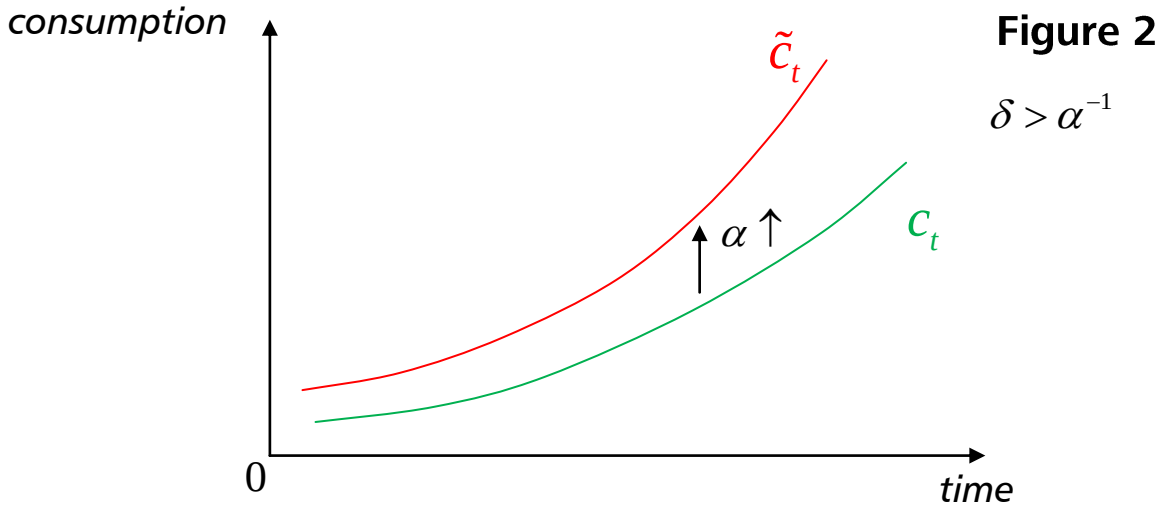
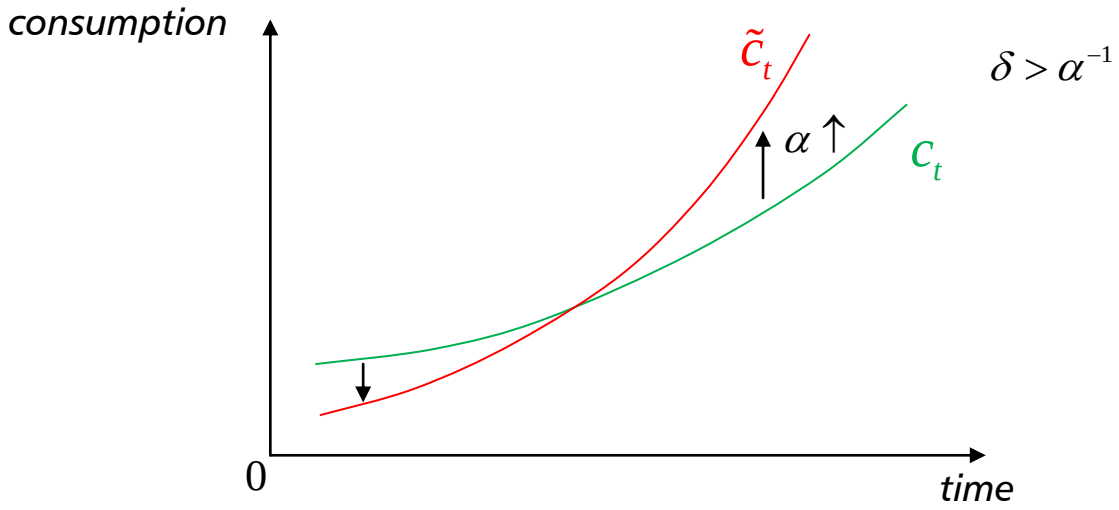


Figure 2

$\delta > \alpha^{-1}$

Otherwise, if $\eta < 1$, consumption of the first generation would fall when α becomes higher (see Figure 3) $\rightarrow$ Higher productivity only benefits later generations $\rightarrow$ This seems to be unfair as a higher α allows for a Pareto improvement of all generations.

Figure 3



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Only if $\eta > 1$ the ethical postulate of circumstance solidarity between generations is fulfilled $\rightarrow$ All generations "share the bad or good luck in change of circumstances" (Fleurbaey 2008).

This consideration shows that Stern's value $\eta = 1$ is very extreme
$\rightarrow$ $\eta = 1$ is indeed "the lowest lower bound of just about any economist's best guess range" (Weitzman 2007).

d) A No-Envy Test

Due to positive productivity $\alpha > 1$ later generations may enjoy higher welfare, but some generations must save for that and make sacrifices.
$\rightarrow$ Which consumption patterns might give a fair intergenerational distribution of burdens and benefits in this situation?

A possible approach (see Buchholz & Schumacher 2010) is: Any two generations t_1 and t_2 with $t_1 < t_2$ are confronted with a no-envy question (cf. Foley 1967, Kolm 1972, Varian 1974) $\rightarrow$ Would you want to change places with the other generation?

If productivity is *not* taken into account generation t_1 would then get consumption c_{t_2}, and vice versa: No-envy means $c_{t_1} \geq c_{t_2}$ and $c_{t_2} \geq c_{t_1}$.

In this case a *naive no-envy path* would have constant consumption over time.

(10) $$c_t = \hat{c} = \frac{\alpha - 1}{\alpha} k_1 \quad \text{for all generations } t = 1, 2, \ldots.$$

$\rightarrow$ Neglecting productivity in the no-envy test implies that it is also neglected in the resulting allocation.

If instead productivity and thus the "difference in inalterable circumstances" is observed, generation t_1 would get the consumption level $\tilde{c}_{t_1} = c_{t_2} \alpha^{t_1 - t_2}$.

We furthermore assume that both generations consider their *relative position* ($\rightarrow$ their status) when making the no-envy test.

Given this, both generations do not envy each other if and only if

(11) $$\frac{c_{t_1}}{c_{t_2}} = \frac{\alpha^{t_1 - t_2} c_{t_2}}{c_{t_1}}$$

Applying condition (11) to $t_1 = t$ and $t_2 = t+1$ for any $t = 1, 2, \ldots$ gives

(12) $$c_{t+1} = \alpha^{\frac{1}{2}} c_t$$

Comparing this outcome with the optimal allocations that maximize some SWF $W_{\eta,\delta}(\cdot)$ yields:

An consumption path is envy-free in the relative sense if $\eta = 2$ and $\delta = 1$
$\rightarrow$ The choice of $\delta = 1$ and $\eta = 2$ can be motivated by a no-envy approach.

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e) A Hypothetical Social Contract between Generations

Generation t endowed with k_t has to save $\hat{s}k_t = \frac{1}{\alpha}k_t$ to avoid a reduction of the capital stock. Given this sustainability constraint

(13) $$\tilde{k}_t = (1-\hat{s})k_t = \frac{\alpha - 1}{\alpha}k_t$$

is left as disposable income (in the sense of v. Schanz 1890) for generation t.

Assume that generation t saves $\tilde{s}_t\tilde{k}_t$ out of $\tilde{k}_t$ in order to bring about economic growth and to improve welfare of future generations.

Then the next generation inherits the capital stock

(14) $$k_{t+1} = \alpha \tilde{s}_t \tilde{k}_t + k_t = (\tilde{s}_t \alpha + (1 - \tilde{s}_t))k_t .$$

Further assume that there is some bilateral arrangement ($\rightarrow$ virtual exchange) between subsequent generations which has the following provisions:

Any generation $t+1$

(i) is *obliged* to apply the same savings rate *to its disposable income* $\tilde{k}_t = \frac{\alpha - 1}{\alpha} k_t$ as its predecessor generation t: $\tilde{s}_{t+1} = \tilde{s}_t = \tilde{s}$.

(ii) is *entitled* to consume the returns $\alpha \tilde{s} \tilde{k}_t$ of the extra savings made by generation t.

Condition (i) implies

(15) $$c_{t+1} = (1-\tilde{s})\frac{\alpha-1}{\alpha}k_{t+1} = (1-\tilde{s})\frac{\alpha-1}{\alpha}(\tilde{s}\alpha + (1-\tilde{s}))k_t$$

Condition (ii) implies

(16) $$c_{t+1} = \alpha\tilde{s}\frac{\alpha-1}{\alpha}k_t = \tilde{s}(\alpha-1)k_t$$

Combining (15) and (16) gives the quadratic equation $(1-\alpha)\tilde{s}^2 - 2\tilde{s} + 1 = 0$ which has the solutions

(17) $$\tilde{s}_{1/2} = \frac{2 \pm \sqrt{4-4(1-\alpha)}}{2(1-\alpha)} = \frac{1 \pm \alpha^{\frac{1}{2}}}{1-\alpha}$$

Excluding the solution $\tilde{s} < 0$ yields

(18) $$\tilde{s} = \frac{1}{1+\alpha^{\frac{1}{2}}}$$

The total saving rate then is

(19) $$s = \hat{s} + \tilde{s}(1-\hat{s}) = \frac{1}{\alpha} + \tilde{s}\frac{\alpha-1}{\alpha} =$$

$$\frac{1}{\alpha} + \frac{1}{1+\alpha^{\frac{1}{2}}}\left(\frac{\alpha-1}{\alpha}\right) = \frac{1}{\alpha} - \frac{1-\alpha^{\frac{1}{2}}}{\alpha} = \alpha^{-\frac{1}{2}}$$

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Comparing (19) with (9) shows that the consumption path that results from the virtual intergenerational contract can also be obtained by maximizing $W_{\eta,\delta}$ given $\delta = 1$ and $\eta = 2$.

The contractual approach contains some central elements of Rawls' (1972) reflections on intergenerational justice and a just savings principle:

- The difference principle ($\hat{=}$ the maximin rule) in its strict sense should not apply in the intergenerational context. There is a "natural duty" for any generation not only to preserve but also to accumulate capital
  $\rightarrow$ The saving rate should be above its sustainability level $\hat{s}$.

- As some kind of virtual reciprocity a "scheme of cooperation spread out in historical time" should govern the process of accumulation.

Some further relevant quotations from Rawls' "Theory of Justice" are:

People in the original position "try to piece together a just savings schedule by balancing how much of each stage they would be willing to save for their immediate descendants against what they would feel entitled to claim of their immediate predecessors" (p. 289). Each generation "cares for its immediate descendants, as fathers care for their sons" (p. 288).

This means: Each generation reaps the fruits of the expansion of the capital stock made by the preceding generation, but in return it must bear an equivalent sacrifice in favor of the subsequent generation
$\rightarrow$ Conditions (ii) and (i).

f) Conclusions

- According to basic ethics concerning fair participation of all generation in the benefits of technical progress, $\eta = 1$ as in the Stern Review is the lowest sensible bound.

- $\eta = 2$ as a particular value may be justified in two ways
  - by no-envy w.r.t. status.
  - by a virtual contract between adjacent generations that implements a fair scheme of capital accumulation.

Remark: For Weitzman (2007) the same value $\eta = 2$ has come out as a "guesstimate" being part of his "trio of twos"!

Originally, the emphasis was laid on ρ = rate of pure time preference $\rightarrow$ Topic of the next section!

2.2 The Ethics of ρ

Concerning ρ the main issue has been whether $\rho = 0$ or $\rho > 0$ is more appropriate. In the literature there are different ethically relevant arguments on that.

a) The Over-Saving Problem

A widely held view is (e.g. Arrow 1995, 1999, and also Rawls 1972):

Without pure time preference the earlier generations would have to save too much in order to improve welfare of the future generations.

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If $\rho = 0$ and $\eta < 1$ the saving rate even would become so high that no optimal solution exists (see Section 2.1.b) $\rightarrow$ Jam tomorrow paradox!

This argument is repudiated by Stern (2006) as "not convincing" and "ad hoc"
$\rightarrow$ Pure time discounting is *not* necessarily required to avoid over-saving!

Stern's assertion will be confirmed in our simple growth model.

Let $(c_1, c_2, ...)$ denote the optimal and increasing consumption path given some η and some $\rho > 0$ with $\alpha\delta = \dfrac{\alpha}{1+\rho} > 1$ (and the initial capital stock k_1).

Let the originally given η be substituted by

(20) $$\tilde{\eta} := \frac{\eta \ln \alpha}{\ln \alpha + \ln \delta} > \eta .$$

The original optimal path $(c_1, c_2, \ldots)$ then is also optimal given this $\tilde{\eta}$ and $\rho = 0$, i.e. without pure time discount!

For a proof only identity of the f.o.c.'s for $W_{\eta,\delta}$ and $W_{\tilde{\eta},1}$ (see (6)) has to be shown: For any $t = 1, 2, \ldots$ we have

(21) $$\frac{c_{t+1}}{c_t} = (\alpha \cdot 1)^{\frac{1}{\tilde{\eta}}} = (\alpha\delta)^{\frac{1}{\eta}} .$$

Note that through the assumption $\alpha\delta > 1$ only increasing (i.e. sustainable) paths are covered by this argument! For some generalization see Asheim & Buchholz

(2003).

b) Incompatibility of Equal Treatment of all Generations with other Postulates

Since Koopmans (1960) and Diamond (1965) it has been known: In the case with an infinite number of generations Anonymity/Equity (→ equal welfare weight for all generations) may be in conflict with other appealing axioms, i.e. with

- Completeness
- Efficiency → Various weaker and stronger types of the Pareto principle
- Cardinal Representability of aggregate welfare → Existence of a Bergsonian SWF on infinite consumption paths
- Continuity of the ordering w.r.t. to various (smaller and larger) topologies.

In the tradition of Koopmans and Diamond the theoretical literature on discounting is full of "impossibility theorems" concerning the compatibility of these postulates.

Svensson (1980) has instead presented a *possibility theorem*: For some specific topology there exists some ordering of infinite consumption streams that simultaneously fulfills equity and efficiency.

Banerjee & Mitra (2008) have shown in this context: "Svensson's bounded ℓ_1 metric induces the smallest topology under which there exists continuous ethical preferences" ($\rightarrow$ Anonymity and Pareto).

Thus everything hinges on the choice of the underlying metric and topology.

BUT: What is the normative relevance of continuity assumptions at all?
A rare attempt at answering this question is also in Banerjee & Mitra (2008):

"Continuity has the important normative implication that rankings of streams are robust to any mis-specification of the streams."

→ Pure time preference is important to avoid wrong decisions when consumption paths are uncertain. This argument needs further investigation.

BUT: Such considerations clearly lie outside the theoretical risk-free framework in which intergenerational discounting is usually treated.

Another novel approach to justify pure time discounting might fit much better to the standard scenario (and is much simpler).

A short sketch: Just if one is interested in equity across generations one may want to have egalitarian-equivalent paths for all feasible consumption paths.

Assume therefore: For any given path $C = (c_1, c_2, ...)$ there exists some egalitarian path $(\hat{c}(C), \hat{c}(C), ...)$ with $(\hat{c}(C), \hat{c}(C), ...) \sim (c_1, c_2, ...)$ (where "$\sim$" denotes the symmetric part of the underlying welfare ordering).
$\rightarrow$ Axiom of Egalitarian-Equivalent Comparability.

Then $W(C) := \hat{c}(C)$ defines a SWF over consumption paths. As follows from Basu & Mitra (2003) this is not compatible with having both Anonymity and Pareto.

This gives a *further impossibility theorem*: In evaluation of infinite consumption streams it is not possible to have Egalitarian-Equivalent Comparability, Completeness, Anonymity and Pareto at the same time.

In this context also note Roemer´s (2008, p. 11) fundamental critique of the preoccupation with impossibility results:

"(Undiscounted, W.B.) utilitarianism is eliminated only because it is incomplete. Is, however, incompleteness such a defect of an ethical theory? Where, indeed, do we have an ethical theory that provides convincing answers to all ethical questions?"

c) Risk of Extinction of Mankind

Since Sidgwick pure time discount is motivated as a device for taking the risk of extinction of mankind (by an asteroid, a nuclear war or some pandemic disease) into account $\rightarrow \delta$ corresponds to the probability of survival in the next year.

In this tradition Stern (2006) has assumed $\rho = 0.001$, i.e. $\delta = 0.999$
$\rightarrow$ The probability of extinction over one century is about 10%.

There are problems with this approach:

- The adequate value of ρ is hard to estimate. The evaluation over time, however, is very sensitive to the exact choice of ρ.
- Just with this approach, the assumption that ρ will be constant forever is very heroic.
- It might seem questionable whether "gambling" on the existence of future generations is justified at all $\rightarrow$ No positive ρ would then be justified!
- One might wonder whether there should be a time discount for other types of risk beyond the risk of extinction, e.g. for changes of preferences or devaluation of part of the capital stock through technological innovation: Efficient use of solar energy in the Sahara (DESERTEC) could make wind farms in the North Sea redundant!
  $\rightarrow$ Some higher level of ρ would be warranted!

d) Conclusion

Justifying pure time preference across generations by invoking the possibility of extinction of the human race (→ Section 2.2.c)) has *some* normative *general* appeal. But this approach does not provide a guideline for assessing *specific* values for ρ.

The other two lines of reasoning (→ Sections 2.2 a) and b)) are either not convincing or lack a clear ethical content.

3. The Descriptive Approach

It is a widely held view that cost-benefit analysis over time should be based on observable behavior and thus on market interest rates (e.g. Nordhaus 2007 and Sinn 2008). The pros and cons of this position will now be discussed.

3.1 Arguments in Favor of the Market Interest Rate

There are two strands of arguments to justify the use of market interest rates in cost-benefit analysis over time

- Methodological individualism: The market interest rate r reflects preferences of actual people $\rightarrow$ These should guide the economic process – and not the personal beliefs of a "philosopher king"!

- Efficiency: The market interest rate r provides a price signal for efficient investment decisions $\rightarrow$ Realizing investment projects with an internal rate of return below r implies a waste of scarce resources and thus lowers the welfare of future generations $\rightarrow$ From this perspective NOT using r would be unethical!

- Avoiding additional environmental damage: Choosing discount rates below r may spur "dirty" investments and thus harm future generations.

But there are also many objections against these neoclassical convictions.

3.2 Reservations against the Use of Market Interest Rates

The counter-arguments are on different levels – practical, conceptual, ethical.

- Capital markets are not perfect. A definite level of the market interest rate does not exist → Should one use the risk-free rate of government bonds or the much higher average rate of return of risky investments of firms?

- Actual market interest rates are determined by the decisions of central banks. They may differ considerably between countries and are highly volatile. It is hard to regard observed market interest rates as an expression of "fundamental economic factors". They are hard to predict even in the short run.

- There is no consensus among economists how to deal with interest rate uncertainty → The Weitzman-Gollier-Puzzle reflects this conceptual ambiguity (see Weitzman 1998, Gollier 2004, and for an attempt at clarification e.g. Buchholz & Schumacher 2008 and Weitzman & Gollier 2009).

- In the case of long-run investment planning the classical normative argument in favor of the market mechanism (→ superior device for coordinating individual economic activities) does not apply → Future generations are affected by current decisions, but obviously are not able to participate in the market process today → Market interest rates and intergenerational ethics are completely different things!

- The welfare of future generations inevitably depends on the goodwill of the present generation that shows some benevolence for their own descendants and for posterity in general → Such altruistic preferences of actual people do not materialize on the capital market and thus do not influence the market interest rate.

  The general problem in this context is: Preserving and improving the welfare of future generations has the characteristics of a public good → Uncoordinated "donations" of present people to the benefit of future generations implies underprovision of the public good → There is a "social dilemma" and a problem of social cooperation: "Isolation, Assurance, and the Social Discount Rate" (Sen 1967).

  Therefore: Even if one wants to base the evaluation of long-term investment projects on current preferences one cannot rely on market interest rates → Contingent valuation studies to measure altruistic attitudes are instead required!

Conclusion: Reference to market interest rates is of not much help if ethical concerns with regard to future generations are to be taken serious!
BUT: Is it the job of economics at all to deal with such ethical issues → Confusion on that question has evolved in the debate on the Stern Review too.
We will deal with this heated (and almost ideological) controversy in the next and final section!

4. Ethics and Economics in the Context of Intergenerational Discounting: A Strained Relationship

Many economists fervently attack the ethical position taken in the Stern Review:

- "Nirvana ethics" (Sinn 2008)
- "Lofty vantage point of the world social planner, perhaps stoking the embers of the dying British Empire" (Nordhaus 2007)

This harsh criticism is motivated by the opinion: Economists should *describe,* not *prescribe* → Not Section 2, but Section 3!

This rejection of an ethical stance on intergenerational evaluation will now be considered more closely → Some thesis in this context:

- Intergenerational evaluation is not possible without ethics because it is about how to treat other people.
- For real people ethical judgment is important: Otherwise climate change would not be perceived to be a problem at all.
- Economics being interested in human preferences should also take their ethical part serious: The classical (egoistic) "homo oeconomicus" is a caricature!
- Rational individuals want to make their ethical decisions in a coherent way: Social welfare functions as applied to intergenerational evaluation are a standard tool for this.

- In general economists are more expert than philosophers in doing ethical analysis in which costs and benefits play a role. Why then leave this important field to philosophers?

- Providing a well-structured framework for ethical considerations and making specific prescriptions are two different things:

  "Methodologically, this approach of exploring the implications of social welfare functions … sits well with economist's preferred view of themselves as giving dispassionate advice on emotive issues: it enables one to infer the consequences of alternative distributional judgments without endorsing any." (Boadway & Keen 2000)

  → SWFs should not be banned from mainstream economics!

Conclusion: The fundamental critics of Stern's ethical approach throw out the baby with the bath: It is a main merit of the Stern Review to have made the ethical underpinning of long-run cost benefit analysis more transparent!

BUT: Does this positive assessment at the methodological level mean that Stern is "correct" in every respect? NOT AT ALL!

Stern's choice of η is extremely low, and – for reasons of general uncertainty – his low value of ρ may also appear questionable.

It may even be doubted that Stern has explained his choices for the crucial parameters carefully enough!

- Their subjective status can easily be overlooked by readers.
- Stern's sloppiness may have been a strategic advantage for "selling" his results to the media and to politicians.

Why do Stern's main opponents make so much fuzz and do not concentrate on this weakness with Stern's argument?

5. Conclusion

The Stern Review has revived the long-standing discussion on the appropriate social discount rate for long-term environmental problems.
Stern's merits and shortcomings are of general relevance for this debate.

The merits on the methodological level: Stern has made explicit that intergenerational evaluation includes a genuinely ethical problem of interpersonal distribution that can be tackled by standard welfare theory.

The shortcomings: Stern did not follow the ethical approach systematically. His choice of a very low value for η was rather ad hoc and not based on a thorough "moral calculus". The foundation of his challenging assertions thus is quite shaky!

The ensuing debate on the social discount rate has been more obfuscating than clarifying. Stern's critiques are partly right and partly wrong!

General impression: The reflection on the ethics of discounting is still incomplete and may be improved. (But see Asheim (2009) for some attempt at a comprehensive assessment!)

Important questions for future research might be:

- What are convincing objections against undiscounted utilitarianism?
- What are good arguments in favor of pure time discount?
- Is the utilitarian approach appropriate at all? Should not instead some variant of a sustainability criterion be applied directly as suggested by Roemer (2008)?

- How should risk and uncertainty be taken into account?