What is the Correct Intergenerational Discount Rate?

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ABSTRACT

The social discount rate typically consists of two components: differences in the marginal utility of consumption across time, and the pure time preference rate as applied to cardinal utility. Within this framework, intragenerational and intergenerational time preference rates must be the same, if we are to avoid strongly counterintuitive results. Both rates, however, can be plausibly equal at zero rather than at a positive level; pure time preference should not necessarily be applied to cardinal utility, even when we apply it to goods. The other component of the discount rate, the marginal utility of consumption, is appropriate only for very small changes in individual wealth; this assumption does not match most of the intergenerational scenarios in question. I conclude that economics does not provide a prima facie case for a positive rate of intergenerational discount for most policy issues.

I. Introduction

The last fifteen years have seen a resuscitation of interest in the question of intergenerational discounting, starting with Parfit (1984). Parfit argued that there was no compelling moral reason for attaching a positive rate of intergenerational discount to benefits and costs in the distant future. A given cost or benefit, once it arrives in the future, is no less real than a cost or benefit today. Cowen and Parfit (1991, p.145) wrote: "Imagine finding out that you, having just reached your twenty-first birthday, must soon die of cancer because one evening Cleopatra wanted an extra helping of dessert." Or consider the comparison prospectively. Under any positive discount rate, if universally applied, no matter how low, one life today can be worth more than one million lives in the future, or the entire survival of the human race, if we use a long enough time differential for the appropriate comparison. To the defenders of zero discounting, these comparisons seem counterintuitive. A recent NBER working paper (Caplan and Leahy 2000) has fueled the controversy by suggesting that the social discount rate is systematically too high.

The empirical literature on discounting raises further questions. Previous theory often has pointed to the market rate of interest, but many consumer choices show far higher implicit rates of discount. When purchasing a refrigerator, for instance, individual decisions on energy-efficiency often show rates of discount ranging from XX to XX percent. The question arises what role these magnitudes should play in discounting intergenerational resource allocation.

Many of the reasons for treating future benefits differently from current benefits do not have to do with time discounting per se. For instance, we should discount future benefits that are uncertain, but this is discounting for risk rather than for time. Similarly, we may discount benefits for future generations because they accrue to wealthier persons, but then we are discounting for wealth. Or altruism may affect how we weight the future, but again this factor is distinct from time discounting as traditionally construed.

Most of the relevant debate has revolved around two separate issues: time preference and the lower marginal utility of consumption for wealthier people in the future. Schelling (1995, p.395) summarizes the current state of the literature: "...there is a near consensus that the appropriate discount rate should be conceptualized as consisting of two components...One is pure time preference and 'deals with the impatience of consumers and reflects their inborn preference of immediate over postponed consumption'…The second reflects the changing marginal utility of consumption with the passage of time, and is decomposed into a rate of growth of consumption per capita and an elasticity of utility with respect to consumption." In other words, variations in the marginal utility of consumption over time determine how goods translate into utility. The rate of time preference then determines how much utility will be discounted with respect to time.[1]

The following simple equation for intertemporal utility represents both components of the problem:

$$(1)\ \int_0^T e^{-\delta t} U[C(t)]dt$$

The exponent after the integral represents the rate of time preference, as applied to cardinal utility. The U term represents the utility of consumption each period, from which can be derived the marginal utility of consumption, once the absolute level of consumption is known.

Following the literature, I use this equation as a starting point to organize the discussion. Section II asks whether time preference presents an independent reason for a positive rate of intergenerational discount. Section III focuses on the marginal utility of consumption and when markets take the interests of future generations into account. Section IV offers some brief concluding remarks.

[1] Broome (1994), and Arrow, Cline, Maeler, Munasinghe, and Stiglitz (1994), and Beckerman (1996) have defended positive discounting of the traditional sort, whereas Cowen and Parfit (1991) and Cowen (1991)

The paper is set in the framework of cost-benefit analysis and Paretian welfare theory, as used in neoclassical economics. I do not wish to deny the potentially problematic nature of these frameworks as a complete moral theory, but the discounting rate debate has been set in this context. The question is what discount rate should be used in a cost-benefit study, not the proper scope of cost-benefit analysis. Even if we reject cost-benefit analysis, the question of weighting current vs. future benefits will continue to arise.[2]

II. Time preference within lives and across lives

Time preference is part of the standard arsenal of arguments for discounting within a single life. Most individuals prefer to receive benefits sooner rather later. This claim has been prominent since the classical economists, such as Adam Smith, and has run through Boehm-Bawerk, Pigou, and other proponents of the neoclassical tradition down to the present day. Today, economists use intertemporal utility functions and postulate a rate of time discount as applied to cardinal utility, rather than to goods. In this context the relevant time discounting must be applied to utility, if pure time preference is to count as a separate reason for discounting. Time preference applied to goods collapses into the changing marginal utility of consumption, to be considered further below.

Time preference within a life, however, cannot be extrapolated directly to time preference across different lives. Consider a policy that would provide a benefit, forty years hence, for persons (some may wish to call them “future persons” or “prospective persons”) who have not yet been born. Before these persons have been born, they are not waiting for the benefit to arrive and do not suffer abstinence. In other words, people ("future people") have no well-defined preference ranking over time periods before they

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have defended zero discounting. Price (1993), Harvey (1994), and Schelling (1995), among others, have defended various intermediate positions, with Schelling coming closest to the zero discounting position.

[2] I define the Paretian framework as one which takes preferences as given and the sole source of information about value, while restricting the relevant information to ordinal comparisons. I define cost-benefit analysis as a more applied framework, which attempts to measure and aggregate values in terms of dollars. Cost-benefit analysis directly compares the benefits and costs of differing individuals, whereas the more purely theoretical Paretian framework does not.

are born. For this reason, pure time preference, taken alone, does not justify positive discounting for the entire forty years.

The passage of time before our births does not involve waiting or preference in the traditional fashion. It makes sense to claim that an individual would rather have an ice cream cone today than tomorrow. It is less meaningful, however, to claim that I am worse off than a medieval peasant because I had to wait longer to receive my utility. Yet even a small but positive intergenerational time preference rate could support such a conclusion, if applied indiscriminately to questions of individual welfare.

I will refer to the "No Waiting Argument" to express the intuition that individuals have no time preference for periods before they are born. A weak form of the argument claims only that time preference does not justify a positive rate of discount across lives. A stronger form states that individuals have a zero rate of time preference for the years before their birth. For purposes of simplicity, I will focus on the stronger version of the claim, although the following discussion could be restated in the more qualified weak form.

The No Waiting Argument has stronger implications than it may at first appear. More specifically, it is not feasible to treat intragenerational and intergenerational time preference in systematically different fashion. If we accept that pure time preference before birth is either zero or poorly defined, we must adopt a similar conclusion about intragenerational time preference, as defined across utility. Similarly, if we believe that time preference within a life or generation is positive, contradictions arise if we treat intergenerational time preference differently.

Consider the choice between two policies, nuclear waste disposal and old age insurance. Nuclear waste disposal produces a future benefit of 100 utils, in the year 2020, for a person who will not be born until 2010. Old age insurance produces a future benefit of 110 utils, again in the year 2020, for a person who is alive now and will continue to be alive when the benefits arrive. Which policy is of greater value?

If we treat intragenerational discount rates as exceeding intergenerational discount rates, it becomes possible that nuclear waste disposal has a higher present value, at least if the gap between time preference rates is sufficiently large. Since the old age insurance benefits accrue to the currently living, we must discount those benefits for all the years between now and when the benefits arrive. So if we take the current year to be 2000, we must discount for twenty years. Nuclear waste disposal benefits, which arrive in 2020, benefit a person who will be born in 2010, and thus we face only ten years of time discounting, at least if we accept the No Waiting Argument.

It is disturbing to conclude that we should prefer the benefit of 100 to the benefit of 110, when both arrive at the same point in the future. And when the benefits arrive, both beneficiaries will be alive. The 100 benefit in the future may have a higher present value when evaluated in the year 2000, but it will not have a higher present value in 2020, the year of arrival for the benefits.

In other words, preferring nuclear waste disposal fails a time consistency test. Assume that a week before the benefits arrive, we have an opportunity to reevaluate our choice of policies. By this point in time, the beneficiary from nuclear waste disposal is now alive, having been born some time ago. The new comparison of policies will now yield an unambiguously superior ranking for old age insurance. We are comparing a benefit of 110 against a benefit of 100, with both now subject to the same extent of temporal discounting. So why choose/prefer nuclear waste disposal at the earlier point in time, if we know that we will later wish we could have implemented old age insurance? In effect, the unborn has a non-exponential discount rate, which is first zero for some period of time and then normally exponential. Given this non-exponential function, we should not be surprised that a time inconsistency problem results.[3]

[3] On time consistency and non-exponential discount rates, see Strotz (1955-6) and Ainslee (1994). On the requirement that intergenerational policies be time consistent, see Cowen (1990) and Blackorby, Bossert, and Donaldson (1996).

If the inter- and intragenerational discount rates were equal throughout, the above conundrums would disappear. At every point in time we would prefer the policy which yields benefits of 110 and the time inconsistency problem does not arise.

In sum, time consistency requires that intragenerational rates of time preference should be equal to intergenerational rates of time preference. Hence arises the disagreement on intergenerational discounting issues. Defenders of zero intergenerational discounting, such as Schelling, appeal to the intuition behind the No Waiting Argument. On the other side, if we accept positive time preference within a life, for cardinal utility, we are led to positive time preference across the generations.[4]

If we accept both the No Waiting Argument and time consistency, we must treat all rates of time preference, both within and across lives, as zero. In this context zero time preference within a life is not as counterintuitive as it may sound, since we are talking about time preference across cardinal utility, not time preference across goods.

The case for discounting cardinal utility is less compelling than the case for discounting goods and services. Zero time preference for cardinal utility does not rule about positive discounting per se from an individual point of view. An individual may plausibly prefer present to future goods because of their greater marginal utility. The argument simply says that there is no meaning to individual time preference in addition to these differences in marginal utility (Stigler and Becker 1976). In this account, there is only one source of discounting, rather than two (or zero), in accordance with Occam's Razor.

This point need not be interpreted as arguing for a zero discount rate for cardinal utility. Instead, we might claim that the entire notion of discounting cardinal utility is poorly defined for normative purposes. In terms of practical implications, this difference would

[4] Note that the resulting discount rate will typically be less than the market rate of interest, which also contains a component resulting from varying marginal utilities. So this conclusion would establish some degree of discounting, but discounting at the market rate would require the "varying marginal utilities of consumption" (see section III below) to succeed as well in the intergenerational context.

be largely semantic. "Time preference across cardinal utility" would in any case not provide an independent reason for discounting.

(Caplin and Leahy 2000) also challenge the traditional approach to discounting cardinal utility, focusing on the intrapersonal setting. They treat the “current self” and “future self” as analogous to two different persons with potentially different interests. In this approach, the correct intertemporal weighting depends on how much the current self cares about the future self, and vice versa. The resulting weighting scheme will not in general be equal to the market rate of interest, and typically the implied discount rate will be lower. To translate their argument into the framework of this paper, I focus on the intergenerational case where present and future clearly represent two distinct individuals. In the polar case of no altruism, we are left with no reason to weight the cardinal utility of one individual more than the cardinal utility of the other. The analysis of Caplin and Leahy would apply to this paper more directly if we assumed altruism across the generations, in both directions, and wished to see how this altruism translated into an implicit rate of discount.

The practitioner of positive economics may wonder what difference it makes whether we postulate that individuals discount pure cardinal utility. Indeed the positive difference is hard to see. If two time periods exhibit different endowments, any observed time preference can be classified into either the category of "differing marginal utility of consumption" or the category of "pure rate of time preference for utility," or some combination of the two. Differing marginal utilities of consumption across time need never disappear, even in a truly stationary state with infinitely long-lived individuals. If we observe individuals preferring present goods to future goods in a stationary state, we never need to resort to postulating a pure discount rate for cardinal utility to explain this. Classifying this behavior in terms of differing marginal utilities for the goods is consistent with the positive economic tradition of treating a utility function as determined "after the fact" by individual choices.

The primary difference between the two approaches comes only if the "differing marginal utilities" rationale for discounting fails to hold. In this case applying a pure rate of positive time preference to cardinal utility would still give us reason to discount, whereas a zero rate of pure time preference for utility would not. There is thus a normative question at stake even though the two approaches cannot be distinguished easily in positive terms.

Given that positive analysis cannot resolve the difference in approach, we are left with three options: abandon the No Waiting argument, abandon time consistency, or give up positive discounting for cardinal utility. Only the third is consistent with our moral intuitions and Occam's Razor. While that does not constitute a knockdown argument for the third option, it does indicate a prima facie case in its favor.

III. The marginal utility of wealth argument

To understand how the productivity of capital affects the rate of time discount, we must examine how it influences marginal utilities of consumption. Technology is typically "fertile" in a growing economy and the future tends to be wealthier than the present. Given the wealthier future, we will (rationally) value future commodities less at the margin. A given unit of wealth brings greater marginal utility when consumed in a poor period, relative to when it is consumed in a wealthy period. The discount rate may serve as an implicit measure for these differences in marginal utility, which require no particular assumptions about pure time preference (Broome 1994, Arrow, et.al.,1994).

It is incorrect to take the rate of discount as exogenously given by the productivity of technology alone, and thus as determining a discount rate without consideration of preferences. In one-commodity models of this kind, an apple tree or bottle of wine increases in value at some fixed rate, defined in terms of numbers of apples or quality of wine. In a more realistic account, capital goods and consumer goods cannot be measured in the same physical unit. The rate of return on capital investment depends on monetary values and thus preferences, which brings us back to the varying marginal utility of

consumption. In the absence of pure time preference, and the varying marginal utility of consumption, the value of capital goods would be bid up to the value of the consumer goods they produce, leaving no room for the productivity of capital as an independent force.[5]

To understand the marginal utility argument in more detail, consider a bottle of wine in a world where the future will be richer than the present. The wine can be consumed today or in the more distant future, but we do not start with any assumption that the wine automatically becomes more valuable with time (see the above paragraph). The investor holding the wine will compare selling the wine for consumption today to holding the wine and selling it in the more distant future. The wine may be sold several times across interlinking generations before being consumed. At any point in time, the wine owner compares the expected revenue from holding the wine to the expected return from selling the wine for immediate consumption. The ratio of marginal utilities to prices for these decisions will be equated over all relevant time periods. If such ratios were not equated, some set of individuals would find it advantageous to reallocate wine to other time periods.

We can think of the equilibrium allocation as mimicking perfect markets, where future generations are allowed to trade in today's markets, specifically in the market for wine. If markets were perfect, future generations would have the option, today, of "bidding" for future wine consumption. In effect they would pay current wine owners not to consume, but rather to hold their wine and sell it for consumption in the future. Of course markets are not literally perfect in this fashion, since future generations cannot trade in today's markets. Nonetheless this market imperfection does not matter for the problem at hand. Given the initial setup, it does not matter if future generations do their bidding today, or whether they wait to bid until they are ready to consume the wine. Either way the allocation is the same.

[5] Single commodity models may be useful for various predictive purposes, and Milton Friedman is correct to stress that we should not judge positive theories by the realism of their assumptions. Nonetheless when doing normative analysis, the more realistic theory will be the preferable one.

Note that if wine is subject to diminishing marginal utility, and is a normal good whose consumption rises with wealth, the marginal utility of wine in a poor period will exceed the marginal utility of wine in a wealthy period. If I am given a bottle of fine wine while I am a poor and struggling 22-year old, it will be one of the few wine bottles I drink that year and it will be of great value to me. If I am given the same bottle when I am a 70-year old millionaire, I already have much fine wine around me and the bottle will be worth correspondingly less. The marginal utility of wine will be higher in poor periods, which implies positive discounting, given that the future will be wealthier than the present.

Of course wine may be an acquired taste or an addiction and thus not subject to decreasing marginal utility. The old millionaire may enjoy wine more than the struggling young man. In that case the implied rate of intergenerational discount will be negative rather than positive. But if we take decreasing marginal utility as the general case, the wine example provides a prima facie case for a positive rate of intergenerational discount. The question remains to what extent the wine example applies to real world instances of intergenerational discounting.

Applicability of the wine example

The wine example does not justify a positive rate of intergenerational discount when we consider significant changes in wealth. As with all cost-benefit methods, the wine example takes the overall distribution of wealth as given and examines the allocation of a single market commodity, small in value relative to the wealth of the individuals in question. But when wealth effects are large for the individuals involved, the market prices then do not measure marginal rates of substitution for the two outcomes. In other words, the market rate of interest measures the rate at which people are willing to trade off marginal dollars across time, but provides no necessary information about how they are willing to trade off infra-marginal dollars.

We can imagine the rates of substitution for the inframarginal units by asking the following question. If individuals in both the present and future were to be poorer than they otherwise will be, through continued subtraction of successive marginal resource units, would wine consumption be shifted towards the future or towards the present? There is no a priori answer to this question and indeed no presumption in either direction. We thus do not know if the inframarginal units produce greater value in the present or in the future. The possibility that the inframarginal units would be allocated to the future shows that the implicit "discounting" on these units can be negative rather than positive.[6]

This point has been well-known in cost-benefit analysis (see the survey of Dreze and Stern 1987), but it is neglected when intergenerational discount rates are discussed or applied. For most cost-benefit issues, income or wealth effects are of negligible importance, since the changes considered are small. But most of the relevant changes for intergenerational policy are large ones for many of the individuals involved. Intergenerational policy issues include the following:

- Greenhouse effect
- Nuclear waste disposal
- Ozone layer
- Environmental destruction
- Natural resource depletion
- Biodiversity and endangered species

Often these changes involve loss of life, significant loss of health, or a significant change in living conditions for the individuals involved, thus affecting inframarginal consumption units. Only for biodiversity and endangered species might the relevant

[6] To show by example that inframarginal units can be more valuable in the future than in the present, consider future individuals whose taste for wine is highly robust to changes in wealth. In contrast, assume also that present individuals cut back on their wine consumption drastically if their wealth falls any more than slightly. This combination of assumptions can give rise to implicit negative discounting for the inframarginal units. If each of the two groups, present and future individuals, had less wine, the perfect markets outcome would allocate more wine to the future, rather than more wine to the present. The implicit rate of discount on those units would be negative rather than positive.

changes be small for the individuals involved, and even then the possibility of pharmaceutical innovations may make biodiversity a matter of life or death for many human beings.

Note that in these contexts it does not matter whether the policy in question is small relative to total national output. Cost-benefit analysis refers to individual valuations, and the measured changes must be small for each affected individual, if the cost-benefit measure is to have meaning.

The wine analogy therefore does not justify positive intergenerational discounting when loss of life, loss of health, or environmental catastrophe is involved. Consider, for instance, the loss of human life. The existence of a positive rate of interest does not indicate that a life today is of greater value than a life in the future. The comparison of one life against another is not a comparison of marginal utilities and also is devoid of a context of market choice. For these reasons, the wine scenario does not imply a positive rate of discount for human lives.[7]

Similarly, the positive rate of discount does not provide a "best estimate" of the value of a life today vs. the value of a life tomorrow. Relative value at the margin does not provide useful information for estimating the values of total stocks. To provide a simple example, a man wandering lost in the desert has a higher marginal value of water than I do. But this does not give us any information about how to forecast the relative values of "I lose all my water" against "he loses all his water." The value of his life may be greater than, less than, or equal to mine. So we cannot invoke the notion of a "best imperfect estimate" to defend positive discounting in this context.

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[7] We might try to save the positive discounting argument by invoking transitivity. This claim would run as follows. If we are willing to discount dollars at a positive rate, we must discount lives at the same rate. At the margin we can always invest dollars to save lives. Differential discount rates for dollars and lives thus suggest an unexploited opportunity to improve social welfare. This argument, however, begs the question. The initial difficulty arose because we cannot infer infra-marginal values from observed marginal trade-offs, especially where markets are incomplete. The mere invocation of transitivity, which will be valid only at the original margin, does not enable us to overcome this gap.

It might be argued that we can translate loss of life, or other large changes, into a small marginal change. We can consider a small "risk to life" as the relevant choice variable (Schelling 1968), rather than examining the loss of an entire life with certainty.

The Schelling method of valuing life does not produce a generally positive rate of discount in this context. First, it is an open question whether the Schelling method turns a large change into a small one for future generations. The Schelling method works best when individuals face small risks in a market context, such as when they choose a riskier job over a less risky job to earn more money. In the case of future generations, risk is imposed on them but they make no marginal voluntary choice up front. From their point of view there is no ex ante measure of policy value; rather they encounter the ex post results when they are born. Those results will typically involve significant changes in wealth and require consideration of inframarginal values.[8]

Even if we set this problem aside, the rate of interest will not typically measure the relevant marginal rates of substitution. In all of the policy areas listed above, we find the potential for significant market failure and the absence of well-defined property rights. We therefore cannot expect the ratios of marginal utilities and prices to be equal over time, and in this regard those policy issues are not analogous to the wine example.

In the wine example the intertemporal storability and tradability of the good kept marginal rates of substitution in equality with the ratio of market prices. If the marginal utility for wine in the future were higher than the current marginal utility, individuals would store some wine for future sale/use and re-equate the relevant ratios. This same equilibration process does not necessarily apply to risks to life, environmental catastrophe, or other areas with ill-defined property rights.

[8] On the difference between ex ante and ex post measures of policy, see Hammond (1983). Furthermore, In many cases, such as the greenhouse scenario, we are dealing with high risks rather than small ones. Furthermore we often know which individuals are subject to the risk.

To focus on the value of life example, much of our safety results from public goods and bads, which are determined by government policies. This is especially true if we disaggregate risks into various categories, such as risk of cancer, risk of global warming, and so on. When safety changes through these non-market mechanisms, consumer choice does not generally establish an equality of marginal rates of substitution with price ratios. So if the government cuts fire protection expenditures, individuals may respond by buying more fire extinguishers, but still they cannot achieve a first-best intertemporal allocation of risks. Equilibrium in the market in safety therefore will not reflect social costs as will equilibrium in the wine market. Government policy might, in principle, bring about an equality of price/marginal utility ratios, as we would find in a first-best market setting, but we do not in general expect this result. We therefore cannot rely on market prices to give us accurate information about the proper intertemporal allocation of marginal increments of public goods.

We can put this point in another terminology. When public goods are present, the government typically has safety-producing instruments that private individuals do not. In that case market prices will not reflect the relevant social marginal rates of substitution for safety. The richer individuals of the future, for instance, might wish to buy more safety than available private technologies will allow at any price. Given this premise, if the government has safety-producing opportunities that private individuals do not, government production of a given marginal increment of safety might be more profitably distributed to the future than to the present. Again, to make this judgment we must compare the inframarginal units and look beyond observed market prices.

Examining direct willingness to pay also shows that the correct implicit discounting over time can be either positive or negative. Future individuals are wealthier and thus they will pay more to reduce risks to their life, compared to poorer current individuals. So based on a gross (undiscounted) willingness to pay standard, the future lives are worth more than current lives, not less. The future lives may remain worth more than the current lives even if we discount these higher willingness to pay sums by the market rate

of interest and convert all sums to present value, using the market rate of interest.[9] The willingness to pay for safety may rise more rapidly than the chosen discount rate dampens it down. Thus it is a mistake to take a single common value for life, say $4 million, and treat future lives as the discounted present value of this $4 million figure. For the same reason that the future is wealthier, the demand for safety, and thus the value of life, will rise as well.

Finally, when considering large policy changes, not everyone in the future will be richer than everyone in the present. The large policy changes, if enacted, might themselves make some people in the future very poor. So the characterization of the future as full of richer people, even if true in general, does not necessarily hold for the individuals in question. On one hand future poverty will limit the willingness to pay for safety improvements, on the other hand it may raise the marginal value of allocations to that time period. These differences may militate in favor of either positive or negative discounting.

Most generally, the requirement that we examine "small changes to wealth" is extremely restrictive in the intergenerational context, given the compound nature of discounting. Examining small cost and benefits is necessary to keep the marginal utility of money constant or nearly constant, so that we may infer relevant marginal rates of substitution from market prices. This implies that the relevant cost or benefit must be small, not only in present value terms, but also when it arrives in the future. If we compare a small benefit today to a temporally distant benefit of equivalent present value, that future benefit will not be small for those who experience it, when that benefit arrives. The fact that it is small in present value terms does not help keep the marginal utility of money constant in the future. The future benefit, when it arrives, will involve significant changes in the marginal utility of money, again vitiating the arguments for positive discounting.

[9] Application of a discount rate in this fashion may be begging the question but nonetheless I allow it to examine the strongest possible scenario for positive discounting.

Comparison with Broome

The most systematic attempt to date to come to terms with the discounting issue is Broome (1994). Broome accepts the wine parable as a reason for discounting in general. His exceptions to that principle, however, differ from those outlined in this paper.

Broome (1994) addresses the applicability of the declining marginal of consumption argument to future generations. He (1994, p.137) notes: "Their well-being [of future generations] is only taken into account to the extent that it is valued by the present generation," and refers to it as "this most fundamental problem with the market price method." Later, Broome (p.152) considers a thought experiment, in which future generations can participate in current markets. We can imagine a trust fund set up in their name, which could borrow against their future earnings and bid for current resource uses, such as for a cleaner environment. Broome concludes that the rate of interest would not change drastically, in the final long-run equilibrium, but the equilibrium rate of interest would be restored only after the future generations had significantly redistributed resources to themselves. He therefore concludes (p.152) that we should use a rate of interest lower than the prevailing market rate, when evaluating costs and benefits for future generations. He believes that market transactions will underallocate resources to future generations.[10]

I interpret this thought experiment as militating against a positive rate of discount. If a relevant first-best optimum involves greater resources for future generations, at the expense of current generations (as Broome suggests), we should prefer any one-to-one resource transfer from the present into the future. In other words, given current allocations, we should prefer that a given resource should be sent to the future, as this would bring us closer to that optimum. This suggests a negative rate of social discount at current margins, if we accept Broome's reasoning.

[10] Oddly, Broome (1994, p.141, n.10) objects to an analogous thought experiment proposed by Cowen and Parfit.

I do not wish to suggest that a general negative rate of discount is the correct result, only that it would follow from Broome's assumptions. Rather than accepting this conclusion, I interpret his thought experiment -- allowing future generations to trade in current markets – as begging the question. When allowing future generations to bid for current results or policies with their wealth, at what rate of interest should we value their future wealth? How should that future wealth be converted into current purchasing power? Presumably we should use the market rate of interest, but which rate: the rate which holds before or after future generations are allowed to bid? If the two rates are not the same, the thought experiment leaves the basic question open.

Broome also argues that equalizing marginal rates of substitution does not generate positive discounting for "non-productive" commodities. In his account, some commodities, such as unspoilt farmland, certain environmental benefits, or the prevention of human deformities, are not necessarily productive over time in the same manner that apple trees are. When the relevant commodity is not productive, we do not necessarily have more of it in the future. And if we do not have more of it in the future, we do not necessarily place lower value on future increments of that commodity. Broome is correct in arguing that this provides another exception to the general practice of positive discounting.

IV. Conclusion

I have examined the two primary arguments for positive intergenerational discounting, time preference and the diminishing marginal utility of consumption. We have seen that these arguments contain a number of complexities.

With regard to time preference, time consistency dictates that intragenerational and intergenerational rates must be the same. The case for a positive time preference rate in this context is not compelling, however. The plausibility of zero intergenerational time preference can be used to argue for zero intragenerational time preference, rather than extrapolating a positive intragenerational rate to a positive intergenerational rate.

With regards to the marginal utility of consumption, we do see a stronger case for positive discounting of a limited kind. For very small changes in policies and incomes, it makes sense to discount future costs and benefits at a positive rate of interest. Nonetheless critics of discounting are correct in the counterexamples they raise. We should not apply discounting of this kind to loss of human life, to environmental catastrophes, or to significant changes in human health. For most of the intergenerational policy issues that are hotly debated, this argument for positive intergenerational discounting is of very limited value. In fact when current policies will barely affect future generations at all, we typically leave them out of the calculation altogether, rendering the discounting issue nugatory.

Given these findings, most instances of positive intergenerational discounting should be interpreted as a form of interpersonal utility comparison between generations. This does not suggest that a zero rate is necessarily correct, but does indicate that the choice of discount rate typically falls into the realm of ethics, and requires more normative presuppositions than are found in the standard body of ordinal welfare economics.

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