

Discounting Across Generations: Necessary, not Suspect

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Periodically, ethical objections are raised against the practice of discounting for future effects. Concerns about the potential effects on future generations from long-term nuclear waste disposal and global climate change have caused these ethical objections to recur. This article rebuts the various ethical objections to future discounting on practical, ethical, and analytic grounds. Discounting for future effects is a ubiquitous practice that cannot be practically prevented. In the event that public policy would dictate against future discounting in public decisions, such a constraint could never be successfully imposed on markets. Market values will always reflect the full, discounted streams of future effects even if governments prohibited the practice among individuals. Ethically, there is no basis for choosing an upper-bound time horizon beyond which discounting should be rejected. Any proposed horizon is arbitrary and has no obvious foundation. All decisions are fundamentally irreversible, so opponents of future discounting also must define a degree of irreversibility beyond which normal discounting should not apply, and defend on ethical grounds the basis for this demarcation. This task is further complicated by the likelihood that choices are rarely, if ever, as irreversible as opponents suggest. Typical examples given to prove future discounting is inappropriate overstate the degree of irreversibility actually present and understate subsequent opportunities for modifications. Finally, opposition to distant-future discounting on the ground that burdens are shifted to future generations must face the fact that such shifts are characteristic of intergenerational transfers now practiced widely and with great public support.

KEY WORDS: Economics; ethics; discounting; intergenerational equity

WHY ARE WE (AGAIN) DEBATING THE MERITS OF DISCOUNTING?

The “problem” of discounting has waxed and waned over the years, and it seems to be rarely written about except during the downward portion of these cycles. Discounting is something that links almost all members of the economics tribe, persons so reviled for their inability to agree with each other that Harry S Truman is remembered for having pleaded for advice from a one-armed economist physically unable to deliver the all-purpose caveat “on the other hand.” Discounting is fundamental to economics be-

cause it forces the recognition that intertemporal trade-offs must be made in a world of endless wants, scarce means, and finite lifetimes. Discounting also comports with human behavior: people prefer consumption today over consumption tomorrow, but at some positive rate of interest they are willing to deny themselves today’s blessings in order to feast in the morrow. The question posed at present is this: Is it appropriate to discount when the potentially deleterious effects of a decision may span many generations into the future, to persons not represented in today’s choice?

The wisdom of the ages consistently advises that we prepare for the future, and “investment”—forgoing consumption today—is the means by which this occurs. The need to save exists independent of discounting, but the magic of compound interest reinforces its vir-

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tue. The Great Depression led many to eschew banks, equities, and other market investments, and instead sock away nest eggs under the mattress. These were rational choices in an era of deflation and insecure banking institutions. But modern markets founded on stable currencies, enforceable property rights, and now electronic trading via the Internet permit even more investment to occur by dramatically reducing uncertainty, unsystematic risk, and transactions costs. To the chagrin of the world's few remaining socialists, capitalism has met democracy and been found to be liberating.

Contrary to the usual articles published in *Risk Analysis*, the history of risk is dominated by the passionate human desire to tame financial perils.⁽¹⁾ Unlike environmental, health, and safety risks, which many persistently seek to eradicate entirely, the objective of financial risk management is efficient risk-bearing. In the absence of risk there is neither opportunity nor reward, perhaps the dullest human existence imaginable. This is especially true for the poor, for whom risk-bearing is the predominant path out of poverty.

Historical Religious Opposition to Discounting

In every generation there seem to have been those who question the legitimacy of interest, and by extension, discounting. For more than 1,500 years, the Church of Rome and the civil authorities it commanded forbade the practice of lending at interest as a deadly sin and punished “usurers” as heretics, thieves, and murderers.⁽²⁾ No less than the church fathers, 28 councils, and 17 popes affirmed its evil. Lending was a capital crime, both spiritually and practically. The church denied lenders the sacraments, absolution in the hour of death, and Christian burial. Caught in the seamless web of ecclesiastical and civil power, lenders were denied the return of principal and the collection of interest, fined, imprisoned, and even subjected to the ordeal.² Even after death, moneylenders were denied peace, their bodies dug from the grave, cast out, and dumped into the river.

² The ordeal, established to discern guilt or innocence in a matter lacking witnesses, typically consisted of one of the following practices: (1) the application of glowing iron to the hands or feet; or (2) the immersion of the suspect's hand into boiling water, with innocence proved if healing occurred in three days; or (3) subjection while bound to cold water, with innocence proved if the subject sank to the bottom. For more grisly details, see the Internet Medieval Sourcebook at <http://www.fordham.edu/halsall/sbook.html> (29 October 2000)

Lending at interest was not condoned by the Reformation, either. In 1552 under the reign of Edward VI, England passed the Bill of Usury, which called lending at interest “a vice most odious and detestable.” Punishment consisted of loss of principal and interest, plus imprisonment at the king's discretion. White⁽²⁾ quotes Martin Luther as saying, “To exchange anything with any one and gain by the exchange is not to do a charity; but to steal. Every usurer is a thief worthy of the gibbet. I call those usurers who lend money at five or six per cent.” It is possible that Luther would have tolerated rates lower than this, but the implied threat of capital punishment probably discouraged any such commerce from materializing in Germany.

John Calvin apparently was the first theologian of the Reformation to depart from an absolute opposition to lending at interest, limiting his definition of usury to “illegal or oppressive interest” but failing, perhaps intentionally, to clarify the line dividing legitimate commerce from sin. Following Calvin, no less a strict theologian than Harvard College's Cotton Mather also rejected the centuries-long doctrine against lending. Harvard University's endowment has risen prodigiously ever since.

The moral results of prohibitions against lending at interest were staggering. As White⁽²⁾ notes concisely, “All lending and borrowing, even for the most legitimate purposes and at the most reasonable rates, tended to debase both borrower and lender.” It “promoted luxury and discouraged economy; the rich, who were not engaged in business, finding no easy way of employing their incomes productively, spent them largely in ostentation and riotous living” (p. 270). Writing at the end of the nineteenth century, White noted the additional moral evil that it was the Jews who “were virtually drawn or driven out of all other industries or professions by the theory that their race, being accursed, was only fitted for the abhorrent profession of money-lending” (p. 270). Lest one wax over this as a distant memory written with the luxurious language of the age, it is worth recalling that Adolph Hitler used the Jews' ostensible control of banking in Germany to justify the predations of National Socialism.

Ironically, it was the protection of the poor and oppressed for which doctrines against lending at interest were divined from Scripture.⁽²⁾ To the Roman Church, lending at interest was equivalent to theft from the borrower, no matter that the transaction might have been voluntary and that both parties prospered from it. When the charging of interest is

prohibited, it is primarily the corrupt who are willing to lend and the poor who are interested in borrowing. Respectable persons lend only during deflationary times, for it is then that the repayment of nominal principal constitutes the practical collection of interest. That the church did not appreciate this economic insight reflects not the venality of its leaders but instead the limited knowledge of the day. Nevertheless, commerce failed to prosper until the weight of this prohibition was lifted. Writing more than 100 years ago, White was prescient in claiming the need for further study in “the modern methods of raising and bettering the condition of the poor—the evolution, especially, of the idea that men are to be helped to help themselves.” White set these “modern” methods “in opposition to the old theories of indiscriminate giving, which . . . grew in the warm atmosphere of medieval devotion into great systems for pauperizing the laboring classes” (p. 287).

Contemporary Religious Opposition to Discounting

Opposition today to lending at interest is more limited, subtle, and tends to be confined to “progressive” politics. Ancient laws against usury persist, and strident complaints are frequently raised about lenders charging “excessive” rates or engaging in “illegal” lending. For example, Consumer’s Union (CU), the publisher of *Consumer Reports* and a member of the Alliance for Justice, the vanguard of progressive activism against real or perceived excesses of capitalism, is particularly noteworthy in its opposition to lending at (high) interest. CU aggressively opposes so-called payday loans—very-short-term advances on future paychecks.⁽³⁾ Customers—who are usually relatively poor and may have serious cash-flow problems, bad credit, and consumption in excess of income—can obtain hard cash in advance of payday by providing postdated personal checks as collateral. Payday lenders sometimes engage in a variety of shell occupations, such as appliance leasing or sales of otherwise worthless commodities, to dodge statutory restrictions that otherwise prevent the poor from borrowing at market-clearing (high) interest rates reflecting their high risk. Like the ancient ordinances of both church and state against lending, these modern-day restrictions ostensibly protect the poor from predatory lending but have the unintended side effect of forcing the market underground, where predation is inherently more intense.

On a more intellectual level, some philosophers seem to be grudgingly reconciled to the utilitarianism of discounting for mere economic purposes but object

to the intertemporal discounting of moral values.⁽⁴⁾ In this view it is ethically unacceptable to make decisions that increase risk to future generations.^(5,6) Shrader-Frechette⁽⁶⁾ further argues that current and future persons should be treated exactly alike because moral values do not diminish with age as do mere financial ones. Moreover, future people cannot exercise due process rights in any political setting today, and current persons imposing future risks take no steps to actually compensate future persons for these risks. In this view, equating different generations requires the rejection of any decision that increases some future risks even if it decreases net future risks or increases net future welfare. As will become clear later, this moral argument against discounting suffers from its own moral dilemmas, for it weighs claims by real persons today no more highly than the hypothetical claims of potentially hypothetical future persons.

At the same time that some philosophers protest the fact that future persons cannot represent their own interests in today’s decisions, they frequently arrogate to themselves the authority to speak for them. This stance mirrors that of the church during the centuries in which it prohibited lending at interest. In both cases, the justification for arrogating power lies in protecting the material interests of the poor and oppressed, and in advancing the higher cause of future lives. That the church concerned itself with spiritual rather than social salvation is a minor difference. The language with which church leaders fretted over human prospects because of the debauchery of lending with interest is rhetorically indistinguishable from that heard today by environmentalist crusaders. If Saint Basil denounced lending with interest as a “fecund monster,”⁽²⁾ others decry an oncoming “environmental holocaust without precedent.”⁽⁷⁾

Easterbrook⁽⁸⁾ calls this new religion “Earthianity” and shows its parallels to a simplified rendition of ancient religious historiography:

Women and men are born in a fallen state, as their ancestors committed transgressions against nature. The Earth, a benevolent creator, once offered unlimited milk and honey in a perfect Garden. Flushed with self-importance, men and women thought they could improve on creation by altering the Garden and to that end grasped for forbidden knowledge. Humanity became a curse upon the land. Now all humans live in a state of sin, defiling the Garden they were given to attend. (p. 130)

These parallels extend to analogous doctrines about original sin, divine judgment, and (among some) even the yearning for cataclysm. If Dante condemned moneylenders to a particularly grueling region of Hell,

many Earthianists feel similarly disposed toward those who would build nuclear power plants. In recent years, Earthianity has found a home within liberal religious denominations that, ironically, have abandoned their traditional sacred texts and doctrines.

Environmentalism and Discounting

Over the past half century, environmentalism has had a love-hate affair with discounting. Examples of this internal conflict include hydroelectric dams; nuclear weapons, power, and the disposal of high-level radioactive waste; stratospheric ozone depletion; and global climate change.

Hydroelectric dams and nuclear power stations were particularly visible on environmentalists' long-range radar screens during the 1960s. Critics of these projects argued that discounting (and at relatively high rates) was essential for accurately capturing the reduced value of future benefits.⁽⁹⁾ Later, a variety of laws and regulations were enacted to curb air and water pollution; manage wastes, pesticides, and other chemicals; and protect threatened and endangered species from extinction. Characteristically, the costs of these programs came first and benefits were realized later. This posed little problem during the first decade or so because initial pollution controls often delivered large net benefits, and where they did not the laws were construed to deny the legitimacy of benefit-cost calculations in which discounting is embedded. Problems have intensified, however, as the marginal cost of environmental protection has risen and its marginal benefit has declined. Now the legal dike holding back benefit-cost analysis—and by necessity, discounting—is showing severe strain when compelled to ignore scientific and economic reality.⁽¹⁰⁾ Advocates also have found it increasingly difficult to protect these programs from the ravages of high discount rates, which reduce net benefits. Even today, the U.S. Environmental Protection Agency (EPA) refuses to discount benefits that cannot be realized for decades. The EPA is implicitly neutral with respect to whether it is more desirable to prevent a case of childhood cancer today or 100 years hence.

The environmentalist love-hate relationship with discounting has now run full circle. Opponents of China's Three Gorges Dam argue with unalloyed verve that the project has fewer benefits and greater costs than advertised, but implicitly endorse an independent analysis that uses a 12% discount rate on future benefits,⁽¹¹⁾ about the same rate that the EPA uses for estimating the benefits of noncompliance in

enforcement actions. The EPA, however, uses rates about one fourth as large when discounting future regulatory costs.

The fundamental problem here is not discounting, but rather intellectual inconsistency. One cannot legitimately revile discounting as the Devil's tool one day and praise it as Holy Writ the next. The principle and honest practice of discounting projects and decisions with environmental consequences is either legitimate or perverse, but it cannot be both. Nor can one legitimately pick and choose when to discount and when not, or use different rates to discount future costs and benefits, depending on how one wants the calculations to come out.

THE UBIQUITY OF DISCOUNTING IN BOTH PRIVATE AND PUBLIC SPHERES

There are two situations in which discounting is especially pertinent to risk management decisions. The first arises when all consequences of a decision are delayed by roughly the same amount of time. The second is when there are asymmetries in the timing of costs and benefits. Discounting is essential to convert disparate streams into "present-value" units that can be immediately and meaningfully compared. A third situation in which discounting is said to be an issue occurs when those who reap the benefits of a decision are not the same as those who bear the costs.⁽⁶⁾ This is a matter of equity and not one of discounting, however, for disputes about winners and losers persist even if all benefits and costs are realized immediately or if discounting is abandoned. Thus, the focus below is on the temporal aspects of decision making rather than matters of distributional equity for which discounting is neither the problem nor the solution.

Having a preferred outcome can lead to distortions in both the theory and practice of discounting. In the case of similarly delayed benefits and costs, the choice of discount rate may matter insofar as longer delays reduce discounted net benefits, and lower net benefits may make an alternative project more appealing if the latter's net benefits can be realized earlier. Those who prefer a project with long-delayed benefits may want lower discount rates to make it appear more attractive. For example, a project whose benefits and costs are both delayed 30 years might have present-value net benefits of \$1 billion when discounted at 7%. Reducing the discount rate to 3% increases present-value net benefits to \$3.1 billion. The lower discount rate makes this project appear more

attractive than another whose immediately realized net benefits are between these two amounts. Those who prefer an alternative project may seek even higher discount rates so as to accentuate the significance of delay.

A theoretical basis for lowering (typically) the discount rate also must be devised to justify these calculations. Historically, this has led to various proposals for “social welfare functions” that discarded individual preferences in favor of socially constructed ones. Generally these social rates of time preference have been substantially lower than rates observed among individuals, except perhaps among the wealthy. These social rates of time preference have been much lower than rates of time preference observed among the poor, thus injecting a bias toward elite preferences into public decision making. This may be defensible for public projects funded with tax revenues the contributors of which are all relatively wealthy because of progressivity built into the tax code. It is not so easily defended, however, when costs are borne indirectly via regulation, and from which low- and moderate-income households cannot escape. For example, high-efficiency refrigerators may be desirable in principle and even cost-effective in practice so long as benefits and costs are discounted at the low interest rates characteristic of wealthy elites. Net benefits may vanish, however, at the high discount rates characteristic of lower-income households. And these latter households stand to bear the brunt of the regulatory diktat: relatively wealthy households can be expected to purchase high-efficiency refrigerators without a government mandate if these appliances offer net benefits at low discount rates, whereas low-income households will not. Layering an additional regulation on top ostensibly forcing landlords to bear the cost of high-efficiency refrigerators will serve only to disguise the economic burden in higher rents.

The incentive to jigger with discount rates intensifies when benefits and costs are asymmetrical. The choice of discount rate can accentuate or attenuate these asymmetries and even change the sign of the net benefit calculation. Project and policy advocates will be tempted to argue for lower discount rates if the latent effects are benefits, and higher discount rates if it is costs that are delayed. Opponents, of course, may seek to influence the choice of discount rate in opposite directions, but for fundamentally identical reasons. The fact that partisans on both sides have incentives to manipulate the choice of discount rates does not undermine the legitimacy of discounting; rather, it merely exposes how vulnerable it is to abuse like so many other scientific principles before it.

Discounting in Private Decision Making

Individuals routinely make decisions in which benefits are obtained immediately and costs are delayed or spread out over extended time periods. Few people purchase homes and automobiles with cash; every mortgage and unsecured loan reflects this preference for consumption today, with the interest rate representing a lower bound of the consumer’s willingness to pay for this privilege. The credit card industry is premised upon the observed knowledge that many consumers are willing to pay interest rates as high as 22% per annum, or higher. In 1999, U.S. consumer credit, excluding loans secured by real estate, exceeded \$1.4 trillion—the highest level since data were first collected in 1943.⁽¹²⁾ As large as this amount may seem, the household debt-service burden, excluding loans secured by real estate, was only 5.98% of monthly disposable income.⁽¹³⁾

If the usual discounting situation individuals face is borrowing where benefits precede costs, by no means is the opposite scenario unknown. Funds are also lent in return for interest payments based on the length of time they must be committed and the borrower’s risk of default. Small-denomination time deposits and retail money market funds alone totaled \$1.8 trillion in the United States at the end of 1999.⁽¹⁴⁾

There are other ways in which individuals choose to delay gratification. By setting goods aside on layaway, for example, one makes installment payments and takes possession only upon payment in full. Sellers may charge fees for layaway purchases to reflect the real costs of inventorying merchandise. Even if they do not, buyers pay an implicit premium by virtue of paying early. Still, layaway plans remain popular. For some it is purely an aversion to debt, but for others it may be a disciplinary device to rein in a different threat: the temptation to rationalize unreasonably high discount rates that make future costs seem trivial.

This does not mean that layaway buyers behave irrationally; for those who lack self-control it is a perfectly rational strategy to limit their decision-making options.^(15,16) Rather, the point is that people faced with real-world decisions where benefits precede costs have many devices at their disposal to make decisions without succumbing to self-delusion. And the layaway plan has not gone by the wayside. A computer search reveals that stamps and coins, arts and crafts, antiques and collectibles, log homes, and even miniature donkeys may be purchased on layaway. For both the debt averse and the debt addicted, only self-control lies in the way of potential customers becoming kinetic

ones. For many, e-commerce represents a terrifying threat to self-control, for immediate gratification is but a click away. The spirit may be willing but resistance to the mouse is weak.

Discounting in Public Decision Making

In public projects the usual situation is one in which society is asked to bear costs up front in return for promises of future benefits. This is certainly the case for capital projects, whether it is the construction of a school or the development of a ballistic missile defense system. Recently, it has also become the rhetorical façade for a host of government spending programs in which future benefits are ephemeral at best. For example, we are told that billions should be “invested” to reduce class sizes or to hire more teachers. The use of the verb “invested” rather than “spent” diverts attention from those who would benefit today, who frequently happen to the advocates of such programs.

The language of investment necessarily invokes the spectre of discounting, and therein resides a silver lining in the political abuse of language. Whereas the public does not really expect anything useful to result over the long run from mere spending, precisely the opposite expectation applies to public investments. At least intuitively, people think that investments deserve rewards. Those that fail to deliver may flag in public support. Thus, by using the language of investment, policymakers may unwittingly set in place an expectation that mere expenditures really should offer significant returns on investment.

Real-World Examples of Intergenerational Inequity

In the private decision-making case where benefits precede costs, credit is the vehicle by which people satisfy more immediate desires and is an important source of financial liquidity. As long as those who abuse credit must pay the piper, there are natural limits on the extent to which future costs can be delayed. The sociology of public decision making is different, however. When governments buy on credit they shift these costs to future generations. Those who worry about the morality of policies that *may* shift environmental risks to future generations must first confront the fact that many existing programs do exactly that on a massive scale, and with extensive public support.

Deficit spending is an obvious and telling example because, at the federal level, it has not been restricted to the funding of capital investment. Assuming that office buildings, aircraft carriers, and highways are

worth building—that is, they offer net present-value benefits when properly calculated—it is fully appropriate to finance them by borrowing. That way, current taxpayers may legitimately share the cost of obtaining these long-lived assets with their generational descendents. Paying for them out of current tax revenue would give future generations a free ride. It might be a nice gesture or even good policy, but it is not obvious what ethical principle could be invoked to justify this.

For many decades, however, deficits were used to finance current government operations. These deficits were financed with government bonds backed by the full faith and credit of future taxpayers. In short, the responsibility for shouldering much of the costs of this year’s stream of public services was simply dumped onto future generations.

There has been much talk in recent years about huge budget surpluses. An authoritative July 2000 forecast⁽¹⁷⁾ estimated federal budget surpluses at \$1,696 billion for fiscal 2001–2005, and \$4,561 billion for fiscal 2001–2010. Of course, these forecasts are based on certain assumptions about macroeconomic performance (which, though estimated very professionally, are inherently uncertain) and the assumption that Congress increases spending at only the rate of inflation. History suggests that the latter is demonstrably counterfactual. Of the \$404 billion net increase in receipts over outlays for FY2000 observed since January 1997 predictions, economic and technical factors dominate. Legislation actually *reduced* surpluses by \$37 billion.⁽¹⁷⁾ That is, Congress spent about 10% of the total gain. During just the second quarter of calendar year 2000, economic and technical factors increased the estimated surplus by \$62 billion; legislation *decreased* it by \$10 billion.⁽¹⁷⁾ Thus, when presented with an opportunity to transfer \$72 billion from current to future taxpayers, the U.S. government instead spent 14% of it. Whether trillions of dollars in forecast surpluses actually materialize depends on the annual appropriations debate. History suggests that actual surpluses, that is, transfers from current to future taxpayers, will be much less. The beneficiaries of current government programs tend to lobby more effectively than future taxpayers, most of whom have yet to be born. In any event, budget surpluses to date have been largely illusory because they include “off-budget” programs such as Social Security and Medicare. When Social Security, Medicare, and other off-budget programs are excluded, the predicted FY2000 budget surplus declines from \$124 billion to just \$1 billion.⁽¹⁷⁾

Besides the practice of borrowing from future taxpayers to fund current government operations, other major government programs tax future generations to pay benefits to those here today. Social Security and Medicare are programs in which those who work pay benefits to those who used to work. It is an explicit transfer of wealth from younger to older people. It may have certain desirable attributes as a compassionate welfare policy because there are people in America who are both elderly and poor. But mostly Social Security redistributes wealth from the poor and adequately well-off to the less-poor and better-off. That's because retirees are generally wealthier than their children.

Social Security and Medicare are the most obvious programmatic examples of intergenerational burden shifting in the United States, but they are not alone. Another massive burden shifted to future generations is the unfunded liability of civil service and military retirement. These liabilities represent promises made by past generations to make future generations pay for the government services received by past generations.

These intergenerational transfers are somewhat obscured by mischaracterizing what they are and misrepresenting how they are funded. For example, payroll taxes for Social Security (called "social insurance" in Budgetspeak) are ostensibly set aside to fund future Social Security payments. In fact, they are not set aside at all. Having received cash, the U.S. Treasury Department issues special U.S. Government bonds to the Social Security Administration, which the latter cashes in when the bonds mature. The treasury obtains the cash to cover these bonds in the usual way—by collecting taxes or by borrowing. The former is a tax borne by the next generation; the latter shifts the burden to their children. Similarly, civil service and military retirement programs are frequently described as moral commitments. They are, indeed, but they were commitments made by the generation that benefited from services delivered, not the generation held accountable for fulfilling the moral commitment.

Meanwhile, both Social Security and Medicare lack sufficient bonds (i.e., claims on future taxpayers) to actually fulfill their obligation to make future payments. Forecasted off-budget surpluses (largely Social Security and Medicare) are \$1,001 billion for fiscal 2001–2005 and \$2,388 for fiscal 2001–2010.⁽¹⁷⁾ Nevertheless, the (nonexistent) Medicare Trust Fund is expected to be exhausted in 2015⁽¹⁸⁾ and the (non-existent) Social Security Trust Fund will run out in

about 2037.⁽¹⁹⁾ Receipts then will cover only 72% of obligations.

WHY DISCOUNTING IS ALLEGED TO YIELD INCORRECT, INVALID OR DISTURBING RESULTS

It is a simple matter to construct a straw man example that appears to demonstrate convincingly why distant-future discounting is inappropriate, or perhaps even immoral. Imagine that society faces a choice today that, if selected, is guaranteed to lead to catastrophe in 100 years. Using a 7% real rate of discount, every billion dollars of damages suffered 100 years hence are worth just \$1.15 million today. If the catastrophe is uncertain the present value of future damages may become vanishingly small. Even a 1% chance of occurring—a very high risk in most environmental, health, and safety contexts—reduces the (risk-neutral) present value of a billion dollars of future damages to about \$11,500. As long as today's benefits exceed this amount, the proposed decision will pass a net benefits test and thus will appear to be potentially worthwhile.

What is missing from the ethical argument against distant-future discounting is a clear definition of how long a time period is involved before effects become "intergenerational," and an explanation for why discounting is acceptable beneath this time horizon but unconscionable beyond it. In the limiting case, any decision made today with effects tomorrow is intergenerational because children born tomorrow do not participate in today's choice. An opponent of intergenerational discounting might well argue that the intergenerational effects in such a case are trivial and pose no ethical problem. But if discounting is acceptable when intergenerational effects are "trivial" and perhaps also when they are "small," there is no obvious line that identifies when such effects are "large," much less when they are "too large." There is no ethical basis for prescribing any particular upper-bound time period beyond which discounting should not be performed. A persuasive argument must state why discounting is the wrong tool, not that its implications become intolerably uncomfortable in particular circumstances.

Even if this intractable conundrum could be resolved, the ethical dilemma would not go away. Suppose that an agreement could be reached on such an upper-bound time period beyond which discounting is immoral. Suppose further that society could discipline itself to refrain from discounting effects beyond that horizon in all public decision making. Nothing

short of a “thought police” could prevent discounting in private. Even such a thought police could not prevent markets from discounting beyond the agreed upon horizon, for free markets reflect collective intelligence and are controlled by no one. There is no law that could be enacted, no regulation that could be promulgated, and no creed that could be enunciated that would prevent markets from discounting distant-future effects. Everyone would simply live a public lie and restrain truthful conduct to private domains. The hypocrisy might be manageable if the horizon for morally acceptable discounting were sufficiently distant that it had little or no practical effect. In such a case the implications of society’s hypocrisy could be too small to worry much about. If instead, however, society chose a relatively short time horizon, everyone would have to live a life of extreme cognitive dissonance. What ethical justification might be mustered to support this?

The task for those who oppose intergenerational discounting is to persuade the public that the practice of discounting distant-future effects is venal, sure to be detected, and subject to massive punishment. In short, it must be a religious crusade of epic proportions, not merely equivalent to persuading people to recycle, use biodegradable detergents, buy low-emission automobiles, or take public transportation. This crusade also must be coercive in the extreme because the behavior proscribed cannot be monitored and would be perfectly acceptable in certain situations. It would have to be a crusade analogous to those orchestrated by the church against lending at interest.

Supposing that such a crusade could be mustered, it would violate numerous other ethical norms related to both individual autonomy and “good government.” With respect to the latter, society could deny its public decision makers the knowledge that the earth is round when it empowers them to make cosmic choices. Failing to discount because the results are sometimes distasteful is tantamount to withholding such critical information. Under what ethical principle can this be justified?

THE ENDEMIC NATURE OF BURDEN-SHIFTING TO FUTURE GENERATIONS

Opponents of intergenerational discounting are acutely concerned about society adopting policies that would shift costs to future generations for the benefit of those living today. This is a legitimate concern, though one that is only indirectly related to dis-

counting. Public policy today is replete with intergenerational transfers of this sort, and discounting had nothing at all to do with their enactment or with their sustenance.

Pensions, Retirement, and Government Operations

Exhibit A on this list for the United States is Social Security. It is funded by a payroll tax on wages up to an earned-income level of \$76,200.³ People who don’t work or who work in the underground economy do not pay this tax. Beneficiaries are chiefly retirees over age 65 who receive monthly stipends depending on their work history and wage income. The popularly understood premise has been that these stipends are the return of contributions paid while working, plus interest. That is, Social Security is supposed to represent an investment in old age insurance that pays off if one suffers the misfortune of growing old.

If this is correct, then Social Security is surely a terrible investment for anyone born after the Second World War. A wildly optimistic scenario for this author is that if he lives an actuarially expected lifetime (78 years), Social Security will return his contributions without interest.⁴ This can be generously interpreted as an interest-free loan to the government to set funds aside for my retirement. Whereas the Social Security Administration states that I can expect a monthly stipend of approximately \$1,500 (in 2000 dollars) at age 66, I could have had over \$8,500 per month if these funds had been invested in a diversified stock fund yielding an average real return of just 6% per year. As a retirement investment, Social Security is a lousy layaway plan.

If Social Security is not an investment in retirement security, however, then what is it? It closely resembles an intergenerational transfer from the young to the old constructed as a Ponzi scheme.⁵ Unlike such

³ The Social Security taxable-earnings base is scheduled to rise to \$93,900 by 2005.

⁴ “Wildly optimistic” means no reduction in benefits, no increase in the retirement age, and no increase in taxes.

⁵ Named after Charles Ponzi (d. 1949), who conducted a famous one in 1919–20, a Ponzi scheme is a “swindle in which a quick return, made up of money from new investors, lures the victim into much bigger risks.”⁽²⁰⁾ Knutson writes: “The engine of Ponzi’s . . . fraud was a simple accounting misclassification. Money paid to investors, described as income, was actually distribution of capital.”⁽²¹⁾ An interpretation less charitable to early investors is that they lent funds at usurious rates in the furtherance of the fraud. Social Security was constructed on precisely this kind of legerdemain, except that participation is involuntary.

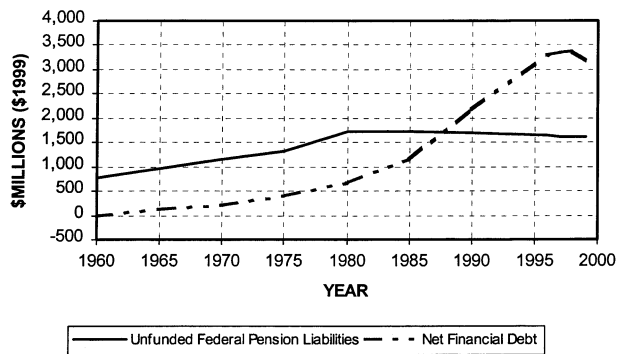


Fig. 1. Aggregate federal debt transfer to future taxpayers. Source: Budget of the U.S. Government, FY 2001: Analytical Perspectives, Table 2-1 (excludes Social Security and Medicare) (p. 24).

private frauds, which succeed as long as there are “greater fools” that follow and self-destruct when they vanish, Social Security lives on because participation in the fraud is mandatory. Greater fools are guaranteed by a promise to current workers that the generation of future workers coming along behind them will pay benefits to them when they retire commensurate with the taxes they paid to support their elders. Social Security shifts the burden of funding each generation’s retirement to its succeeding generation, a huge intergenerational transfer of wealth not to the future but to the past. Future contributors, including this author’s children, will pay 15% of their income—double that if benefits are not cut and the retirement age is not raised—to merely reimburse without interest the contributions their parents’ generation made to support their grandparents’. Charles Ponzi would be proud.

This is probably not the kind of approach to intergenerational equity that opponents of intergenerational discounting have in mind. Nevertheless, it is the dominant form of intergenerational equity that actually exists in the real world. To convincingly argue that the current generation has a moral obligation to make unusually large sacrifices in favor of future generations—especially those hundreds of years distant—they must first tackle the much larger ethical dilemma posed by popular programs such as Social Security, which are expressly designed to take wealth from the *very next* generation, never mind far-distant ones, to subsidize the consumption of those retiring today.

The unfunded liabilities of the civil service and military retirement systems provide more well-aimed examples of intergenerational transfers from the future to the past. As one measure of the degree of redistribution involved, Leonard⁽²²⁾ has estimated that

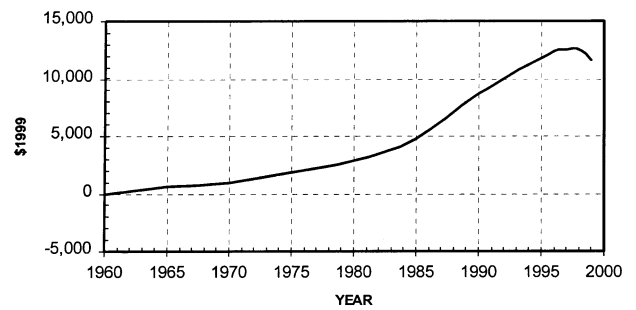


Fig. 2. Net financial debt per capita. Source: Budget of the U.S. Government, FY 2001: Analytical Perspectives, Table 2-1 (excludes Social Security and Medicare) (p. 24).

the full cost of funding civil service retirement would have been 36% of payroll instead of the 7% actually paid out of federal agency budgets. The full cost of funding military retirement would have been 58% of payroll, and at the time Leonard performed his analysis no funds at all had been set aside in current budgets to fund these costs. Leonard estimated that the unfunded liabilities in these two accounts alone amounted to \$1.2 trillion in 1982; more recent U.S. government estimates from the office of Management and Budget indicate that the true unfunded liability amounted to about \$1.7 trillion that year.

Figures 1 and 2 summarize the degree to which it has been common practice in the United States to stiff the next generation with liabilities for which the current generation refuses to take responsibility. Unfunded pension liabilities peaked in the early 1980s but have receded very slowly. On-budget deficit spending peaked in the mid-1990s and so far has displayed a similarly slow-paced decline. Over the past 40 years, more and more of the burden of paying for current government services has been shifted to the future. Excluding Social Security and Medicare, a child born in the year 2000 faces an immediate lump-sum financial debt of about \$11,000.

These figures reflect deficit spending. Deficits could have been justified if they reflected capital acquisitions whose benefits would be shared by future generations. That, however, was not the case. Not only did these deficits fund current government operations, their true size was considerably greater than advertised because Social Security and Medicare tax receipts were reported as current revenues rather than commitments for future outlays. Removing these receipts from the calculation shows that deficit spending amounted to a substantial percentage of annual outlays, and that it persists despite a widespread

(and government-cultivated) perception that we are awash in surpluses. In FY1999 when the reported budget surplus reached \$126 billion, only \$1 billion of this was not collected to fund future Social Security and Medicare outlays. Even more troubling, the amount collected to fund future Social Security and Medicare outlays is substantially less than will be needed to pay these obligations when they come due.

Superfund

One prominent place in which intergenerational inequity has reared its ugly head has been the U.S. Superfund program for the management of abandoned hazardous waste sites. A host of inefficiencies and inequities has been laboriously documented over the years, the recent work of Hamilton and Viscusi⁽²³⁾ being particularly noteworthy. The EPA, which manages the Superfund program, established regulations governing site cleanups that direct liable parties to protect hypothetical future residents. Because these hypothetical future residents outnumber current ones (and are inexplicably assumed to be more highly exposed), this policy gives much greater weight to future generations than to the current one actually living adjacent to these sites. The ethical basis for weighing the value of hypothetical future residents more heavily than current ones is mysterious at best.

There is another intergenerational equity issue that arises in the Superfund program, however, this one due to its reliance on strict, joint, and several liability. This liability rule has been touted as one that embraces the Polluter Pays Principle—those who caused the pollution are the ones held responsible for its remediation.⁶

This could be a defensible policy if it were, in fact, true, but it is not. For all publicly traded corporations held liable for site remediation, the beneficiary capitalists were those who owned stock at the time these actions occurred. These are not necessarily the same people and institutions who owned shares at the time that contamination was discovered thereby triggering the EPA's cleanup demands, or when stock prices declined to capitalize the reduced future stream of (discounted) profits. Depending on how ancient the hazardous waste problem, most of the actual beneficiaries could be dead. Instead of making polluters pay, Superfund imposes the cost of remediation on those with the misfortune of having acquired stock from those

who benefited from the pollution. It is not based on the Polluter Pays Principle, but rather on the Hot Potato Principle.

Liability may have been shifted from past to current stockholders because it was impossible to craft a minimally credible legal basis for imposing a retroactive tax on stock ownership.⁷ Nevertheless, the program generally permitted the beneficiaries of pollution to escape judgment and rewarded those clever or cynical enough to have bailed out in time. Because of illiquidity, it is among individuals, partnerships, and closely held corporations where an intergenerational burden shift is least likely to have occurred. Ironically, it is these entities, which include many small, family-owned businesses, that have captured the greatest sympathy about Superfund's grotesque inequities. While statutory relief for small business from onerous retroactive liability has been slow in coming, there has been no interest whatsoever in providing such relief to the owners of publicly traded corporations whose ethical claims for relief under the Polluter Pays Principle are strongest. This means that the Polluter Pays Principle is a rhetorical flourish rather than a guiding policy. It also means that concerns for intergenerational equity are not as salient as its many crusaders would have us believe. When equity matters, less lofty concerns dominate.

The point of raising these examples is not to criticize the way in which we have chosen to fund old-age pensions or government operations in the United States for most of the past century, though such criticisms are not hard to come by. Nor is it to condemn the Superfund program, though grounds for condemning it are legion. Rather, it is to show that the dominant form of intergenerational equity practiced by the U.S. government has been to shift burdens to the future. That these policies have occurred without any application of discounting reveals that discounting has nothing to do with it. If a problem exists, it is that future generations do not elect current governments.

Instead, discounting is proving to be an extremely powerful instrument in the reform of these intergenerational transfers. As millions more Americans take responsibility for saving for future consumption through defined-contribution retirement plans, they also have become owners of capital via direct stock purchases and mutual funds. They now concretely understand the power of compound interest. They pay attention to relative rates of return on in-

⁶ Strict, joint, and several liability is rife with inequities, but only those that are intergenerational in character are discussed here.

⁷ Article I, Section 9, Clause 3 of the U.S. Constitution prohibits Congress from enacting *ex post facto* laws.

vestment and on the business strategies of the companies in which they own shares. They also increasingly understand that programs such as Social Security have been disastrous, risky vehicles for retirement planning.

Benefit Shifting to the Future

So far the discussion has highlighted large-scale examples in which the current generation has left its descendants to fend for themselves, if possible making their fending more difficult by heaping today's burdens upon them as well. Where might be found examples of the opposite case, where the current generation willingly makes sacrifices for the benefit of future generations?

Within the public sector, education may be the best example of such a program. In the United States, \$262 billion was spent in 1995–1996 on primary and secondary education. Another \$123 billion of public funds were spent directly on higher education.⁽²⁴⁾ Billions more in grants and contracts indirectly supported higher education. Public support for these expenditures is widespread and appears to be highly resistant to concerns that these expenditures support bloated educational bureaucracies that have failed to demonstrably improve educational performance.

While it is easy to imagine that spending on public education transfers wealth from current to future generations, this conclusion is confounded by the pecuniary benefits that derive from being in the education business. Because these pecuniary benefits are so large, it is difficult to determine whether proposals to improve the quality of education serve the interests of future generations (the stated beneficiaries) or education providers (the self-appointed advocates for the stated beneficiaries). It is instructive to note that most proposals focus on inputs, such as teacher salaries, class size, computers in the classroom, and school construction, rather than outputs such as educational achievement. Teacher testing (a useful measure of input quality) and student testing (a critical measure of performance) have both been highly controversial educational reforms in practice.

Another \$73 billion was spent on private higher education in 1996,⁽²⁴⁾ most of this clearly intended to benefit future generations. Statistics on expenditures for private primary and secondary schools are elusive, and no statistics capture the opportunity cost of home schooling. Private buyers have an incentive to shop carefully and weigh educational programs based on their likely value in terms of educational achievement and economic reward. While “sellers” advertise

inputs that “buyers” believe are important, they also try to distinguish themselves based on important output measures. For buyers, the task of choosing among competing sellers is clearly difficult and fraught with uncertainty. But it is not confounded by political and institutional demands from education providers for more resources without meaningful measures of accountability.

Apart from public education, it is hard to find examples of benefit shifting to future generations within the realm of government. The best examples lie outside government's control, especially within the family and the local community. Parents routinely save for braces, college educations, and weddings. Despite the predations of estate and gift taxes, people endeavor mightily to bequeath accumulated assets to their children, grandchildren and even more distant descendants. No institution does a consistently better job than the family at promoting children's health, education, and welfare, because none is more knowledgeable about needs or more highly motivated.

Thus it is useful to note that on many fronts public policy operates to frustrate these activities. First, government discourages saving and investment by taxing them at higher rates than consumption. Second, government subjects investors to its own whim by failing to index capital gains for inflation. And third, government tries to confiscate the majority interest in every estate worth more than \$650,000 by inheritance (i.e., “death”) taxes.

Discounting versus Depreciation?

For some policy concerns that extend over extremely long time periods, an argument can be made that discounting is not the correct conceptual model to use in evaluating alternative choices. Schelling⁽²⁵⁾ believes that wealth transfers to distant-future persons with whom one has no special affinity are analogous to foreign aid programs rather than investments or bequests. Investments must earn returns sufficient to justify the investor's decision to postpone consumption, so discounting is clearly appropriate. Similarly, discounting is justifiable for bequests for the benefit of familial descendants such as children or grandchildren who are likely to share similar outlooks, cultural perspectives, and fundamental values, and for whom one has a special affinity.

Problems arise, however, when proposed policies would transfer wealth to future persons for whom one lacks any shared kinship, ancestry, religious faith, or other affinity. Future persons with whom one lacks

any special relationship are not obviously more deserving of such largesse than are currently living persons similarly situated. Thus it is difficult to justify a policy that would transfer wealth from current U.S. residents to future Chinese persons at levels Americans are unwilling to transfer to current Africans. This is made harder by the plausibility that current Africans are worse off economically than future Chinese will be. If ethics require that rich Western nations make a large wealth transfer to economically disadvantaged peoples precisely because they are disadvantaged, then transferring this wealth to future Chinese at the expense of current Africans represents a transfer from the poor to the (relatively) rich.

Instead of debating the merits of discounting, Schelling suggests that such temporally and culturally distant transfers ought to be subject to a form of depreciation.⁽²⁵⁾ That is, the rough-and-ready practice of depreciation based largely on subjective rules of thumb ought to supplant the precise mathematics of compound interest. Implicit in Schelling's view is that the mathematics of discounting imposes unnecessary constraints on ethical choices. In any event, the practical effect of depreciating distant generations rather than discounting may be very small. Depreciation could even result in lower values being placed on distant-future generations than discounting does. For example, where discounting always yields a positive value however distant the future one considers, societal willingness to pay for a foreign aid-style wealth transfer might well be zero. Current-generation Americans (or Europeans or Japanese) may not be willing to make any financial sacrifices on behalf of "future foreigners" with whom no affinity exists.

Reversibility

A common theme among opponents of discounting is the notion that the practice is inappropriate when outcomes are potentially catastrophic and irreversible, such as "the extinction of humanity and other sentient species" (p. 207).⁽²⁶⁾ In the illustrative examples cited, a policy decision made today could be so weighty that it had huge, negative ramifications hundreds of years hence. Nuclear power is thus objectionable because it yields waste that remains hazardous for millennia. Similarly, efforts to stop global climate change must begin now because failing to take action could result in an uninhabitable earth. The Precautionary Principle is said to be appropriate in part because, unlike discounting, it rejects the possibility that irreversible future harms are ever legitimate.

Implicit in these strawman examples is the idea that today's decisions may have huge irreversible consequences; that there is something special about irreversibility that makes long-term discounting inappropriate; and that failing to discount avoids these perils. The argument falls flat for three reasons.

First, strictly speaking all decisions are irreversible. Today's mundane decision to eat beef instead of fish cannot be reversed, nor can yesterday's choice of reading a novel in lieu of cardiovascular exercise. However trivial they may seem in the short run, each of these decisions has incrementally deleterious effects on health over the long run. If long-term health is deemed a critical concern, then each otherwise trivial decision affecting long-term health is potentially important and irreversible.

Outside of science fiction there are no time machines or warps in the space-time continuum to allow an individual to go back and change his or her mind based on future knowledge. If there were such devices and they operated without error and at low cost, discounting might be unnecessary.⁽²⁷⁾ Ironically, the terrors of both uncertainty and irreversibility could be vanquished by taking the maximum risks and reversing history whenever bad outcomes arose. If all decisions are fundamentally irreversible and that alone is insufficient to reject discounting, then what is the threshold of reversibility beyond which discounting is ethically suspect? For any proposed threshold, is there an ethical argument that distinguishes it from an alternative threshold slightly above or below it?

Second, society is generally untroubled about discounting when outcomes are irreversible over extended time periods. Every decision to build a highway, office building, bridge, home, or low-income housing project entails irreversible consequences. Not only must the land committed to construction be sequestered from alternative use for many years or decades, but the resources used in construction also can never be recovered.

The same is true about decisions *not* to consume or develop resources. Enforceable commitments to set aside grand expanses of land as wilderness, national monuments, or nature preserves are just as irreversible, if not more so. Some such decisions might even be *justified* based on discounting, which reduces the present value of future resource extraction. Without discounting, however, forgone resources must be counted at their undiscounted value. This means, for example, that a policy decision to forswear coal and oil to reduce greenhouse gas emissions would have to count the full, undiscounted stream of benefits that

coal and oil would otherwise yield. These costs would be astronomical, and it is not clear that the benefits of preventing global warming would exceed this amount when calculated at a zero discount rate.

Third, the kinds of decisions typically characterized as having large-scale, irreversible consequences may not in fact display such qualities. Long-term, high-level nuclear waste disposal certainly presents difficult technological challenges in maintaining safety over thousands of years. That does not necessarily mean, however, that decisions are made once and once only and that future decisions are completely preempted from influencing the future. Global climate change may also pose a serious environmental challenge, but it is manifestly untrue that decisions made today precludes all choice tomorrow, or that the failure to take action now condemns us to a future beyond our influence. It is especially peculiar to assume that the power to change the future rests only with the current generation and that our descendants will be technologically and financially incompetent in such an endeavor.

Decisions with potentially momentous long-term consequences are probably more reversible than the seemingly mundane dietary and lifestyle choices one makes daily. Indeed, the prospects for technological advancement with respect to both high-level nuclear waste management and global climate change loom much brighter than overcoming the human capacity for rationalization and self-delusion when it comes to dietary discipline.

Finally, it is not demonstrably true that *not* discounting avoids the perils of irreversible future harm. The Precautionary Principle is not a substitute for discounting, but rather the expression of an extremely high level of aversion to certain risks and not others. A precautionary action that prevents a nontrivial risk of future catastrophe may itself have catastrophic consequences. That is, taking precautionary action now could increase either the likelihood or severity of future harm. There is no basis for assuming otherwise.

CONCLUSION

Manifest in the form of lending at interest, discounting was persecuted for hundreds of years by both church and government. Discounting was believed to oppress the poor and undermine public and private morals, but it is quite plausible that greater moral harm arose from this persecution than the activities it targeted. Absolutist opposition to discounting lost credibility because the practice has proved to be essential for beneficial commerce and rational

public decision making. Thus, while opposition to discounting periodically reappears, it must do so in increasingly subtle forms and arguments.

Environmentalists have been on both sides of the debate, arguing at one time for high discount rates in the evaluation of large-scale development projects (such as hydroelectric dams and nuclear power stations) and for low or zero discount rates elsewhere (such as valuing the avoided health effects from pollution). Some philosophers now object to distant-future discounting because it appears to make distant-future catastrophes inconsequential.

These positions are intellectually inconsistent. Environmentalist opponents of discounting must conjure up a principled basis for determining a priori whether discounting is an appropriate tool, not wait until the calculations have been done and the results are apparent or shape their arguments based on whether it is costs or benefits that are long delayed. Philosopher-opponents of distant-future discounting must articulate an upper-bound time horizon beyond which discounting should not be practiced, and an ethical basis for selecting this horizon and not another one slightly sooner or later.

Claims that discounting undervalues future generations do not stand up to scrutiny. Typically, such claims are based on theoretical examples that rely on implausible assumptions concerning both the irreversibility of decisions and the inability to revisit them as more information is obtained. In addition to articulating and defending a threshold time horizon beyond which discounting should not be performed, opponents must also set forth an upper-bound threshold for irreversibility and a lower-bound threshold for the capacity for subsequent modification. Because each of these thresholds lies somewhere along a critical continuous variable, the difficulty of this task cannot be underestimated.

Finally, opponents of discounting must overcome the fact that present public policies freely and remorselessly shift large burdens to future generations. What distinguishes these real-world cases from hypothesized large-scale environmental burdens, such as high-level radioactive waste disposal and global climate change, is that the former are already with us and the latter may not actually occur. It is perfectly acceptable to rail against the inequities the current generation may perpetrate on its descendants. Intellectual consistency requires, however, that one also rail against similar inequities that surround us here and now. Discounting had nothing to do with these current problems, and it seems highly unlikely that if

it were abolished the practice of shifting burdens to future generations would disappear.

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