Caring about the Distant Future:
Why It Matters and What It Means

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I. INTRODUCTION

A discount rate indicates how to compare future costs and bene-
fits to current costs and benefits. Insofar as the discount rate is high,
we are counting future costs and benefits for less. A zero discount rate,
by definition, means that the future counts for as much as the present.

My informal polling over the years suggests that many advocates
of greater state spending—especially noneconomists—like the idea of
a very low discount rate. Many of these individuals wish that our gov-
ernment would devote more resources to education, to infrastructure,
and to improving the environment. They see a lower discount rate as
supporting these policies. More generally, these individuals believe we
are not caring enough about the future. Very low rates of discount
therefore serve as a "left-wing" view in most cases. Similarly, support
for market-based discount rates often comes from centrist or more
"right-wing" views.[1]

In contrast, I see a stronger concern for the distant future as cut-
ting across the current political spectrum. A greater orientation to-
ward the future is likely to increase the desirability of policies favoring
a market economy, economic growth, and technological innovation—
all prerequisites for sustainable economic growth. Furthermore, some
of the arguments for these choices may *require* a deep concern for the
more distant future. For instance, strongly positive discount rates usu-
ally imply that we should grant considerable importance to the alle-
viation of immediate suffering. Market liberalizations, whatever long-
run virtues they may have, sometimes *increase* immediate suffering.
Market economies and market reforms look better the greater the
weight we place on the relatively distant future. A free society is better
today than a corrupt and totalitarian alternative. But one hundred

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1   For a "left-wing" view of discounting, see, for example, Robert Solow, *The Economics of
Resources or the Resources of Economics*, 64 Am Econ Rev 1, 10 (1974) (imposing the require-
ment that consumption per head be equalized over time so no generation is favored over an-
other). But see Wilfred Beckerman, *Through Green-Colored Glasses: Environmentalism Recon-
sidered* at 192–94 (Cato Institute 1996) (offering a market-oriented view that is critical of zero
discounting).

years from now, the difference in human welfare, and other relevant pluralist values, will prove far more pronounced.

With these issues in mind, let us turn to the discount rate and its implications.

II. ECONOMIC APPROACHES TO DISCOUNTING AND THEIR LIMITATIONS

Economists, when they ponder discounting, commonly offer at least one of three points. First, many believe that the problem largely takes care of itself. Altruism leads many people to care for their children, their grandchildren, and their great-grandchildren. Arguably, overlapping generations extend the circle of care yet further into the future. Markets in durable assets help us trade in these assets. A profit-maximizing landowner maintains his stock of trees rather than cutting it down, even if he does not care about future generations.

But these automatic mechanisms—however weak or strong they may be—do not apply to all settings. Even if we take those arguments at face value, we do not see comparable property rights–induced altruism in public policy decisions. When people are voting or choosing for all future generations as a whole, they often behave quite selfishly. Political time horizons tend to be low, often extending no further than the next election or the next media cycle. Many government policies, such as Medicare, redistribute to the wealthy elderly at the expense of future growth. Therefore, my core scenario is a potentially short-sighted political procedure, not a father with children or a landowner trying to conserve the value of his trees.

The economists' second response is to argue that we should discount for risk, and that risk may be correlated with temporal distance. A current benefit is certain, but a future benefit may or may not materialize. To be sure, we should take account of risk, but we need not add an *additional* discount factor for time. Time and risk are correlated imperfectly, especially for the more distant future. Beyond a specified forecasting horizon, risk may not increase much, but the time clock keeps ticking. More generally, discounting for risk supports rather than overturns the idea of caring about the distant future. It is precisely because we care about future tragedies that we seek to make the world less risky.[2]

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[2]   We should not discount the welfare of our successors because those individuals will be better off or wealthier. Even if we take the egalitarian premise for granted, wealth per se does not supply a good reason to discount future welfare. If the rich enjoy additional wealth less, a very low rate of discount will not prevent us from reflecting this judgment by other means such as explicit distributional weights. Even if the future is wealthier on average, we can discount for wealth without using a separate discount rate for time.

The economists' third response thinks of discounting in terms of opportunity cost, as represented by a market rate of interest. Typically the project under evaluation is akin to a dam or a new bus line, where the relevant costs and benefits are measured in dollar terms. A dollar today can be invested to yield more than a dollar a year from now.[3] More generally, capital is productive, and modern economies typically grow wealthier over time. So a dollar today is worth more, at the margin, than a dollar in the future. This judgment does not require interpersonal comparisons of utility. The positive market interest rate equalizes marginal rates of substitution over time; in other words, the positive interest rate expresses the lesser market value of a future dollar relative to a current dollar. This argument does not require positive time preference in the traditional sense.[4]

The economic argument need not accept observed market interest rates uncritically. We must adjust for risk, transactions costs, and other complicating factors such as taxes. But observed real rates of return give us some proxy for the greater value of current resources. Since market interest rates are typically positive in real terms, I will use the phrase "strong positive discounting" to describe this view.

Consider the following equation as representing the economic argument for discounting:[5]

$$p_t = \delta + \eta \, (C_t) \, \frac{C_t}{C} \, . \tag{1}$$

The first term represents pure time preference, whereas the second term represents the greater marginal utility of consumption in a specified period.[6]

My revision of this equation is simple. The first term fails to apply to the long run if we refuse to apply positive time preference across

3   See K.J. Arrow, et al, *Intertemporal Equity, Discounting, and Economic Efficiency*, in James P. Bruce, Hoesung Lee, and Erik F. Haites, eds, *Climate Change 1995: Economic and Social Dimensions of Climate Change* 125, 130 (Cambridge 1996) (noting that damages of $1 billion two hundred years from now has a present value of only $1300); John Broome, *Weighing Goods: Equality, Uncertainty and Time* 60–63 (Cambridge 1991) (providing an example of how risking money on day one can result in more money in the future); Robert C. Lind, et al, *Discounting for Time and Risk in Energy Policy* 25–26 (Resources for the Future 1982).

4   The economic argument does not require time preference, but it does require assumptions about the intertemporal substitutability of consumption. Diminishing marginal utility, in the classic sense, is defined at a single point in time. But how do differing marginal utilities of consumption vary *across* time? How does my two millionth dollar next year compare to my one millionth dollar today? This variable is distinct from either classic time preference or classic diminishing marginal utility. For the argument to work, we must assume that consumption tomorrow is a relatively close substitute for consumption today.

5   See Partha S. Dasgupta and Geoffrey M. Heal, *Economic Theory and Exhaustible Resources* 294 (Cambridge 1979).

6   Id.

generations. The second term will be replaced by broad and rough interpersonal comparisons of utility. When we consider the more fundamental question of how to discount *cardinal well-being*, opportunity costs will not apply in that setting.[7] We cannot invest utility for a positive return as we invest dollars or real resources, so we must seek other methods of comparing utilities across time. I will return to how ordinal and interpersonal cardinal approaches to discounting fit together. But plausibly, we care more about well-being than we do about wealth per se; this makes interpersonal cardinalism primary when we have a choice between the two approaches.

A.   Time Preference

Consider a decisionmaker weighting present and future interests. The following table represents some potential tradeoffs, using various positive rates of intergenerational discount:

TABLE 1: ESTIMATED NUMBER OF FUTURE BENEFITS EQUAL TO ONE PRESENT BENEFIT BASED ON DIFFERENT DISCOUNT RATES

Years in the Future	Discount Rates			
	1%	3%	5%	10%
30	1.3	2.4	4.3	17.4
50	1.6	4.3	11.4	117.3
100	2.7	19.2	131.5	13,780.6
500	144.7	2,621,877.2	39,323,261,827	4.96×10^{20}

A simple example shows what is at stake. If we discount the future by 5 percent, a given outcome 500 years from now is worth more than 39 billion times less than that same outcome would be worth today. Alternatively, at that same discount rate, 1 death 200 years from now is equal in value to 131.5 deaths, of comparable lives, 300 years from now. Few people would share these conclusions.

Given these comparisons, the arguments against discounting well-being are straightforward. Derek Parfit and Tyler Cowen wrote the following:

> Why should costs and benefits receive less weight, simply because they are further in the future? When the future comes, these benefits and costs will be no less real. Imagine finding out that you, having just reached your twenty-first birthday, must

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[7]   By cardinal well-being I mean simply the view that utility is a real entity, to some (imperfect) extent comparable across persons and across time, and more than just the economists' ex post mapping of observed choices onto a function.

soon die of cancer because one evening Cleopatra wanted an ex-
tra helping of dessert. How could this be justified?[8]

Under a positive discount rate, no matter how low, one life today can
be worth more than one million lives in the future, or worth the entire
subsequent survival of the human race, if we use a long enough time
horizon. At the very least, we should be skeptical that positive dis-
count rates apply to every comparison.[9]

Consider a policy that kills a person today, or a policy that kills a
person fifty years from now. And by assumption, each death, when it
comes, will strike a person with an equal remaining life expectancy.
The traditional economic approach suggests that the life today is
worth more by some discounted amount. But a focus on the discount-
ing of well-being will imply a different policy conclusion. Most likely
the future life will be happier than the current life. We can lose one
life today or a (possibly happier) life in the more distant future. This
comparison should either be a wash, or arguably we should favor the
future life, again assuming we have discounted for risk.

Time preference does not justify the positive discounting of well-
being across the generations. Time preference may mean that an indi-
vidual prefers to have a given benefit sooner rather than later. Per-
haps I am impatient to enjoy my steak dinner, or I wish to put off go-
ing to the dentist. It is a moot point whether individual time prefer-
ence for utility is rational, but pure time preference across the genera-
tions is harder to defend. Our still unborn great-great-grandchildren
will not receive benefits for some while. But in the meantime they are
not sitting around, waiting impatiently. It cannot be argued that a
forthcoming slice of time is worth less because future generations
must wait for it. Nor did medieval peasants receive some kind of bene-
fit from having been born before us.

The concept of time preference, which relates to individual
choice, cannot be applied directly to unborn people. Time preference

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8   Tyler Cowen and Derek Parfit, *Against the Social Discount Rate*, in Peter Laslett and
James S. Fishkin, eds, *Justice Between Age Groups and Generations* 144, 145 (Yale 1992).

9   The economics of restitution consider the issue from the temporal reverse. When determin-
ing the size of an intergenerational award, it is not always plausible to use straightforward com-
pounding according to market interest rates. Assume, for instance, that A stole $1,000 from B back
in 1850. If we apply a 7 percent rate of compounding to this loss, this will be worth roughly $35
million in the year 2005. Yet few observers hold the intuition that the descendants of A should pay
that sum to the descendants of B, circa 2005. And when large sums are at stake, we doubt whether
simple compounding makes these present values commensurable over time. Had the theft not
occurred, the "victimized" descendants would not, in all likelihood, be current multimillionaires. See
generally Tyler Cowen, *Discounting and Restitution*, 26 Phil & Pub Aff 168 (1997).

therefore does not justify the discounting of the distant future even if it justifies Tom wanting a steak dinner sooner rather than later.[10]

Looking to physics, Einstein's theory of relativity suggests that there is no fact of the matter as to when "now" is. Any measurement of time is relative to the perspective of an observer. In other words, if you are traveling very fast, the clocks of others are speeding up from your point of view. You will spend a few years in a spaceship but when you return to earth thousands or millions of years will have passed. Yet it seems odd, to say the least, to discount the well-being of people as their velocity increases. Should we pay less attention to the safety of our spacecraft, and thus the welfare of our astronauts, the faster those vehicles go? If, for instance, we sent off a spacecraft at near the velocity of light, the astronauts would return to earth, hardly aged, millions of years hence. Should we—because of positive discounting—not give them enough fuel to make a safe landing? And if you decline to condemn them to death, how are they different from other "residents" in the distant future?

Instead of letting our speedy astronauts die, we can think of the universe as a block of four-dimensional space-time. We would not discount human well-being for temporal distance per se any more than we would discount well-being for spatial location per se. Even if Einstein turns out to have been wrong, it would be odd if the case for positive discounting required his refutation.

An imperfect markets argument also suggests that observed market rates of interest are too high for many normative social purposes. Welfare economics holds up perfect markets as an ideal, yet future generations cannot contract in today's markets. If we can imagine future generations engaging in such contracting, current decisions would run more in their favor than is otherwise the case.

Consider a much wealthier future one hundred years from now. Some of these individuals might die from current environmental decisions. If those individuals could bid on today's policies, they would bid for greater concern for the future. It is an open question how wealthy a group of bidders they would be; in present value terms this will depend on the relationship between the growth rate of the economy and

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[10] Individual time preference is a tricky concept. What if I am very hungry and wish to eat now rather than later? Does this count as time preference? Or does time preference imply that the same "eating experience," holding the level of hunger constant, should be preferred sooner rather than later. If we hold *everything* constant, in what sense can we say that time passes? The passage of time must mean that ceteris paribus clauses cannot be totally strict, but then we return to the question of what is to vary. Arguably all instances of "goods in different time periods" are simply *different goods*, noting that economists define "goods" in terms of revealed preference and indifference in the first place.

the rate of interest. If we think of the growth of wealth as (roughly) matching the interest or discount rate, their bids, in today's terms, would carry about as much weight as ours. And if the policy had a potentially big impact on their lives, future generations could well be the dominant (hypothetical) bidders in our policy evaluation.

John Broome offers a related thought experiment, in which future generations participate in current markets.[11] We can imagine a trust fund set up in their name, which could borrow against their future earnings and bid for or against current policies. In the final equilibrium, future generations will have redistributed some resources to themselves by obtaining a better political deal.

This thought experiment is more complex than first meets the eye. For instance, when allowing future generations to bid in these imaginary markets, what level of wealth do we assign them? Presumably, we let them bid with the present discounted value of their wealth, but what rate of discount do we use to measure this magnitude? We are looking to determine a correct discount rate, and thus cannot start by assuming a particular rate already in place. While we might try to solve for mixes of bids and discount rates which imply equilibria, that procedure will not in general offer unique solutions.[12]

Regardless of how we answer this question, arguably future generations should have more bidding power in this thought experiment than they have in the real world, namely zero. The relevant first-best optimum then involves greater resources for future generations, at the expense of current generations, than does the status quo. Given this description, we arguably should *prefer* any one-to-one resource transfer from the present into the future. Such a reallocation would bring us closer to the specified optimum. This suggests a possibly *negative* rate of social discount for small choices at current margins, to reflect the desirability of making one-to-one resource shifts into the future. I am not endorsing the idea of a negative rate overall, especially given the difficulties of constructing a coherent version of this thought experiment. But the opportunity cost argument, once we take perfect markets into account, does not automatically imply strongly positive rates of discount for intergenerational allocations, even for real resources rather than utility. Observed intertemporal prices are based

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11   John Broome, *Discounting the Future*, 23 Phil & Pub Aff 128, 151–52 (1994).

12   Imagine, for instance, two equilibria. In one, the intergenerational discount rate is very high, and the future generation has no real wealth to bid with. In another, the rate is very low— possibly negative—and future generations have immense amounts of wealth to bid with. Each distributional decision will support an equilibrium, yet we are left with no guidance as to the appropriate discount rate.

on highly imperfect market participation, at least if current policies can affect the more distant future.

B. Gamma Discounting

Models with changing discount factors over time will tend to have relatively low discount rates on net.[13] The lowest discount rate will have the highest contribution to an expected value calculation and thus should carry an especially high weight in our decisions. This can lead to what is sometimes called "gamma discounting."

Richard Posner summarizes the argument:

> Suppose there's an equal chance that the applicable interest rate throughout this and future centuries will be either 1 percent or 5 percent. The present value of $1 in 100 years is 36.9 cents if the interest rate used to compute the present value is 1 percent but only .76 cents (a shade over three-quarters of a cent) if it is 5 percent. Now consider the 101st year and remember the assumption that the two alternative discount rates are equally probable. If the interest rate used to discount the future to the present value is 1 percent, then the present value of $1 at the end of that year will have shrunk from 36.9 cents to 36.6 cents. If instead the interest rate used is 5 percent, the present value of .76 cents will have shrunk to about .75 cents. This means that the *average* present value of $1 at the end of the 101st year will be 18.68 cents, implying an average discount rate of less than 2 percent, rather than 3 percent. The reason is that the more rapid decline in value under the higher discount rate (5 percent) reduces its influence on present value.[14]

In other words, when there is uncertainty about future discount rates, lower rates have a greater weight the further we look into the future. Standard approaches, properly applied, imply lower discount rates than are often believed.

Differing opinions about discount rates produce results comparable to uncertainty about future discount rates. Martin Weitzman notes: "[E]ven if every individual believes in a constant discount rate,

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[13]   See Martin L. Weitzman, *Why the Far-Distant Future Should Be Discounted at Its Lowest Possible Rate*, 36 J Envir Econ & Mgmt 201, 207 (1998) (stating that long-term calculations will have a low interest rate because the discount rate shrinks over time).

[14]   Richard A. Posner, *Catastrophe: Risk and Response* 153–54 (Oxford 2004), citing Richard Newell and William Pizer, *Discounting the Benefits of Climate Change Mitigation: How Much Do Uncertain Rates Increase Valuations?* 15–16 (Pew Center on Global Climate Change 2001), online at http://www.pewclimate.org/docUploads/econ%5Fdiscounting%2Epdf (visited Jan 22, 2007).

the wide spread of opinion on what it should be makes the effective social discount rate decline significantly over time."[15] Differing opinions imply some uncertainty as to who is correct, and the above logic kicks in. The lower discount rate estimates will receive greater weight in the expected value calculation.

The results from gamma discounting often show up in the intuitions of economists and others. Many individuals will argue that the present is more important than thirty years from now, but that after some point further differences in time should cease to matter. For instance, perhaps what happens three hundred years from now is not much less important than what happens two hundred years from now. This view has found significant support in polls of economists.[16]

The behavioral literature on time preference suggests that most of our tendency to discount is bunched in the very near future. For instance, an individual will greatly prefer a dollar today to a dollar three weeks from now. The implicit discount rates on such choices can run as high as 300 percent.[17] But when the comparison is between ten years from now and twenty years from now, the rate of discount is very low, sometimes zero. Individual time preference most frequently concerns very near events.[18]

Gamma discounting nonetheless fails for very long-run comparisons. Gamma discounting still implies that we can choose a single correct (nonzero) number or set of numbers for the long-term rate of discount. If such rates are positive, we still face the possibility that a single life today will be worth more than continued world survival, provided we choose a long enough time horizon for the comparison. For most practical issues, these problems are unlikely to arise. Nonetheless, gamma discounting can place too much weight on the present when we look at long periods of time.

III. DEEP CONCERN FOR THE DISTANT FUTURE

In lieu of gamma discounting, I suggest a postulate of *Deep Concern for the Distant Future*. In this view, we should not count catastrophic losses for *much* less, simply because those losses come in the fu-

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[15]   Martin L. Weitzman, *Gamma Discounting*, 91 Am Econ Rev 260, 260 (1991).

[16]   See id at 269–70 (polling fifty economists).

[17]   See, for example, Shane Frederick, George Loewenstein, and Ted O'Donoghue, *Time Discounting and Time Preference: A Critical Review*, in George Loewenstein, Daniel Read, and Roy F. Baumeister, eds, *Time and Decision: Economic and Psychological Perspectives on Intertemporal Choice* 13, 25 (Russell Sage 2002) (finding a 345 percent annual discount rate over a one-month horizon).

[18]   See Tyler Cowen, *Consequentialism Implies a Zero Rate of Intergenerational Discount*, in Laslett and Fishkin, eds, *Justice Between Age Groups and Generations* 162, 162–65 (cited in note 8) (attempting to axiomatize zero discounting).

ture. In the absence of qualifying factors, no amount of temporal distance per se should cause widespread tragedies to dwindle into current insignificance. For instance, we should believe that the end of the world is a truly terrible event, even if that collapse comes in the very distant future. Similarly, the continued persistence of civilization, three hundred years from now, is *much* better than no further civilization at that point in time. Our algorithms for evaluating the future should not yield contrary conclusions.

This informal postulate does not translate easily into formal analysis. First, well-being is a rough and heterogeneous concept not susceptible to exact measurement, even in principle. There appear to be many different kinds of happiness and more than one reward system in the human brain. We cannot apply exact axioms to very inexact concepts with much precision.

Second, the choice across an infinite or finite time horizon often raises embarrassing questions. Infinite horizons can involve problems with infinities, boundedness, and nonmonotonicity.[19] Finite horizons postulate an immediate truncation at some arbitrarily chosen date; this is counterintuitive and contrary to our concern for the distant future. Again, given the imprecision of the well-being concept, we should not expect an exact and axiomatic approach to the time horizon to fit the problem perfectly.

Those caveats having been noted, the mathematical options fall into a few categories. The most straightforward approach invokes the polar approach of a zero discount rate for utility:

$$SW = \sum U(a^i). \qquad (2)$$

Such a practice would represent a basic principle of neutrality or equal respect across time. No person would count for less simply because his or her well-being lies in the more distant future. In this view, time per se does not possess ethical significance. A death in fifty years counts for as much as a death today, holding other conditions equal. This draws upon the argument above that there should be no positive time preference across different lives in different generations. Of course, we still might use positive discounting within lives but zero discounting across lives and generations.[20]

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[19] See Nick Bostrom, *Infinite Ethics* 7 (unpublished manuscript 2005), online at http://www.nickbostrom.com/ethics/infinite.pdf (visited Jan 22, 2007) ("Infinitudes are notoriously counterintuitive to the human mind.").

[20] See Colin Price, *Time, Discounting and Value* 327, 345 (Blackwell 1993) (arguing against positive discounting for future generations).

Alternatively, we could borrow a version of the Golden Rule from capital theory:

$$\text{Max: lim } U\,(a\,'). \tag{3}$$

This equation instructs us to choose the highest sustainable path of utility or consumption over time. That is, we should maximize a steady state value over an indefinite time horizon; we can think of this value as utility or well-being. This gives us some general guidance as to a good macrosolution, without requiring that each and every comparison be subject to a zero discount rate for utility.[21]

An overtaking criterion presents a third approach. In this view, we should be willing to give up a discrete benefit today if in return we can create a sufficiently long string of well-being increases for the future. More formally, we can write the following:

The *Overtaking Criterion*: A sequence $h^\infty = (a^1, a^2, \dots)$ is preferred to $h^\infty = (a^1, a^2, \dots)$ if

$$\exists \tau_0 \in \aleph: \forall \tau > \tau_0, \sum_{t=1}^{\tau} W_i\,(a\,') > \sum_{t=1}^{\tau} W_i\,(\hat{a}\,'). \tag{4}$$

This equation prefers one sequence of values to another if that former sequence, after some point in time and continuing for the future, remains systematically higher.

Unlike much of the formal literature, we need not embed the overtaking criterion in an infinite time horizon. Instead, we can prefer the dominating sequence if that subsequent domination lasts "long enough." If we only have one final time period where one sequence beats another, this may not seem to justify a normative conclusion. But if one sequence dominates another for, say, fifty or two hundred years running, with no immediate end in sight, the case for that dominating sequence is stronger.

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21   For early presentations of the Golden Rule, see, for example, F.P. Ramsey, *A Mathematical Theory of Saving*, 38 Econ J 543, 543 (1928) (articulating the rule as follows: "[t]he rate of saving multiplied by the marginal utility of money should always be equal to the amount by which the total net rate of enjoyment of utility falls short of the maximum possible rate of enjoyment"); Edmund Phelps, *The Golden Rule of Accumulation: A Fable for Growthmen*, 51 Am Econ Rev 638, 642 (1961) (stating that the Golden Rule is met when "the investment ratio and the profit ratio are constant and equal"); J.E. Meade, *The Effect of Savings on Consumption in a State of Steady Growth*, 29 Rev Econ Stud 227, 230 (1962) (rejecting profits greater than investment as the universal rule for the optimum level of savings). For the conditions under which various principles coincide, see Geoffrey Heal, *Valuing the Future: Economic Theory and Sustainability* 110–11 (Columbia 1998).

We also can introduce add-ons to an overtaking criterion. For instance, we might stipulate that an overtaking which starts earlier is to be preferred to an overtaking which starts later. We might addend a Pareto principle: in some cases, two finite sequences have equivalent latter parts, but one sequence strictly dominates the other during the earlier dates. These secondary standards are common sense and would be found in most plausible ethical theories. Such modifications avoid the potential problem of a "dictatorship of the future," common to many infinite horizon models. In such a setting an overtaking criterion might lead to the present counting for nothing. A boost in current values in a sequence, taken alone, will not affect the overtaking calculations for the later periods of the sequence. But these added criteria — or other parts of a broader pluralist moral theory—will help us evaluate future-neutral choices.[22]

Drawing upon these principles, I will consider a rough-and-ready rule of policy evaluation, based on the idea that sufficiently large quantities of wealth make people better off.

A.   The Principle of Growth.

We should make political choices so as to maximize the rate of sustainable economic growth.

We also can attach rights constraints to this recommendation.

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[22] For discussions of the points raised in this paragraph, see Graciela Chichilnisky, *What is Sustainable Development?*, 73 Land Econ 467, 468, 477 (1997) (suggesting a modified version of the overtaking criterion that does not force the present time period to count for nothing). We could entertain such an alternative if, in fact, we faced an infinite time horizon and a dictatorship problem. See Posner, *Catastrophe* at 152–53 (cited in note 14). See also Peter A. Diamond, *The Evaluation of Infinite Utility Streams*, 33 Econometrica 170, 170–77 (1965); Tjalling C. Koopmans, *Stationary Ordinal Utility and Impatience*, 28 Econometrica 287, 287, 296 (1960). With an infinite horizon, the overtaking criterion will fail to satisfy certain axioms of intergenerational equity, such as anonymity or indifference across labeling decisions. On the difficulties of satisfying all reasonable axioms in an infinite horizon setting, see Marc Fleurbaey and Philippe Michel, *Intertemporal Equity and the Extension of the Ramsey Criterion*, 39 J Math Econ 777, 777, 784–86 (2003); Toyotaka Sakai, *Intergenerational Preferences and Sensitivity to the Present*, 4 Econ Bull 1, 4–5 (2003). But see Geir B. Asheim, Wolfgang Buchholz, and Bertil Tungodden, *Justifying Sustainability*, 41 J Envir Econ & Mgmt 252, 253 (2001). On the postulates of "stationarity" and "independence," see Koopmans, 28 Econometrica at 293–95, 307–08. Note that the difficulties with infinity are not unique to issues of intertemporal value. Many plausible cosmologies allow for infinite expected value throughout the universe, with or without a zero discount rate. See, for example, Bostrom, *Infinite Ethics* at 16 (cited in note 19). These cosmologies may not be true, but they need only have some positive chance of being true for the infinity to surface in our expected value calculations. Pascal's Wager and the St. Petersburg Paradox bring related issues to the fore, again without relying on a zero discount rate. See generally Stanford Encyclopedia of Philosophy, online at http://plato.stanford.edu/entries/pascal-wager/ (visited Jan 22, 2007) and http://plato.stanford.edu/entries/paradox-stpetersburg/ (visited Jan 22, 2007).

1.   The modified principle of growth.

We should push for sustainable economic growth, but not at the expense of inviolable human rights.

For simplicity, I will refer to the *Principle of Growth*, but it should be understood that the option on rights constraints remains. With or without the rights constraint, the Principle should be understood as a useful practical rule, rather than as a first principle of moral theory which can withstand all possible philosophic counterexamples. It is a first-order approximation and a decision guide, rather than a con-tender for the Best Ethical Theory.

Maximizing the long-run rate of growth refers to gross domestic product (GDP) as properly understood, and not as currently meas-ured by governments. True GDP should account for leisure time, household production, and environmental amenities. Current GDP statistics have a bias towards what can be measured, rather than what contributes to human welfare. For this reason, "maximizing the rate of growth" does not mean that everyone should work the maximum number of hours in a day. An eighteen-hour workday might maximize measured GDP but would not maximize true GDP over time, once we take the value of leisure into account, not to mention labor burnout.

Furthermore, we wish to maintain higher growth over time, and not just for a single year. Maximizing the sustainable rate of economic growth does *not* imply pursuing immediate growth at the expense of all other values. Policies that seek growth at breakneck speed are fre-quently unstable in both economic and political terms. The Shah of Iran, for instance, tried to bring his country into the modern world very rapidly. Growth rates were high for a while but in the longer run could not be maintained. Since the revolution, Iran has done poorly, often with negative rates of growth. The Shah's forced modernization did not in fact maximize economic growth, and a more cautious set of policies likely would have been better.[23]

It might be argued that a well-being approach to discounting is unlikely to prove operational. We are far from being able to measure human well-being. But we need only very gross welfare judgments. We need establish only that much richer people are better off than much poorer people. If we accept this intuition, the moral force behind the Principle of Growth is simple. Greater sustainable growth will, at some point in the future, make many people much better off than would otherwise be the case. These benefits can continue and indeed

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[23]   For a formal look at the concept of sustainability, see Heal, *Valuing the Future* at 1–25 (cited in note 21).

extend themselves across long periods of time. We should act to bring about these benefits, rather than declining them.

2. Why growth is a compelling metric for welfare.

Economic growth alleviates human misery and lengthens human lives. Wealthier societies have better living standards, better medicines, and offer greater autonomy, greater fulfillment, and more sources of fun.[24] As recently as the end of the nineteenth century, life expectancy in Western Europe ran about forty years of age. Polio, tuberculosis, and typhoid were common ailments, even among the rich. Most individuals worked at hard physical labor, and a college or university education was a luxury.[25]

Just as the present appears remarkable from the vantage point of the past, our future may offer comparable advances in benefits. Continued progress might bring greater life expectancies, cures for debilitating diseases, and cognitive enhancements. Millions or billions of people could have much better and longer lives. Many features of modern life might someday seem as backward as we now regard the large number of women who died in childbirth for lack of proper care. Most of all, economic growth limits and mitigates tragedies. It is a simple failure of imagination to believe that human progress has run its course.

Imagine a time traveler from the eighteenth century visiting the life of Bill Gates. He would witness television, automobiles, refrigerators, central heating, antibiotics, plentiful food, flush toilets, cell phones, personal computers, and affordable air travel, among other remarkable benefits. The most impressive features of Gates's life, from a historical point of view, are those shared by most middle-class Americans today. The very existence of an advanced civilization—the product of cumulative economic growth—confers immense benefits on ordinary citizens.[26]

Even today's poor, in the United States, enjoy a virtually unimaginable standard of living by comparison to previous times. In 1995, 41 percent of poor households owned their own homes. The average poor home had three bedrooms, one-and-a-half baths, a garage, and a porch or patio. Now 70 percent of poor households own a car; 27 percent own two or more cars. In terms of leisure products, 97 percent of the poor have a color television, and almost half of the poor have two or

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[24]   On the benefits of a wealthier society, see Indur M. Goklany, *Affluence, Technology, and Well-Being*, 53 Case W Res L Rev 369, 378–82 (2002).

[25]   For a detailed discussion of the evolution of life expectancy and living conditions, see generally James C. Riley, *Rising Life Expectancy: A Global History* (Cambridge 2001).

[26]   I am indebted to Don Boudreaux for this way of framing the point.

more color televisions. As for household appliances that have only appeared in the last half-century, 64 percent of poor households own microwave ovens, half have a stereo system, and over a quarter have an automatic dishwasher. Two-thirds of households classified as poor have air conditioning. For purposes of comparison, only 36 percent of the entire U.S. population had air conditioning as recently as the early 1970s. Today's American poor are more likely to be overweight than are middle-class persons. Most poor children today grow up to be, on average, one inch taller and ten pounds heavier than World War II American GIs.[27]

Wealth and well-being move together in the long run. The modern world is *much* richer than medieval times, *and* it is *much* better off. Look back at how we climbed out of the poverty of the year 1000 CE or 5000 BCE. Analogous reasoning applies today. If we are sufficiently forward-looking, sustainable economic growth will be our priority.

World history offers precedents for the idea of a "great transformation," leading to enormous increases in the quality and quantity of human lives. Our ancestors did not foresee the evolution of humans, the agricultural revolution, the "urban revolution" (Sumeria and Mesopotamia, circa 4000 BCE), or the Industrial Revolution. Each development, over time, *drastically* changed the human condition, eventually very much for the better. The history of economic growth, to some extent, is the history of working out the consequences of such unforeseen transformations.[28] It is unlikely that we have seen the last of such revolutions, at least provided that civilization manages to stay afloat.

The importance of the growth rate increases the further into the future we look. If a country grows at 2 percent, as opposed to growing at 1 percent, the difference in welfare in a single year is relatively small. But over time the difference becomes very large. For instance, had America grown 1 percentage point less per year between 1870 and 1990, the America of 1990 would be no richer than the Mexico of 1990.[29] At a growth rate of 5 percent per annum, it takes just over 80 years for a country to move from a per capita income of $500 to a per capita income of $25,000, defining both in terms of constant real dollars. At a growth rate of 1 percent, such an improvement takes 393 years.

Robert Lucas put it succinctly: "The consequences for human welfare involved in questions like these are simply staggering: Once

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[27] See Robert Rector, *America Has the World's Richest Poor People*, Wall St J 1 (Sept 24, 1998) (summarizing U.S. Census statistics of those classified as living in poverty).

[28] See Robin Hanson, *Long-Term Growth As A Sequence of Exponential Modes*, J Econ Behav & Org (forthcoming), online at http://hanson.gmu.edu/longgrow.pdf (visited Jan 22, 2007) ("We thus ... model[] long term human history as a sequence of exponential growth modes.").

[29] See Tyler Cowen, *Does the Welfare State Help the Poor?*, 19 Soc Phil & Policy 36, 45 (2002).

one starts to think about [exponential growth], it is hard to think about anything else."[30]

Even a very small growth increment becomes enormous after enough time has passed. If we find 7 percent growth a compelling reason to disregard some non-growth-correlated value, we will find a smaller boost in the growth rate a compelling reason as well, but *only if our time horizon is sufficiently long.*

If you are comparing a 1 percentage point boost to the growth rate, and starting at real income parity, you need a time horizon of 110.4 years to establish a 3:1 ratio of superiority. If you are comparing a 2 percentage point boost in the growth rate you need a time horizon of 55.5 years. For a more ambitious boost of 5 percentage points, the time horizon must stretch for only 22.5 years. The force of the Principle of Growth does not require time horizons of millions or billions of years.

Keep in mind that the indicated number of years expresses when a 3:1 ratio will be reached. Over time, if the higher growth continues, the 3:1 ratio will be exceeded on an ongoing basis. For growth boosts of 1, 2, and 5 percentage points net, we would need 161, 81, and 33 years respectively to reach a *quintupling* of real income. So the 3:1 requirement is only a temporary milestone on the path toward even greater discrepancies of wealth and (likely) welfare. Asking a policy to deliver a 3:1 wealth ratio is thus a fairly stringent rule for ascertaining the welfare-dominance of one outcome over another.

Although I am focusing on utilitarian values, the benefits of growth are not restricted to utility. For instance, wealthier societies bring greater access to the arts and better education.[31] Economic growth also minimizes the "tyranny of place." Individuals suffer a lack of freedom when they have little or no chance to escape the circumstances of their births. Perhaps they are born poor, into the wrong social class, into a community with little tradition of formal education, or far removed from urban culture. Today, because of wealth, more individuals escape these shackles than ever before. We are more mobile, more able to shape our selves, more able to choose our friends, and more able to weave together different cultural traditions when constructing our personal narratives.

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[30]   Robert E. Lucas, Jr., *On the Mechanics of Economic Development*, 22 J Monetary Econ 3, 5 (1988).

[31]   See Tyler Cowen, *In Praise of Commercial Culture* 16 (Harvard 1998) ("The artistic professions ... flourish with economic growth."). See also Alexander Tabarrok and Tyler Cowen, *Who Benefits From Progress?*, 51 Kyklos 379, 388 (1998) (asserting that wealthier individuals have higher elasticities of substitution allowing for increased education in the form of an expanded consumption set).

These pluralistic considerations all point toward the same conclusion. The more rapidly growing economy will, at some point, bring *much* higher levels of human well-being on an ongoing basis. We will favor growth even if we focus only on special egalitarian concerns about the very poor. The economic growth of the wealthier countries benefits the very poor as well. Most generally, the evidence suggests that the bottom quintile of an economy shares proportionally in growth.[32] Furthermore, a growing wealthy economy has a greater capacity to absorb immigrants. Poor people who migrate to rich countries earn much higher incomes, and their children become richer still. A typical migrant from rural Mexico to the United States will move from earning $2 a day to $10 an hour. Over time, the children of immigrants approach the national average, depending on how long they have been in the country and how concerned they are with assimilating. Of course, the richer the wealthier country, the more new immigrants will benefit.

Immigrants also send remittances back home. Total remittances around the world are now about $80 billion a year, about twice the amount of the formal category of foreign aid. Remittances, however, bypass governments and do not encounter comparable problems with waste or corruption. Remittances are now ten times the amount of net private capital flows, after adjusting for profit repatriation and interest payments. To cite one example, Mexicans working in the United States send back home $20 billion every year, circa 2003. This sum is twice the value of Mexico's agricultural exports, and over a third more than tourist revenue. Many Latin Americans have used U.S. remittances to start new businesses or revitalize their communities through infrastructure investments.[33]

Many migrants return to their home countries, bringing skills and liberal democratic ideas. Software repatriates have helped build India's competitiveness in high-tech industries. Thousands of Asian students have obtained science or engineering degrees from American universities, thereafter returning home to start new businesses. If a country is willing to offer some scope for entrepreneurship, it need not fear a "brain drain." Instead foreign contacts, training, and periods of residency will help promote domestic development. The global poor

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[32] See David Dollar and Aart Kraay, *Growth is Good for the Poor*, 7 J Econ Growth 195, 195–96 (2002).

[33] For a detailed report on remittances to Latin America and the Caribbean, see generally Roberto Suro, *Remittance Senders and Receivers: Tracking the Transnational Channels* (Pew Hispanic Center 2003), online at http://pewhispanic.org/files/reports/23.pdf (visited Jan 22, 2007).

also benefit from new medicines, new global technologies, and research and development efforts.[34]

3. Aggregation issues.

The immense long-run benefits of growth help us address aggregation problems, the traditional bugaboo of welfare economics. Pure Pareto improvements are few and far between. So at some level of the analysis, through some method or another, we must assert that the benefits to one group of people outweigh the losses to another. Cost-benefit analysis invokes a "potential compensation" principle toward this end. If the winners could in principle compensate the losers, as measured in material wealth, cost-benefit analysis recommends the policy, at least subject to distributional caveats. This is not commonly considered an interpersonal utility comparison, but in practice it functions as one. In most real-world cases, the compensation is never paid or even seriously contemplated. So we must be judging one set of gains as socially "worth more" than the losses on the other side of the scale.

I do not reject the potential compensation principle out of hand. But the principle does not persuade many philosophers or even many specialists in normative welfare economics. Most generally, if some people gain and others lose, why should measured total wealth be the relevant tiebreaker? Must we not consider a broader bundle of plural values as possible tiebreakers?[35]

The potential compensation principle nonetheless contains a core of truth. A policy that brings overwhelming costs but few offsetting benefits is unlikely to be a good idea. Therefore the potential compensation principle is most plausible when the surplus of benefits *far* exceeds the measured costs, or vice versa.

We therein find a means of resurrecting one part of the potential compensation principle. If the well-being gains to the future are significant and ongoing, those gains should far outweigh one-time costs to the present. Looking toward the future expands the number of cases where an overwhelming preponderance of benefits lies in the same direction. As argued above, a sustainable increase in economic growth will boost many plural values in the medium and long runs. To be sure, some people will be worse off, and some values, in the short-to-medium run, will not be favored. In these regards aggregation

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[34] Consider Elhanan Helpman, *The Mystery of Economic Growth* 84 (Belknap 2004) (noting that "less-developed countries experience substantial gains from [research and development] expansion in the industrial countries").

[35] For the most effective philosophical critique of the potential compensation principle, see generally Ronald M. Dworkin, *Is Wealth a Value?*, 9 J Legal Stud 191 (1980).

problems do not disappear. Nonetheless, the competing options do not generally offer a deadlock of roughly equivalent values and interests on each side of the scale. The higher growth alternative will, at some point in the future, offer a clear and ongoing preponderance of plural values in its favor. These values will include the distribution of large benefits to very poor individuals. This predominance of values stands on one side of the scale whether we consider ordinal or cardinal measures of welfare, or some weighted average of the two. We should opt for that preponderance of benefits.[36]

This approach to the aggregation problem coincides with common-sense morality. Not everyone can be happy all of the time, but we nonetheless should choose an option that makes a strong preponderance of people much better off. We will never resolve aggregation problems by producing some new algorithm or voting rule that magically resolves all conflicts. If John and Sally favor different policy options, there is always some irreducible clash of interests. We instead should look for options with a preponderance of values on one side of the scale. We find such options by considering a broader class of affected individuals, namely the more distant future. The longer our time horizon, the more likely we can find a preponderance of values pointing in a particular direction, in this case toward growth-enhancing policies.

4. Survey evidence on wealth and welfare.

A growing body of literature suggests that additional riches do not make citizens in wealthy countries any happier, at least not above a certain level. Using information taken from questionnaires, once a country has a per capita income of roughly $10,000 a year or more, the aggregate income-happiness link appears weak. John Helliwell argues that the curve flattens out at about half of current American per capita income, or roughly the standard of living in contemporary Greece.[37] These results might lead us to wonder whether economic growth is so important after all.[38]

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[36]   See John S. Chipman and James C. Moore, *Aggregate Demand, Real National Income, and the Compensation Principle*, 14 Intl Econ Rev 153, 153, 155–56 (1973) (presenting the major technical problems with the potential compensation principle). Note that the grossness of the real income comparisons, when we consider the distant future, limits the scope for intransitivity and Scitovsky double-switching problems.

[37]   See John F. Helliwell, *How's Life? Combining Individual and National Variables to Explain Subjective Well-Being*, 20 Econ Modeling 331, 355 (2003) ("[T]he well-being effects of living in higher income countries are small and insignificant, and do not show any evidence of subsequent increase once GDP per capita exceeds half that in the United States in the mid 1990s.").

[38]   See David G. Myers, *The Funds, Friends, and Faith of Happy People*, 55 Am Psych 56, 59 (2000) (stating that among nations with a gross national product above $8,000 the correlation between wealth and happiness dissipates); Michael Argyle, *Causes and Correlates of Happiness*,

Despite this evidence, wealth and happiness commove in the longer run. At most, the happiness literature shows that many more changes are irrelevant than we had previously thought. This result does not eliminate the major benefits of economic growth, as experienced over longer periods of time. It might turn out that (if we believe the happiness literature) many small changes are irrelevant or nearly irrelevant for happiness. Yet sufficiently large changes still boost (or harm) human welfare by significant amounts. If the small changes do not matter much, that is all the more reason to focus on the large changes. The importance of significant economic growth for happiness probably would strengthen if we had a more accurate measure of GDP, one which also considered, for instance, the value of leisure time.

The standard of living found in contemporary Greece—even if comparable in happiness to the current U.S.—would not match up to the likely future with continued growth. Or go back to the past. The happiness-wealth curve may have had a flat range in the Stone Age, but the entire range of that curve would not make for a very satisfying existence today. So a flat range of the curve, at any point in time, does not break the long-run link between wealth and happiness. Economic growth still shifts the curve up over time.

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in Daniel Kahneman, Ed Diener, and Norbert Schwarz, eds, *Well-Being: The Foundations of Hedonic Psychology* 353, 356 (Russell Sage 1999) (noting that studies have shown only a small correlation between income and happiness in America); Andrew J. Oswald, *Happiness and Economic Performance* 107 Econ J 1815, 1827 (1997) ("[E]conomic progress buys only a small amount of extra happiness."). Wealthy countries, when they become wealthier over time, do not become happier in the aggregate. In some cases (for example, the United States 1946–1991), greater wealth is correlated with *lower* levels of self-reported happiness. See David G. Blanchflower and Andrew J. Oswald, *Well-Being over Time in Britain and the USA* 16 (NBER Working Paper No 7487, Jan 2000), online at http://www.nber.org/papers/w7487 (visited Jan 22, 2007) (noting that Americans are not happier although the GDP has risen); Myers, 55 Am Psych at 59 (noting in the 1980s, the Irish had greater life satisfaction than the doubly-wealthy West Germans); Ed Diener, et al, *Positivity and the Construction of Life Satisfaction Judgments: Global Happiness Is Not the Sum of Its Parts*, 1 J Happiness Stud 159, 159–60 (2000) (using Japan in comparison to Colombia to demonstrate that wealth does not correspond to happiness); Charles Kenny, *Does Growth Cause Happiness, or Does Happiness Cause Growth?*, 52 Kyklos 3, 4 (1999) (arguing that if there is a correlation between growth and happiness, it is that happiness causes growth and not vice-versa); Bruno S. Frey and Alois Stutzer, *Happiness Prospers in Democracy*, 1 J Happiness Stud 79, 91 (1999) (finding that happiness does correlate with income but only minor differences in subjective well-being across income groups); Robert E. Lane, *The Joyless Market Economy*, in Avner Ben-Ner and Louis Putterman, eds, *Economics, Values, and Organization* 461, 462 (Cambridge 1998) (finding support for the proposition that the United States is a nation of increasingly unhappy people); Richard A. Easterlin, *Will Raising the Incomes of All Increase the Happiness of All?*, 27 J Econ Behav & Org 35, 37 (1995) (pointing to evidence that income growth does not increase happiness). On the United States, see Bruno S. Frey and Alois Stutzer, *Happiness and Economics: How the Economy and Institutions Affect Human Well-Being* 76–77 (Princeton 2002) (finding that while income per capita increased, happiness decreased between 1946 and 1971 in the United States); Ed Diener, *Subjective Well-Being*, 95 Psych Bull 542, 553 (1984) (reporting a downward trend in happiness as wealth grew between 1957 and 1978 in the U.S.).

It is sometimes questioned whether even extreme catastrophes make people less happy. Individuals who experience severe disabilities or physical handicaps do to some extent adjust their expectations. Often these victims compare themselves to individuals who are even worse off than they are, or they lower their aspirations in life. The loss in happiness is not as great as a naïve perspective might expect. Nonetheless, victims of catastrophe still report lower levels of happiness than do comparable healthy individuals. The happiness difference is more distinct the greater the extent of the disability. At the very least, a significant percentage of victims experience an ongoing "core of distress" for many years. People cope least successfully when the catastrophe or malady is ongoing and involves an ongoing deterioration of condition. Most of the counterintuitive results come when the bad event has a "once and for all" nature, such as a one-time physical handicap. But individuals remain subjectively worse off when they suffer from progressive or degenerative problems.[39]

The observed flatlining of the happiness-wealth relationship also may in part reflect framing. The literature usually focuses on aspiration or treadmill effects. Under this view, you get more but you start expecting more as well, or aspiring to more. The greater wealth therefore translates into less happiness than might have been expected. But this is not the only adjustment occasioned by growing wealth. The wealthy also recalibrate how they should respond to questions about their happiness. If happiness itself is subject to framing effects, surely *talk* about happiness is subject to framing effects as well. The wealthy

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[39] On coping, see generally Camille B. Wortman and Roxane C. Silver, *Coping with Irrevocable Loss*, in Gary R. Vandenbos and Brenda K. Bryant, ed, *Cataclysms, Crises, and Catastrophes: Psychology in Action* 185 (1987); C. Buf Meyer and Shelley E. Taylor, *Adjustment to Rape*, 50 J Personality & Soc Psych 1226 (1986); Ronald C. Kessler, Richard H. Price, and Camille B. Wortman, *Social Factors in Psychopathology: Stress, Social Support, and Coping Processes*, 36 Ann Rev Psych 531 (1985) (examining the interaction between stress, psychiatric impairments, and coping mechanisms); Phillip Brickman, Dan Coates, and Ronnie Janoff-Bulman, *Lottery Winners and Accident Victims: Is Happiness Relative?*, 36 J Personality & Soc Psych 1917 (1978); Ronnie Janoff-Bulman and Camille B. Wortman, *Attributions of Blame and Coping in the "Real World": Severe Accident Victims React to Their Lot*, 35 J Personality & Soc Psych 351 (1977). On the "core of distress" idea, see Frey and Stutzer, *Happiness and Economics* at 56 (cited in note 38) (noting that paraplegics cope effectively but are still not as happy as an accident-free individual); Margaret S. Stroebe, Robert O. Hansson, and Wolfgang Stroebe, *Contemporary Themes and Controversies in Bereavement Research*, in Margaret S. Stroebe, Wolfgang Stroebe, and Robert O. Hansson, eds, *Handbook of Bereavement: Theory, Research, and Intervention* 457, 465–67 (Cambridge 1993) (discussing the tendency of grief to last one to two years and sometimes even longer in certain individuals); Philip W. Wirtz and Adele V. Harrell, *Police and Victims of Physical Assault*, 14 Crim Just & Behav 81, 86 (1987) (finding victims of physical assault experience increased fear, stress, and anxiety). On degeneration, see Shane Frederick and George Loewenstein, *Hedonic Adaptation*, in Kahneman, Diener, and Schwarz, eds, *Well-Being* 302, 312 (cited in note 38) (noting that individuals do not adapt as well to disability when the disability is chronic or progressive).

develop higher standards for reporting when they are "happy" or "very happy." If you are a millionaire living next door to a billionaire, you might be less likely to report that you are ecstatically well off. This does not mean that you spend your entire time envying the billionaire or suffering because of your lower relative status.

So let us assume that both framing effects—concerning happiness *and* talk about happiness—operate at the same time. This will suggest that even a constant measured level of reported happiness implies growing real happiness over time. Life improvements do usually make us happier, while *both* our expectations and our reporting standards adjust upwards. This is the most likely interpretation of the aggregate data. Furthermore, it is supported by direct observation. Most individuals strive to earn higher incomes even after they have experienced the strength of "aspiration" and "treadmill" effects. Note also that *within* a country wealthier people report higher levels of happiness, on average, than do poorer people.[40] This result has not been challenged, and it is unlikely that it all boils down to a zero-sum relative status effect.

Finally, even if we accept the "flatline" empirical result as valid, the questions are posed to individuals in normal life circumstances. The answers will not pick up the ability of wealthier economies to postpone or mitigate extreme tragedies, whether in the wealthier or poorer parts of our world. For instance, the happiness measures, by their nature, do not pick up the benefits of greater life expectancy. The dead and incapacitated cannot complain about their situation, at least not in questionnaire form. If an immigrant, or a child of an immigrant, fills out the form, there is no comparison with a preimmigration state of affairs. By its very nature, happiness research draws upon a fixed pool of people in relatively normal circumstances. This will limit its ability to measure some of the largest benefits brought by economic growth.

Opting for growth also addresses intra-self aggregation problems. For instance, individual preferences do not always reflect individual interests. Observed preferences often appear to be irrational, transitive, spiteful, or otherwise morally dubious. Given these facts, it is often asked why the concept of preference satisfaction should stand at the center of an economic approach to welfare. Arguably, satisfying particular preferences, at the margin, does not always make people happier or make the world a better place.

Focusing on the macroeconomics of long-term growth sidesteps these dilemmas. We might doubt that the marginal fast food cheeseburger is worth $4.89 for me, all things considered. Perhaps the offer is manipulating my evolutionarily-programmed desire for more fat, to

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40   Diener, 95 Psych Bull at 553 (cited in note 38).

the detriment of my health. It is more difficult to doubt that living in a much wealthier society is good for me, all things considered. The relevant comparisons become quite gross after the passage of enough time. A given individual is likely better off living an extra twenty years, receiving anesthesia at the dentist, enjoying plentiful foodstuffs, having more years of education, and not losing any children to premature illness. Similarly, people one hundred years from now will be much better off if growth stays high. At some point, these cumulated benefits will be sufficiently gross and sufficiently obvious to be robust to particular instances of irrational or misguided preferences.

5. Growth maximization versus cost-benefit analysis.

The importance of the growth rate is hardly news, but rarely is the point made fully explicit for the theory of economic policy. Instead of performing a cost-benefit analysis, I recommend that we simply ask whether a given policy is likely to increase or decrease the rate of economic growth. Over a sufficiently long time horizon, the growth effects of policies will overwhelm the static allocation effects as measured by cost-benefit analysis. Of course, the postulate of Deep Concern for the Distant Future is central to this judgment and central to our ability to overcome aggregation problems.

Under the traditional cost-benefit view, we should not in general maximize the rate of economic growth. At the growth maximum there will always exist some increase in current consumption that will lower growth yet improve current welfare. In this view, future periods will be wealthier, and thus maximizing the utility path of growth will imply pulling some additional resources toward the present. Marginal utilities are equalized over time, taking into account a declining marginal utility of wealth. The recommended rate of growth will stand below the maximum possible rate of growth due to growing wealth over time (see Equation (1) above). My more future-oriented perspective emphasizes that the more rapidly growing economy will, after some point, have systematically higher levels of both wealth and well-being. The difference in welfare would be analogous to putting several or more generations of the modern world back into nineteenth-century conditions.

If the time horizon is extremely short, the benefits of continued higher growth will be choked off and will tend to be small in nature. Even if we hold a deep concern for the distant future, perhaps there is no distant future to care about. To present this point in its starkest form, imagine that the world were set to end tomorrow. There would be little point in maximizing the growth rate, and arguably we should just throw a party and consume what we can. Even if we could boost growth in the interim hours, the payoff would be small and not very

durable. The case for growth maximization therefore is stronger the longer the time horizon we consider.

One generalizing approach might classify policies in terms of the size and time distribution of their benefits. Policies with small and temporary benefits would call for a relative balance closer toward cost-benefit analysis. Other policies—with larger benefits and more durable effects on long-term growth—would give greater weight to inframarginal methods. Marginal and inframarginal approaches would coexist in a common framework. In practical terms, we know that policy analysis should involve greater emphasis on growth maximization than is suggested by current methods of cost-benefit analysis.

6.   Once-and-for-all changes versus growth rate changes.

Beneficial policies may fall into one of three categories. First, they may increase some benefit in once-and-for-all fashion. Imagine boosting the power of all extant light bulbs for one year. Second, they may yield a benefit for the ongoing future. Imagine discovering a light bulb that burns longer. Third, they may lead to a permanent increase in the rate of economic growth. Imagine a new laboratory that speeds the rate at which better light bulbs are discovered.

Gains of the first kind, which do not stretch far into the future, become in relative terms much less important than gains of the other two kinds (the same can be said for costs). Gains of the third kind are now more important, in relative terms, than gains of the second kind. The temporally distant, exponentially increasing gains are no longer discounted away at such a high rate.

Which categories best describe the costs and benefits of policy options becomes a question of social importance. A given cost might involve an up-front, once-and-for-all burden, or instead it might bring a systematic decline in the growth *rate* over time.

Counterintuitively, a concern for the distant future sometimes will militate *against* some environmental investments. For instance, many of the costs of global warming appear to be "one time" in nature, such as the costs of relocating coastal and inland settlements. In long-run equilibrium, transition costs aside, it is no worse and arguably better for the world to have a warmer climate (we spend more money on warming space than on cooling it). At the same time, stopping or limiting global warming might lower permanently the rate of economic growth. When the rate of intergenerational discount is sufficiently low, maximizing the growth rate tends to take priority over avoiding one-time expenditures and one-time adjustments. Even if those one-time expenditures are large, we will earn back that value over time and more, due to the logic of investment compounding.

Alternatively, other environmental issues will become more important. For instance, many scientists have argued that global warming will increase the number of virulent and persistent storms. This can limit the prospects for economic growth (this is illustrative; I am not seeking to debate the facts). When it comes to global warming, we should be more concerned with the growth-affecting elements of the phenomenon, and less concerned with the one-off effects.

Economic models provide differing accounts of which changes are likely to affect the growth rate. The most prominent approach, the Solow model, postulates a stripped-down, economy-wide production function based on constant returns to scale. Output is the result of capital inputs, labor inputs, and technological progress, which renders both capital and labor more effective.[41] In this model, the primary way to increase growth is to induce a higher rate of technological innovation. Along these lines, many empirical tests have shown embodied technological progress to be the major force behind U.S. economic growth.

In the Solow model, the rate of return on capital diminishes as the capital stock increases, and the rate of capital accumulation responds to this rate of return. Given these assumptions, poorer countries should be expected to catch up to richer countries as they borrow new technologies and increase their capital stocks. Furthermore, economies should be able to recover quickly from one-time shocks, such as earthquakes. Although the capital stock has fallen, the rate of return on capital is now higher. Additional savings should make up the gap and restore the economy to its previous growth path.

The Solow model makes a distinction between the level of real income and subsequent rates of growth. Many traditional factors— such as a boost in savings and investment—are seen as contributing to "transition growth paths" but not to "steady state growth" in long-run equilibrium. Alternatively, a decrease in wealth lowers the base on which growth occurs, but it has no necessary implications for the succeeding rate of growth in the long run.

To use a biological metaphor, consider a lobster. If an arm is lopped off another arm grows rapidly to replace it. In the long run the lobster is not much worse off, even if it never quite replaces its original weight. In economic terms the mechanism runs as follows. The decline in the capital stock raises the rate of return on capital, which induces more savings, which tends to restore a higher capital stock. In the long run, an increase in the savings rate makes up, over time, for the "destroyed" resources. The very rapid recovery of some economies

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after wars or major natural disasters might represent this mechanism in operation. The rate of growth will remain permanently lower only if the negative shock somehow reduces the rate of technological progress. And since capital has a diminishing marginal product in the model, a higher rate of savings will boost the absolute level of income and transitional growth, but not the ongoing rate of growth. Growth would proceed from a higher base but not at higher rates in the long run.[42]

The Solow model implies that policy toward science and innovation is especially important. At the same time, we should be less worried about a variety of daily catastrophes.

In contrast to the Solow model, increasing-returns models suggest that more resources beget more growth. In this view, larger economies should grow more rapidly than smaller economies, and growth patterns should be serially correlated over time. Ideas—and their nonrival nature—often are cited as the fundamental source of increasing returns. Once an idea has been generated, it can be used many times by many different people at very low marginal cost. Larger markets generate stronger incentives for idea production and thus face a comparative growth advantage. New ideas will lead to more growth, which in turns encourages more new ideas, and so on.[43]

Increasing-returns models are sometimes traced back to Adam Smith. In Smith's implicit model, a larger market size supports a greater division of labor, which in turn makes the economy more productive. In other models, greater openness to trade, or a common market area, can drive an increasing returns to scale process. Along these lines, legal and

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[42] That being said, some later modifications of the Solow model allow for the rates of savings and investment to be correlated with economic growth in a more general manner. See, for example, Jonathon Temple, *The New Growth Evidence*, 37 J Econ Lit 112, 137–41 (1999) (discussing the role that investment in physical capital, human capital, and research and development play in economic growth). Extensions by Hirofumi Uzawa and Robert Lucas stress the role of human capital—not just physical capital—in boosting or maintaining the growth rate. See Hirofumi Uzawa, *Optimum Technical Change in an Aggregative Model of Economic Growth*, 6 Intl Econ Rev 18, 19 (1965) (examining human capital in detail)· Lucas, 22 J Monetary Econ at 17–27 (cited in note 30) (considering a model of growth that focuses on human capital). In some economic models, having more capital does not always increase the growth rate. In some so-called Golden Rule models the costs of maintaining extra capital can exceed its rate of return; in these cases, the proper recommendation is to decrease the rate of investment. See, for example, Miguel Sidrauski, *Rational Choice and Patterns of Growth in a Monetary Economy*, 57 Am Econ Rev 534, 544 (1967). It is not generally believed that these latter models are policy-relevant.

[43] On increasing-returns models, see Paul M. Romer, *Endogenous Technical Change*, 98 J Polit Econ 71, 71–73 (1990) (finding "[l]arger markets induce more research and faster growth" in turn creating even larger markets and so on); Paul M. Romer, *Increasing Returns and Long-Run Growth*, 94 J Polit Econ 1002, 1002–04 (1986) ("[P]er capita output can grow without bound, possibly at a rate that is monotonically increasing over time."). On the Solow model versus the increasing-returns model, see Symposium, *New Growth Theory*, 8 J Econ Persp 23–72 (1994).

regulatory standardization may help economies grow, as has been one rationale for the European Union.

A one-time negative shock more likely has serious negative effects on the long-run rate of growth. Intuitively, the increasing-returns concept suggests that resources multiply themselves at increasingly rapid rates. The larger the economy, the faster it will grow. Rather than losing the arm of a lobster, we have lost a colony of very fertile rabbits. Even if the colony is small at first, it has the potential to become much larger with time. The increasing-returns model implies that "one-time" negative shocks in fact have significant lasting effects.

The Solow model suggests a picture of greater resilience. In general, the Solow model will give us greater latitude to worry about the present, whereas the increasing-returns model imposes a stricter discipline. Many more events will matter greatly for the distant future. To the extent the increasing-returns model is true, it is harder to justify the pursuit of non-growth-related values. The Solow model suggests a lower final cost for indulging in present values. When debating one-time costs, it is therefore a central question whether the Solow model, the increasing-returns model, or some other approach comes closest to capturing the real world.

That being said, the logic of the increasing-returns model will likely carry considerable weight in our final evaluation. In many cases our best answer, given current knowledge, will suggest that a given cost brings some probability of an ongoing growth effect and some probability of a once-and-for-all adjustment cost. In our expected-value calculations, this will operate as an expected impact on the long-term rate of economic growth, of course discounted for the uncertainty. The long-run logic of the increasing-returns model applies, even when that model is not our best current forecast of what drives economic growth.[44]

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    44   Neoinstitutional approaches are less formal than either the Solow or increasing-returns models. They point to the importance of property rights, well-functioning institutions, trust, the rule of law, and properly aligned microeconomic incentives. Nonetheless, these views do not typically specify which policy changes cause permanent boosts in the growth rate, as opposed to once-and-for-all changes. For a foundational work on neoinstitutionalist approaches, see generally Douglass C. North, *Structure and Change in Economic History* (Norton 1981). See also generally Robert H. Bates, et al, *Analytic Narratives* (Princeton 1998) (presenting a number of essays in the neoinstitutionalist tradition); Mancur Olson, *The Rise and Decline of Nations: Economic Growth, Stagflation, and Social Rigidities* (Yale 1982) (applying the neoinstitutionalist approach to the rise and collapse of civilizations); Daron Acemoglu, Simon Johnson, and James Robinson, *Institutions as the Fundamental Cause of Long-Run Growth* 11–20 (NBER Working Paper No 10481, May 2004), online at http://www.nber.org/papers/w10481 (visited Jan 22, 2007) (surveying neoinstitutionalist literature).

B. How Much Should We Redistribute?

Increasing-returns growth models will make us more wary about redistribution than will the Solow growth model. In the Solow growth model, many of the economic costs from redistribution are "once-and-for-all," rather than lowering the long-term rate of growth. Under the increasing-returns model, any deadweight loss makes the economy smaller and thus limits future rates of growth with significant implications for the distant future.

This is one way in which traditional political debates should be redrawn. Individuals who believe in increasing-returns models should be much more skeptical of welfare states than individuals who believe in the Solow model.

More generally, we should redistribute only up to the point that maximizes the rate of sustainable economic growth. This may mean more redistribution than we currently undertake, or perhaps redistribution of a much different kind, namely growth-enhancing redistribution. (It is debatable how much today's government programs in fact redistribute to the poor at all.) It will not, however, suggest that a utilitarian or consequentialist approach is obliged to redistribute most of national income to the very poor.

To cite some pluses from redistribution, a welfare state can give the poor greater access to education and nutrition. These individuals not only enjoy a higher quality of life, but they produce goods and services, they contribute to tax revenues, and they are less likely to end up as a destructive social force.[45] Other growth-enhancing benefits of redistribution are political in nature. Welfare payments sometimes "buy" the loyalties of special interest groups, thereby inducing them to support public order. Some of the poor will be less desperate and will feel less desperate as well. Those groups receive a financial stake in the system and socially sanctioned legitimacy for their claims. More generally, welfare systems make many higher-income individuals feel good about their state and increase levels of political support. Many people want to have states whose benevolence they can feel good about. This benevolence contributes to state legitimacy and thus to public order.[46]

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[45] See, for example, Alberto Alesina and Dani Rodrik, *Distributive Politics and Economic Growth*, 109 Q J Econ 465, 477–78, 484–85 (1994) (arguing that high inequality leads to a fiercer dispute over the distribution of resources, increases conflict, and leads to lower growth rates).

[46] See, for example, Dennis Epple and Thomas Romer, *Mobility and Redistribution*, in Torsten Persson and Guido Tabellini, eds, 2 *Monetary and Fiscal Policy: Politics* 313, 314 (MIT 1994) (noting studies that posit the wealthy's concern for the poor as one factor contributing to a redistributive welfare state). For a survey of the growing literature on how income distribution

These arguments provide good reasons to support some degree of transfers. Furthermore, they suggest an appropriate nature and scope for redistribution, namely that we target growth-enhancing programs.

Beyond some point, a sufficiently generous welfare state limits the rate of growth. It withdraws some individuals from the labor force, weakens productive incentives, necessitates higher tax rates, and is usually combined with static, insider-oriented labor market regulations. Furthermore, if everyone approaches government looking for a handout, basic mechanisms of governance can break down, leading to rentseeking, corruption, and fiscal bloat. Alternatively, welfare may create urban cultures of dependency and crime, which endanger social order. As noted above, the empirical literature suggests that non-infrastructure government spending is correlated positively with lower growth rates. Over the long run, this will hurt the prospects of poor people around the world.[47]

More subtly, high levels of welfare make it harder for wealthy countries to afford large numbers of poor immigrants from around the world. The more we spend on domestic welfare, the less we can spend on absorbing immigrants. In public choice terms, a larger welfare state will make society less willing to take in many immigrants. Our true concern is global growth, rather than the per capita average in any single country, and value-maximizing immigration boosts this variable significantly. So even if a specified set of welfare expenditures brings some growth benefits, alternative investments may be superior.

We therefore can see limits to the common utilitarian or consequentialist prescription to redistribute a massive share of global wealth. It is true that sending a large chunk of American GDP to Africa would raise African welfare in the short run. But if current total income were divided equally, world per capita income would be about $3500. This average would then fall rapidly, due to incentive effects; after all, people would work much less hard if they expected their surplus wealth to be confiscated. Civilization as we know it could not survive, and the world's poor would fall into a deeper state of misery. The poor coun-

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can affect growth, see Alfred Greiner, Willi Semmler, and Gang Gong, *The Forces of Economic Growth* 132–36 (Princeton 2005).

[47] See, for example, Robert J. Barro, *Economic Growth in a Cross Section of Countries*, 106 Q J Econ 407, 430 (1991) (stating that larger government consumption has a negative effect on growth and investment). See also Robert E. Goodin, et al, *The Real Worlds of Welfare Capitalism* 151 (Cambridge 1999) (finding welfare regimes bring about growth and prosperity at about the same rate as corporatist and social democratic regimes); Peter H. Lindert, *Growing Public: Social Spending and Economic Growth since the Eighteenth Century* 239 (Cambridge 2004) (arguing that higher welfare spending tends to be packaged with other growth-enhancing policies, such as low taxation on capital income). However, Lindert does not show that higher spending at Western European levels is itself good for economic growth. Id.

tries no longer would benefit from their interactions with the previously richer countries. So, rather than redistributing most wealth, we would reap greater utilitarian benefits by investing it in high-return activities.[48]

A sufficiently long time horizon will favor growth over redistribution even if we are counting *only* the interests of the very poor in the social welfare function. The benefits of radical redistribution are one-time in nature. We can try to equalize all wealth today, but we would not be able to draw on comparable resources for the next generation. Such a widespread collective redistribution would lead rapidly to negative economic growth. In contrast, the benefits of economic growth will compound over time. It is common to scorn the phrase "trickle down economics," but a steady and ongoing flow of benefits is exactly the goal. A flood is better than a trickle, but a lasting trickle is better than eating our cake today and cashing in all of our chips.

C.   Utilitarian Slaves?

Peter Singer and Shelly Kagan have argued that our personal obligations toward the poor are strong.[49] Bernard Williams, among others, claimed that these obligations are so demanding that they provide a reason to reject utilitarian reasoning.[50] The needs of the suffering are so enormous that few able or wealthy individuals would be able to carry out individual life projects. We can imagine, for instance, that every individual is obliged to work for charity, or to send most of his or her income to the poor in India. Wealthy doctors should spend their careers in African villages. Many more of us would have to become doctors or nurses. A mother might have to abandon or sell her baby to send food to the babies of others, and so on.

At the individual level, we may well be obliged to help the poor more than we are doing. But utilitarian considerations do not imply

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[48]   On utilitarian obligations, see Geoffrey Scarre, *Utilitarianism* 182–204 (Routledge 1996). See also J.J.C. Smart and Bernard Williams, *Utilitarianism: For and Against* 77–150 (Cambridge 1973) (offering a critique of utilitarianism). For other critiques of extreme utilitarianism, see Thomas Nagel, *The View from Nowhere* 190–96, 205 (Oxford 1986) (rejecting utilitarianism as a form of impersonal morality that forces individuals to act against their interests); Peter Railton, *Alienation, Consequentialism, and the Demands of Morality*, 13 Phil & Pub Aff 134, 156–60 (1984); Susan Wolf, *Moral Saints*, 79 J Phil 419, 427–30 (1982) (critiquing utilitarianism because it forces moral perfection, an undesirable outcome because someone can be "too good"); Israel Scheffler, *Science and Subjectivity* 68 (Hackett 2d ed 1982) (characterizing utilitarian experimental inquiries as not means to "proof or discovery"); Ayn Rand, *Capitalism: The Unknown Ideal* 20 (Signet 1967) (noting an attempt to sum the "good" of all individuals is meaningless and indeterminate).

[49]   Shelly Kagan, *The Limits of Morality* 395 (Oxford 1991) (noting that promotion of the good requires meeting the needs of the poor); Peter Singer, *Practical Ethics* 168–71 (Cambridge 1979) (arguing there is an obligation to assist the poor).

[50]   Smart and Williams, *Utilitarianism* at 108 (cited in note 48) (questioning how far one must go to determine if an action is "maximally beneficent").

personal enslavement or massive redistribution of our personal wealth. Most of us should work hard, be creative, be loyal to our civilization, build healthy institutions, save for the future, contribute to an atmosphere of social trust, be critical when necessary, and love our families. The personal obligation is to contribute to sustainable economic growth rather than to engage in massive charitable redistribution.

These stipulated individual obligations are not so far from commonsense morality. To be sure, we have not bridged the gap between utilitarian reasoning and commonsense morality. Even when utilitarianism and common sense recommend the same courses of behavior, they do so for very different reasons. Utilitarianism tells us we should work and save to serve the purposes of others, or, in this case, future generations. Commonsense morality tells us that we should work and save to take care of our families and because we own our lives. These two perspectives remain different. Nonetheless, to the extent the practical conclusions converge, we can think of utilitarian and commonsense modes of reasoning as two parts of some broader pluralist moral picture. Rather than forcing those two perspectives into complete accord, it may suffice that two of the "kits in our toolbox" point in broadly compatible directions. We do not yet have the Best Ethical Theory, but our quest is no longer so torn between two warring accounts of what we should do. By emphasizing our deep concern for the distant future, we come closer to reconciling utilitarianism (or consequentialism) and commonsense morality.

Commonsense morality also suggests that public and private codes should differ in their advice. For instance, a mother might be justified in giving preference to her own baby, rather than tending to the babies of others. At the same time, perhaps the government should behave as some approximation of an impersonal welfare-maximizer, taking into account the interests of all citizens.[51] When allocating resources, governments should not favor one particular baby over another. It has remained an open question why morality should be split in this fashion. After all, why do moral obligations change, simply because an individual is labeled as acting privately rather than within the context of a public institution? But we now have the tools to defend a bifurcation of this kind. Such a division of responsibilities stands a good chance of maximizing the long-term rate of sustainable economic growth. Proscribed behavior of both private citizens and government then would spring from a common principle of growth maxi-

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[51] See Robert E. Goodin, *Utilitarianism as a Public Philosophy* 61 (Cambridge 1995) (differentiating between private and public utilitarianism and advocating that the government act in a utilitarian manner).

mization, and the resulting principles again would be roughly compatible with commonsense morality.

Empirical research suggests that a stable market order, private property, and the rule of law are strongly correlated with economic growth. Infrastructure-oriented government spending and years of education are positively correlated with growth as well. Noninfrastructure government spending, high and volatile inflation, and regulatory interventions all are negatively correlated with growth. A good distribution of income may benefit growth. For lesser-developed nations, colonial origins and the quality of current legal institutions help predict growth. A quick summary of these results suggests a leading role for capitalistic market institutions, as have driven the growth of the West and parts of Asia. Governments should focus on providing growth-maximizing public goods.[52]

That being said, we can imagine circumstances under which a utilitarian *should* favor large-scale redistribution toward the very poor. Perhaps, for whatever reason, the world is ending in the near future. Redistribution then would stand a greater chance of being favored in utilitarian terms. The scope for compounding over time would be correspondingly limited and the immediate returns to charity would weigh more heavily in the decision calculus. Alternatively, the real return on investment might be permanently negative or zero. In this case, compounding would not operate, and we again would see greater reason to redistribute wealth.

Under more normal circumstances, a utilitarian or consequentialist framework still may recommend that some individuals sacrifice significant parts of their lives, or risk such sacrifices, for a greater social good. Martin Luther King, Jr. brought much good to the world, with respect to both justice and economic growth. Nonetheless, such obligations to sacrifice cannot be universal or near universal. If we all went around sacrificing, there would be no civilization left to advance.

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[52] For seminal investigations, see Paul G. Mahoney, *The Common Law and Economic Growth: Hayek Might Be Right*, 30 J Legal Stud 503, 523 (2001) (noting that "the common law produces improvements in property rights and contract enforcement that in turn speed economic growth"); William Easterly and Sergio Rebelo, *Fiscal Policy and Economic Growth: An Empirical Investigation*, 32 J Monetary Econ 417, 419, 442 (1993) (finding a correlation between growth and public investment in transport and governmental budget surplus); Barro, 106 Q J Econ at 437 (cited in note 47) (summarizing research findings on the correlates of growth); Kevin B. Grier and Gordon Tullock, *An Empirical Analysis of Cross-National Economic Growth, 1951–80*, 24 J Monetary Econ 259, 274 (1989) (finding significant negative correlations between economic growth and governmental share in GDP and between economic growth and inflation variability). For a survey of time-series tests of similar growth propositions, see Greiner, Semmler, and Gong, *The Forces of Economic Growth* at 159–63 (cited in note 46) (summarizing time-series tests that consider the correlation between growth, on the one hand, and investment, education, knowledge accumulation, public infrastructure, and income inequality, on the other).

As we saw before, we should reject collective sacrificial recommendations that will lower the rate of sustainable economic growth.[53]

In some cases, utilitarian prescriptions will have morally counterintuitive implications, but running counter to the usual fears of enslaved doctors serving Africa. Namely, utilitarianism may support the transfer of resources from the poor to the rich. A talented entrepreneur, for instance, can probably earn a higher rate of return on invested resources than can a disabled great-grandmother. So we will have some reason, when thinking about the future, to redistribute *additional* resources to the more productive members of society. The implications will be antiegalitarian at first, but over a sufficiently long time horizon the poor will benefit increasingly from the high rate of economic growth. The results need not be antiegalitarian if we take the appropriate broader stretch of time, but they still will appear antiegalitarian by the usual metrics.

I am not suggesting that a good pluralist theory will, all things considered, endorse systematic redistribution toward the wealthy or the talented. This may be one case where we impose a rights constraint on the recommendation of growth maximization. Nonetheless, the example shows how direct, short-term redistribution is no longer the default option for an impersonal moral theory that emphasizes individual well-being. Pure utilitarianism can be antiegalitarian, at least in the short run, and even in the medium run, in its implications.

D.   Inframarginal Considerations

To return to where we started, a look at the poor suggests further reasons why the economic approach to discounting is incomplete. Cost-benefit analysis cannot escape the necessity of considering human well-being in some fashion. Some number of the poor will always be with us, and we must ask how to weight the costs and benefits that accrue to them.

The economic case for a positive rate assumes that wealth is rising, but this is not always the relevant assumption. For instance, the world as a whole is richer today than ever before. Nonetheless, the extent of growth spillover benefits to large numbers of the very poor is also higher than ever before. The more distant future might boost these spillovers yet further; this would mean that not all future benefi-

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[53]   Often our obligations are collective rather than individual. In a game-theoretic setting, perhaps not everyone need sacrifice, but it is an open question which person should sacrifice. In this case, the correct recommendation is for stronger sacrifice-inducing norms, which again accords with commonsense morality.

ciaries have high levels of wealth and correspondingly low marginal utilities of money.

We can imagine further relevant scenarios where the rising wealth assumption is misleading. When we evaluate the danger of future civilizational collapse, it is an open question whether rates of return will remain positive. We are asking how bad an outcome it would be if rates of return turned consistently zero or negative. That is part of what civilizational collapse means. We cannot answer this question by assuming that rates of return remain positive and that the marginal utility of money is falling over time. We must instead make rough interpersonal welfare comparisons concerning current lives and future lives.[54]

Pending individual deaths present more commonplace cases for which falling real wealth makes the need for interpersonal comparisons obvious. As a person approaches death, he or she in real terms becomes very poor, regardless of measured nominal wealth. Suicides aside, the forthcoming loss of human capital (in other words, *life*) usually far exceeds the expected pleasure from leaving a bequest. So when we compare present versus future deaths, the economic framework again does not yield a simple case for positive discounting. We are comparing one very poor about-to-die person to another very poor about-to-die person. Such comparisons will always be with us, no matter how wealthy society grows. In other words, to the extent that wealth prolongs lives, it is always conferring large benefits to large numbers of "the very poor," if we understand that concept to include human capital as well.

These points all restate the well-known distinction between marginal and inframarginal changes in welfare. Traditional cost-benefit analysis does best when the possible change in allocations is small relative to the wealth of the individuals in question and the marginal utility of money for each person is roughly constant across the possible policy changes. In those cases, market prices (with appropriate adjustments for risk, taxes, and transaction costs) will measure the value of resources. If apples cost twenty-five cents apiece, we know that an additional apple is close in value to that same twenty-five cents; the same is true for having one apple less. But when wealth effects are large for the individuals involved, the marginal utilities of money change, and market prices and interest rates no longer measure

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[54] Christian Gollier, *Discounting an Uncertain Future*, 85 J Pub Econ 149, 163 (2002), argues that the discount rate should be zero for *some* point in the distant future, provided that the rate of growth in each period is uncertain. Uncertain growth (read: some chance of eventual catastrophe) brings some chance that the marginal utility of money for a future period is extremely high, high enough to justify zero discounting.

marginal rates of substitution for the relevant outcomes. Tragedies—
the major bane of human existence—are inframarginal by their nature.[55]

A simple example can clarify the limitations of the marginal ap-
proach to welfare economics. A desert country probably has a higher
marginal value of water than does a country with many lakes. Market
prices will reflect this difference in value, as water will cost more in
the drier country. But this does not give us useful information about
how to forecast the relative values of "the desert country loses all its
water" against "the lake country loses all its water." Either country
would fall apart without water, but the current market prices of water
do not tell us which collapse would be a greater tragedy. The original
difference in marginal values for water does not even "imperfectly
measure" or "forecast" the differing value of the two societies. The
small change and the large change are simply two different magnitudes.

Or compare two lives. Tom is in the desert and Jane is in the wet
state of Wisconsin. Tom has a higher marginal value for water. But
which is a greater loss: Tom losing all access to water forever and dy-
ing, or Jane losing all access to water forever? Tom's higher *marginal*
valuation does not predict which life is more important. Again, we
cannot readily infer inframarginal values from marginal values. In fact
under some cardinal views, the loss of Jane's life will be the greater
tragedy. Jane lives in a wealthier, water-rich world and therefore has a
higher standard of living than does Tom. If we are willing to make in-
terpersonal welfare comparisons in this setting, it might be worse if
Jane died.

Marginal values do provide good clues to inframarginal values in
many cases. Assume, for instance, that Betty has a marginal valuation
of high heels of $60 and Tyler has a marginal valuation of zero. Tyler
doesn't value high heels at all. It is then a greater loss for Betty (rather
than Tyler) to have no high heels. When strong heterogeneity of pref-
erence is present, marginal valuations can give clues as to inframar-
ginal valuations. But in many policy choices strong heterogeneity does

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55   See generally Jean Drèze and Nicholas Stern, *The Theory of Cost-Benefit Analysis*, in
Alan J. Auerbach and Martin S. Feldstein, eds, 2 *Handbook of Public Economics* 909 (Elsevier
1987) (surveying the difference between marginal and inframarginal effects in the theory of cost-
benefit analysis). On this theme, see also John P. Hoehn and Alan Randall, *Too Many Proposals
Pass the Benefit Cost Test*, 79 Am Econ Rev 544, 550 (1989) (suggesting that conventional cost-
benefit approaches to evaluating policy "systematically overstate net benefits"); David E. Wil-
dasin, *Indirect Distributional Effects in Benefit-Cost Analysis of Small Projects*, 98 Econ J 801,
804, 805 (1988) ("[S]mall equilibrium price-changes that emanate from small public projects are
not necessarily negligible for the purposes of project evaluation."); John S. Chipman and James
C. Moore, *The New Welfare Economics 1939–1974*, 19 Intl Econ Rev 547, 578 (1978) (finding
certain welfare criteria give rise to inconsistent policy recommendations unless "the distribution
of income and wealth ... were assumed to be suitably restricted").

not hold. The relevant policies involve loss of life, senility, loss of health, and other universal human tragedies. Virtually everyone wishes to avoid these outcomes, just as virtually everyone values drinkable water. We then face no clear link between marginal and inframarginal values.

So when we are talking about policy effects over long periods of time, the marginal approach often fails. The marginal approach holds for policies whose long-term effects dampen out into a small squib. But other policies, such as an increase in the rate of economic growth, will have significant effects into the distant future. People fifty or one hundred years from now will be *much* wealthier than otherwise, and we must make some inframarginal comparisons, which brings us back to interpersonal utility comparisons and a deep concern for the distant future.

IV. CONCLUSION

Let us sum up some core conclusions:

1. Our deep concern for the distant future has concrete policy implications.

2. Welfare economics should focus on empirical questions of growth and place less emphasis on traditional cost-benefit analysis.

3. Normative argumentation should focus much more on which policy changes involve once-and-for-all changes in wealth, and which have a long-term impact on the rate of growth.

4. The proper role of government is to support growth-enhancing public goods.

5. We should care most about those environmental problems that will impact the long-run rate of true GDP growth. One-time losses and adjustment costs are less important than we used to think.

6. Even if we are strict utilitarians, our collective obligations to the very poor are more limited than is commonly believed. Given a sufficiently long time horizon, economic growth is the best means of improving the lot of the poor. Our strongest obligation is to adopt growth-maximizing institutions.

7. These views do not stand in gross conflict with the conclusions of commonsense morality.