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Abstract

In protecting safety, health, and the environment, government has increasingly relied on cost-benefit analysis. In undertaking cost-benefit analysis, the government has monetized risks of death through the idea of "value of a statistical life" (VSL), currently assessed at about $6.1 million. Many analysts, however, have suggested that the government should rely instead on the "value of a statistical life year" (VSLY), in a way that would likely result in significantly lower benefits calculations for elderly people, and significantly higher benefits calculations for children. I urge that the government should indeed focus on statistical life-years rather than statistical lives. A program that saves young people produces more welfare than one that saves old people. Nor does a focus on life-years run afoul of ethical limits on cost-benefit analysis. It is relevant in this connection that every old person was once young, and that if all goes well, young people will eventually be old. In fact, a focus on statistical lives is a more plausibly a form of illicit discrimination than a focus on life-years, because the idea of statistical lives treats the years of older people as worth far more than the years of younger people. The hard question involves not whether to undertake this shift, but how to monetize life-years, and here willingness to pay (WTP), despite it many problems, is generally the place to begin. Discussion is also devoted to the uses and limits of the willingness to pay criterion in regulatory policy, with reference to the underlying welfare goal and to the nature of moral and distributional constraints on cost-benefit balancing.

I. Introduction

In the last two decades, numerous regulatory agencies have conducted cost-benefit analysis (CBA) of proposed rules.[1] To undertake this analysis, they have had to quantify the value of a statistical life (VSL).[2] Recently the range, for that value, has been

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[1] See Robert Hahn, Global Regulatory Reform (2001); W. Kip Viscusi, Fatal Tradeoffs (1994).
[2] See id.

in the neighborhood of $6.1 million.[3] But there is a conspicuous difficulty with the use of a uniform VSL. Some regulatory programs benefit people who are relatively young; others benefit people who relatively old. If a program would prevent fifty deaths of people who are twenty, should it be treated the same way as a program that would prevent fifty deaths of people who are seventy? Some people believe that other things being equal, a program that protects young people is better than one that protects old people,[4] because it delivers greater benefits In their view, government should consider not simply the number of lives at stake, or the VSL; it should concern itself also or instead with the number of life-years, or the value of statistical life-years (VSLY). At the very least, VSLY is a more precise measure of what is at stake.

At least since 1976, analysts have suggested the possibility of focussing regulatory policy on either life-years or quality-adjusted life-years (QALYs).[5] Through the latter measure, the issue is not merely the number of life-years saved by regulation; attention is also paid to qualitative improvements in health.[6] An aggregate measure of QALYs would catalogue all of the health-related benefits of regulation. And for many years, some agencies have experimented with the idea that cost-benefit analysis should consider either QALYs or life-years, not merely the number of lives saved.[7] For simplicity, my major focus here is on life-years, which imposes lower informational demands on regulators than do QALYs, and which is also less contentious in principle.[8] A moment's reflection will show that VSLY can produce different results from VSL. If the beneficiaries of a regulation are mostly elderly people, then the regulation will seem far less attractive with the use of VSLY than with VSL.[9] But if the beneficiaries are

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[3] See Robert Frank and Cass R. Sunstein, Cost-Benefit Analysis and Relative Position, 68 U. Chi. L. Rev. 323, 334-35 (2001). For discussion of why these numbers might be too low, see Dora Costa and Matthew Kahn, The Rising Price of Nonmarket Goods, 93 American Economic Review 227, 229 (Papers and Proceedings) (2003) (suggesting a likely current value of $12 million) Richard Revesz, Environmental Regulation, Cost-Benefit Analysis, and the Discounting of Human Lives, 99 COL L REV 941 (1999) (suggesting the need to inflate current figures for increases in social wealth and in the particular context of dreaded and involuntary risks); Cass R. Sunstein, The Arithmetic of Arsenic, 90 Geo. L. J. 2255 (2002) (discussing plausible reasons to adjust current figures upwards); Dora L. Costa and Matthew Kahn, Changes in the Value of Life: 1940-1980 (2002), available at http://papers.ssrn.com/sol3/papers.cfm? abstract_id=364740. For recent evidence that the current numbers are indeed too low, see W. Kip Viscusi, Racial Differences in Labor Market Values of A Statistical Life (2003), available on ssrn.com (finding values as high as $15.1 million in the case of white males).

[4] See, e.g., Michael J. Moore and W. Kip Viscusi, The Quantity-Adjusted Value of Life, 26 Economic Inquiry 369 (1988).

[5] Richard Zeckhauser & Donald Shepard, Where Now for Saving Lives?, Law & Contemp. Probs., Autumn 1976, at 5.

[6] Id.

[7] For examples, see Appendix.

[8] The reason is that in assessing life-years, government need not concern itself with issues of the quality of life. I offer a brief discussion of QALYs below.

[9] I am assuming a relatively uniform value, for each statistical life year, and hence assuming that the valuation of each of the remaining years of seniors is not going to be much higher than the valuation of each of the remaining years of younger people. If older people's remaining years have a much higher valuation, the conclusion in the text does not follow. For discussion, see below.

mostly children, then a regulation is likely to seem far more attractive with VSLY than with VSL.[10]

The issue received a great deal of public attention in connection with recent debates within Office of Management and Budget (OMB) and the Environmental Protection Agency (EPA).[11] EPA's own assessment of the benefits of the Clean Air Act includes a calculation of VSLY, using two estimates, $270,000 (not discounted) and $166,000 (discounted at an annual rate of 3 percent).[12] In its "Clear Skies" proposal, EPA estimated benefits both by using the $6.1 million figure and by using an alternative method that produced numbers of $3.7 million for those under 70 and $2.3 million for those 70 and older.[13] The difference between $3.7 and $2.3 million triggered intense criticism of a "senior death discount."[14] Eventually EPA abandoned the idea of varying VSL on the basis of age,[15] perhaps as a result of public pressure, and after the Office of Management and Budget (OMB) found methodological problems with the study that supported the age-adjustment analysis.[16] But OMB has been strongly encouraging federal agencies, including the EPA, to consider VSLY,[17] and OMB's draft guidelines on cost-benefit analysis ask agencies to "consider providing estimates of both VSL and VSLY."[18]

Thus OMB has urged that "agency analysts, when performing benefit-cost analysis, present results using both the VSL and the VSLY methods."[19] Relying on evidence that older people show unusually high VSLY, OMB also suggests "that agencies present analyses with larger VSLY estimates for senior citizens."[20] Building on

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[10] The same qualification is appropriate here as in note 9; if children's life-years are valued in terms of WTP, and if their WTP is low, the statement in the text would not follow.

[11] For recent discussion, see Robert H. Hahn and Scott Wallsten, Is Granny Worth $2.3 Million or $6.1 Million?, http://www.aei.brookings.org/policy/page.php?id=138

[12] See Environmental Protection Agency, Benefits and Costs of the Clean Air Act, 1970 to 1990 (1997). See the criticism of this approach in Environmental Protection Agency, Children's Health Valuation Handbook 3-13 (2003), suggesting that "the relationship between the value of risk reductions and expected remaining life years is more complex than the simple discounted linear relationship . . . Current research does not provide a reliable method for estimating a value of a statistical life-year." I explore this problem below.

[13] See id.; Environmental Protection Agency, Technical Addendum: Methodologies for the Benefit Analysis of the Clear Skies Initiatives 35-37 (2002), relying on M.W. Jones Lee et al., The Value of Preventing Non-Fatal Road Injuries; Findings of a Willingness-to-Pay National Sample Survey, TRY Working Paper, WP SRC2.

[14] See John Tierney, Life: The Cost-Benefit Analysis, section 4, p. 3, The New York Times, May 18, 2003.

[15] Id.

[16] See Memorandum of John D. Graham, Administrator, Office of Information and Regulatory Affairs, Office of Management and Budget, to the President's Management Council 1 (May 30, 2003).

[17] See id.; Dana Wilkie, White House Continues to Push For "Age" Discount In Rulemaking, Copley News Service (May 16, 2003), available at https://www.lexis.com/research/retrieve?_m=b9948ff37008fac2330 e2ce6a66f5e57&docnum=4&_fmtstr=FULL&_startdoc=1&wchp=dGLbVtz-lSlWk&_md5=aaa30b6f202f7 e1e23717bc35a2806b1.

[18] See Office of Management and Budget, Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations, 68 Fed. Reg. 5521 (Feb. 3, 2003).

[19] See Memorandum of John Graham, supra note, at 2.

[20] Id. I raise questions about this recommendation below. In brief, older people might be willing to pay more for risk reduction than younger people, but the higher willingness to pay need not reveal a greater welfare gain from risk reduction.

existing studies, one proposal would value each year of life at $273,000 for people over 65 but at $172,000 for people who are younger.[21] Because the number of remaining years is a central part of the proposed calculus, a 65-year old, with a life expectancy of ten more years, would be valued at $2.7 million, whereas a 40-year old, with thirty-five years left, would be valued at $6 million. Thus regulations protecting people over forty would be worth less than they would under the $6.1 million benchmark, whereas those under forty would be worth more. A ten-year old, with sixty-five years left, would be valued at over $11 million.

Would focussing on life-years make a large difference for policy? How much? The answers depend on what it means to focus on life-years. At first glance, a decision to look at VSLY is highly likely to reduce the expected benefits of programs that mostly help older people. This was the effect of a life-years calculation for the Clear Skies Initiative.[22] A focus on VSLY is also likely to increase the expected benefits of programs that protect children and young people. The extent of the increase depends on value of the relevant life-years and the discount rate. Suppose that a uniform number is used for the remaining life-years of young people. With no discount rate, or a low discount rate, a program that protects such people will be far more valuable under VSLY than VSL. With a high discount rate, the difference between VSLY and VSL will be compressed, but it will still result in higher numbers for younger people.

My simplest claim in this essay is that in terms of welfare, it is fully appropriate to focus on life-years, not merely lives, and that both academic and public criticisms of the life-years approach are misconceived. The reasons for this conclusion are simple: No program literally "saves" lives; life-extension is always what is at issue. If the goal is to promote people's welfare by lengthening their lives, a regulation that saves 500 life-years (and, let us say, twenty-five people) is, other things equal, better than a regulation that saves 50 life-years (also, let us say, twenty-five people). A program that saves younger people is better, along every dimension, than an otherwise identical program that saves older people[23]—a statement that seems controversial only if we see life as a snapshot in which people are frozen at their current points in the age distribution.

Any defense of relying life-years has to come to terms with some equitable objections to what seems to be a form of age discrimination.[24] A central goal here is to answer those objections. Hence I suggest not only that more life-years mean more

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[21] See Hahn and Wallsten, supra note. EPA's current estimates are $170,000 for those under age 65 and $434,000 for those over age 65. See Memorandum of John Graham, supra note, at 2 note **. For a lifetime risk faced by someone who is now 40, it would be sensible to calculate each life year, before 65, at the lower rate, and to calculate each life year, after that age, at the higher rate, subject to the appropriate discount rate. OMB says, delicately, that "[m]ore research is needed to provide a complete picture of how VSLY varies over the lifespan." Id.

[22] See supra note.

[23] The "other things being equal" proviso is important here. I put to one side the problem of transition, taken up below. Note also that a decision to shift from VSL to VSLY will be harmful to people who are now older and who did not benefit from earlier use of VSLY.

[24] See the overview in John McKie et al., The Allocation of Health Care Resources: An Ethical Evaluation of the QALY Approach 47-72 (1998).

welfare, other things being equal, but also that a focus on life-years does not offend ethical constraints on the pursuit of increased welfare through regulation.[25] Of course it is tempting, and in a sense right, to urge that each life should count for no more and no less than one. On this view, a focus on life-years might be seen to violate the equality principle, because it treats elderly people as if they were worth less (literally) than younger people. This argument, I suggest, is rooted in a generally sound moral intuition: Sometimes the pursuit of welfare should be constrained by considerations of justice. It is at least imaginable, for example, that one hundred white people would receive more welfare from the elimination of a risk of 1/100,000 than would one hundred African-Americans. But even if this is so, government should not create an "African-American death discount."[26] The reason is that the welfare difference—assuming that it exists—is at least partly a product of past and present injustice. By contrast, injustice is not the source of the welfare difference between the protection of one hundred children and the protection of one hundred elderly people. Because every old person was once young, an emphasis on life-years does not discriminate against anyone; the very people who lose, in a sense, when older also gained when younger. In fact the use of statistical lives, rather than life-years, is plausibly taken as a form of discrimination against younger people, because it treats each of their anticipated years as less valuable than those of older people. As I shall also show, an emphasis on life-years does not run afoul of the principles that animate the prohibition on age discrimination. My most modest suggestion, then, is that in producing regulatory impact analyses,[27] agencies should do a sensitivity analysis in which they inquire into life-years as well as lives—and take account of that sensitivity analysis in deciding what to do.

Even if we agree that life-years matter, there remains the separate and quite vexing question of how to turn them into monetary equivalents. For VSL, willingness-to-pay (WTP) studies are used to produce the relevant values.[28] Economists and economically oriented urge that CBA is properly based on WTP for the various benefits of regulation.[29] Hence the real issue, an empirical one, is whether WTP varies over the life-cycle. If thirty-year-olds are willing to pay more (or less) to eliminate a statistical risk than sixty-year-olds, then the difference should be reflected in cost-benefit analyses of regulatory proposals. On this view, policymakers should use different values for old

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[25] Hence I am suggesting that for purposes of regulatory policy, the goal is to promote welfare, subject to justice-related constraints. It might be urged instead that here as elsewhere, justice is part of the social maxim and. I do not believe that these different approaches lead to different analysis of the issues I am discussing here. For a general discussion of welfare and fairness, see Louis Kaplow and Steven Shavell, Fairness vs. Welfare (2002). Because Kaplow and Shavell use a capacious understanding of welfare, one that includes distributional considerations, my identification of ethical (and in a sense fairness-related) constraints on the promotion of welfare through regulation is not at odds with their claims.

[26] The issue is complex if the beneficiaries of regulation must pay all of its social cost. Suppose, for example, that a program benefiting African-Americans would also impose costs, in the form (for example) of higher water bills. If so, and if the beneficiaries have full information, a lower VSLY, for them, might be justified in principle. Government does people no favors by requiring them to pay more than their WTP, at least if no information failure is involved. For discussion, see below.

[27] As required by Executive Order 12866, 3 CFR 638 (1993).

[28] See Sunstein, The Arithmetic of Arsenic, supra note.

[29] See, e.g., Anna Alberini et al., Does the Value of a Statistical Life Vary with Age and Health Status? Evidence from the United States and Canada (unpublished manuscript 2002).

people and young people <u>if and only if WTP studies show such a disparity</u>.[30] This view has been endorsed by the Office of Management and Budget itself.[31] And indeed, WTP is the basis for current evaluations of regulatory benefits.[32]

I do not attempt to engage the complex debate over WTP fully here. But I do urge that with respect to lives or life-years, the argument for relying on WTP is most secure in cases in which the beneficiaries of regulation have to pay all of its cost. So long as people have adequate information, government does them no favors by requiring them to purchase goods for which they are not willing to pay. When the beneficiaries of regulation do not pay its full cost, the argument for making WTP conclusive is less strong. Nonetheless, I urge that there is no special reason to depart from WTP if government is focussing on statistical life-years rather than statistical lives. My more ambitious suggestion, then, is that at least in general, cost-benefit analysis (CBA) should be conducted with primary attention to VSLY rather than VSL. If CBA is to be used at all, it is because CBA is a rough way of testing whether a regulation will promote people's welfare, understood to mean their actual well-being in their lives.[33] An inquiry into VSLY is an important way of answering that question. I also urge that agencies should be permitted to make adjustments from WTP when the beneficiaries of regulation lack information or when they would pay only a fraction of its cost. Of course there are hard questions here about the relationship between accuracy and administrability. Lacking good information about population-wide variations in WTP, government might relate on uniform figures, for life-years or lives, simply because more accurate numbers do not exist.

In principle, the choice between lives and life-years is clear and simple. It gives the appearance of difficulty only because of a kind of optical illusion, which suggests some choice "between" older people and younger ones. But a discussion of the underlying problems provides a window onto a much larger and more complex set of questions. I touch on three more general issues. First, economists and policymakers should not take the willingness to pay criterion too seriously, and they are in danger of

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[30] See id.

[31] See 68 Fed. Reg. 5521 (Feb. 3, 2003), suggesting that those who endorse VSLY assume "that the public is willing to pay more money for a rule that saves an average of 10 life years per person than a rule that saves one year per person."

[32] See, e.g., Environmental Protection Agency, Technical Addendum: Methodologies for the Benefit Analysis of the Clear Skies Initiatives 30-38 (2002); W. Kip Viscusi, Faral Tradeoffs (1993); Sunstein, The Arithmetic of Arsenic, supra note.

[33] See Matthew D. Adler and Eric A. Posner, Rethinking Cost-Benefit Analysis, 109 Yale L J 165 (1999). Throughout I use the idea of welfare in a nonsectarian sense. I do not mean to identify the idea with the utilitarian account, and I do not mean to reduce welfare to "happiness," narrowly defined. As I use the term, it is agnostic on the controversial normative questions. On utitarianism and consequentialism, see Amartya Sen, Utilitarianism and Welfarism, 76 J Phil 463 (1979); for general discussion, see Amartya Sen, Development As Freedom (1999). I believe that without resolving <u>any</u> difficult normative questions, it is possible to show that VSLY is preferable to VSL, and more generally to show that WTP is an inadequate proxy for welfare in many circumstances. On some of the empirical issues involved in measuring welfare, see Bruno S. Frey and Aliois Stutzer, Happiness and Economics 4-11 (2001);Alberto Alesina et al., Inequality and Happiness: Are Europeans and Americans Different? (2001).

doing precisely that.[34] As a measure of welfare, that criterion has several advantages, above all in circumstances in which regulation amounts to a <u>forced exchange</u>, requiring people to "buy" a benefit that they may or may not find it in their interest to buy. But in some contexts, no forced exchange is involved, because the beneficiaries of regulation do not have to pay for it. And in some contexts, willingness to pay is a poor proxy for welfare. In such contexts, regulators should abandon it and think about welfare directly if they can.[35] I attempt to bring recent work on people's mispredictions of the welfare effects of their own choices to bear on that question,[36] with the suggestion that this work raises doubts about the use of WTP in many situations.[37] There is a large research agenda here.

The second issue has to do with the relationship between welfare and equity in the context of government regulation. While promoting welfare is the basic goal of environmental regulation, there are important ethical constraints on the pursuit of that goal. Those constraints support some, but not all, of the moral reservations about CBA and WTP that are stressed by their critics.[38] As I have suggested, it would generally be unacceptable for government to adopt a higher VSL or VSLY for men and whites than for women and African-Americans.[39] Related problems infect the use of QALYs in certain circumstances. Suppose, for example, that an otherwise identical government intervention could produce more QALYs if directed at the moderately disabled than at the severely disabled; is it so clear that the intervention should therefore favor the moderately disabled? I do not believe so. An understanding of the nature and the weaknesses of the ethical objections to VSLY helps explain the strength of objections to the promotion of welfare through regulation in other settings.

Finally, I hope to make some progress in clarifying the debate between those who emphasize WTP and those who emphasize life-years and QALYs.[40] I suggest that QALYs can be used as part of a cost-effectiveness analysis; it would be fully possible to investigate how many QALYs can be obtained for a given investment of resources. But when mortality and morbidity gains are converted into monetary equivalents, QALYs are

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[34] See id.

[35] Of course this is a difficult task, and I offer some thoughts here only about the easy cases. For general discussion, see Daniel Kahneman, et al., Back to Bentham? Explorations of Experienced Utility, 112 Q. J Econ 375 (1997).

[36] See id.; Daniel Kahneman, A Psychological Perspective on Economics, 93 Am. Econ. Rev. 162 (Papers and Proceedings) (2003); George Loewenstein and David Schkade, Wouldn't It Be Nice? Predicting Future Feelings, in Daniel Kahneman, Ed Diener, and Norbert Schwarz, eds., WellBeing: The Foundations of Hedonic Psychology 85 (Russell Sage 1999).

[37] See Jonathan Gruber and Sendhil Mullainathan, Do Cigarettes Taxes Make Smokers Happier? (2003, available at http://www.brook.edu/comm/events/20030605.htm), for an empirical demonstration that higher taxes on cigarettes actually increase the happiness of smokers, apparently because smoking decreases happiness and taxes decrease smoking. One of the many intriguing features of this essay is this: People are willing to pay for cigarettes, and thus in order to smoke, but smoking decreases welfare (on almost any understanding of that term) for many or most smokers.

[38] See Lisa Heinzerling and Frank Ackerman, Priceless: Human Health, the Environment, and the Limits of the Market (forthcoming 2004).

[39] But see note supra.

[40] For an overview, see James Hammitt, QALYs vs. WTP, Harvard Center for Risk Analysis (2002).

insufficiently informative. Indeed they tell us nothing at all. The value of WTP is that it allows for the conversion. In some circumstances, affected people might be willing to pay a large amount for relatively few QALYs—if, for example, they are wealthy or inclined to spend much of their wealth on risk-reduction. In other circumstances, affected people might be willing to pay a small amount for relatively many QALYs—if, for example, they are poor or inclined to spend little of their wealth on risk-reduction. In fact this seemingly paradoxical result—higher WTP for few QALYs than for many—is far from unlikely. There is no question that other things being equal, more QALYs are better than fewer. But where the beneficiaries of regulation would pay all or almost all of its cost, WTP is normally the appropriate starting-point for the measurement of benefits.

The remainder of this essay is organized as follows. Part II discusses the choice between life-years and lives. Here I urge that life-years are an appropriate focus of regulatory concern. I also explore ethical and distributive constraints on the promotion of welfare through regulation; I suggest that such constraints are real and important, but that the use of life-years does not run afoul of them. Part III turns to the vexing question of monetization. I suggest that the use of WTP does not raise any special or distinctive conceptual issues in the context of life-years. Unfortunately, current evidence does not provide clear findings about how WTP for life-years or the remainder of life varies over the lifespan. A constant WTP is not supported by existing evidence, and there is some reason to think that older people are willing to pay more, per life-year, than younger people. I investigate this possibility and what might lie behind it. Part IV briefly identifies some options for policy. My most cautious suggestion here is that a life-years calculation should be part of the analysis that underlies policy judgments. Part V discusses three extensions of the analysis: the possibility of resolving the debate over life-years by reference to survey evidence; the choice between QALYs and WTP; and the fact that WTP might not adequately measure welfare. Part VI is the conclusion.

II. Welfare and Equity, Lives and Life-Years

Should government focus on statistical lives or instead statistical life-years? We should be clear on the nature of the opposition between the two. No regulatory program can eliminate death; if it is successful, it will merely extend life. If regulators focus solely on statistical lives, they will be lengthening lives, and they will be analyzing the consequences of regulation without regard to the extent of the lengthening. In fact they will be ignoring that intuitively relevant consideration. The initial question, then, is whether regulators should focus on statistical lives[41] rather than life-years, even while acknowledging the fact that life extension is all that is involved.

My goal in this section is to show that a focus on life-years should be found desirable from a variety of different perspectives, and that it does not offend justice-related constraints on regulatory policy. I suggest that if welfare is the goal of regulatory policy, it is important to assess the number of life-years at stake. I suggest as well that

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[41] I deliberately leave ambiguous the meaning of "a focus." At a minimum, I mean to suggest that government should assess the number of life-years at stake, and use the resulting figure when the ultimate decision is otherwise difficult. See Part V below.

such an assessment should be appealing to those who are concerned with fairness or reciprocity—and also to those who believe that as a matter of principle, regulatory policy should attempt to ensure citizens with lives of ordinary lengths. If these claims are correct, it should be possible to obtain an incompletely theorized agreement[42] on the relevance of life-years—an agreement from a diverse set of theoretical perspectives, and one that does not depend on resolution of disagreements about the proper foundations of regulatory policy.

A. Behind the Veil of Ignorance

It should be clear that an emphasis on statistical lives neglects highly pertinent information. Why should analysts blind themselves to that information? Other things being equal, and as a matter of simple logic, the welfare gain from a program saving (say) 1000 people between forty and sixty-five is unquestionably higher than the welfare gain from a program saving (say) 1000 people who are 65 and over. The former program does everything that the latter program does, and much else besides. After all, the sixty-five year-olds were themselves forty once, and it would be astonishing if the welfare gain, to each of us, of ten more years of life were equivalent to the welfare gain of forty more years of life.

Nor does an emphasis on life-years disregard or downplay the welfare of older people. Once programs focussing on life-years are in place, old people will benefit from them no less than younger people, simply because those programs helped them at a younger stage and hence increased the likelihood that they would become old.[43] In this sense, the idea that a life-years approach prefers younger people over older people is based on a kind of optical illusion—one that sees human life as a snapshot with everyone always at their current age, rather than a moving picture in which people age over time.[44] In any case the life-years approach considers everyone's life-years the same, old people no less than young people, and hence will argue for careful attention to risks that face significant numbers of old people.

To see the claim for considering life-years, imagine that people are placed behind a veil of ignorance,[45] in which they do not know their personal characteristics; they are

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[42] On the general idea, see Cass R. Sunstein, Legal Reasoning and Political Conflict (1996).

[43] There is one exception to this conclusion: People who became old while government used statistical lives but after it switches to statistical life-years. Such people could not, by hypothesis, benefit from statistical life-years when they were younger. But it would extremely odd to invoke this short-term problem as a reason to continue with the idea of statistical lives if it is obviously inferior.

[44] Note that a claim for attention to life-years does not mean that the nation is devoting too little or too much in the way of resources to protect public health. Even if the United States doubled, tripled, or quadrupled the money it spends on environmental protection, for example, it would be necessary to decide how that money should be spend, and here it would remain necessary to choose between statistical lives or statistical life-years.

[45] See John Rawls, A Theory of Justice (1971). I am using the idea of the veil of ignorance for heuristic purposes, but not in the way Rawls does. Rawls is interested in issues involving the basic structure of society, and it is not at all clear that he believes that the veil should be used to assess the justice of particular issues that are contested on grounds of justice. Nonetheless, I believe that the veil of ignorance is an illuminating way of testing the legitimacy of asking about life-years.

unaware of their race, sex, wealth, or (most pertinently) age. Note that the veil of ignorance is intended to be an extremely stringent constraint on choice, one that ensures that morally irrelevant factors will not play a biasing role.[46] If those behind the veil would choose statistical life-years over statistical years, we have good reason to believe that life-years are the appropriate focus of regulatory attention. Would people behind the veil be indifferent between a program that would eliminate risks that people would face at thirty and one that would eliminate otherwise identical risks faced at sixty? If people do not know how old they are, would they have the slightest difficulty concluding that it is better to eliminate a 1/50,000 risk faced by one million teenagers than a 1/50,000 risk faced by one million social security recipients? At first glance, the choice is entirely clear. The program that saves more life-years is better, because it provides more welfare to its beneficiaries, and does so without offending any ethical consideration.[47] From behind a veil of ignorance, choosers would surely select the program that protects younger people, and hence would make life-years highly relevant to their own judgments.

Or consider the following question:

You do not know how long you will live. Which of the following two programs do you prefer:

*(a) A program that would eliminate, starting **now** and for the rest of your life after that point, a 1/200,000 risk of death.*

(b) A program that would eliminate, starting at sixty-five and for the rest of your life after that point, a 1/200,000 risk of death.

It would be truly astonishing if most people did not prefer Program (a) over Program (b). Perhaps a preference for Program (a) reflects, in part, the discounting of future years, which (rationally or not[48]) may not loom so large in people's current calculations.[49] But the difference is highly likely to reflect not merely discounting but also the fact that Program (a) provides more risk-free years. In answering questions of this kind, reasonable people take account of the fact that the welfare benefit of Program (a) is significantly higher than the welfare benefit of Program (b). In fact Program (a) literally dominates Program (b): It provides everything that Program (b) does, and more years of reduced risk as well. It would be easy to design questions, for those behind the veil of ignorance, that have this characteristic. A focus on statistical life-years allows choosers to select programs that are better, on every dimension, than programs that seem identical to those who focus on statistical lives.

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[46] See id. It is noteworthy here that Rawls uses the veil of ignorance as a way of challenging utilitarianism itself. Id.

[47] I take this point up in more detail below.

[48] On hyberbolic discounting, see David Laibson, Intertemporal Decision Making, Encyclopedia of Cognitive Science (forthcoming), available at http://post.economics.harvard.edu/faculty/laibson/papers /euler.pdf ; David Laibson and Christopher Harris, Hyberbolic Discounting and Consumption, available at id.; Richard Thaler, The Winner's Curse (1993).

[49] On that issue, see Revesz, supra note.

Some cases are not as simple as this one, because they do not involve lifetime risks. We could imagine a Program (c) that eliminates a risk faced mostly by people between the ages of twenty and twenty-five, and a Program (d) that eliminates a risk faced mostly by people between the ages of seventy and seventy-five. Program (c) cannot be said to do everything that Program (d) does, and more. Program (d) protects people who are not protected by Program (c); there is a real choice here. But Program (c) does provide far more life-years, and because it enables (a certain number of) people to reach the age of seventy in the first place, it is surely preferable, other things being equal, to Program (d).

B. Discrimination, Life-Years, and Welfare

Does a focus on life-years discriminate against older people in some invidious or unacceptable way? It is tempting to reach this conclusion.[50] But illicit discrimination is not involved. In fact it is the idea of statistical lives that is far more plausibly discriminatory than the idea of statistical life-years, because the former treats the remaining life-years of old people as more valuable than the remaining life-years of young people.[51] And because every old person was once young, and (with a little luck) young people will eventually become old, an approach that emphasizes life-years does not treat old people unfairly. But to approach this question, let us begin with cases in which ethical constraints on the pursuit of welfare seem most insistent.

Suppose that we could measure welfare directly through a kind of hedometer. Suppose too that the hedometer does not rely on contentious conceptions of welfare; it is not narrowly limited to pleasure or happiness, and it includes the proper ingredients of welfare however these are defined.[52] Suppose too that the hedometer is able to show that in a relevant population, white people receive more welfare from their lives than do African-Americans. Hence, let us suppose, a program that would save fifty white people (from cancer as a result of arsenic in drinking water, for example) will produce greater welfare gains than a program that would save sixty African-Americans (from air pollution in the inner city, for example). Certainly it is not unimaginable that the welfare gain is higher for programs that protect whites than for programs that protect an equivalent number of African-Americans (though the opposite might also be true). Gender differences are possible as well. Perhaps men flourish more than women (though here too the opposite might be true). If these examples seem too contentious, imagine that there are two social groups, the Flourishing and the Depressed. Members of both groups are easily identifiable, and their present and future welfare is captured in the names of their respective groups. By stipulation, a program that protects the lives of the Flourishing will produce more welfare than one that protects the lives of the Depressed. To sharpen the normative question, stipulate too that the Flourishing are responsible for

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[50] See McKie et al., supra note, at 47-72.

[51] Note that this is objectionable if, other things being equal, each person's life-year counts for no less and no more than one. It is all the more objectionable if older people are seen as having a larger "stock" of life-years and hence as comparatively "rich" in welfare terms. In that event, the life-years of younger people deserve higher priority on distributive grounds. I do not explore these complexities here.

[52] Hence the term eudaimeter seems to me more fitting but more unruly. See the discussion of eudaimonia in Marths Nussbaum, The Fragility of Goodness 142,-43, 343-72 (rev. ed. 2001).

the depression of the Depressed; that if not for the active efforts of the Flourishing, the Depression would come closer to flourishing too.

This example is hypothetical and we lack hedometers. For the moment, let us turn to willingness to pay (WTP) instead.[53] W. Kip Viscusi finds that African-American males have a significantly lower WTP than white males: $7.7 million versus $15.1 million.[54] He also finds that African-American females have a lower WTP than white females: $8.7 million versus $11.3.[55] Thus the overall VSL for the white sample is $13.4 million, whereas the overall VSL for the African-American sample is $9.3 million, and the VSL for the male sample is $15.1, much higher than the VSL of $11.3 for the female sample.[56] If WTP is the basis for government policy, agencies should be assigning a much higher VSL for whites and men than for African-Americans and women. Viscusi himself does not reach this conclusion. He says that "because of differences in market opportunities, it is inappropriate to attribute the observed differences to a greater willingness to black workers to bear risk."

Of course the WTP numbers do not show or even suggest that when regulatory programs save lives, African-Americans and women gain less, in terms of welfare, than whites and men. By itself, the lower WTP demonstrates no such thing; as we shall see, WTP is merely a proxy for welfare, and an especially crude one in the face of disparities in income, wealth, and opportunities. Suppose that Donald Trump is willing to pay $500 to eliminate 1/50,000 risk of having migraine headaches for the next year; suppose too that I am willing to pay only $25 to eliminate the same risk. The difference might well stem only from differences in wealth; the welfare loss, from migraine headaches, would be the same for the both of us. But it is certainly imaginable that some people, defined in demographic terms, do obtain more welfare from their lives than others. To see whether there are ethical constraints on the promotion of welfare through regulation, let us simply stipulate that this is the case.

Should government devote more resources to the protection of those racial or ethnic groups that would gain more welfare from protection? Most people would find the very question absurd. In cases of these sorts, there is an equality-based check on the pursuit of greater welfare. In fact racial discrimination on this basis would be unconstitutional. But what is the source of the equality-based check? In the context of race discrimination, a central problem is that if African-Americans receive less welfare from their lives than do white people, a large part of the reason lies in social and legal practices, past and present, which help produce that state of affairs. This form of inequality reflects injustice. If government takes the inequality as a kind of given for the purposes of policy, it is compounding the injustice. In fact it is actually creating a kind of vicious circle, in which disparities in welfare justify increased disparities in welfare, which in turn justify ever-increasing disparities in welfare. The ethical intuition is simple:

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[53] See W. Kip Viscusi, Racial Differences in Labor Market Values of A Statistical Life (2003), available on ssrn.com.
[54] See id. at 29.
[55] Id.
[56] Id. at 25.

<u>Where disparities in the welfare effects of regulatory policies are a product of background injustice, government is properly blocked from taking those disparities into account.</u>[57]

This point has implications for the debate over the use of quality-adjusted life years in regulatory policy. Insofar as the idea of QALYs is designed to rank health gains along with fatalities averted, it makes a great deal of sense; reductions in curable cancers, asthma attacks, and chronic bronchitis surely count as gains, whoever receives them. But suppose that people with severe physical and emotional ailments can be benefited only moderately by protective interventions—and hence that the number of QALYs, from such interventions, is relatively low, simply because those who are helped cannot, in light of their disability, be helped much. Should government concentrate instead on programs for people with less severe ailments? If government should not, it is because it is unjust to disfavor those whose aliments are most serious.[58] This problem is not the same as the problem of disparities across lines of race and gender, but it raises related concerns.

C. Life-Years, Fairness, and Reciprocity

Thus far I have suggested that considerations of justice constrain the promotion of welfare through regulatory controls. But is the use of statistical life-years morally unacceptable in the same way as a VSL that discriminates on the basis of race or gender? This seems quite implausible. The initial point is that it is hard to argue that **injustice** accounts for the welfare disparity between protection of a thirty-year-old and protection of a sixty-year-old. The disparity comes from the simple fact that younger people have more years left. Now that disparity might itself be an injustice if social practices, or even nature, singled out certain groups of people and gave them shorter lives. Hence the use of life-years would indeed be problematic if it systematically burdened members of identifiable social groups (an issue to which I will return). But by itself, the notion of life-years is demographically neutral in both theory and practice.[59]

Under the life-years approach, older people are treated worse for only one reason: They are older. This is not an injustice. Every old person was young once, and every young person will be old too (if given the chance). In fact an important form of <u>reciprocity</u> is built into the life-years approach. If regulatory policy is based on life-years, every person will, in a sense, be both benefited and burdened, and in exactly the same way. Indeed, every person will be both a beneficiary and a victim of the relevant discrimination. People—the same people—will be benefited when they are younger and burdened when they are older. They have no cause to complain of an approach from

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[57] I am putting to one side the possibility of adopting welfare-promoting regulatory policies alongside redistributive tax-and-spending policies. See below.

[58] See the discussion of the natural lottery in John Rawls, A Theory of Justice (1973).

[59] There is a possible qualification here if African-Americans (for example) live shorter lives, and if VSLY therefore ensures that African-American lives will be valued, on average, less than white lives. In theory, this is indeed a possible problem. But in practice, regulatory policies that use VSLY do not run into that problem, because they are too coarse-grained to discriminate in this fashion.

which they gained at an earlier stage.[60] It is hard to see how the relevant form of discrimination is illicit. In fact it is not clear that it is a form of discrimination at all. Everyone's life year counts as no less and no more than one. In fact it would be possible to conclude that this argument from reciprocity is a free-standing justification of the life-years approach, putting issues of welfare entirely to one side.

In an important sense, a focus on statistical lives is discriminatory, not a focus on statistical life-years. The former discriminates against younger people, simply because it treats each of their years as less valuable than those of older people. A program that uses statistical lives accords far more value to each remaining year of an old person's life than to each remaining year of a young person's life.[61] The point is not purely semantic. Suppose that we conclude that lifetime well-being is what matters, and that other things being equal, policies should not give some people more lifetime well-being than others. A policy that looks solely at statistical lives will violate this principle. Compare a group of people who die from a certain risk at fifty with a group of people who die from the same risk at seventy. Other things being equal, the latter group has received significantly more lifetime well-being than the former, and attention to statistical lives forces government to ignore this fact. If anything, an age-neutral statistical lives approach is subject to a claim of illicit discrimination, not an approach that focuses on life-years.

A possible argument would come from the criminal law. Those who kill older people are not punished less harshly than those who kill younger people. In fact it would be extremely surprising to find a criminal sentencing policy that imposes higher sentences on those who kill people thirty and under than on those who kill people fifty and over.[62] If criminal punishment treats lives as equivalent, and does not make life-years relevant, why, it might be asked, should regulation be any different? Part of the answer lies in the sheer heinousness of murder. The intentional killing of another human being is, in terms of its consequences, so bad that the age of the victim is a matter of relative indifferences. Perhaps the system of criminal justice focuses not solely on social consequences but also on the character of the act and the perpetrator. If this is the focus, a murderer of a young person is unlikely to be worse than a murderer of an older person.

Distinctions among different kinds of crimes raise many complexities, and it is certainly reasonable to think that a murder of another human being regulation is more

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[60] Arguments from reciprocity are not always convincing. Suppose, for example, that certain people were beneficiaries of racial discrimination in the past, and at some future point they are harmed by racial discrimination. At least it is not clear that the latter form of discrimination can be justified by reference to the former. If not, the problem is that discrimination is unjust. If my arguments in the text are correct, this problem does not apply to the life-years criterion, because there is no injustice.

[61] For a utilitarian, this approach is objectionable because each life-year, other things being equal, is an equal source of utility, and hence a program should prefer more life-years rather than fewer. We could imagine a kind of utilitarian or consequentialist who would give higher priority to the welfare of the least well-off. In this context, who counts as the least well-off? In an important sense, young people fall in that category, because they have not yet had the opportunity to accumulate welfare; older people already have a large welfare "stock." But a resolution of these complexities is not important for my analysis here.

[62] It would be less surprising to find a sentencing policy that imposes severe punishment on those who murder children. But here the reason for the severity would be the special vulnerability of children, not the fact that they have many life-years left.

analogous to the system of civil damages, which do seem to turn on life-years. Many state courts, including several state supreme courts, have calculated damages in wrongful death cases by assigning a net value to each remaining year the decedent would likely have lived. These courts have used life expectancy tables and projected annual earnings to determine lost income.[63] Several courts have gone further and used estimated life expectancy to determine damages for loss of society or consortium.[64] In these states, the lives of young people are presumptively more valuable than those of the elderly. In this respect, the use of life-years, as part of an understanding of appropriate policy, is hardly foreign to the legal system.

Consider another way to get at the issue. On one view, people have a moral entitlement to have a chance to live to the end of a human life of normal length.[65] It follows that there is a special moral objection if members of a relevant population are dying at the age of thirty or forty, an objection that does not apply if members of a relevant population are dying at the age of seventy or eighty. If people have a moral entitlement to avoid (excessive risks of) premature death, then government legitimately devotes special attention to otherwise identical risks faced at relatively early places in the lifespan. Those who emphasize the importance of providing people with ordinary longevity should find a focus on life-years compatible with their goals, and highly congenial insofar as that focus makes it more likely that citizens will have a chance to have lives of ordinary length.[66] In any case a special virtue of focussing on life-years is that it ensures attention to a crucial question, which is whether affected citizens have had an opportunity to live a number of years already.[67]

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[63] *See, e.g., Payne v. Eighth Judicial Dist. Court*, 60 P.3d 469, 473 (Mont. 2002); *Romero v. Byers*, 872 P.2d 840, 845-46 (N.M. 1994); *Bemenderfer v. Williams*, 745 N.E.2d 212, 219 (Ind. 2001); *Davidson v. Lindsey*, 104 S.W.3d 483, 493 n.2 (Tenn. 2003).

[64] *See, e.g., Thomas v. Hilburn*, 654 So.2d 898, 903 (Miss. 1995); *Durham ex rel. Estate of Wade v. U-Haul Int'l*, 745 N.E.2d 755, 766 (Ind. 2001).

[65] See Martha Nussbaum, Women and Human Development 78 (2000). Nussbaum lists, as the first of "central human functional capabilities, "Being able to live to the end of a human life of normal length; not dying prematurely, or before one's life is so reduced as to be not worth living." Complex issues are raised by the application of this idea to the context of social risks (and hence I do not adopt her phrasing here). Suppose, for example, that citizens in a population of 200 million are exposed to a median annual mortality risk of 1/500,000 from all causes (including, for example, motor vehicle accidents, cigarette smoking, alcohol use, air pollution, water pollution, pesticides, occupational accidents, homicide, hunger, and much more). This would be an exceptionally safe population—safer, in fact, than any society in the history of the world. But of that population, 400 people would die each year, many of them prematurely.

[66] A focus on life-years is not, of course, the same as an effort to ensure that everyone has a chance to have a lifespan of ordinary length. My only suggestion is that an approach that looks at statistical lives, and does not look at life-years, is less likely to provide that chance than an approach that make life-years relevant.

[67] Note that this is a different question from the life-years question, though it is overlapping. Consider two programs. (a) Program A would remove a statistical risk from a population of people who are forty; their life expectancy is sixty-five. (b) Program B would remove the same statistical risk from a population of people who are fifty; their life expectancy is eighty. On the life-years approach, Program B is to be preferred. But if we are focussing on the numbers of years that people have had already, Program A might be better.

D. Literal Age Discrimination?

Do these arguments undermine the widely acceptable principle against age discrimination? If so, the arguments might be thought to have mischaracterized the ethical issues involved—or to have broad and perhaps radical implications, calling for a rethinking of the broadly accepted prohibition on age discrimination.

Under the Age Discrimination in Employment Act,[68] employers are forbidden from discriminating against people over forty. They cannot choose a thirty-year-old over a fifty-year-old. Indeed, they cannot discriminate even if they can claim that they are relying on a statistically sound generalization—as sound as those on which employers and others rely every day.[69] It is not acceptable for an employer to conclude that thirty-year-old teachers are more fit, energetic, and creative than fifty-year-old teachers, even if this is generally true, and even if it is difficult, in individual cases, to test creativity before people have started to work.[70] Nor would it be permissible for an employer to adapt the argument I have been defending here. An employer could not say that he wants to hire people who have a large number of life-years left—even if the employer could say, not implausibly, that he would like employees with many life-years rather than fewer, and even if he could add, also not implausibly, that a life-years approach to hiring does not, in a sense, discriminate against anyone. (Recall that every older person was young once and that every younger person, if lucky, will eventually be older too.) The question, in short, is whether it is possible to defend the use of statistical life-years over statistical lives while also accepting the prohibition on age discrimination in employment. I believe that it is.

To be sure, the prohibition on age discrimination in employment does not have the same moral standing as the corresponding prohibitions on race and sex discrimination.[71] But it is easy to see how the former prohibition might be justified. Some age discrimination is undoubtedly a product of unthinking prejudice—of a false belief that older people are unable to engage in certain tasks.[72] If prejudice is frequently responsible for age discrimination, perhaps age discrimination should generally be banned. A supplemental rationale would be that discrimination on the basis of age inflicts an unusual kind of dignitary harm—one that makes it different from, and worse than, most kinds of employment-related injury. If an employee is fired because he is fifty-five, or not hired for that reason, the psychological and dignitary injury is plausibly worse, even far worse, than that faced by people who are fired or hired for other reasons. At least this point seems to animate the Age Discrimination in Employment Act.[73]

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[68] See 29 USC 621-34.

[69] See Samuel Estreicher and Michael C. Harper, Cases and Materials on Employment Discrimination and Employment Law 445 (2000). In some narrow circumstances, however, age might be a bona fide occupation qualification. See Western Air Lines v. Criswell, 472 US 400 (1985).

[70] See id.

[71] See Samuel Issacharoff & Erica W. Harris, Is Age Discrimination Really Age Discrimination? The ADEA's Unnatural Solution, 72 N.Y.U.L Rev. 780, 783 (1997).

[72] See Estreicher and Harper, supra note, at 444-45.

[73] See id.

The key point is that whether prejudice or dignitary harm is the basis of the ADEA, the same problems do not raise doubts about the government's use of statistical life-years. When government uses life-years, it is not because it is prejudiced against older people or acting on the basis of unreliable stereotypes about them. There is no overgeneralization here. Nor is it easy to show that a dignitary harm, of the sort involved in the employment context, is an issue here. It is one thing to be told, by a specific employer, that you will be fired or not hired because you are too old. It is quite another thing for the government to use an approach that focuses on life-years rather than lives. To be sure, it is <u>possible</u> to characterize such an approach in a way that does inflict dignitary harm. Perhaps some objections to life-years stem from a perception that this measures values older people less, treating them as "worth" some fraction of younger people. But these objections rest on a highly misleading way of framing what life-years is all about.

E. Bad Luck in the Natural Lottery (with a note on sex discrimination)

There is, however, one set of ethical constraints on the life-years approach. Compare two programs:

(a) Program A would eliminate a risk faced by people who are ten years old or younger, but who have a life expectancy of forty years or less, because they have a preexisting condition that will likely lead to premature mortality.
(b) Program B would eliminate a risk faced by people who are thirty years old, but who have a life expectancy of seventy or more, because they are in good health.

On the life-years approach, Program B is better. But is it better in principle? Note that if it is objectionable, it is not for the same reason as an approach that discriminates on the basis of race or sex. Social injustice is not responsible for the low life expectancy of the people who would be helped by Program A. (Let us so stipulate; if social injustice is involved, the case is close to those of race and sex discrimination.) Instead the problem, for the beneficiaries of Program A, is bad luck in the "natural lottery."[74] People whose life expectancy is low, as a result of preexisting conditions, have been dealt an unfortunate blow by fate. In my view, government should take reasonable steps to ameliorate such blows, and should not make them worse through social policies. A life-years approach that is blind to the natural lottery would be unjust,

This point very much bears on medical interventions and on government funding for medical projects. But it is rarely raised in regulatory policy. Typically government is deciding whether to adopt regulations that reduce pollution or otherwise increase safety across large populations. From the standpoint of the natural lottery, the life-years criterion does not raise objections in the vast bulk of such cases.[75] But it might well turn

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[74] See Rawls, supra note, at XX.
[75] Compare another puzzle. (1) Program A would save 1000 infants. (2) Program B would save 1000 ten-year-olds. On the life-years approach, Program A is of course better, other things being equal. On willingness to pay grounds, taken up in part III, this is much less clear; there are hard empirical and conceptual questions here. And there are theoretical reasons to question a preference for Program A.

out to create intriguing questions in the context of programs that disproportionately benefit men or women. The life expectancy of women is higher than the life expectancy of men. As of 2000, the average life expectancy for men at birth was 74.1, but 79.5 for women.[76] A breast cancer prevention program might well protect more life-years than an otherwise identical program designed to protect men.[77] In my view, a neutral use of the life-years approach should not be thought to be unacceptably discriminatory even if it produces more attention to women than to men, though a formal commitment to sex equality, or to counteracting the effects of natural lottery, would raise real doubts.

III. Monetization

These points suggest that in deciding whether to regulate, government should consider life-years saved, not merely lives saved (a misleading way of framing the alternative, which is really lives extended).[78] And if life-years are the focus, it would be possible to engage in cost-effectiveness analysis, seeing how many life-years are obtained for given investments in regulatory protection. Government might therefore reallocate some of the resources devoted to programs protecting the elderly to programs protecting younger people.[79] But suppose that government seeks to engage not merely in cost-effectiveness analysis but also in cost-benefit analysis. If this is what it seeks to do, it will have to turn life-years into monetary equivalents. For most economists, the valuation of regulatory benefits, and the monetization of life-years, depends on WTP.[80] Should WTP be used here?

At first glance, the use of WTP, as a way of monetizing benefits, creates no special or novel issues in the context of life-years. Under the economic framework, the goal should be to calculate people's WTP for statistical years over the lifespan. We

Because Program B would save people who have accumulated memories and experiences, the individual loss might be higher; and because of the investment of family and friends, the social loss might be higher as well. For relevant discussion, see Ronald Dworkin, Life's Dominion (1996). A full account would of course have to come to terms with this question, which might justify further constraints on the use of life-years.

[76] See http://www.cdc.gov/nchs/fastats/lifexpec.htm.

[77] To make the issue more concrete, compare two programs. (1) Program A would save 1000 women with a median age of sixty. (2) Program B would save 1000 men with a median age of sixty. Under the life-years approach, Program A is better, because it would protect more life-years.

[78] There are some exotic variations that I do not deal with here. Compare two programs. (1) Program A would save 50 people who are ten years old. (2) Program B would save 100 people who are forty-six years old. If life expectancy is 80, then the first program would save 3500 life-years, whereas the second would save 3400 life-years. Is it so clear that program A is to be preferred? If not, it might be because reasonable people would prefer something like a weighted average of lives saved and life-years saved, so that a large number of people, and a small number of life-years, would receive more attention than life-years alone suggest, just as a small number of people, and a large number of life-years, would receive less attention. I do not deal with that possibility here. If government concentrated on life-years for purposes of regulation, it is likely that this issue would balance out in the end. The area of medical treatment is one in which the issue might have more practical importance.

[79] This would be an extension of the reallocations aimed at in Stephen Breyer, Breaking the Vicious Circle (1993).

[80] See, e.g., V. Kerry Smith, Do the "Near" Elderly Value Mortality Risks Differently? (unpublished manuscript 2002).

would want to know, for example, how much thirty-year-olds, forty-year-olds, fifty-year-olds, and more are willing to pay to eliminate or reduce risks faced in some or all of their remaining life-years. WTP for statistical life-years would be compiled by finding the relevant numbers and applying the appropriate discount rate. To be sure, this would be a daunting empirical task.[81] But in principle, it is a conventional application of the economic framework. It would also seem to promise greater accuracy than an approach that uses a uniform number for statistical lives. It would be astonishing if that uniform number accurately captures the WTP of people at diverse points along the spectrum of possible ages.[82]

I do not intend to reach any final conclusions here about the place of WTP in regulatory policy. But I do address an evidentiary gap and a possible paradox. The gap consists of the absence of evidence of how VSLY varies over people's lifespans. We do not know how much thirty-year-olds are willing to pay to eliminate a 1/100,000 risk of losing their remaining life-years, and how that amount compared with the WTP of fifty-year-olds to eliminate the same risk. If we are interested in measuring actual WTP, it would be surprising to find a constant amount over the life-span. Unfortunately, the relevant amounts cannot be found in the existing literature.

The paradox is the possibility that WTP would actually be _higher_ to protect older people than younger people—if and because older people are willing to pay more to eliminate statistical risks than younger people. This is a paradox, because it suggests that WTP might be higher to produce lower gains in terms of life-years. One of my goals is to explain how and why this might be so. I also suggest that whether for lives or for life-years, WTP has its strongest claims in cases in which the beneficiaries of regulation must also pay for it. Finally, I explore an issue for which the life-years debate can be seen as an opening wedge: whether government should use a uniform WTP or instead a highly variable one, making numerous distinctions according to context. But let us begin with some basics.

A. WTP and VSL in General

Advocates of the WTP criterion urge that as a measure of welfare, WTP has the promise of administrability.[83] While it is not always simple to calculate WTP, market measures and contingent valuation studies provide a great deal of information. The

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[81] Note in this regard that there are complex relationships among risks and the lifespan. Some risks, for example, might be constant over the remainder of life, so that a thirty-year-old faces (say) a 1/1,000,000 chance of death, from that risk, for each of her remaining years. But other risks might be somewhat higher or somewhat lower in later years. If the calculation were to seek accuracy, it would use fine-grained numbers about WTP over the lifespan for different risks. Administrable numbers would of course be far less fine-grained.

[82] There is a vexing question about how to calculate the VSL or VSLY of children and young people, who lack much willingness to pay. See notes infra for discussion and references.

[83] The point should not be overstated. Studies of WTP show a great deal of variability. See Cass R. Sunstein, The Arithmetic of Arsenic, 90 Geo. L.J. 2255 (2002) (showing a range from $1 million to $14 million), and a recent study, based on 1990s data, suggests that the current figure of $6.1 million might well be doubled. See W. Kip Viscusi, Racial Differences in Labor Market Values of A Statistical Life (2003), available on ssrn.com. (finding values as high as $15.1 million in the case of white males).

government has placed heavy reliance on labor market studies, which suggest a WTP in the general range of $6.1 million.[84] These studies purport to show that in the market, people receive a certain level of compensation to run statistical risks, revealing an ascertainable "price" for potential hazards.[85] In ordinary markets, there is a market for safety, with some products (like Volvos) receiving higher prices partly because they reduce statistical risks. People are willing to pay specified amounts for risk reduction. On one view, markets provide relevant information about appropriate prices, and regulators should draw on that information, refusing to force people to buy more than they would (if well-informed).

Of course it is possible to question existing studies on various grounds and to ask whether real-world data actually reveal people's WTP for increases in safety.[86] The government relies on twenty-six studies, finding that $6.1 million is the mean of a diverse area of figures—an approach that has a large degree of arbitrariness in itself.[87] Contingent valuation studies, asking people how much they are willing to pay for such increases, might seem to produce more reliable answers, simply because the answers to such questions are far less "noisy" than market behavior. But contingent valuation studies raise serious problems of their own.[88]

Let us assume that these difficulties can be solved and that existing studies can indeed measure people's WTP for increases in safety. There is certainly a connection between WTP and welfare. The more that someone is willing to pay for a benefit, the more likely it is that the benefit would actually promote that person's welfare. But if welfare is our guide, the WTP criterion might be criticized on several grounds. Consider a few:

1. Willingness to pay is dependent on ability to pay. As a result, poor people might be unwilling to pay much for a regulatory benefit even though they would greatly gain from it, and wealthy people might be willing to pay a great deal for a regulatory benefit even though they would receive very little from it.[89]
2. Some people lack relevant information, and hence they might not be willing to pay for goods that would, in fact, produce significant welfare benefits for them. They might also be willing to pay a great deal for goods that would not, in fact,

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[84] See Technical Addendum, supra note, at 32 (figure of $6.12 million); Sunstein, supra note.

[85] See W. Kip Viscusi, Fatal Tradeoffs (1994); W. Kip Viscusi, The Value of Risks to Life and Health, 30 J Econ Lit 1912 (1993); W. Kip Viscusi and Joseph Aldy, The Value of A Statistical Life: A Critical Review, J Risk and Uncertainty (forthcoming 2003).

[86] See, e.g., William T. Dickens, Differences between Risk Premiums in Union and Nonunion Wages and the Case for Occupational Safety Regulation, 74 Am Econ Rev 320 (1984) (dividing workers between union and nonunion sectors and using the results to doubt the idea of compensating wage differentials); William T. Dickens, Assuming the Can Opener: Hedonic Wage Estimates and the Value of Life, in A Hedonics Primer for Economists and Attorneys 145 (1992) (generally challenging those estimates); Peter Dorman, Markets and Mortality (1996) (same).

[87] Technical Addendum, supra, at 32.

[88] See Peter Diamond & Jerry Hausman, Contingent Valuation: Is Some Number Better Than No Number, 8 J. Econ. Persp. 45, 49-52 (1994); Note, Ask A Silly Question, 105 Harv L Rev 1981 (1992).

[89] As we shall see, this point does not justify abandoning WTP in cases in which poor people must pay the full cost of the benefit that government is providing, at least if those people are adequately informed.

produce significant welfare benefits for them. It is well-documented that people's welfare judgments at time of decision ("anticipated welfare") do not always match their experience ("experience welfare").[90]

3. People's preferences might have adapted to deprivation or injustice.[91] Hence they might be unwilling to pay anything for goods from which they would benefit. If government relies on WTP, it will not engage in actions that might turn out to be welfare-promoting.

4. As I have noted, measures of WTP rely on hedonic pricing or contingent valuation studies that elicit monetary amounts from individuals, with the apparent assumption that such individuals will be paying those amounts whether or not other people are doing so as well.[92] But people care about their relative economic position, not simply their absolute economic position,[93] and hence they would be likely to be willing to pay significantly more if they could be assured that others would be paying for the regulatory benefit as well. The reason is that when everyone is paying for the benefit, people can maintain their relative economic position while also receiving the benefit. Because existing studies do not take account of this point, they might undervalue regulatory protections.[94]

I do not intend to come to terms with these problems here; I will bracket the more general challenges to WTP itself and assess the questions here within the existing framework, in which WTP plays a central role. But it is noteworthy that actual agency use of WTP does not run afoul of most of these problems.[95] The most important point here is agencies do not give a lower VSL for poor people than for rich people; they use a uniform figure.[96]

B. WTP and Age: Evidence

If WTP is the proper measure of VSLY, it would follow that in order to convert life-years into monetary equivalents, regulators should investigate how much people, at various stages of life, are willing to pay for years of risk reduction. In principle, WTP might or might not vary over the lifespan; there is no good a priori answer to that question. For children, the elicitation of WTP is especially vexing, because children usually do not have significant assets of their own, and because parental WTP might not

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[90] See, e.g., Daniel Kahneman and J. Snell, Predicting Changing Taste: Do People Know What They Will Like?, 5 J. Behavioral Decision Making 187 (1992); George Loewenstein and David Schkade, Wouldn't It Be Nice? Predicting Future Feelings, in Daniel Kahneman, Ed Diener, and Norbert Schwarz, eds, WellBeing: The Foundations of Hedonic Psychology 85 (Russell Sage 1999).

[91] See Jon Elster, Sour Grapes (1983); Martha Nussbaum, Women and Human Development (2002); Amartya Sen, Commodities and Capabilities (1985).

[92] See Robert Frank and Cass R. Sunstein, Cost-Benefit Analysis and Relative Position, supra note.

[93] See Robert Frank, Luxury Fever (1999).

[94] See Frank and Sunstein, supra note.

[95] See Matthew D. Adler and Eric A. Posner, Implementing Cost-Benefit Analysis When Preferences Are Distorted, in Cost-Benefit Analysis 269 (Matthew D. Adler and Eric A. Posner eds. 2001).

[96] See id. Note that it would be reasonable to do exactly that in the context of forced exchanges. Unless there is some informational problem, poor people are not helped when regulation forces them to pay $200 for a benefit that is worth only $50 to them. In such cases, perhaps government should impose regulation but subsidize poor people to ensure that they do not have to pay for it. I return to this point below.

be a good proxy here.[97] EPA relies on a single WTP as a default assumption,[98] but there is no simple theoretical justification for this approach. And perhaps studies would show that older people are willing to pay more for each of their remaining life-years than younger people are willing to pay for each of theirs—so that even if we focus on life-years, the "remainder of life" for older people is as high as or even higher than that for younger people. Imagine, for example, that people who are 65 and over are not willing to pay less to eliminate a life-time risk of 1/500,000 than are people who are 40 and under. We could speculate about different possible results here. Perhaps labor market studies would show that the value of a statistical life steadily decreases over the life-span[99]; perhaps they would show that VSL steadily increases; perhaps VSL rises to a certain age and declines thereafter. On one view, the right question for purposes of policy is what well-designed studies actually establish.

Unfortunately, no studies provide clear answers to the key questions. Hence an approach that uses life-years cannot easily translate the relevant figure into dollar equivalents. If government uses a uniform number—say, $172,000 per life year[100]—it will not be tracking actual WTP *if* WTP varies across the lifespan and if the program protects people at various ages. Perhaps the uniform number captures the population-wide mean and is therefore accurate (enough). But it is possible that within the economic framework, a life-years approach that uses a uniform VSLY will produce wildly inaccurate measures of benefits.

Consider a recent investigation that attempts to resolve exactly that issue.[101] The study asked respondents in the United States and Canada to state their willingness to pay for risk reductions of 1-in-1000 and 5-in-1000. Demographic information was collected, so that the authors could hold constant relevant variables (such as health and income). A key finding is that in the United States, age had no impact on WTP. In the 1-in-1000 condition, VSL estimates exceeded $4 million; the estimates were less than half that in the 5-in-1000 condition.[102] But in both cases, older people did <u>not</u> show a lower WTP than younger people. For Canada, age generally had no effect, but with one exception: people over 70 were willing to pay about one-third less than others for risk reduction.[103] The authors conclude that in general, their results support government's "current practice with regard to treatment of age,"[104] because they suggest that WTP does not vary across the lifespan. If this study is correct, then multiplication of the number of statistical life-

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[97] For an overview that turns out to be highly tentative and indeterminate, see Environmental Protection Agency, Children's Health Valuation Handbook (2003).
[98] See id. at 3-12-3-13, referring to Environmental Protection Agency, Guidelines for Preparing Economic Analyses (2000).
[99] For a result in this general direction, see Viscusi and Aldy, supra note.
[100] See note supra.
[101] See Anna Alberini et al., Does the Value of a Statistical Life Vary with Age and Health Status? Evidence from the United States and Canada (unpublished manuscript 2002), available at http://www.rff.org/disc_papers/PDF_files/0219.pdf.
[102] See id. at 14.
[103] See id. at 16.
[104] Id. at17.

years by a uniform VSLY will produce erroneous numbers, above all because it will understate the total WTP of older people for their remaining years.

Or consider another study based on labor market data.[105] The simple result is that older workers require significantly higher, not lower, compensation to accept increase in fatality risks on the job. For the full sample, the estimated VSL is $5.31 million, well within the range of existing EPA figures.[106] The authors actually find that VSL increases with age, from $7.4 million for workers between 51 and 55, to $10.2 million for workers between 56 and 60, to $14 million for workers between 61 and 65.[107] The implication is that regulatory policy should give a higher monetary value to statistical risks faced by older people. Instead of a "senior death discount," regulators should use a "youth death discount." If the findings in this study are right, the "remainder of life" is actually worth more to older people, even though they have fewer life-years left. Any exercise of multiplication—of life-years times actual VSLY across the life-span—would actually result in higher numbers for those who are older, notwithstanding what I have said above about welfare. Hence a uniform VSLY would produce real inaccuracy.

I do not mean to say here whether the particular findings in these two studies are convincing. Other studies find that older people show a lower VSL than younger people do.[108] This finding seems intuitive, simply because older people have fewer years to protect. But if VSL does not decline with age, it remains to explain why.[109] The simplest answer is that older people have less to do with their money and hence lower opportunity costs (unless the bequest motive is very strong). Because fewer years of life remain, savings are a lower priority, and older people have less, in general, on which to use their resources. But the full story is somewhat speculative and certainly more complex.

A possible contributing factor is wealth itself: If older people have more income than younger people, their WTP will be higher, and for reasons that have nothing to do with welfare. Some of the studies, finding no age differences in WTP, do control for income.[110] But they do not control for wealth, which is an important missing variable. Older people have more savings even if they have lower incomes, and hence the higher WTP might reflect a wealth effect. (Recall that wealthy people will show a higher WTP simply because they have more money.) There is a complementary explanation. It might be that older people have a comparatively high WTP—as high as or higher than that of younger people—because they have fewer years left in which to spend. Suppose, for example, that people over sixty are willing to pay $100 to eliminate a risk of 1/50,000,

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[105] See Smith et al., supra note, available at http://www.rff.org/valuinghealthoutcomes/VHO_Readings.htm.
[106] Id.
[107] Id. at 15.
[108] See Viscusi and Aldy, supra note, at 50-53.
[109] I am assuming that well-conducted WTP studies will not find decreases as remaining life-years decrease. It is possible, of course, that some such studies will find such decreases, see id., as the studies discussed supra do not. I am attempting in this section to show that even if older people do not show a lower WTP to reduce statistical risks, this fact can be explained while acknowledging that other things being equal, a program that provides more life-years is better on welfare grounds than one that provides fewer.
[110] See Alberini et al., supra note.

whereas people under forty are willing to pay only $75 to eliminate such a risk. It may be that the younger people want to use their disposable income on other things, including savings (of less use to the elderly[111]), whereas for older people, the reduction of risk is a high priority. In short, older people have lower opportunity costs. Unless the bequest motive is powerful, they will be especially willing to use what they have to reduce statistical risks.

This possibility is related to another one: The comparatively high WTP for older people might reflect the preciousness of the relatively fewer years that remain. Consider two questions:

1. *You are 75 years old. How much would you be willing to pay to avoid a 10 percent chance of dying one year earlier than you otherwise would?*
2. *You are 25 years old. How much would you be willing to pay to avoid a 10 percent chance of dying one year earlier than you otherwise would?*

It is easily imaginable that question (a) would produce a far higher WTP than question (b), for respondents answering hypothetically, and even more predictably for respondents who are actually 75 and 25 respectively. It may well be that the perceived value of any given year increases, for some or many, when the number of remaining years declines. For people who are 25, the prospect of losing one year of life might not loom terribly large, and for people who are 75, that loss is probably a matter of major importance. Undoubtedly the different answers are a product of discounting, rational or otherwise; but this is not all that is involved. For those with fewer years remaining, each particular year becomes all the more valuable.

In some cases, the absence of age-related differences in WTP might well be a product of the contingent valuation setting. Some studies of contingent valuation show "scope neglect": people are willing to pay the same to protect 1000, 10,000, and 100,000 migratory birds.[112] The absence of an age effect may reflect a similar phenomenon. It is possible that in contingent valuation studies or in market behavior, the number of years is "telescoped" into a kind of single unit, called "the rest of life." Hence the amount that people are willing to pay for a 1/500,000 risk of losing "the rest of life" might not much vary across the life-span.

It is also possible that older people are generally risk-averse, and differences in risk preferences might help account for differences in WTP. Other things being equal, it is imaginable that older people would pay more to reduce an annual risk of 1/500,000 than younger people would, simply because younger people are more willing to run low-probability risks. According to expected utility theory, risk-related judgments are made by multiplying the extent of the harm by its probability; but according to prospect theory, people are generally risk-averse with respect to low-probability risks of catastrophe.[113]

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[111] The possibility of bequests introduces some complications.

[112] See Daniel Kahneman and Jack Knetch, Valuing Public Goods, 22 J. Env Econ and Mgt. 57 (1992).

[113] See Daniel Kahneman and Amos Tversky, Prospect Theory: An Analysis of Decision Under Risk, in Choices, Values, and Frames 17, 20 (Daniel Kahneman ed. 2000); for a clear discussion with application to

Perhaps older people are, with respect to such risks, even more risk-averse than the population median. For present purposes, it is not necessary to choose among these various explanations. My central point is that there are plausible reasons that WTP might not decline with remaining life-years.

C. Using WTP? Regulation As Forced Exchange

Now let us turn to the central question of valuation. I have suggested that government should focus on life-years rather than lives. But should life-years be valued by using WTP for them? My ultimate conclusion is that WTP is, in principle, a good place to start. The case for using WTP for statistical life-years is not weaker than the case for using WTP for statistical lives. But there are a number of complexities here, and they illuminate some of the virtues and vices of using WTP in general.

Begin with the simplest set of cases: <u>Those in which the cost of the regulatory benefit is entirely borne by those who are supposed to benefit from it</u>. I suggest that in this set of cases, WTP is generally the appropriate measure <u>unless</u> an informational problem or cognitive error is distorting people's assessments.[114]

To see why, compare two programs:

<u>A.</u> Program A would mostly benefit people thirty years old and under. The median WTP, for such people, is $50 to eliminate a lifetime statistical risk of 1/200,000.

<u>B.</u> Program B would mostly benefit people sixty-five and older. The median WTP, for such people, is $100 to eliminate a lifetime statistical risk of 1/200,000.

Suppose that in both cases, the full cost of the benefit would be paid by those who receive it. I have argued that the welfare benefit of program A is higher than the welfare benefit of program B. But it does not follow that the government should adopt a more expensive regulation to implement program A than to implement program B. So long as the beneficiaries of both programs would pay their full cost, so long as there are no third-party effects, and so long as people's WTP is not distorted by informational problems or cognitive errors, government should not impose a cost of over $50 on those who would benefit from program A. At the same time, it should be willing to impose a cost of up to $100 on those who would benefit from program B.

Under the analysis I am suggesting, government should be willing to impose more costly and aggressive regulations in cases in which the anticipated welfare gain (on one side of the equation) is lower. Is this a contradiction? It is not. Consider two other programs:

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law, see Christopher Guthrie, Framing Frivolous Litigation: A Psychological Theory, 67 U. Chi. L. Rev. 163 (2000).

[114] Or unless there is a third-party effect.

C. Program C would eliminate a risk of 1/200,000, faced mostly by poor people, whose median WTP is $10.
D. Program D would eliminate a risk of 1/200,000, faced mostly by wealthy people, whose median WTP is $50.

Under plausible assumptions, program C and program D would produce identical welfare gains. In the abstract, there is no reason to think that wealthy people gain more than do poor people from the elimination of a statistical risk. But in light of the fact that they have little money, the payment of $10 is worse for poor people than for wealthy people; hence the welfare loss of paying $10 is higher for them. This point explains the difference in WTP. Program C might well give its beneficiaries the welfare equivalent of program D; but insofar as program C is taking money from those same beneficiaries, it is removing more welfare, on a dollar-per-dollar basis, than program D does. If the beneficiaries of program C are being asked to pay for it, government should not require them to pay more than their WTP.

As a general rule, the same conclusion applies to WTP over the life-span. Government should not require younger people to "buy" more regulatory protection than they believe to be in their interests. Note here that such protection is, in a sense, a form of insurance. If younger people are not willing to pay much for such insurance, government ought not to compel them to do so <u>unless</u> there is some kind of informational or cognitive problem with their decisions. Now it is entirely possible that some such problem is at work. Young people might be acting as if low-probability events are worth no concern at all, or they might be engaged in a form of hyberbolic discounting for risks that will come to fruition in what seems to be the irrelevantly distant future.[115] But unless a problem of this kind can be identified, WTP is the appropriate measure in cases in which regulation is a forced exchange.

D. When the Beneficiaries of Regulation Do Not Pay Its Full Cost, and Regulation vs. Transfers

But it is frequently the case that the beneficiaries of regulatory protection pay little or none of its cost.[116] What should be done in that event[117]? Here the analysis is more complex. To see the problem, suppose that people who are under thirty would pay a median of $50 to eliminate a risk of 1/200,000, that the aggregate cost of eliminating that risk is $55, but that the beneficiaries would pay only $10 of that amount, with the remainder of the cost being borne by others (say, consumers and employees). This program is, by hypothesis, inefficient, because the monetized costs exceed the monetized benefits. But it might well be justified on grounds of overall welfare; to answer that question, we would need to measure the actual welfare effects of the program (to say the least, a difficult task). In terms of the welfare of the possible beneficiaries of the

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[115] See note supra.
[116] This is true for clean air act regulation. See, e.g., See Matthew E. Kahn, The Beneficiaries of Clean Air Act Regulation, 24 Regulation 34 (2001).
[117] For an extremely valuable discussion in the related area of employment law, see Christine Jolls, Accommodation Mandates, 53 Stan L Rev 223 (2000).

regulation, the question is much easier. If they are paying only $10 for benefits valued at $50, they are net gainers. It follows that if social planners are particularly interested in the welfare of the possible beneficiaries, the program is justified.

But there is an obvious response. To assist the relevant population, it would be better to give them a cash subsidy rather than to provide them with a regulatory benefit that is, by hypothesis, less valuable to them than it is costly to those who must provide it. And under plausible assumptions, a subsidy would indeed be better than a regulatory benefit, both because it is more efficient and because it is a better means of accomplishing the redistributive goal. In the face of background injustice, or indefensible inequality, the tax system should usually be used as a corrective.[118] On a widely held view, regulation should involve maximization; redistributive tax and spending policies, rather than regulation, should be used to promote redistribution.[119] The issue is disputed.[120] But if a redistribution is not going to come from tax and spending policies, it is certainly possible that provision of the regulatory benefit is preferable to the status quo on grounds of both welfare and distribution. Note that a uniform VSL or VSLY is itself a kind of redistributive strategy (imperfect to be sure).[121]

Fortunately, it is not necessary to resolve the hard questions here. If the life-years approach ends up valuing younger people more than older people (because they have more life-years left), the older people have no claim for special government help. But we can reach some more general conclusions about WTP and regulatory policy. If the beneficiaries of regulation pay its full cost, and if there is no informational or cognitive problem, WTP provides the correct figure. If the beneficiaries of regulation do not pay its full cost, regulation might be justified even if it exceeds WTP. For purposes of policy, one problem is that in many cases, government cannot easily determine how much of the cost of regulation is borne by its purported beneficiaries. With perfect tools, regulators would have a complete sense of the incidence of regulatory costs, and an understanding of the distribution of benefits and burdens would be helpful in making regulatory choices.[122] But government lacks those tools. The best approach is probably to begin with WTP to measure the value of statistical life-years, and then to make distributional

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[118] See, e.g., David A. Weisbach, Should Legal Rules Be Used to Redistribute Income?, 70 U. Chi L Rev 439 (2003); Louis Kaplow and Steven Shavell, Why the Legal System Is Less Efficient Than the Income Tax in Redistributing Income, 28 J Legal Stud 667 (1994); Steven Shavell, A Note on Efficiency vs. Distributional Equity in Legal Rulemaking, 71 Am Econ Rev. 414 (1981).

[119] See Weisbach, supra note; Kenneth J. Arrow et al., Benefit-Cost Analysis in Environmental, Health, and Safety Regulation 8 (1996)

[120] See Chris Sanchirico, Deconstructing the New Efficiency Rationale, 86 Cornell L Rev 1003, 1069 (2001; Chris Sanchirico, Taxes versus Legal Rules as Instruments for Equity: A More Equitable View, 29 J Legal Stud 797, 820 (2000).

[121] See W. Kip Viscusi, Risk Equity, in Cost-Benefit Analysis 7 (Matthew D. Adler and Eric A. Posner eds. 2001); see also Kahn, supra note. In the racial context, a uniform VSL can even be seen as a form of affirmative action, in the sense that it gives a "boost" to African-American VSL because of a perception of past social discrimination. Note that the boost also results in a reduction of white VSL, at least if regulators use the median VSL.

[122] Note that in its recent draft guidelines, OMB asks regulators to try to assess the distributional effects of regulation. See Office of Management and Budget, Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations, 68 Fed. Reg. 5521 (Feb. 3, 2003).

adjustments in appropriate cases.[123] Along these dimensions, the analysis of statistical life-years does not differ from the analysis of statistical lives.

Of course government does not lack control over the distributional incidence of efforts to protect safety, health, and the environment. Government might provide a benefit for free, perhaps by accompanying regulation with a cash payment to those who are supposed to benefit. But an analysis of this possibility would take me well beyond the present discussion.[124] For reasons I have given, older people, as such, are not a strong payment for cash subsidies, even if future studies find that their WTP is sometimes relatively low under a VSLY approach.

E. Uniformity and Disaggregation in Monetary Valuation

Government agencies tend to use a uniform VSL. Proposals for the use of VSLY tend to use a uniform number or a number that makes only simple, crude distinctions—between, say, people under and over 65.[125] But we can make some conceptual progress here, and eventually practical progress as well, if we recognize that if government had perfect information, and if it could individuate regulatory benefits, its valuations would be much more fine-grained. In fact the use of VSLY, as opposed to VSL, can be seen as an initial step toward more in the way of individuation. To put the point in the simplest terms: <u>To the extent that the beneficiaries of regulation bear its full costs and have perfect information, a perfectly informed government might use a perfectly individuated WTP, giving people precisely the level of protection that they deem to be in their interests with respect to the risk in question</u>.[126]

It follows that a uniform VSL, or a uniform VSLY, is not easy to justify. It can be supported partly on the ground that government lacks the tools to bring about sufficient individuation across either people or risks. We have seen that government does not know how VSLY varies across the life cycle. With their various endowments and preferences, individuals show a great deal of heterogeneity with respect to statistical hazards. We have seen that wealthy people will pay more than poor people; risk-averse people will of course pay more than risk-inclined people In addition, social risks, even risks of death, are hardly all the same. Many people are risk-averse with respect to some hazards but risk-inclined with respect to others. In deciding whether to be risk-averse, numerous distinctions might be deemed relevant. People might reasonably distinguish, for example, between a risk of death from cancer and a risk of death from heart disease, and they might also distinguish among workplace risks, risks of motor vehicle accidents, and risks associated with air pollution.[127] If government were omniscient, it would individuate regulatory programs along all these dimensions. And if regulatory tools could be perfectly individuated, government might provide every individual with regulatory protection that perfectly matched his preferences and hence his situation-specific WTP—

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[123] See Cass R. Sunstein, Risk and Reason (2002).
[124] For some remarks, see Sunstein, The Arithmetic of Arsenic, supra note.
[125] See note supra.
[126] I am assuming that WTP is based on informed preferences and that there are no third party effects.
[127] See relevant discussion, see Paul Slovic, The Perception of Risk (2001).

assuming, again, that people are being forced to pay the cost of that protection.[128] There would be no single VSL or VSLY; the relevant values would be highly particular to persons and situations.

Why, then, does government rely on such crude population-wide, largely risk-invariant[129] measures? One reason is that it lacks good information about the WTP of subgroups; another reason is that for many regulatory programs, it must simultaneously protect large populations. In these circumstances, a decision to adopt subgroup-specific WTP would be hard to defend <u>unless</u> the program in question would benefit and burden mostly or entirely classes of people who could be defined in terms of those subgroup characteristics. As knowledge grows, it might be expected that less uniform numbers will be used in the future.[130] I cannot discuss that issue in any detail here, but the shift from VSL to VSLY can be seen as a small but unmistakable movement in that direction.

IV. Policy Implications

I have suggested that on grounds of welfare and equity, it makes a great deal of sense to focus on statistical life-years rather than statistical lives. At a minimum, regulators should have, and give, a sense of the life-years expected to be saved by regulation. The hard question involves the translation of life-years into monetary equivalents. The basic claim of WTP is that it provides a (crude but administrable) proxy for the welfare effects of various courses of action. Other things being equal, more life-years provide more welfare than fewer, whatever the results of WTP studies. But if young people show a low VSLY, and if old people show a high one, government does people no favors by using a uniform number <u>if</u> they are well-informed and if they bear the cost of the benefits that are being provided. Because VSLY might vary over the lifespan, there is a risk that a uniform VSLY will produce significant errors—possibly, in fact, more serious errors than a uniform VSL.[131] Ideally, a government that uses WTP, and seeks accuracy, would inquire into WTP over lifespans and use varying VSLY depending on the ages of the beneficiaries of regulation. Lacking that information, government might do best to proceed more modestly and cautiously.

We could imagine a range of possibilities. At a minimum, a focus on life-years allows alternatives to be ranked in terms of cost-effectiveness: A program that saves 10,000 life-years is better than one that saves 4000, and more resources should be devoted to the former than to the latter. With respect to CBA, the most modest approach would be purely informational: to calculate both VSL and VSLY (using the most

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[128] As noted, subsidies might be appropriate in cases in which people's WTP is low because of (say) poverty despite the possibility of large gains from regulation.

[129] But see the sensitivity analysis in the context of arsenic, giving a premium because of the dread and involuntary nature of the cancer, discussed in Sunstein, The Arithmetic of Arsenic, supra note.

[130] Id.

[131] The reason is that if a uniform VSLY leads to far too low numbers for some people, and far too high numbers for others, the multiplication of life-years by the monetary value might produce less accuracy than would reliance on a simple, single VSL. Suppose, for example, that the government is choosing between a VSL of $6.1 million and a VSLY of $200,000. If young people show a VSLY of $60,000, and if old people show a VSLY of $350,000, it is possible that VSL will actually provide a better match to actual WTP.

accurate available measure) and to inform the public of the calculations. A mildly less modest approach would be to continue with VSL, but in close cases, to treat VSLY, or the age distribution of the protected population, as a kind of tie-breaker. When CBA produces difficult calls, agencies might be told not to act if the benefited class is mostly elderly, but to do so if the benefited class is mostly young. On this view, the age distribution would be consulted only if the case were otherwise in equipoise.

The most ambitious approach would be to abandon VSL and to use VSLY instead, at least if reasonably accurate numbers are available. On this view, VSL would be seen as a crude first step toward the more refined inquiry than VSLY makes possible. A number of intermediate approaches are possible. Perhaps VSL would be the basic foundation for analysis, but a sensitivity analysis would run the numbers with VSLY. Perhaps regulators would have the authority, subject to political constraints, to use one or another number when the circumstances make that decision seem reasonable.[132] Of course any effort to engage in analysis of costs and benefits would be constrained in the usual fashion, with, for example, permission to consider distributional considerations, especially if poor people stand to lose or to gain a great deal from regulation.[133]

V. Extensions

The discussion thus far has been narrowly focussed on the choice between statistical lives and statistical life-years. But an exploration of the relevant issues has some broader implications. I explore three questions here: the possible opposition between the use of surveys to resolve hard normative questions; the choice between QALYs and WTP in regulatory policy; and the possible opposition between welfare and WTP.

A. A Tempting Wrong Question

It might be tempting to argue that the choice between statistical lives and VSL or statistical life-years and VSLY should be made not by asking people about their WTP, but by asking them their preferences as between programs that focus on VSL or VSLY.[134] People might be asked if they believe that government should treat each averted fatality as no more and no less than one, or if government should instead consider the age of those whose lives are saved. If it turns out that people prefer life-years, then we

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[132] One implication of the present discussion involves the possibility of legal challenges to the decision to use either VSL or VSLY, and also to particular decisions about how to measure them. Under some statutes, cost-benefit analysis is the basis for decision, and in such cases, the agency's calculations are subject to challenge. See, e.g., Corrosion Proof Fittings v. EPA, 947 F.2d 1201 (5th Cir. 1991). In light of the present state of uncertainty, it would not be arbitrary for an agency to choose either VSL or VSLY, though there are plausible challenges to both measures. See Sunstein, The Arithmetic of Arsenic, supra note, for relevant discussion.

[133] See Robert Hahn and Cass R. Sunstein, Broader and Deeper Cost-Benefit Analysis?, U Pa L Rev (2002). Note that OMB suggests attention to distributional considerations in its draft guidelines. See Office of Management and Budget, Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations, 68 Fed. Reg. 5521 (Feb. 3, 2003).

[134] For a related survey, see McKie et al., supra note, at 117-127.

might select appropriate numbers by asking subjects to choose between programs with different amounts for VSLY, or by seeing, through surveys, how people value life-years over the course of a lifespan. It might turn out, for example, that people consider each life-year as equivalent to (say) $200,000; or perhaps people will value life-years at a special premium when the beneficiaries are either especially old or especially young. Perhaps people do not believe that every life-year counts as equivalent to every other, but would prefer to devote special attention to the life-years of those at identifiable points at the age distribution. In any case, the suggestion would be that policy should be set by consulting not WTP, but instead the public's judgments about the appropriate values.

This solution has some intuitive appeal; it seems responsive, as a democracy should be, to citizens' judgments. Hence this solution has been used as a way of getting some purchase on the normative issues.[135] If WTP in the market seems to have distortions, surveys might seem better, perhaps because they invite people to consult their conscience, not simply their self-interest. But this approach has two fundamental problems. The first is that people's answers are highly likely to depend on how the questions are set up. The second is that even if people do have stable answers to such questions, it is unclear that those answers have any moral standing for purposes of policy and law. The problems with surveys, in this context, suggest that surveys are not likelihood to be a helpful way to solve many normative issues of this kind.

1. <u>An analogy</u>. Consider the analogous question of obligations to future generations,[136] a much-disputed problem in regulatory policy.[137] A regulatory system that attempts to track people's preferences would try to measure <u>intergenerational time preferences</u>, that is, to elicit people's judgments about how to trade off the protection of current lives and future lives. Hence an important question, asked in many debates about the issue, is whether people actually make such judgments and whether they can be elicited. And indeed, an influential set of studies finds that people value the lives of those in the current generation far more than the lives of those in future generations.[138] From a series of surveys, Maureen Cropper and her coauthors suggest that people are indifferent between savings one life today and saving 45 lives in 100 years.[139] They make this suggestion on the basis of questions asking people whether they would choose a program that saves "100 lives now" or a program that saves a substantially larger number "100 years from now."[140]

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[135] See id.

[136] See Shane Frederick, Measuring Intergenerational Time Preference: Are Future Lives Valued Less?, 26 J. Risk and Uncertainty 1 (2003).

[137] Richard Revesz, Environmental Regulation, Cost-Benefit Analysis, and the Discounting of Human Lives, 99 Col L Rev 941 (1999); Comment, Judicial Review of Discount Rates Used in Regulatory Cost-Benefit Analysis, 65 U Chi L Rev 1333 (1998).

[138] See Maureen Cropper et al., Rates of Time Preference for Saving Lives, 82 Am. Econ. Rev. 469 (1992); Maureen Cropper et al., Preferences for Life Saving Programs: How the Public Discounts Time and Age, 8 J. Risk and Uncertainty 243 (1994).

[139] Id.

[140] Id.

But it turns out that other descriptions of the same problem yield significantly different results.[141] Here, as in other contexts, it is unclear whether people actually have well-formed preferences with which the legal system can work.[142] For example, most people consider "equally bad" a single death from pollution next year and a single death from pollution in 100 years[143]—implying no preference for members of the current generation. In another finding of no strong preference for the current generation, people are equally divided between two programs: one that will save 55 lives now and 105 more lives in twenty years; and one that will save 100 lives now and 50 lives 25 years from now.[144] It is even possible to frame the question in such a way as to find that future lives are valued more, not less, highly than current lives.[145] The most sensible conclusion is that people do not have robust, well-ordered intergenerational time preferences.[146] If so, it is not possible for government to track those preferences, because they are an artifact of how the question is put.

The issue of statistical lives or VSL vs. statistical life-years or VSLY is similar on this count. It should be easy to construct questions that would yield a preference for VSL:

Government is considering a policy that would count the value of elderly people as significantly less than the value of younger people. According to one proposal, for every dollar that most people are worth, people over 70 are worth 53 cents. Do you approve of this proposal?

We can safely predict that most respondents would answer "No." But it should also be easy to construct questions that would suggest public disapproval of a uniform VS:

Would you favor (a) a program that would save one hundred children from dying of a fatal cancer at the age of ten or instead (b) a program that would save one hundred and one senior citizens from dying of a fatal cancer at the age of eighty?

We can safely predict that most people would favor (a). In fact I have conducted a small survey myself, asking University of Chicago law students whether they would favor a policy that saves twenty people with a median age of forty or one that saves thirty people with a median age of sixty-five. By a majority of about two-to-one (fifty-three to twenty-five), the former policy was favored. But as in the context of harms to future

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[141] Frederick, supra note.

[142] The point is stressed in Cass R. Sunstein and Richard H. Thaler, Is Libertarian Paternalism An Oxymoron?, U Chi L Rev (forthcoming 2003).

[143] Frederick, supra note, at 43.

[144] Id. at 44.

[145] Id. at 45. Frederick asked subjects to choose between two programs. The first would become more effective over time, saving 100 lives this decade, 200 lives in the following decade, and 300 lives in the decade after that. The second would become less effective over time, saving 300 lives this decade, 200 lives in the following decade, and 100 lives in the decade after that. Most people preferred the first program, apparently suggesting that future lives are valued more highly. Id.

[146] The absence of robust, well-ordered preferences is a pervasive theme in behavioral economics. See Cass R. Sunstein and Richard H. Thaler, Libertarian Paternalism Is Not An Oxymoron, U Chi L Rev (forthcoming 2003).

generations, highly variable responses should be expected in accordance with the nature of the question. It is doubtful that people have stable, well-considered judgments on the issue.

2. <u>Why the question is wrong</u>. The more fundamental problem is that people's judgments on survey questions of this sort should not be determinative for purposes of policy or law. Suppose, for example, that a relevant population concluded that it would prefer to save one hundred white lives to one hundred African-American lives—or that it would prefer to abandon cost-benefit analysis altogether, finding both VSL and VSLY morally unacceptable. What kind of standing would those judgments have? Or suppose that existing generations concluded that a current life is worth fifty lives in 2080. Why would that conclusion count for purposes of policy? What matters is not the <u>fact</u> of those judgments, but their <u>legitimacy</u> and their <u>sense</u>. If we care about WTP, it is only because WTP is a proxy for welfare, and because welfare deserves (some) moral standing as such. But eliciting people's judgments, on future generations or VSL vs. VSLY, has no such justification.

To be sure, those judgments deserve consideration and respect if they are reflective. And it is always possible to ask: Who will assess the legitimacy and sense of citizens' judgments? This is a reasonable question, and it is certainly possible to doubt the legitimacy and sense of the assessor. But ours is a deliberative democracy, one that does not make policy on the basis of opinion polls or snapshots of people's opinions.[147] Difficult normative questions of this kind might be informed by surveys, but they cannot be answered by them.

B. A Brief Note on QALYs

If focussing on life-years is appropriate, then it might be tempting to suggest that officials should be concerned with quality-adjusted life-years, or QALYs. The central idea behind QALYs is that regulators should be concerned with maximizing the aggregate health of the community.[148] To calculate QALYs, regulators come up with a scale that ranges from zero, for death, to one, for perfect health. Adverse health effects are ranked in terms of severity, with serious harms (say, a devastating but nonfatal heart attack) ranked lower than less serious ones (say, low-level respiratory problems). Some government agencies have attempted to assess regulations by calculating the QALYs that they save.[149] From the public health perspective, it is easy to see the appeal of QALYs. If a choice must be made, a doctor might reasonably decide, for example, that she will perform a difficult operation on someone who is thirty rather than someone who is eighty. And if the public health community has to allocate scarce resources, an inquiry into QALYs seems like a sensible place to start.

If government should calculate VSLY, should it also calculate the value of QALYs, and then VQALYs, and proceed accordingly? I cannot answer that complex

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[147] See William Bessette, The Mild Voice of Reason (1996).
[148] See Adam Wagstaff, QALYs and the Equity-Efficiency Trade-Off, 10 J Health Econ 21 (1991).
[149] See Appendix.

question here. But we can see that any response must come to terms with questions of both welfare and equity. At first glance, an effort to increase the number of QALYs has many advantages in terms of welfare; in fact it seems directly connected to the welfare goal. But in some contexts, the use of QALYs would raise serious questions of equity. Suppose, for example, that regulators are considering two kinds of interventions, Intervention A and Intervention B, designed to assist two different groups of people. The first group consists of people with extremely serious disabilities; Intervention A would increase their QALYs. But it would do so only by creating a relatively small increase in their well-being, raising them from extremely serious to merely serious levels of disability. The second group consists of people with moderate levels of disability, and Intervention B would raise them to slight levels of disability, in a way that would result in significantly more QALYs than Intervention A. If QALYs are our guide, Intervention B is clearly preferable, and indeed it is plausible to think that Intervention B would result in a larger welfare gain than Intervention A.

Is Intervention B to be preferred? This is by no means obvious, and for two different reasons. First, QALYs might not be adequately measuring welfare gains in this context. In the abstract, it is possible that the welfare gains from Intervention A are actually higher even if it produces fewer increases in QALYs. Second, Intervention A is assisting those who are most severely disadvantaged, and people in that category have a claim on social attention even if helping them produces fewer QALYs than imaginable alternatives.[150] Those with especially severe preexisting conditions might deserve higher priority on equitable grounds, whatever the QALY calculus might show. Here as elsewhere, the pursuit of welfare, through regulation, should be undertaken in a way that gives distributional weights to those who are least well-off. In this way, the larger philosophical debates about utilitarianism and its limits find analogies in current and coming debates about regulatory policy.

I do not mean to suggest that these are fundamental objections to the use of QALYs. The problem of severe preexisting conditions does not often arise in the context of regulation; it is more likely to occur in the context of medical interventions, where QALYs have raised special concerns. There are also hard questions about how to monetize QALYs, even if we decide that we should focus on them. Is the WTP approach appropriate here? Should VQALYs be calculated by multiplying each QALY by the beneficiaries' WTP for them? We could easily imagine a population (one of wealthy senior citizens, for example) that would show a high WTP for a few QALYs. We could also imagine a population (one of poor teenagers, for example) that would show a low WTP for a large number of QALYs. At first glance, QALYs are a far better measure of welfare gains than WTP in such situations.

But recall once again the particular problems created by forced exchanges: If those who obtain a large number of QALYs are not willing to pay for them, government does them no favors by mandating the purchase. In a case in which people are not willing to pay much for a large number of QALYs, government should probably do a great deal

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[150] See Erik Nord et al., Incorporating Societal Concerns for Fairness in Numerical Valuations of Health Programmes, 8 Health Economics 25, 26-27 (1999).

of subsidizing. My (tentative) analysis of the uses of WTP in the context of statistical lives applies, in its essential form, to the context of QALYs—suggesting that here as elsewhere, WTP is a sensible place to begin, but that there are extremely difficult and unresolved normative and empirical questions here.

C. Welfare vs. WTP

I have suggested that WTP is a plausible starting-place for policy judgments about how to monetize statistical life-years. But I have also indicated that in the face of a problem of information or cognition, the argument for relying on WTP is greatly weakened. It will be useful to explore that possibility.

The most obvious cases are simple: People lack information about the risks that they face, and hence they show a small WTP to avoid a risk that is statistically large. Or people might have an inflated sense of the likely risk, and show a high WTP to avoid a risk that is miniscule.[151] A growing body of literature shows a separate point: At the time of decision, people often mispredict the welfare effects of one or another option.[152] For example, assistant professors often exaggerate the effects of a denial of tenure on their well-being a year after the decision.[153] In general, people overestimate the adverse consequences of setbacks, to which they are frequently able to adapt.[154] In the context of environmental and social changes, an empirical study shows pervasive exaggerations of likely consequences for quality of life.[155] It follows that in some contexts, WTP will mispredict the lived consequences of choices. "The evidence of grave deficiencies in taste predictions appears to pose a significant challenge to many applications of the rational-agent model."[156] Some of these deficiencies stem from a failure to appreciate the possibility of adaptation to change; some of them are a product of an exaggerated sense of the effect any single factor on well-being.[157] What I am adding here is that WTP will be a poor proxy for welfare in cases in which we have good reason to suppose that underestimation or overestimation are likely. Of course government officials should be reluctant to second-guess citizens, but in some cases, the second-guessing is well-justified.

Consider an example: A reliable contingent valuation study shows that people are willing to pay far more to prevent a long cancer death than to prevent a sudden unanticipated death, with death from heart disease falling somewhere in the middle.[158] As it happens, the median WTP for a sudden unanticipated death is <u>half</u> the median WTP for

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[151] See Cass R. Sunstein, Probability Neglect: Emotions, Worst Cases, and Law, 112 Yale L.J. 61 (2002)

[152] See Kahneman, supra note; Loewenstein and Schkade, supra note.

[153] See Daniel Gilbert et al., Immune Neglect: A Source of Durability Bias in Affective Forecasting, 75 J Personality and Social Psych 617 (1998).

[154] See Loewenstein and Schkade, supra note.

[155] See George Loewenstein and Shane Frederick, Predicting Reactions to Environmental Change, in Environment, Ethics, and Behavior 52, 61-67 (Max Bazerman et al. eds. 1997).

[156] Kahneman, supra note, at 165.

[157] See Loewenstein and Frederick, supra note, at 66.

[158] See George Tolley et al., Valuing Health for Policy: An Economic Approach 342 (1994).

a cancer death.[159] Must these numbers be decisive for purposes of policy, assuming that the contingent valuation study is reliable[160]? I suggest that they should not be <u>if</u> we have reason to believe that the WTP figures are not accurately measuring welfare. And is it even plausible to think that the "cancer premium" is so high that it actually doubles the cost of death? Is it reasonable to think that a death from cancer is actually twice as bad as a death that is sudden and unanticipated? To be sure, a degree of pain and suffering typically accompanies cancer, but it is not easy to defend the set of (exotic) values that would lead to the conclusion that the relevant pain and suffering is as bad as death itself.[161] I believe that WTP is not measuring welfare here, and that the inflated numbers for cancer deaths is a product of an intuitive recoil at the idea of cancer, one that leads to unrealistically high monetary values.

Perhaps this example can be disputed. If so, consider the fact that according to some studies of WTP, a curable cancer is valued at $2.3 million, more than a third the value of a statistical life.[162] Suppose that these studies are reliable and that $2.3 million really does capture people's WTP for a curable cancer.[163] Is it plausible to think that the welfare loss from a curable cancer is more than a third of the welfare loss from death? More likely, the frightening idea of "cancer" is driving people's judgments, in a way that leads to a WTP that does not accurately measure the welfare loss from a curable cancer. This is an example of a situation in which "decision utility" (anticipated utility at the time of decision) does not match "experience utility" (the actual utility of lived experience).[164] There are many other illustrations, as, for example, when people show a high WTP to avoid an injury that is not so terrible in actual experience.[165] In short, WTP is sometimes a poor proxy for welfare. Because that issue does not directly bear on the choice between VSL and VSLY, I will not discuss it in detail here. But I do suggest that the point holds out a warning for the use of WTP studies to assess statistical risks, especially in the domain of morbidity.

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[159] Id.

[160] For an affirmative answer, see Revesz, supra note.

[161] If one believed that death itself is not terribly important, and that pain and suffering matter a great deal, then a huge cancer premium might well make sense. And undoubtedly some people have this exotic set of values. All I am suggesting is that the people who give the relevant answers in contingent valuation studies are most unlikely to endorse those particular values.

[162] See Cass R. Sunstein, The Arithmetic of Arsenic, 90 Georgetown L J 2255 (2002).

[163] Note that WTP is often labile and ill-formed, very much dependent on the context of the question. See Cass R. Sunstein and Richard H. Thaler, Libertarian Paternalism Is Not An Oxymoron, U Chi L Rev (forthcoming 2003). I am putting that possibility to one side for now. The general claim here is that even when WTP is stable and well-formed, it might not capture the welfare that comes from one or another option. For relevant discussion, see Kahneman et al., Back to Bentham, supra note.

[164] See Daniel Kahneman et al., Back to Bentham? Explorations of Experienced Utility, 112 Q. J Econ 375 (1997).

[165] See the discussion in Edward J. McCaffery, Matthew Spitzer, and Daniel Kahneman, Framing the Jury: Cognitive Perspectives on Pain and Suffering Awards, 81 Va. L. Rev. 1341, 1354-73 (1995) (experimental finding that willingness to pay is systematically lower than willingness to accept for pain and suffering). The most important point here is that the experience of an injury is often less bad, because more adaptation is possible, than people anticipate in advance. See id.

Conclusion

In this essay, I have suggested that government should focus its attention on statistical life-years, not statistical lives. No regulatory program makes people immortal. The only issue is life extension, and here the length of the extension surely matters. In terms of welfare, a program that saves 10,000 life-years is better than one that saves 1,000 life years, holding all else constant. Behind a veil of ignorance, reasonable people would undoubtedly prefer a program that eliminates a 1/500,000 risk faced at thirty to a program that eliminates the same risk faced at sixty. In welfare terms, a program that saves younger people is unquestionably better than one that saves older people, holding all else constant.

To be sure, there are ethical constraints on the promotion of welfare through regulatory policy. But as a general rule, there is no injustice in taking account of the difference between the anticipated welfare gain of a program that saves older people and the anticipated welfare gain of a program that saves younger people. Older people were once younger, and if all goes well younger people will become older. In any case a focus on statistical life-years has an important kind of neutrality: It treats everyone's life-years the same. I have also suggested that the claims that underlie the prohibition on age discrimination do not raise serious moral questions about focussing on life-years. These points suggest that in terms of welfare and equity, it is better to attend to statistical life-years than to statistical lives. If either approach discriminates, it is one that relies only on statistical lives, because that approach treats the life-years of older people as worth more than the life-years of younger people.

But a choice in favor of life-years leaves open questions of monetary valuation. These questions are both normative and empirical in nature. The usual debates about WTP reappear in this context. In any case, we do not have good information about how WTP changes over the life cycle. Older people may or may not be willing to pay less to reduce risks than younger people. Even if older people are willing to pay more to save each remaining statistical life-year, it is likely that older people are willing to pay less than younger people, in the aggregate, to save the number of life-years that remain.[166] Without resolving the WTP debate, I have suggested several ways that regulators might incorporate information about life-years in regulatory decisions. At a minimum, I have urged that information on life-years should be compiled, and that it should be made relevant to judgments that are otherwise close or difficult. In this way, regulatory policy would be shifted toward somewhat greater concern for the risks faced by children, and somewhat reduced concern for the risks faced by those who are elderly—thus making it more likely that more people would have a chance to become elderly.

If the analysis here is correct, it has two more general implications. The first is that WTP is a pragmatic tool and no more. Some economists seem to identify WTP with welfare itself—an absurd claim that, if taken seriously, would produce both blunders and injustices. As we have seen, people's WTP is sometimes poorly predictive of the welfare

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[166] See Viscusi and Aldy, supra note, at 50-53.

effects of one or another option[167]—a point with general and underexplored implications for regulatory policy. The second involves constraints on the promotion of welfare. While welfare is indeed the basic goal of much regulation, there are constraints on the pursuit of that goal, and these constraints should be specified. Any attempt at specification will be controversial. I have suggested, for example, that when people have had bad luck in the natural lottery, government cannot legitimately use the life-years criterion to disadvantage them further. But however the hardest controversies are resolved, I suggest that the constraints do not apply to most regulatory decisions that focus on statistical life-years. Regulators should calculate expected savings in those terms and give the result serious consideration at the point of decision.

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[167] For a great deal of relevant discussion, see Well-Being: The Foundations of Hedonic Psychology (Daniel Kahneman et al. eds. 1999).

Appendix

Regulatory Impact Statements Using Life-Years or Quality-Adjusted Life Years

FDA final seafood HACCP rule (1995). US Food and Drug Administration: Procedures for the Safe and Sanitary Processing and Importing of Fish and Fishery Products; Final Rule. 60 FR 65095, December 18, 1995. Used monetized QALYs in a primary benefit-cost analysis; QALYs described accurately.

FDA final anti-smoking rule (1996). US Food and Drug Administration, "Regulations Restricting the Sale and Distribution of Cigarettes and Smokeless Tobacco to Protect Children and Adolescents; Final Rule," 61 FR 44395, August 28, 1996. Used QALYs in a primary benefit-cost analysis.

EPA final ozone and particulate standards for outdoor air quality (1997). ADD citation. Used life years but not QALYs in a sensitivity analysis of benefit-cost analysis.

FDA final mammography rule (1997). US Food and Drug Administration: "Quality Mammography Standards; Final Rule." 62 FR 55851, October 28, 1997. Used a 5-year survival rate approach when measuring benefits, but monetized only lives saved, using the value of a statistical life of $5 million.

HRSA organ donor final rule (1998). Health Resources and Services Administration: "Procurement and Transplantation Network; Final Rule." 63 FR 16295, April 2, 1998. Used statistical life years valued at $116,000 per year, but did not use QALYs.

FDA final juice labeling rule (1998). Food and Drug Administration: "Food Labeling: Warning and Notice Statement: Labeling of Juice Products; Final Rule." 63 FR 37029, July 8, 1998. Used monetized QALYs in a primary benefit-cost analysis; QALYs described accurately.

FDA proposed consumer trans-fat labeling rule (1999). US Food and Drug Administration: "Food Labeling: Trans Fatty Acids in Nutrition Labeling, Nutrient Content Claims, and Health Claims; Proposed Rule." 64 FR 62746, November 17, 1999. Used monetized QALYs in a primary benefit-cost analysis; QALYs described accurately.

FDA final shell egg safety rule (2000). US Food and Drug Administration: "Food Labeling, Safe Handling Statements, Labeling of Shell Eggs; Refrigeration of Shell Eggs Held for Retail Distribution; Final Rule." 65 FR 76091, December 5, 2000. Used monetized QALYs in a primary benefit-cost analysis; QALYs described accurately.

EPA Tier 2 Rule (date?).

FDA final juice HACCP rule (2001). Food and Drug Administration: "Hazard Analysis and Critical Control Point (HAACP); Procedures for the Safe and Sanitary Processing

and Importing of Juice; Final Rule." 66 FR 6137, January 19, 2001. Used monetized QALYs in a primary benefit-cost analysis; QALYs described accurately.

CMS immunization standards final rule with comment (2002). Centers for Medicare & Medicaid Services, "Conditions of Participation: Immunization Standards for Hospitals, Long-Term Care Facilities, and Home Health Agencies." 67 FR 61808, October 2, 2002. Used $50,000-$100,000 cost per year of healthy life saved to monetize benefits, assuming lifespan of 84 years.

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