EFFICIENT ETHICAL PRINCIPLES FOR MAKING FATAL CHOICES

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Resource allocations of all kinds inevitably encounter financial constraints, making it infeasible to make financially unbounded commitments. Such resource constraints arise in almost all health and safety risk contexts, which has led to a regulatory oversight process to ascertain whether the expected benefits of major regulations outweigh the costs. The economic approach to monetizing health and safety risks is well established and is based on the value of a statistical life ("VSL"). Government agencies use these values reflecting attitudes toward small changes in risk to monetize the largest benefit component of regulations—that dealing with mortality risks. This procedure consequently bases the benefit value on the individual's own rate of tradeoff between risk and money and in effect creates a quasi-market approach to public policy assessment. Whereas tort liability awards are personalized to reflect the particular circumstances of the case, government policies generally rely on average valuations of mortality risk across broad worker groups. The COVID-19 pandemic has highlighted the potential role of resource constraints in the distribution of medical resources, particularly with respect to the provision of ventilators. The age-based allocation of treatment advocated by some medical ethicists violates age discrimination laws, is based on their own ethical judgments, and is divorced from consideration of private willingness-to-pay values or other possible economic efficiency criteria. A more constructive approach than the lifeboat and triage scenarios that are often discussed by medical ethicists is to consider ex ante how people would choose to provide for treatments when facing a prospective risk, making the task equivalent to that of valuing and saving statistical lives. Continued high valuations of risk reductions even by those who are old provides a rationale for more protective practices and more forward-thinking medical decisions than those advocated by some bioethicists.

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INTRODUCTION

The monetization of reduced risks to life and health is the linchpin of evaluation procedures to ascertain the economic desirability of interventions affecting public health.[1] The function of these values and the degree of their personalization to the specific context are different than for damages in tort cases. Compensation in personal injury cases is ex post and is targeted to address what has been lost as a result of the injury, usually including the present value of the financial harm.[2] To provide compensation for the specific harms, the payment amounts are tailored to the particular circumstances of the case, such as the family's financial loss.[3] Public valuations of health risks focus on reducing the risks to broad population groups, where these risks are valued ex ante.[4] The valuation amounts are broadly based and generally reflect average valuations for the general population rather than being tailored to correspond to the demographic profile of the target population.[5] Bioethicists' discussions of medical rationing in the context of the COVID-19 pandemic have taken a more targeted approach, incorporating distinctions across different patient groups. However, this tailoring of the benefit assessments is not linked to people's own preferences and has not been guided by any economic efficiency principles. Instead, recent bioethicist discussions of the proper response to the COVID-19 pandemic and related medical rationing often incorporate highly problematic ethical judgments as well as a myopic conceptualization of medical resource allocation decisions.

The dominant benefit component in policy evaluations of health risks consists of the value that people attach to reducing mortality risks, or the value of a statistical life.[6] Part I presents a brief summary of this benefit-assessment approach as well as related measures, such as those dealing with very short life extensions. Government agencies generally use population-

1 *See, e.g.*, FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING 61–62 (2004) ("[T]he value of life is easily the single most important number in the economics of health and environmental protection, frequently accounting for the great majority of the benefits in cost-benefit studies."); OFF. OF MGMT. & BUDGET, 2015 REPORT TO CONGRESS ON THE BENEFITS AND COSTS OF FEDERAL REGULATIONS AND AGENCY COMPLIANCE WITH THE UNFUNDED MANDATES REFORM ACT 13 (2015) ("The largest benefits are associated with regulations that reduce risks to life.").

2 W. KIP VISCUSI, PRICING LIVES: GUIDEPOSTS FOR A SAFER SOCIETY 192–94 (2018).

3 *See, e.g.*, Eric A. Posner & Cass R. Sunstein, *Dollars and Death*, 72 U. CHI. L. REV. 537, 543–45 (2005).

4 *See id.* at 552.

5 The general procedures outlined by the U.S. Office of Management and Budget make no provision for the heterogeneity of the value of a statistical life. *See* OFF. OF MGMT. & BUDGET, CIRCULAR A-4, REGULATORY ANALYSIS 13 (2003).

6 *See, e.g.*, ACKERMAN & HEINZERLING, *supra* note 1, at 61–62 ("[T]he value of life is easily the single most important number in the economics of health and environmental protection, frequently accounting for the great majority of the benefits in cost-benefit studies."); OFF. OF MGMT. & BUDGET, *supra* note 1, at 13 ("The largest benefits are associated with regulations that reduce risks to life."); VISCUSI, *supra* note 2, at 9.

wide estimates of the VSL to monetize mortality reduction benefits.[7] Although agencies usually rely on average values, that is not because there is no heterogeneity in the VSL. The discussion in Part II indicates that the economic literature has documented several sources of heterogeneity, with the most prominent being differences by age and by income. Part III explores the ethical aspects of different valuation approaches. All of those measures grounded in economic efficiency are related to private values as reflected in the willingness to pay to reduce risks by those who are exposed to the risk. As discussed in Part IV, the literature on medical resource allocation decisions often displays little or no understanding of these underlying economic principles for resource allocation. This failure has received particular prominence with respect to allocating access to ventilators during the COVID-19 pandemic. Proposals to impose arbitrary age cutoffs on access to medical care are both illegal and divorced from economic efficiency concerns. The concluding Part V recommends that the conceptualizations of medical resource decisions be reframed to focus on decisions that are more foresighted in nature, reflecting the prospective willingness to pay of those who will ultimately be bearing the risks.

I. Economic Valuation Concepts

The pertinent matter of interest for assessing policy benefits is society's willingness to pay for the benefit.[8] In the case of health risks, it is the value of the incremental change in the risk that is most relevant, as that is the risk-reduction benefit that is being provided. Schelling first analyzed the economic importance of this tradeoff rate between mortality risk and money, which is now most widely known as the value of a statistical life ("VSL").[9] The VSL represents the willingness to pay for safety-per-unit risk. For example, suppose that you are willing to pay an extra $900 for a safer car that reduces your fatality risk by 1/10,000. Then your VSL is given by the willingness-to-pay amount divided by the reduction in the risk, or $900/(1/10,000), which equals $9 million. Viewed in another way, if a group of 10,000 people each faced an annual fatality risk of 1/10,000 and each of them would be willing to pay $900 to eliminate that risk, it would be feasible to raise $900 x 10,000 people, or $9 million, to eliminate this group risk of one expected death.

Although Schelling introduced the concept now known as the VSL, he did not indicate what the source of these numbers should be, was skeptical of whether they could be estimated empirically, and did not discuss how they should be used for policy purposes.[10] My introduction of the use of the VSL in government policies utilized my labor-market estimates of the VSL derived

7 Viscusi, *supra* note 2, at 23.

8 Off. of Mgmt. & Budget, *supra* note 5, at 18.

9 Thomas C. Schelling, Choice and Consequence 115–19 (1984).

10 *See id.* at 144 ("The main problem is that people have difficulty knowing what it is worth to themselves, cannot easily answer questions about it, and may object to being asked. Market evidence is unlikely to reveal much.").

from wage-risk tradeoffs, which incorporated two principles.[11] First, the valuations that are most pertinent are those of the individuals being affected by the risks, not the expert assessments of government officials or academicians. In effect, the VSL incorporates the personal valuations revealed in this implicit market for risk and, as such, respects individual preferences. Second, the best estimates of the VSL are those based on people's actual risk-taking decisions in market contexts.[12] Fortunately, in the United States there is detailed information on the fatality risks of different occupations that can be matched to employment information to estimate statistically the wage premium for fatality risks, making it feasible to calculate the VSL.[13] The alternative approach is to use interview methods designed to elicit the valuation of hypothetical risks.[14] Although these stated preference estimates are sometimes useful when data limitations are encountered, they do not provide as meaningful measures of the VSL.[15]

My mean estimate of the VSL after adjusting for publication selection effects is $11 million in 2019 USD.[16] The mean estimate without such adjustments is about $2 million higher.[17] Current estimates applied by government agencies are in a similar range after making appropriate adjustments for inflation. The U.S. Department of Transportation recommends a value of $9.6 million in 2016 USD,[18] the U.S. Environmental Protection Agency recommends a value of $7.9 million in 2008 USD,[19] and the U.S. Department of Health and Human Services recommends a value of $9.6 million in 2014 USD.[20] The VSL estimates that have been used in regulatory impact analyses by agencies have increased over time, but in recent years have been in the $9 million to $11 million range across federal agencies.[21]

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11 VISCUSI, *supra* note 2, at 1–2.

12 *Id.* at 24.

13 *Id.* at 25.

14 *Id.* at 32.

15 In addition to the various hypothetical biases associated with such surveys, there is evidence of rampant publication selection biases in the stated preference literature on the VSL. Clayton Masterman & W. Kip Viscusi, *Publication Selection Biases in Stated Preference Estimates of the Value of a Statistical Life* 2 (Vanderbilt Univ. L. Sch. Working Paper, Paper No. 20-11, 2019), https://ssrn.com/abstract=3536641.

16 VISCUSI, *supra* note 2, at 28 (advocating a VSL of $10 million, or $11 million in 2019 USD); W. Kip Viscusi, *Risk Guideposts for a Safer Society: Introduction and Overview*, 58 J. RISK & UNCERTAINTY 101, 105 (2019).

17 W. Kip Viscusi, *Pricing the Global Health Risks of the COVID-19 Pandemic*, 61 J. RISK & UNCERTAINTY 101, 107 (2020).

18 MOLLY J. MORAN & CARLOS MONJE, U.S. DEP'T OF TRANSP., REVISED DEPARTMENTAL GUIDANCE 2016: TREATMENT OF THE VALUE OF PREVENTING FATALITIES AND INJURIES IN PREPARING ECONOMIC ANALYSES 9 (2016).

19 U.S. ENV'T PROT. AGENCY, GUIDELINES FOR PREPARING ECONOMIC ANALYSES 7-8 (2010).

20 LISA A ROBINSON & JAMES K. HAMMITT, U.S. DEP'T OF HEALTH & HUM. SERVS., GUIDELINES FOR REGULATORY IMPACT ANALYSIS 15–17 (2016).

21 Viscusi, *supra* note 17, at 106 & n.4.

In situations in which the life extension that results from a policy is extremely short, it is also feasible to use an analogous concept, the value of a statistical life year ("VSLY").[22] This measure imputes the value of an additional expected year of life based on the VSL estimate and the remaining life expectancy of the person at risk. The current estimate of the VSLY in U.S. Department of Health and Human Services guidance in current dollars is just over $500,000.[23] Valuation of a new cancer treatment that would extend life by one expected year consequently would have a benefit value of about $500,000 rather than the full VSL.

Following a similar approach to that of the VSL, there are also estimates of how much people value risks of cancer and other health impacts.[24] As in the case of the VSL, the objective is to base the monetization of the risk reduction on how much those who are exposed to the risk value changes in the risk level.

Although the VSL approach has received its greatest prominence in policy valuation situations, plaintiffs have also proposed its use in wrongful death cases. Basing compensatory damages on financial losses addresses the monetary impacts on survivors but does not address the loss of life for the deceased. Particularly in states where the loss of enjoyment of life is an element of damages, there have been attempts to introduce the VSL as a measure of the decedent's loss.[25] There have also been other proposals advocating more general application of the VSL in wrongful death cases, such as that by Posner and Sunstein as well as by Polinsky and Shavell, each of which favor making the VSL a routine component of damages in wrongful death cases.[26]

Efforts to introduce the VSL as a compensatory damages component have had only limited success. Most courts have generally rejected attempts to introduce the VSL estimates as a guideline for jury determination of damages, though there may be some situations in which discussion of the methodology may be permitted.[27] From an economic standpoint, compensation

22 VISCUSI, *supra* note 2, at 104–07.

23 ROBINSON & HAMMITT, *supra* note 20, at 21. The U.S. Department of Human Services estimate of the VSLY is $490,000 in 2014 USD for an expected quality-adjusted life year, which is $536,000 in 2019 USD. *Id.* Studies underlying the $500,000 estimates are discussed in Viscusi, *supra* note 17, at 111–12.

24 *See* W. Kip Viscusi & Rachel Dalafave, *Economic Value of Reducing Exposure to Environmental Health Risks* (Vanderbilt L. Sch., Working Paper No. 20-50, 2020), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3701981.

25 *See e.g.*, Chavez v. Marten Transp., Ltd., CIV No. 10-0004, 2012 WL 988008, at *2 (D.N.M. Mar. 22, 2012).

26 *See* Posner & Sunstein, *supra* note 3, at 587–92; A. Mitchell Polinsky & Steven Shavell, *Punitive Damages: An Economic Analysis*, 111 HARV. L. REV. 869, 941–42 (1998); Catherine M. Sharkey, *Valuing Black and Female Lives: A Proposal for Incorporating Agency VSL into Tort Damages*, 96 NOTRE DAME L. REV. 1479 (2021).

27 For further review about principal hedonic damages decisions, see generally Thomas R. Ireland, *Recent Legal Decisions Regarding Hedonic Damages: An Update*, 13 J. FORENSIC ECON. 189 (2000); Thomas R. Ireland, *The Last of Hedonic Damages: Nevada, New Mexico,*

based on the VSL provides excessive levels of insurance. In products liability situations, the purchaser of the product in effect will be paying for this excessive insurance since the expected costs of the compensation will be embedded in the product price. This level of compensation is more than the person would choose to provide after death. Given the economic underpinnings of the VSL, its use in setting damages would be more suitable for setting the total level of damages in situations in which establishing incentives for deterrence is of paramount concern, which usually are when punitive damages are warranted.[28]

II. HETEROGENEITY OF THE VSL AND POLICY IMPACTS

The VSL is not a natural constant and does not have a uniform value across the population. That attitudes toward health risks may vary is no more surprising than the presence of differences in other types of preferences. The two most prominent personal characteristics that have been analyzed with respect to the heterogeneity of the VSL are age and income.[29] Age is consequential because it plays a critical role in determining the remaining life expectancy that is at risk, which is the commodity that is being valued in the VSL. Income levels also have a critical role since people's willingness to accept financial compensation to incur risks and their willingness to pay to reduce risk will both be affected by one's financial resources. Although age and income are the principal characteristics of interest here, there have also been analyses of variations in the VSL on other dimensions such as gender, race, immigrant status, and occupation, as well as across countries.[30]

The variation of the VSL with age reflects a variety of influences that vary with age. There are many life-cycle factors pertinent to the VSL that may change with age, including, among others: remaining life expectancy, health status, family relationships and obligations, income and wealth levels, and knowledge and experience of risks. Although people's remaining life expectancy declines steadily with age, the VSL displays an inverted-U shape trajectory with respect to age.[31] The VSL rises with age and peaks in the midforties and then begins to decline.[32] This decline is not precipitous, as there is no statistically significant difference in the estimated VSL for workers aged fifty-five to sixty-two and that of workers aged eighteen to twenty-four.[33] Detailed labor-market estimates for very old age groups, such as those beyond the

and Running a Bluff, J. LEGAL ECON., Oct. 2009, at 91; Thomas R. Ireland, *Trends in Legal Decisions Involving Hedonic Damages from 2000 to 2012*, J. LEGAL ECON., Oct. 2012, at 61.

28 Joni Hersch & W. Kip Viscusi, *Saving Lives Through Punitive Damages*, 83 S. CAL. L. REV. 229, 238–42 (2010).

29 Differences by age are discussed in VISCUSI, *supra* note 2, at 90–113, and differences by income are discussed at 114–38.

30 *Id.* at 97–100, 117–23, 144–51.

31 *Id.* at 97–99.

32 *Id.* at 99.

33 *Id.*

usual retirement age, are not available, but it is feasible to construct such values based on the VSLY.[34]

The variations of the VSL with income have been the subject of numerous analyses. In the United States, many estimates of the income-VSL relationship indicate an income elasticity of the VSL of around 0.6, i.e., a ten percent increase in one's income will generate a six percent increase in the VSL.[35] Some estimates of this relationship indicate a responsiveness that may even be greater, whereby the change in the VSL exceeds the percentage change in income.[36] Government agencies incorporate differences over time in income levels in adjusting the VSL, but they have not distinguished populations of different income levels at any point in time. Across countries, the income elasticity is 1.0 so that, internationally, percentage differences in per capita income levels will lead to equal percentage changes in the VSL.[37]

The dependence of the VSL on income also is instrumental in driving a wedge between the VSL for small changes in risk and the willingness to pay to buy out of the prospect of certain death. For small increases or decreases in risk, the tradeoff of $11 million per expected death is reflective of the amount that people would be willing to pay for very small reductions in risk, and it also equals the amount that they would require to incur equivalent small increases in risk.[38] The willingness to pay to avoid certain death or to pay for other very large reductions in risk will be less, principally because purchasing these risk reductions inevitably makes one poorer. The discrepancy between the VSL for a small risk of an expected death and the amount that people could pay to avoid certain death is an expected consequence of the VSL theory. Personal resource limitations in situations involving an identified life at risk will consequently lead to lower private valuations per life at risk than their counterpart ex ante VSL to avoid a small risk of death.

The quantity of life at risk also varies considerably across policy contexts. If mortality risk-benefit assessments were tailored to the specific populations at risk, there might be substantial differences in the valuations. Consider the life expectancy loss from different causes of death. Mortality risks that affect younger age groups lead to much greater losses in life expectancy than deferred risks that disproportionately affect older age groups. The life expectancy losses associated with different causes of death differ markedly. Auto accidents lead to an average lost life expectancy of thirty-seven years, accidents more generally lead to twenty-nine years of lost life expectancy, cancer causes fourteen years of lost life expectancy, and cardiovascular disease causes ten years of lost life expectancy.[39] Causes of death associated

34 Such estimates for the mortality risks of COVID-19 appear in Viscusi, *supra* note 17, at 111–12.

35 VISCUSI, *supra* note 2, at 117.

36 *Id.* at 118.

37 *Id.* at 118–19.

38 *Id.* at 181–82.

39 W. Kip Viscusi, Jahn K. Hakes & Alan Carlin, *Measures of Mortality Risks*, 14 J. RISK & UNCERTAINTY 213, 218 (1997).

with traumatic injuries tend to affect younger populations who have a greater amount of life expectancy at risk than do policy efforts that address health and illness risks that are more distant. The impacts of such risk reductions are often affected by the presence of a time lag or a latency period before the policy effects become apparent.[40] Despite these often substantial differences in the amount of life expectancy being valued, there is great similarity in the VSL estimates used by agencies.[41] Deferred health risks posed by environmental and health-related behaviors are treated symmetrically with more immediate hazards faced in occupational and transportation risk contexts.[42] Similarly, agencies also do not make provisions for differentiating the VSL across income groups.[43]

The role of age and differences in remaining life expectancy has become more prominent in 2020 in the discussions of the COVID-19 pandemic. The mortality risks of this disease have disproportionately affected older age groups. From February 1 to June 20, 2020, about one-third of the COVID-19 deaths in the United States were among people age eighty-five or older.[44] Should these mortality risks be accorded the same value as government agencies assign to other causes of death? Although many of the victims of COVID-19 are in nursing homes, even for those age eighty-five, the remaining life expectancy is 5.9 years for men and 7.0 years for women.[45] If all of the COVID-19 deaths in the United States are valued using a VSL of $11 million, the total mortality loss for the deaths through June 20, 2020, is $1.4 trillion.[46] Recognition of the diminution of the value of mortality risks in very old age groups leads to a substantial reduction in this amount. Consider the mortality cost of COVID-19 where the risks to those age fifty-five and below receive a VSL value of $11 million, while deaths in older age groups receive a value based on the number of years of life lost multiplied by the VSLY.[47] Making this age-related adjustment consequently reduces the total mortality cost of COVID-19 by just over half of the value obtained by using a

40 *Id.*

41 *See* MORAN & MONJE, *supra* note 18, at 5–7; U.S. ENV'T PROT. AGENCY, *supra* note 19, at 7–8; Viscusi, *supra* note 17, at 106 n.4.

42 The timing of when the losses occur is also consequential since that affects the present value of the loss. Agencies account for such effects when calculating the present value of benefits. *See, e.g.*, Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units, 83 Fed. Reg. 44,746, 44,784–85 (Aug. 31, 2018) (to be codified at 40 C.F.R. pt. 51, 52, 60).

43 VISCUSI, *supra* note 2, at 121.

44 *See* Nat'l Ctr. for Health Stat., *Provisional COVID-19 Death Counts by Sex, Age, and State*, CTRS. FOR DISEASE CONTROL & PREVENTION, https://data.cdc.gov/NCHS/Provisional-COVID-19-Death-Counts-by-Sex-Age-and-S/9bhg-hcku (last updated Mar. 3, 2021).

45 Elizabeth Arias & Jiaquan Xu, *United States Life Tables, 2017*, NAT'L VITAL STAT. REPS., June 24, 2019, at 3.

46 Viscusi, *supra* note 17, at 122.

47 *See id.* at 113. The value of the years of life lost is also discounted at a three percent interest rate. *Id.*

uniform VSL across the population.[48] The calculated losses in the assessed mortality costs experienced by those in older age groups incorporate the changes in the value if mortality risks to these age groups are valued using the VSLY rather than the VSL.[49] Thus, the age-adjusted counterpart of the VSL is $8.5 million for those fifty-five to sixty-four, $6.4 million for those sixty-five to seventy-four, $4.1 million for those seventy-five to eighty-four, and $3.0 million for those age eighty-five and above.[50]

III. Ethical Principles

Recognition of the heterogeneity of the VSL clearly is potentially consequential in terms of its impact on the monetized values. Whether and to what extent heterogeneity should enter are the principal determinants of the two measures that I focus on here—personalized risk valuations and what I have termed, "equitable risk tradeoffs."[51] Each of these approaches is based on the private values of those exposed to the risk, but they differ with respect to the population's set of preferences being considered.

Under the equitable risk tradeoffs approach, a common population-wide VSL serves as the value for monetizing changes in mortality risks.[52] Thus, there are no distinctions made in valuing lives based on factors such as age or income. Designing policies so that all mortality risks are assigned a common VSL treats all people symmetrically, but other conceptions of equity are also possible. As a policy guide, the equitable risk tradeoffs approach may lead to different policy prescriptions than other equity efforts such as equalizing risk levels or ensuring that all people have the same life expectancy.

The optimal level of safety for any individual will be that for which the cost reduction per unit risk equals the person's VSL. Applying a symmetric VSL using the equitable risk tradeoffs approach will lead to an undervaluation of risk reductions for affected groups with above-average levels of VSL and an overvaluation of risk reductions for affected groups with below-average levels of VSL.[53] Consider first the situations in which beneficiaries are paying for the cost of the safety measure. This is a useful starting point since tailoring the VSL to the preferences of the affected group is less controversial when they are paying the cost. Application of a population-wide average VSL that is greater than the affected population's value will, in effect, force them to pay for levels of safety that they do not value.[54] In much the same manner that buyers do not want to incur the cost to have entry-level vehicles equipped with all of the features of luxury cars, it will not be desirable to force people to pay for levels of safety that exceed what they would have chosen if there were a market for safety. In this situation, the level of safety is

48 *See id.* at 119.
49 *See id.* at 111.
50 *See id.* at 113.
51 Viscusi, *supra* note 2, at 139.
52 *Id.* at 142, 144.
53 *See id.* at 144–47.
54 *See id.* at 144–46.

too great, as is the amount that people must pay for it. The opposite problem arises if the beneficiary group's VSL is higher than that of the population average. Their level of safety will be too low if policies are based on the average population VSL, and they would be willing to pay more for greater levels of safety than would prevail for policies implied by the average VSL. Application of a VSL higher than that of the average population for more affluent populations will better align the safety levels with their preferences and should clearly be desirable when they are paying the cost of the safety measure. This situation arises in the case of private market transactions. In the case of airline safety measures, the regulatory costs are transmitted through ticket prices.[55] In such situations in which the policy beneficiaries are bearing the cost, a deviation from applying average VSL amounts is compelling on both efficiency and equity grounds.

Suppose that the beneficiaries are not paying the cost, as these costs are shifted more broadly across the population. Application of the population-specific VSL provides a subsidy to the groups with above-average VSL as society at large pays for the more expensive safety protections that are better aligned with this group's preferences. Similarly, groups with below-average levels of VSL will receive less protection from population-specific safety levels than under the equitable risk tradeoffs approach. The levels of safety are more efficient with personalized VSL levels in that they are responsive to the population-specific benefits, but redistributive impacts and risk-level inequities will result.

If the personalized VSL approach is adopted, it should be based on a comprehensive assessment of the VSL rather than cherry picking selected personal characteristics of interest. Some personal characteristic dimensions are associated with higher levels of VSL, and other dimensions are associated with lower levels. Affluent older people will, for example, have a greater VSL than much younger people if the influence of their higher income levels outweighs their shorter life expectancy. Personalizing the VSL based on selective inclusion of different dimensions on which the VSL may differ can lead to VSL levels that are not reflective of the overall impact of the heterogeneity.

Even if undertaken correctly, there may be substantial public resistance to the personalized VSL approach. In its analysis of the Clear Skies Initiative in 2003, the Environmental Protection Agency reduced the VSL for those over age sixty-five by 37%.[56] There was a substantial public outcry—"Seniors on sale, 37% off" and "What's a granny worth?"[57] The agency subsequently abandoned this valuation approach.[58] Personalizing the VSL to the preferences of the population at risk may also generate resistance from the general public, who may be reluctant to devalue the lives of groups who face greater risk. Not surprisingly, given their income levels, soldiers have a lower VSL

55 *See id.* at 145.
56 *Id.* at 91–92.
57 *Id.* at 92.
58 *Id.*

than does the population average.[59] The responsiveness of reenlistment decisions to financial incentives provides one such basis for assessing the VSL of those in the military.[60] Despite soldiers' lower VSL, military decisions with respect to their lives reflect an average societal VSL when making military decisions, as do economic analyses of the mortality costs of war.[61] Even those not directly affected may not support personalization of the VSL when it leads some groups to be exposed to greater risks, particularly when the risks arise in situations in which those at risk are providing a public service.

IV. COVID-19 Ventilator Rationing, Vaccinations, and Medical Treatments

Application of efficient principles for medical policies is straightforward in the case of statistical risks to life. Suppose that vaccines for COVID-19 become available, but in limited supply. Assume too that vaccines are effective in reducing the risk of death from COVID-19. Also, set aside cost considerations. Then following efficient economic prescriptions, the vaccines should be targeted where the increased probability of survival multiplied by the pertinent VSL is greatest. For the equitable risk tradeoffs approach in which all mortality risks are valued equally, the appropriate policy reduces to that in which the vaccines are targeted to those who will reap the greatest increase in the probability of survival. All that matters is how much treatment will reduce the risk of death. The groups meriting priority for vaccinations may include vulnerable older populations and those with high levels of exposure, such as frontline health care workers. If one departs from the equitable risk tradeoffs approach and instead incorporates heterogeneity in the VSL in valuing the mortality risk reductions, then differences in willingness to pay for the vaccine also enter. Other things being equal, more affluent citizens at any given level of efficacy of vaccinations would receive priority for vaccinations, just as would emerge if there is an open market for the purchase of treatments.

Such proposed targeting of medical interventions based on personalized assessments of the benefits has surfaced in situations in which the risk-reduction effects are more consequential and involve imminent life-and-death decisions. The rationing of scarce medical treatments received particular prominence in the medical ethics literature addressing the allocation of ventilators during the COVID-19 pandemic. Ventilators served as a general proxy for discussing other potential shortages in medical resources that also may arise, such as with respect to intensive care unit beds and hospital beds

59 W. Kip Viscusi, *The Mortality Cost Metric for the Costs of War*, Peace Econ. Peace Sci. & Pub. Pol'y, May 29 2019, at 1, 5.

60 Chris Rohlfs, *The Economic Cost of Conscription and an Upper Bound on the Value of a Statistical Life: Hedonic Estimates from Two Margins of Response to the Vietnam Draft*, J. Benefit-Cost Analysis, Aug. 23, 2012, at 1, 1–2.

61 Chris Rohlfs, Ryan Sullivan & Thomas J. Kniesner, *Reducing Risks in Wartime Through Capital-Labor Substitution: Evidence from World War II*, 52 J. Risk & Uncertainty 163, 165 (2016); Viscusi, *supra* note 59, at 5.

generally.[62] The discussions frequently have framed the treatment decision in terms of triage or lifeboat situations.[63] If the number of available ventilators is less than the number of people whose health would be improved by a ventilator, how should the ventilators be allocated? One such approach is to rely on age as a principal basis for allocation. For example, Weill Cornell Medical College medical ethicist Franklin G. Miller suggested that if ventilators need to be rationed that can be accomplished by adopting an age cutoff: "I would suggest that an initial age criterion for rationing ventilators when the demand outstrips the supply is a cut-off of [eighty]. Eighty years of age is just above the average life expectancy in the [United States], which is [seventy-nine] years old."[64] If the shortage is extreme, he suggested an age cutoff of seventy.[65] His underlying rationale for age-based rationing was that older patients sometimes have poor prognosis and have already had the "opportunity to live a complete life."[66] Vanderbilt medical ethicist Larry R. Churchill offers a similar age-based approach based on what is sometimes termed a "fair innings" rationale since older people have already had their "turn[ ] at bat."[67] The role of age-related factors in practice varies. Ventilator allocation guidelines differ by state, with some states having exclusion criteria, and others that do not.[68] Some states include age as part of a multicomponent assessment for ventilator allocation, and Maryland considers age in their initial triage decisions.[69] If distinctions with respect to exposure and treatment based on age are not feasible, it still may be feasible to penalize older age groups in the design of COVID-19 policies. In the case of social distancing policies for COVID-19, which yield greater health benefits to old,

62 Shortages of ventilators, intensive care units, and hospital personnel emerged after COVID-19. Timothy W. Farrell et al., *Rationing Limited Healthcare Resources in the COVID-19 Era and Beyond: Ethical Considerations Regarding Older Adults*, 68 J. AM. GERIATRICS SOC'Y 1143, 1144 (2020).

63 *See, e.g.*, Mike Baker, *Whose Life is Worth Saving? In Washington State, People with Disabilities Are Afraid They Won't Make the Cut*, N.Y. TIMES (Mar. 23, 2020), https://www.nytimes.com/2020/03/23/us/coronavirus-washington-triage-disabled-handicapped.html (discussing fears that people who are disabled might be at risk when doctors and hospital make end-of-life triage decisions); Franklin G. Miller, *Why I Support Age-Related Rationing of Ventilators for COVID-19 Patients*, THE HASTINGS CTR. (Apr. 9, 2020), https://www.thehastingscenter.org/why-i-support-age-related-rationing-of-ventilators-for-covid-19-patients/ (expressing support for age-related triage criteria).

64 Miller, *supra* note 63.

65 *Id.*

66 *Id.*

67 Paula Span, *Should Youth Come First in Coronavirus Care?*, N.Y. TIMES (July 31, 2020), https://www.nytimes.com/2020/07/31/health/coronavirus-ethics-rationing-elderly.html (quoting Larry R. Churchill, *On Being an Elder in a Pandemic*, THE HASTINGS CTR. (Apr. 13, 2020), https://www.thehastingscenter.org/on-being-an-elder-in-a-pandemic/).

68 Gina M. Piscitello, Esha M. Kapania, William D. Miller, Juan C. Rojas, Mark Siegler & William F. Parker, *Variation in Ventilator Allocation Guidelines by US State During the Coronavirus Disease 2019 Pandemic: A Systematic Review*, JAMA NETWORK OPEN, June 2020, at 1, 4.

69 *Id.* at 3, 8.

vulnerable populations, Matthew Adler advocates that such efforts be coupled with "significant taxes on older individuals and substantial payments to younger ones" based on his conception of distributive justice and the social welfare function.[70] His analysis does not continue to follow the logic of his approach by taxing other groups, such as minorities, who may benefit disproportionately from policies that reduce COVID-19 risks.

Explicit discrimination in medical treatment on the basis of age is inconsistent with section 1557 of the Affordable Care Act, which prohibits discrimination on the basis of race, color, national origin, sex, age, or disability in healthcare programs receiving federal funds or which are administered by the executive branch of the federal government.[71] This provision incorporates by reference the criteria for discrimination specified in the Age Discrimination Act of 1975.[72] The civil rights office of the Department of Health and Human Services issued a bulletin during the COVID-19 pandemic explicitly indicating that age and disability status could not be used in rationing health care.[73] While age is not legally permitted as a determining factor in the allocation of healthcare resources, it could be highly correlated with factors such as life-years saved and long-term predicted life expectancy for which there are no explicit prohibitions. Use of criteria more explicitly linked to age may be more common in other countries, such as Italy, which has made rationing decisions based on age cutoffs, including one hospital that decided not to intubate anyone over the age of sixty.[74]

As one might expect, the reliance on age-based criteria has not been well received by senior-citizen groups and gerontological scholars. The statement on resource allocation in the COVID-19 era by the American Geriatrics Society led with the following recommendation: "Age per se should never be used as a means for a categorical exclusion from therapeutic interventions that represent the standard of care. Likewise, specific age-based cutoffs should not be used in resource allocation strategies."[75] Discussions by this group

70 Matthew D. Adler, *What Should We Spend to Save Lives in a Pandemic?: A Critique of the Value of Statistical Life*, COVID ECON., June 30, 2020, at 1, 32.

71 Patient Protection and Affordable Care Act § 1557, 42 U.S.C. § 18116 (2018).

72 *Id.*; Age Discrimination Act of 1975, 42 U.S.C. §§ 6101–6107.

73 U.S. DEP'T OF HEALTH & HUM. SERVS., OFF. FOR CIV. RIGHTS, C.R., HIPAA, AND THE CORONAVIRUS DISEASE 2019 (COVID-19), at 1 (2020); Sheri Fink, *U.S. Civil Rights Office Rejects Rationing Medical Care Based on Disability, Age*, N.Y. TIMES (Mar. 30, 2020), https://www.nytimes.com/2020/03/28/us/coronavirus-disabilities-rationing-ventilators-triage.html.

74 Farrell et al., *supra* note 62, at 1145; Ciaran McGrath, *Italian Hospital Makes Heartbreaking Decision Not to Intubate Anyone over the Age of 60*, EXPRESS (Mar. 20, 2020), https://www.express.co.uk/news/world/1257852/Italy-coronavirus-intubating-elderly-pandemic-china-hospitals-Nadine-Dorries.

75 Timothy W. Farrell et al., *AGS Position Statement: Resource Allocation Strategies and Age-Related Considerations in the COVID-19 Era and Beyond*, 68 J. AM. GERIATRICS SOC'Y 1136, 1138 (2020). Similar views are expressed by *Age UK*. Caroline Abrahams et al, *Joint Statement on the Rights of Older People in the UK to Treatment During This Pandemic*, AGE UK (Mar. 30, 2020), https://www.ageuk.org.uk/latest-press/articles/2020/03/rights-of-older-people-during-pandemic/.

appealed to different conceptualizations of justice and fairness that are reflected in their proposed guidelines.

Much discussion of the potentially terminal medical treatment decisions is shortsighted. My framing of the decision context and the criteria for making critical judgments is different in that it is based on economic efficiency principles, but with a more forward-looking perspective than medical-rationing discussions. Focusing on the dire end-of-life context in isolation creates a very narrowly constricted decision environment. If we were to inquire about preferences when faced with an on-off decision between life and death, one would expect that most people will have a preference for preserving their own lives, assuming that all people would rather be alive than dead and that their altruism toward others does not outweigh the value they place on their own life. One could undertake the analog of willingness-to-pay elicitations for small risks and apply them to ventilator assignment. However, allocations based on willingness to pay at the time when people are facing a life-or-death decision may be problematic in such identified-life situations. We don't, for example, have public auctions of ventilators to the highest bidder or auctions of spaces on lifeboats when they are in limited supply. There are some exceptions where it is feasible for financial resources to be influential, such as patients who travel to other countries to obtain organ transplants or who can afford medical treatments that are not available to the population at large.

Rather than begin with the dire identified-lives scenario as the decision-making context, it is more instructive to take a longer-term view that incorporates the following framework. How should we structure policies ex ante when faced with the possibility of a future pandemic or similar health crisis? These preferences in turn can guide how much to provide for treatment in the post-pandemic period. This formulation transforms the decision context from one in which what is at risk are not current identified lives but rather prospective statistical lives. How much people would be willing to pay ex ante for lifesaving treatment and equipment such as ventilators that will be needed in the future, where this situation will occur with some probability between zero and one? This framing takes the context back to before the individual has become ill, but it is not tantamount to the Rawlsian original position.[76] People know their age, their health status, and their current economic situation. In effect, to value the mortality-reduction benefits from ventilators, one applies the pertinent VSL determined before the terminal medical context arises. These values in turn will guide the level of provision of ventilators and their allocation. The allocation will also depend on the incremental mortality reduction achieved by the medical treatment. Thus, for any given cost, the targeting of the resources should be based on the mortality-risk reduction multiplied by the VSL. The incremental-risk effects will vary across people. The VSL will be the same for all under the equitable risk tradeoffs approach, but will vary based on the personalized VSL approach.

76 *See* JOHN RAWLS, A THEORY OF JUSTICE 11 (3d ed. 2003).

Posing the decisions in a prospective context avoids the dire scenarios of on-off decisions for life, places the decisions in a situation where the VSL has a meaningful role to play, and alters the ex post thinking such as that reflected in the comments of New York Governor Andrew Cuomo: "My mother is not expendable. And your mother is not expendable. And our brothers and sisters are not expendable. . . . We're not going to put a dollar figure on human life."[77] The approach advocated below is to use the VSL to value small prospective risks in structuring medical resource provision.

The costs involved in providing for medical equipment that might be of future use are not prohibitive. Premium-quality ventilators have a proportional solenoid ("PSOL") valve delivery design and cost between $25,000 and $50,000 in 2019.[78] There are also much lower-cost ventilators on the market. If there is at least a 1/200 chance that a ventilator would prevent one expected death, purchasing the top-quality ventilator at $50,000 would pass an efficiency test. There also may be attendant-personnel costs. The respiratory therapists who are skilled in operating ventilators had a median pay of $61,330 in 2019.[79] However, the full labor cost is not for ventilator skills alone since in addition to their work with ventilators, they also perform other functions in the treatment of patients with breathing or cardiopulmonary disorders using other methods.[80] Even attributing the full cost of a respiratory therapist and a $50,000 price tag for the ventilator, it would be desirable to purchase the ventilator if the probability that it would prevent one expected death in the next year was 1/100.[81]

Selecting the particular VSL estimate to be used could either reflect the heterogeneity of the VSL across the population, which is a tailored efficiency approach, or it could use a population average VSL. The concept of equitable risk tradeoffs treats all people symmetrically in terms of the valuation of their mortality-risk reductions. Thus, life-expectancy considerations do not enter. Recognition of VSL heterogeneity will lead to lower valuations in the upper-age groups, but these values still may exceed those of younger people

77 Ja'han Jones, *NY Governor on Conservatives Who Want to End Social Distancing: Life Is Not 'Disposable,'* HUFFPOST (Mar. 24, 2020), https://www.huffpost.com/entry/andrew-cuomo-trump-social-distancing-coronavirus_n_5e7a4a27c5b62f90bc525564 (quoting press conference statement by New York State Governor Andrew Cuomo).

78 Heather Glass, *High-Acuity Ventilator Cost Guide*, MEDTRONIC, https://hcpresources.medtronic.com/blog/high-acuity-ventilator-cost-guide (last visited Sept. 28, 2020).

79 *Occupational Outlook Handbook: Respiratory Therapists: Summary*, U.S. BUREAU OF LAB. STAT., https://www.bls.gov/ooh/healthcare/respiratory-therapists.htm (last visited Sept. 28, 2020).

80 *Occupational Outlook Handbook: Respiratory Therapists: What Respiratory Therapists Do*, U.S. BUREAU OF LAB. STAT., https://www.bls.gov/ooh/healthcare/respiratory-therapists.htm#tab-2 (last visited Sept. 28, 2020). For example, respiratory therapists also may evaluate lung capacity and perform physiotherapy to remove mucus for patients with cystic fibrosis and other lung diseases.

81 This is a conservative estimate that assumes that ventilators must be replaced annually.

given the modest decline in the inverted-U shape of the VSL life-cycle trajectory.[82]

Even if the VSL is identical for different groups, there may still be a rationale for targeted allocation of ventilators. The mortality-reduction benefit that drives the economic assessment of the ventilator benefits is the product of the VSL and the incremental improvement in the probability of survival. Valuing all lives equally does not imply that the expected benefits will be the same. If resources are more beneficial in increasing the probability of survival of different groups, then their expected mortality reduction benefits will be greater. Those who will experience the greatest mortality-reduction benefit from treatment could be at either end of the age distribution as what matters is how much the treatment will enhance the chance of survival, not the absolute level of the mortality risk. This additional consideration of marginal efficacy of resources differs from an approach in which all people are treated symmetrically regardless of the productivity effects of medical resources.[83]

V. Toward a Broader Perspective on Fatal Risk Decisions

Meaningful conceptualization of health-related decisions does not require that one jettison the economic efficiency principles that guide assessments of risk regulation. The value of different outcomes is governed by society's willingness to pay for that outcome, which usually incorporates a large reliance on the value of those most directly affected by the outcome. Inquiring what values would be expressed if there were a market for the good is the underlying rationale for the monetization of mortality risks for purposes of benefit assessment. When decisions become more dire and involve much greater shifts in mortality risks, individuals' value of the losses to be experienced remains pertinent. It is not appropriate to override individual preferences because of notions of distributive justice or other imagined ethical rationales. Continued recognition of the substantial valuations of risks to life, even among those who are very old, should provide a cautionary brake on efforts to adopt policies that involve strict age cutoffs for life-and-death decisions. Such rigid cutoffs are illegal and have no sound basis from the standpoint of respecting individuals' value of their lives.

The increased attention devoted to medical rationing has been framed in contexts of triage or lifeboat scenarios. However, rather than focusing on the terminal decisions at the time of which there may be legitimate resource constraints, a sounder approach is to utilize a more forward-looking approach. If the desired outcome based on health care costs and personal

82 *See* Viscusi, *supra* note 2, at 97–99; *supra* Part II.

83 The American Geriatrics Society offered the following view on resource allocation: "A just healthcare system should treat similarly situated people equally, as much as possible." Farrell et al., *supra* note 62, at 1137. In its view, using age as a categorical exclusionary criterion violates the Age Discrimination Act of 1975. Consistent with my approach, this Society recognized that other concerns could also enter, but not age-related factors such as "life-years saved" and "long-term predicted life expectancy." *Id.* at 1138.

valuations in the terminal pandemic situation is to have adequate resources to avoid rationing, then there should be appropriate anticipatory efforts to guard against such eventualities. In effect, society will be providing a form of self-protection to guard against possibilities that remain prospective. But if they do occur, they will impose potentially grave outcomes that will be less severe if provision has been made in advance.