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Based on the keynote address presented at the annual meeting of the American Academy of Economic and Financial Experts (April 25, 2019, Las Vegas, NV)

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Abstract: *This article is based on my keynote address at the American Academy of Economic and Financial Experts conference in which I examined some of the implications for legal contexts of my book, Pricing Lives: Guideposts for a Safer Society. The value of a statistical life (VSL) provides an economic measure of the efficient cost-risk tradeoff rate for mortality risk decisions. Consequently, the VSL is well suited to serving as a measure of the benefits of mortality risk reduction for government regulatory policies and for corporate risk decisions. The tort liability counterpart of this function is using the VSL to assess the possible negligence of corporate risk decisions. Setting total damages equal to the VSL also can provide efficient levels of deterrence in punitive damages contexts. Unlike situations of property damage losses for which making the victim whole leads to efficient levels of insurance and deterrence, in personal injury contexts, damages amounts that create efficient deterrence incentives do not also provide the efficient levels of insurance. Hedonic damages based on the VSL exceed the efficient level of insurance in wrongful death cases.*

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I. Introduction[1]

Society values lives in a variety of institutional contexts. Some of these purposes involve selecting levels of safety, while others are concerned with providing compensation to the family and the estate after death. Companies set a price on lives at least implicitly when they select safety levels. Government policies primarily value mortality risks for purposes of choosing the level of stringency of government regulations and evaluating the policies that reduce mortality risks. Government agencies also place a value on lives when setting the level of sanctions for regulatory violations that have led to fatalities. In some situations, such as workers' compensation and the Victim Compensation Fund after the 9/11 terrorist attack, the government provides compensation to the victims' heirs after fatalities. Court awards in wrongful death cases primarily seek to provide compensation and are less concerned with deterrence except in punitive damages contexts. Within and across institutions, there is valuation of lives for quite different purposes. Because of the diversity of economic objectives, one would not expect that a one-size-fits-all approach for valuing mortality risks would be pertinent.

This article focuses on the value of a statistical life (VSL), which has diverse uses in a variety of institutional situations. Many of the participants in the American Academy of Economic and Financial Experts conference have been directly involved in advocating or opposing the use of the VSL in setting damages levels in tort liability cases. Ireland (2019) examines some of these long-standing controversies, particularly as they relate to the use of the VSL to monetize the loss of enjoyment of life. My current article and my book are consistent with his assessment that I strongly oppose the use of the VSL for determination of the value of the loss of enjoyment of life. Although my principal focus here is on legal contexts, it is often useful to consider other uses of the VSL by the government and by corporations. A broader perspective on the applications of the VSL fosters understanding of the VSL concept and also provides the context for ascertaining the inappropriateness of the claim by some economic experts that the use of the VSL by government agencies in regulatory analyses serves to validate using the VSL to set damages amounts in the courts for the loss of enjoyment of life.

A principal theme of my book, *Pricing Lives: Guideposts for a Safer Society* (Viscusi 2018), is that there should be expanded use of

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[1] Unless otherwise indicated, all empirical results cited in this article are drawn from Viscusi (2018).

the VSL to foster efficient levels of safety, but the VSL should not be misused for other purposes. In particular, the VSL can serve as the economic reference point for assessing the efficiency of corporate risk decisions, the monetary value of mortality reduction benefits in policy contexts, and the appropriate level of regulatory sanctions after fatalities. However, the VSL is not well suited to setting compensation levels after fatalities in routine wrongful death cases. In the case of the courts, I advocate the prohibition of the use of the VSL in setting compensatory damages for matters such as loss of enjoyment of life. The courts should, however, use the VSL to evaluate safety levels for purposes of assessing negligence and when setting punitive damages awards for cases involving fatalities.

Section II introduces the basic economic theory underlying the VSL and the empirical approaches to estimating its value. Government agencies routinely use the VSL to monetize mortality risk effects, which Section III documents with a selection of recent government applications of the VSL. There is a legitimate role for the VSL in the courts for purposes of determining liability and setting damages amounts, as is discussed in Section IV. However, despite the name of the VSL concept, it is not always appropriate to apply this measure in every situation involving fatality risks. Section V explores why the use of the VSL to monetize the loss of enjoyment of life for fatal and nonfatal injuries is not appropriate. Section VI examines more specialized issues pertaining to use of the VSL. These matters include the heterogeneity of the VSL for different population groups and new ways in which the government can use the VSL to foster safety incentives. Section VII concludes.

II.   The Value of a Statistical Life: Economic Basics

Economic Concepts

Consider the following thought experiment. Suppose that you are asked how much you are willing to pay to eliminate a one-time only 1/10,000 risk of immediate death. If your response is $900, then your marginal value per unit risk, or the VSL, is given by $900/(1/10,000) = $9 million. Viewed somewhat differently, if 10,000 people faced a risk of death of 1/10,000, and each person was willing to pay $900 to eliminate the risk, it would be possible to raise $900 × 10,000 = $9 million to prevent the one expected death.

From the standpoint of serving as a value of a life, the VSL only gives the tradeoff rate involving small probabilities of death. The VSL understates the amount of compensation that a person would require

to accept immediate certain death. Similarly, the VSL overstates how much people would be willing to pay to avoid immediate certain death. The VSL is consequently bracketed by the willingness-to-pay (WTP) amount to eliminate immediate certain death and the willingness-to-accept (WTA) amount to accept immediate certain death. For small changes in risk, the WTP and WTA amounts should imply approximately the same values of VSL, but for large changes in risk, such as those involving immediate certain death, the equality in the WTP and WTA amounts no longer holds.

The local risk-money tradeoff that is captured by the VSL has a well-defined theoretical basis. In particular, the VSL = [(utility when healthy) – (utility when dead, or the bequest function)] / [expected marginal utility of income]. The VSL consequently serves as a measure of welfare loss from death. Since utility levels are only defined up to a positive linear transformation, the difference in utility when healthy and when dead is normalized by the expected marginal utility of income. The resulting VSL measure is only applicable for very small changes in risk.

Being limited to only small changes in risk makes the VSL quite pertinent to analyzing optimal levels of safety. Economic models in which the firm is picking the product or job risk in a market context will set the efficient level of risk based on the tradeoff rate implied by the VSL, i.e., the marginal cost of providing greater levels of safety will equal the VSL. The VSL appears in the mathematical structure of the firm's profit-maximizing optimization criteria because it reflects the risk-money tradeoff that consumers and workers make, which in turn set the marginal price of safety for the firm. Consumers choosing from a continuous schedule of price-risk combinations and workers choosing from a menu of wage-risk combinations will choose to incur greater risk levels in return for lower prices or higher wages. When doing so, they will continue to increase the risk level that they are willing to incur until the rate of tradeoff equals the VSL. Thus, on both sides of the market, the VSL provides the information on the tradeoff rate that establishes the efficient level of risk.

Empirical Evidence on the VSL

Researchers have explored a variety of types of evidence to estimate the VSL, including both stated preference estimates derived from survey questions and revealed preference evidence based on actual risk-taking decisions. Stated preference studies utilize surveys to ascertain WTP and WTA values for hypothetical risks. Survey techniques have evolved considerably over the past several decades and now incorporate rationality and consistency checks to establish some basis for having confidence in these estimates. Stated preference

approaches are often instructive for valuing specialized outcomes for which market data may not be instructive, such as cancer. Estimates based on revealed preference studies are more likely to be reflective of individual preferences and comprise the dominant source of evidence used by U.S. regulatory agencies. These studies exploit excellent databases that facilitate the analysis of risk-money tradeoffs in job markets, product markets, and housing markets. The largest VSL literature is with respect to job markets because of the wide availability of employment data as well as detailed job risk data, making it possible to match objective risk levels to workers in the sample. The underlying economic theory for exploring wage-risk tradeoffs dates back over two centuries to Adam Smith, who observed that workers would receive a compensating differential for jobs that were unpleasant in some respect.

There have been hundreds of empirical estimates of the VSL using labor market data throughout the world. The most reliable estimates for the U.S. utilize fatality rates derived from the Bureau of Labor Statistics Census of Fatal Occupational Injuries (CFOI). This comprehensive census of job-related deaths includes all traumatic occupational fatalities that are verified based on multiple sources. The refined nature of the data makes it possible to construct risk levels conditional on a variety of worker characteristics including, among others—industry, occupation, gender, age, race, and immigrant status. In Viscusi (2018), I conclude that the appropriate VSL estimate based on CFOI data is in the range of $10 million. This value is below the median VSL estimate of $11 million in the studies using the CFOI data and slightly above the $9.6 million value derived after undertaking statistical corrections for publication selection biases. Publication selection effects can arise from authors' selection of which VSL estimates to submit to journals and the decisions by journals that affect which estimates are accepted for publication.

The VSL is not a universal constant. It varies over time, of course, with variation in overall price levels. It differs within countries and across countries. One important source of variation in the VSL is with respect to income. The estimated income elasticities for VSL in the literature are positive, and vary based on the sample and the estimation approach. For the United States, the VSL income elasticity estimates are often in the range of 0.5 to 0.6, but some estimates are 1.0 or greater. Based on international data, the average income elasticity is about 1.0, but the income elasticity may be greater for countries with very low income levels. Age variations in the VSL are also consequential, but the VSL does not steadily decline with age. Rather, the VSL-age trajectory displays an inverted-U shape over the life cycle, peaking at middle age in much the same way as does the life-cycle

pattern of consumption. Despite the decline in the VSL with age, the VSL does not plummet with age, as the VSL for workers age 62 exceeds that for workers age 20. Economic studies have also estimated VSL differences by gender, race, union status, immigrant status, and other characteristics.

III.   How the Government Values Lives

Government agencies have a long history of monetizing changes in mortality risks for policy purposes. This practice predates the advent of the VSL literature. The early approach to monetizing mortality risks was to use the present value of income of the decedents as the benefits measure. Equating the benefit of mortality risk reductions with the income loss has the advantage that the number is comparatively easy to calculate and is the approach used in wrongful death cases, which gives it an aura of legitimacy. However, this human capital approach is divorced from the underlying benefits principle for all government policies, which is that society's willingness to pay for the benefit should govern how the policy effects should be monetized. For policies reducing mortality risks, the unit benefit amount per expected life saved is the willingness to pay for the mortality risk reduction. As a result, the economic benefit to be valued corresponds appropriately to the VSL.

Despite the economic merits of using the VSL to monetize mortality risks, government agencies were reluctant to embrace the approach. Government officials resisted the notion of valuing lives as being "immoral." Instead, they monetized the same change in mortality risks based on the monetary loss, or what they termed the "cost of death," which involved different nomenclature but nevertheless still involved placing a dollar value on the expected lives that would be saved. The shift in government policy to adopt the VSL occurred after the debate over the proposed hazard communication regulation in 1982.[2] The Occupational Safety and Health Administration (OSHA) calculated the mortality reduction benefits associated with the regulation based on the medical costs and income loss, or OSHA's assessment of the "cost of death." Because the benefits that OSHA calculated were below the estimated costs, the Office of Management and Budget (OMB) rejected the proposal. After OSHA appealed the decision to then Vice President Bush, I was asked to settle

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[2] My role in this debate is documented by Pete Earley, "What's a Life Worth? How the Reagan Administration Decides for You," *Washington Post Magazine*, June 9, 1985, p. 36.

the dispute between the two agencies. While the OMB critique of OSHA's benefit-cost analysis was correct, the calculated benefits exceeded costs once I replaced the cost of death value with my estimate of the VSL, which was about $8 million in current dollars. Shifting to the VSL approach boosted benefits by about an order of magnitude. The day after my report in support of the regulation reached the Reagan White House, OMB approved the regulatory proposal. Agencies then shifted to use of the VSL to value government policies.

While government agencies embraced the general VSL approach, there was controversy over the magnitude of the estimates. Some critics attacked the values as being too large because these VSL estimates greatly exceeded the present value of lost earnings. However, because the VSL is only a reflection of the WTP and WTA for small changes in risk, and it is not a measure of how much a person could pay to avoid immediate certain death, this critique is inappropriate. From a WTP standpoint, people will be willing to pay large amounts for the first small initial reduction in risk, but their willingness to pay for subsequent risk reductions will diminish as their resources become depleted. With each incremental expenditure to reduce the risk, income effects take hold, reducing the marginal valuation of further risk reductions. An additional economic influence that comes into play is that each marginal risk reduction purchase reduces the risk of death and increases the probability that the person will be alive. The expected opportunity cost of money consequently becomes greater as the probability of survival increases, thus lowering the WTP amount. If the VSL was being used to value prevention of immediate certain death, then it would be too large because $10 million exceeds most people's available financial resources.

Other critics of my approach suggested that my benefits value for mortality risks, and indeed, any finite value, was too low. The purported problem was not that the estimates were wrong but that life is priceless and that the value placed on mortality risks should be infinite. Society should be willing to pay any price to prevent the loss of life. This unbounded commitment to mortality risk reduction is, however, inconsistent with individuals' revealed preferences for risk-taking behavior. Moreover, budgetary constraints for government policies limit our resources in all domains of choice. An additional problem is that profligate spending on safety measures leads to the loss of life. In particular, government expenditures shift resources that individuals use to provide for matters such as better health care, improved diets, and living in a safer neighborhood. My empirical estimates indicate that every expenditure of $100 million leads to the loss of one expected life because of these opportunity costs. Put somewhat differently, every time the government spends $100 million

to save one expected life, that effort is a break-even proposition in terms of the overall mortality risk effects.

Despite the conceptual shift in benefit assessment procedures from the cost of death approach, agencies remained anchored to the cost of death numbers and tended to make only gradual progress toward implementing VSL values consistent with the literature. However, after more than three decades of using VSL estimates, there has been widespread convergence in the VSL levels used for policy. Table 1 provides a list of a series of recent regulatory analyses and the VSL statistics that have been used to monetize the mortality-related benefits from 2014 to 2018, where all values have been converted to 2017 dollars. The VSL estimate ranges for different regulations are from $9.1 million to $11.1 million for the Environmental Protection Agency (EPA), $9.9 million to $10.2 million for the Occupational Safety and Health Administration (OSHA), $9.8 million to $10.0 million for the Department of Transportation (DOT), and $9.5 million to $10.4 million for different branches of the Department of Health and Human Services (HHS). The estimates may differ within agencies because of different times when the underlying analyses were undertaken and differences across agencies in which VSL estimates are used in constructing the consensus number used for the analysis. However, the VSL estimates used are quite similar and in accordance with the findings in the economics literature. Claims that there are wide disparities in the VSL are not borne out. Policies are unlikely to be affected by use of a VSL of $9 million or $11 million, but a VSL of $2 million would have a dramatic impact on which efforts passed a benefit-cost test.

In an effort to provide greater structure to the choice of the VSL, the three agencies that are responsible for the most costly health, safety, and environmental regulations have issued official guidance memoranda. Recent examples of the official guidance VSL numbers for the U.S. Environmental Protection Agency (2016), the U.S. Department of Transportation (2015), and the U.S. Department of Health and Human Services (2016) indicate VSL amounts in the $9 million to $10 million range. EPA and DOT have established a peer review process or selecting the VSL and have prepared detailed literature reviews to support their chosen VSL estimates. DOT derives its VSL estimate based on a review of the labor market studies using the CFOI estimates, while EPA relies on a broader sample that also includes some stated preference studies. The HHS (2016) report does not specify the procedure used by that agency for selecting its VSL estimate.

Table 1.   Selected Values of Statistical Life Used by U.S. Regulatory Agencies*

Year	Agency	Regulation	VSL ($ 2017)
2014	Environmental Protection Agency	Carbon Pollution Guidelines for Existing Power Plants and Emission Standards for Modified and Reconstructed Power Plants	11.1
2014	Occupational Safety and Health Administration	Electric Power Generation, Transmission and Distribution; Electrical Protective Equipment	10.2
2015	Environmental Protection Agency	O3 NAAQS	11.2
2015	Environmental Protection Agency	Residential Wood Heaters NSPS Revision	9.1
2015	Environmental Protection Agency	Clean Power Plan Rule	11.1
2015	Environmental Protection Agency	Brick and Structural Clay Products NESHAP	10.9
2015	Department of Transportation	Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains	9.8
2016	Environmental Protection Agency	Cross-State Air Pollution Rule (CSAPR) Update for the 2008 O3 NAAQS	11.1
2016	Department of Transportation	All Policy Analysis	10.0
2016	Food and Drug Administration	Amendments to Registration of Food Facilities	9.5
2016	Health and Human Services	Guidelines for Regulatory Impact Analysis	10.4
2016	Occupational Safety and Health Administration	Walking-Working Surfaces and Personal Protective Equipment (Fall Protection Systems)	9.9
2017	Food and Drug Administration	Tobacco Product Standard for N-Nitrosonornicotine Level in Finished Smokeless Tobacco Products	10.0
(continued on next page)			

Table 1. (continued)

Year	Agency	Regulation	VSL ($ 2017)
2018	Environmental Protection Agency	Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units; Revisions to Emission Guideline Implementing Regulations; Revisions to New Source Review Program	10.9

*When the published summaries of the regulatory impact analyses for these rules do not specify the year in which the reported dollars are denominated, the calculations assume that the dollar year corresponds to the date of rule publication for purposes of converting all values into December 2017 dollars using the CPI-U. These data are drawn from Table 2 of Viscusi (2019a), which in turn was based on estimates in regulatory impact analyses published in the *Federal Register*.

IV. Applying the VSL in the Courts

Economic Functions of the VSL

The subsequent sections explore the uses of the VSL in non-governmental contexts in further detail, but it is useful to briefly summarize the legitimate uses of the VSL in tort liability contexts. The VSL emerges from money-risk tradeoffs in the market that simultaneously reflect the efficient mortality risk-money tradeoff for firms and the mortality risk-money tradeoff that is consistent with the preferences of those exposed to the risk. In each instance, there is no aspect of the valuation linked to compensation amounts after fatalities or levels of insurance that people would find to be desirable after death. In that vein, the government has never used the VSL for purposes of establishing compensation levels after fatalities. Rather, the exclusive focus of governmental practices has been on the implications for setting efficient levels of safety based on the guidance the VSL provides for monetizing mortality risks. These applications of the VSL by government agencies to monetize mortality risks are consistent with the economic theory underpinning the VSL concept.

The most direct analog in legal contexts of these governmental practices is to employ the VSL to assess the efficient level of safety in much the same way as government agencies use the VSL to assess the efficient levels of risk reduction. Consistent with standard law and economics models of the economic structure of negligence rules, the task for the courts with respect to evaluating corporate risk decisions is to ascertain whether companies have struck an efficient balance between risk and costs. Making this risk-utility test assessment requires that the monetary costs and fatality risks be placed in comparable terms, which can be accomplished by applying the VSL to monetize the

risks. Thus, the first potential application of the VSL in legal contexts is with respect to determining liability. Has the corporation been negligent in its product safety decisions? If that is the case, then the usual compensatory damages amounts are appropriate.

There is also an additional safety incentive role of the VSL in legal situations where creating incentives for deterrence is paramount. Suppose that punitive damages are warranted because a company is guilty of conduct that is malicious, reckless, or displays a callous disregard for safety. What level of penalties will induce the company to have the economic incentive to provide an efficient level of safety? By setting the total value of compensatory damages plus punitive damages equal to the VSL for each death resulting from the company's behavior, the firm will have a financial incentive to strike an efficient balance between risk and cost. This incentives role of the VSL is analogous to my proposal that governmental agencies set regulatory sanctions for violations leading to fatalities based on the VSL.

Adopting an economic theory for setting punitive damages surely will be controversial. The courts thus far have not embraced economic theories in which the total damages amount should be inversely related to the probability of detection of the harm. This formulation dates back to Jeremy Bentham and has more recently been articulated by Polinsky and Shavell (1998). The reluctance to adopt an economic approach may stem from the belief that punitive damages should remain "within the province of the jury," as noted by Judge Wolfson in *Voilas v. General Motors Corp.* (D.N.J. 1999).[3] A substantial body of research has documented the ability of jurors to identify egregious behavior, which is suggestive of some constructive role for juries in punitive damages contexts. However, these studies have also found that the ability to discern such egregious behavior is often accompanied by rampant inability to make sound decisions with respect to the level of punitive damages (Sunstein et al. 2002). Jurors have difficulty in systematically mapping their sense of the recklessness of the behavior into a monetary damages amount. Equating the total of punitive damages plus compensatory damages to the VSL as I propose is a straightforward approach that can be implemented by jurors quite easily. My proposal to use the VSL in punitive damages contexts provides structure to jury deliberations and also will yield punitive damages values that will address the deterrence function of punitive damages.

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[3] The author is indebted to Thomas R. Ireland for calling this case to my attention.

The uses of the VSL that I advocate for the courts consequently draw on the underlying theory for the VSL, which is based entirely on efficient risk tradeoffs and is unrelated to providing compensation after fatalities. Thus, the VSL has no role to play in setting damages for components such as the loss of enjoyment of life despite the similarity of the wording of the VSL to the valuation of life. Before delving more deeply into the occasional misuse of the VSL in setting compensatory damages, it is instructive to examine why there would be such a mismatch between deterrence and compensation amounts in wrongful death cases while there is no such disparity for property damages cases.

The Misleading Property Damages Reference Point

If the VSL is the appropriate economic measure for providing efficient levels of incentives for risk avoidance, why is it not also the appropriate value to use in setting compensation amounts? There is such a correspondence for property damages cases. Setting damages in property loss cases equal to the value of the harm establishes both efficient safety incentives and optimal levels of insurance. While the procedure for setting damages amounts in tort cases involving property damage has well-established efficiency properties, the property damages case provides misleading lessons for setting damages for personal injury. In the property damage situation, a single policy instrument can simultaneously promote two objectives—optimal deterrence and optimal compensation (Shavell 2004). However, it is not feasible to simultaneously fulfill both objectives in wrongful death cases and personal injury cases generally. It is instructive to begin with the basic law and economics analysis of property damages models, which is the primary focus of the law and economics literature, and then contrast these results with the economic model for personal injury. Understanding these principles assists in establishing the conceptual framework for motivating the legal context in which the VSL might play a constructive role.

Let the utility function before the harm be $u_1(y)$, where y is the income level. The tort imposes some property damage amount v, so that the utility $u_2(y)$ after the damage is a simple modification of the initial utility function so that $u_2(y) = u_1(y - v)$. Setting the damages amount d equal to v has attractive economic properties. First, the procedure is straightforward and intuitively appealing, as it serves to make the victim whole, restoring the utility level to the pre-injury utility level. Second, because $d = v$, setting damages in this manner creates efficient incentives for accident avoidance because the damages payment will lead the injurer to internalize the cost of the accident when choosing risky behaviors. Third, setting damages equal to v

provides the optimal level of insurance. If the victim were to purchase insurance on an actuarially fair basis, the efficiency criterion for optimal levels of insurance would equate the marginal utility of income before and after the injury. This result for equating the marginal utility in the two health states is true generally, as it also holds for harms involving personal injury. However, because the property damage loss v is a monetary equivalent that does not alter the structure of the utility function u_1, equating the marginal utility before and after the harm leads to an optimal insurance amount v, so that damages payment d equals the harm v.

Matters become much different when the harm alters the structure of the utility function and is not tantamount to a monetary loss. The documented empirical estimates of utility functions after severe injuries is that they reduce the marginal utility of income so that the marginal utility of $u_2(y)$ is below that of $u_1(y)$ for any given level of income (Viscusi 2019b). In the case of death, $u_2(y)$ is the individual's bequest function, for which the estimated marginal utility of income is far below that when alive. Economic researchers have documented the drop in marginal utility from severe injuries and the alteration of the structure of the utility function for a wide variety of adverse health impacts, including serious job injuries, multiple sclerosis, cancer, and death.

An injury does lower the victim's welfare, as do property damages as well. However, because of the effect of serious injuries on the structure of utility functions, the economically efficient damages remedies are quite different. Suppose the individual has the option of purchasing insurance on an actuarially fair basis for a potential injury. The optimal insurance amount continues to equate the marginal utility of income in the two health states, but the optimal insurance payment no longer restores individual utility to the pre-injury utility level when the injury reduces the marginal utility of income for any given income level. In the case of job injuries that are sufficiently serious so as to reduce the marginal utility of income, the optimal insurance amount does not restore the injured worker to the pre-accident level of utility. The result is even starker for health impacts such as death that severely reduce the marginal utility of income.

Posing the question in terms of how much compensation is required to make the injured party as well off after the harm as before the injury consequently does not have a meaningful economic role for conceptualizing optimal insurance and compensation levels for personal injury. Consider the wrongful death situation. After the person is dead, which is the time at which any liability compensation would be paid, there no longer is a utility function. Inquiring regarding the amount of compensation needed to restore a person's welfare after

death is not a meaningful exercise. What if the question posed instead is what compensation level would the person select while alive if designing an insurance policy to make a payment after death? Because estimates of the marginal utility of income for bequests are quite low, inquiring how much insurance a person would purchase to transfer income to one's heirs would lead to very low levels of desired compensation that are far below the VSL.

The optimal insurance reference point that I propose for conceptualizing the optimal compensation amount is more than a hypothetical thought experiment. Damages payments in market contexts have ramifications that are very much like the insurance scenario of making premium payments in return for insurance coverage. Suppose that a firm is marketing a product involving some risk p of death to the consumer. Let the damages amount paid to the victim's estate be designated by z. Then the expected cost increase for the product due to this damages payment is pz. This expected cost in turn raises the marginal cost of the product so that just as in the thought experiment above consumers of the product will be implicitly purchasing the insurance policy. However, if the value of z is set at a level above that which they would have chosen in the insurance thought experiment, in this instance they will be charged for coverage that they do not fully value. An analogous result holds for worker fatalities, as there is a reduction in worker wages in response to higher levels of workers' compensation benefits. For injuries that do not involve a market transaction, as in the case of an injurer harming a stranger, the victim does not suffer any over-insurance losses directly, but there nevertheless will be an efficiency loss to the economy.

V. Hedonic Damages and the Loss of Enjoyment of Life

Why Hedonic Damages Do Not Measure the Loss of Enjoyment of Life

Use of the VSL to establish a value of nonmonetary losses associated with injuries comes under the general heading of "hedonic damages." The terminology draws on that used for the econometric approach for estimating the VSL, which is based on hedonic (or quality-adjusted) wage equations. Despite the absence of any foundation in economic theory for equating the VSL with the nonmonetary loss from death, application of the VSL for this purpose is sometimes attractive to plaintiff attorneys because it provides jurors with a high dollar anchor for setting the compensation levels for nonmonetary loss components. Even in situations where the economic expert cannot recommend a single VSL figure, having the jury think of

damages corresponding to the magnitude of the VSL will tend to boost damages awards.

Most, but not all courts, have consistently rejected the use of hedonic damages to measure nonmonetary loss components of damages associated with death or serious personal injuries (Ireland 2000, 2009, 2012). Mississippi formerly was a prime hedonic damages venue until the state legislature passed a statute in 2003 prohibiting this approach. Nevada and New Mexico permit the introduction of the VSL in hedonic damages cases, but limit the testimony to discussing the VSL approach rather than giving guidance with respect to a specific damages amount for that particular case.

A representative nonmonetary loss component for which hedonic damages have come into play is with respect to setting a damages value for what has been termed the "loss of enjoyment of life." Ideally, jury instructions should give jurors meaningful ways to conceptualize the damages task and select a specific damages amount that is pertinent to the particular circumstances in the case. However, jury instructions for the loss of enjoyment of life fall short in achieving this goal. Consider the jury instructions for loss of enjoyment of life in South Carolina, which are representative:

> Loss of the capacity to enjoy life, resulting from a personal injury, is a proper element of damages. If you find evidence of "loss of enjoyment of life," you may award damages for this loss. Damages for "loss of enjoyment of life" compensate for the limitations, resulting from the defendant's negligence, on the injured person's ability to participate in and derive pleasure from the normal activities of daily life, or for the individual's inability to purse his talents, recreational interests, hobbies, or avocations. "Loss of enjoyment of life" damages compensate the plaintiff not only for the subjective knowledge that one can no longer enjoy all of life's pursuits, but also for the objective loss of the ability to engage in these activities.[4]

Recognizing that there has been loss of enjoyment of life is often simple. But mapping this loss of enjoyment of life into an appropriate monetary amount is more challenging. What dollar amount corresponds to the loss of enjoyment of life for a severe burn injury or a fatal auto accident? Consider first the application of the loss of enjoyment of life in the case of a fatal injury. The victim has lost all of

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[4] Ralph King Anderson, *South Carolina Requests to Charge—Civil* (Columbia: South Carolina Bar, 2002), S 13-9 (2002), SC-JICIV 13-9: Damages—Elements of Actual Damages—Loss of Enjoyment of Life.

his or her future welfare. Providing compensation after the person's death will not enable the victim to enjoy life or derive any welfare benefit from the payment. The victim does not have a utility function after death. Any bequest function only enters in an anticipatory way before death, but the victim was not aware *ex ante* of the prospective payment amount. The pertinent economic conceptualization of this damages component is consequently unclear. Perhaps in part because of the conceptual challenges involved in ascertaining a sensible role of loss of enjoyment of life damages after fatal injuries, some states such as Louisiana that have permitted loss-of-enjoyment-of-life damages in some instances do not permit this damages component for fatalities.

An alternative conceptualization of loss of enjoyment of life is to inquire what damages payment the victim would have chosen *ex ante* for the nonmonetary loss resulting from death. There should be some cost to the individual when making this choice or else there would be no reason to limit the request to a finite amount. One such reference point is the damages amount the prospective victim would select if permitted to purchase an actuarially fair insurance policy to provide for such a payment. That approach would lead to payment amounts far below the VSL given the low marginal utility for bequests as compared to spending the funds while alive. Moreover, if a person is buying such coverage that would be provided after death, why would there be any desire to set up payments related to the loss of enjoyment of the victim's own life given that the victim is deceased? Because the role of the payment for deterrence has been set aside, as the concern here is compensation to the victim and the victim's estate, only the bequest motive would be pertinent. That amount is unrelated to restoring the victim's loss of enjoyment of life after death. Ultimately, there is no plausible economic conceptualization for using the VSL to establish a value on the loss of enjoyment of life for fatal injuries.

Consider next the application of the loss of enjoyment of life in the situation of nonfatal injuries. Unlike the effect of fatalities on future well-being, after a nonfatal injury the victim continues to have a utility function, and providing monetary payments can enhance the person's well-being. However, since the victim is not dead, the VSL is not an appropriate match to the health impact involved whether the purpose is deterrence, compensation, or some ad hoc conceptualization of how the loss of enjoyment of life can be linked to the VSL.

Unfazed by the analytic mismatch between the VSL and nonfatal injuries, some plaintiff experts attempt nevertheless to shoehorn the multi-million dollar VSL anchor into jurors' deliberations. There are several approaches that economic experts have introduced. Disability ratings can indicate that the person has suffered some percentage disability, such as 20 percent. Alternatively, one could provide scores

based on the burgeoning behavioral economics literature in which people rate their happiness, life satisfaction, or well-being on various scales, such as a 0 to 10 score. For simplicity, assume that the post-injury happiness score is 20 percent less than it was before the injury. Straightforward application of hedonic damages approaches would suggest that the loss of enjoyment of life in these instances is 20 percent of the VSL. With a VSL of $10 million, the calculated loss of enjoyment of life would be $2 million.

Even as a measure of deterrence, not compensation, this approach is invalid. There is no correspondence of the VSL theory to disability scales, happiness scores, life satisfaction scores, or well-being scores. A 20 percent decline in these scores is not tantamount to a 20 percent risk of death. Death is forever, but happiness and well-being scores are more ephemeral. Even serious physical ailments may not have the anticipated long run adverse effect on well-being. The effect of multiple sclerosis (MS) on the marginal utility of income is much less for patients who have MS than the anticipated decline in welfare among healthy individuals who are provided information regarding the consequences of MS (Viscusi 2019).

While the conceptual mismatch between the VSL and these measures of the welfare effects of nonfatal injuries cannot be remedied, it is feasible to move away from the life and death framework of the VSL. The counterpart of the VSL is the VSI, or the value of a statistical injury. As in the case of the VSL, these figures set values for efficient levels of deterrence, not compensation. For work-related injuries, the VSI values are usually in the range of $50,000 to $100,000. These VSI amounts reflect potential financial and non-financial impacts of job injuries, net of losses addressed by workers' compensation payments. An expert seeking to apply these figures to the loss of enjoyment of life after an injury would still have to confront the task of demonstrating how the VSI values relate to the legal and economic conceptualization of the loss of enjoyment of life. It is likely that the modest magnitude of the figures that would result from such an effort has dampened any enthusiasm for exploring the VSI approach.

Advocacy of Hedonic Damages in the Law and Economics Literature

While hedonic damages have arisen most frequently in expert reports in personal injury cases, there have also been some advocates of applying this approach by eminent scholars in the law and economics literature. Posner and Sunstein (2005) advocate setting damages in wrongful death cases based on two damages components that they suggest could be added together. The first component is what they term the base amount, which is equal to the current

compensatory damages value consisting of the loss to the victim and the loss to survivors. The second component is the hedonic loss to the victim monetized by the VSL. Posner and Sunstein also note a possible alternative to using the VSL based on the jury's assessment of the "value of the life's pleasures lost by the victim," but the only specific monetary guideline they provide for such an assessment is the VSL.

Consider the consequences of augmenting the current compensatory damages values by the VSL. Let us assume that compensatory damages that are currently awarded equal the optimal insurance amount. This correspondence is not entirely direct as pain and suffering compensation provides additional funds not related to income loss, and payment of attorney fees reduces the level of resources that the victim actually receives. Whether people would choose to insure for pain and suffering losses depends on the effect of the injury on the marginal utility of income, which is typically negative for severe injuries. An adjustment in the opposite direction is that reductions from the award for legal expenses and attorney fees may promote the alignment of the compensatory damages value with the optimal insurance amount. Awarding the VSL as an additional award component will not only foster deterrence but will lead to excessive deterrence if damages also include the standard compensatory damages amount. This duplicative payment will also lead to excessive levels of insurance so that their proposal will be excessive from the perspective of insurance and deterrence.

A different proposal is that of Polinsky and Shavell (1998), who advocate replacement of the current compensatory damages regime by the VSL. Their proposal will generate efficient incentives for deterrence, but will provide excessive levels of insurance. Relying instead solely on the current compensatory damages values sacrifices deterrence by focusing solely on insurance-related concerns. However, by relying on the VSL to set total damages as I have proposed when punitive damages are warranted, ideally the courts will target the financial incentives in situations where the shortfall in safety incentives is most problematic.

VI. Heterogeneity and Legitimate Uses of the Value of a Statistical Live

Daubert Tests and the VSL

Provided that we set aside the purpose for which the VSL is being used in the courts, the VSL certainly meets the standard Daubert criteria for expert testimony that is based on scientific evidence. The

VSL concept and empirical evidence are mainstream economic concepts that have undergone extensive peer review in the academic literature and by government agencies before they implemented their agencies' VSL guidance. The observed differences in VSL estimates do not undermine their scientific validity. There is, of course, heterogeneity in empirical estimates of the VSL because of different samples that are used and differences in econometric approach. Despite this heterogeneity, government agencies have converged in their estimates of the VSL to figures around $9 million to $11 million based on their review of the most credible studies in the literature. Similarly, my analysis of hundreds of published VSL estimates based on labor evidence using the CFOI data indicate a similar value after taking into account publication selection effects. That the VSL is a credible measure of the risk-money deterrence amount does not, however, imply that it has been validated as an appropriate measure of compensation.

Damages awards ideally should be specific to the losses the particular decedent incurred. Many attempted applications of the VSL have ignored the important role of heterogeneity so that even if application of the VSL was appropriate, the failure to account for differences in the VSL would be problematic. Studies in the literature have documented variations in the VSL with respect to characteristics such as age, income, and gender, among other demographic factors. Governmental applications of the VSL rarely account for such differences because the policies tend to have broadly based impacts across society. There are also political concerns in play. Whereas court awards differ markedly in wrongful death cases for victims of different ages, there was a public outcry after the EPA reduced the VSL for those over age 65 by 37% in its analysis of the Clear Skies Initiative. Recognizing case-specific differences in the VSL should be less controversial in personal injury contexts. Court cases have long tailored the damages amounts to the specific aspects of the case. Failure to incorporate case-specific heterogeneity in the VSL in many hedonic damages analyses is consequently an additional deficiency of the common hedonic damages approach.

Proper Uses of the VSL for Corporate Risk Decisions and Regulatory Sanctions

To provide efficient levels of product safety, companies should set the cost-risk tradeoff for product design based on the VSL. A shortfall in safety below this level would be evidence of negligence. Historically, companies undertook such calculations, but they used as their reference point the value of wrongful death awards rather than the VSL. In its analysis of the gas tank placement for the Ford Pinto, Ford

relied on wrongful death awards for guidance, leading to the conclusion that the benefits of additional safety measures did not exceed the costs. Chrysler and General Motors undertook similar analyses for their companies' vehicles using the costs of wrongful death awards as the monetized value of mortality risks. The result is that companies were not only found to be guilty of negligence, but they also incurred substantial punitive damages awards that were sometimes in excess of $100 million.

Rather than putting corporate risk analyses on a sounder economic basis, the approach instead has been to shunt safety issues to the side. The GM ignition switch defect and the failure to recall the defective vehicles led to 124 deaths, which would have a value of $1.2 billion based on the U.S. Department of Transportation's current VSL estimate of $9.6 million. The estimated cost of the recall in 2007 was only $100 million so that even if this cost increased as the scale of the recall expanded it would have passed a benefit-cost test. Not only did GM fail to undertake a meaningful risk analysis, but the report commissioned by the CEO of GM found that the GM safety culture was seriously deficient. For example, the Valukas (2014) Report found that GM had compiled a list of forbidden words not to be used in company documents, including: bad, dangerous, defect, problem, and safety. Similarly, after test driving vehicles, company drivers were advised to not make comments such as: "This is a safety and security issue..." and "Dangerous...almost caused an accident." Other aspects of corporate behavior likewise indicate a lax safety culture, such as the "GM nod," whereby meeting participants acknowledged a problem and did not commit to taking any action to address it.

Companies can rectify their risk analysis approach by using the VSL in their corporate risk decisions. Despite the economic rationale for using the VSL to monetize risks, companies may be reluctant to do so because use of the VSL would establish a high dollar anchor for jury awards. To eliminate this disincentive, I advocate legislation following the approach of apology laws for medical malpractice in order to establish a safe harbor for use of the VSL in corporate risk analyses. If this protection is provided, plaintiffs could not introduce evidence regarding application of the VSL.

Another mechanism for promoting the application of the VSL in corporate risk decisions is to use the VSL in setting the penalty levels for regulatory violations that led to fatalities. For the GM ignition switch failure, the National Highway Traffic Safety Administration had a damages cap of $7,000 per violation and a maximum penalty amount for a related series of violations equal to $35 million. Other agencies have statutes that similarly impose rigid limits on the level of

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penalties, undermining potential safety incentives. As a result of these caps, the average penalty levied by OSHA for serious violations leading to fatalities is $7,000 for federal enforcement actions and $3,500 for state enforcement actions. Maximum penalty amounts in 2018 were $12,934 for serious violations and $129,336 for willful and repeated violations. Other agencies such as EPA and the Food and Drug Administration likewise are constrained by caps that restrict penalties to below the efficient level. There is consequently a tremendous inconsistency between the cost-risk tradeoffs used in analyses of prospective policies and the level of penalties used to establish efficient incentives for deterrence. This shortfall is a legacy that can be traced back to the time period when the statutory guidance was established, which was before the advent of the application of the VSL by government agencies. Revamping the statutory guidance to boost the upper limits on penalty amounts is long overdue.

VII. Conclusion

The value of a statistical life has provided the mechanism that the federal government has used for several decades to monetize mortality risks. This function has a sound economic foundation in that it is based on the money-risk tradeoff rate that emerges from optimization problems involving risks of death. A principal theme of Viscusi (2018) and this article is that the role of the VSL should be greatly expanded. Two of the more promising applications of the VSL are that government agencies should set regulatory sanctions based on the VSL, and companies should integrate the VSL into their corporate risk decision making.

The proper role for the VSL in the courts entails a departure from current applications of the VSL, which are problematic. However, there are additional roles that the VSL could play. Unfortunately, the VSL does not serve as an all-purpose economic measure irrespective of the context. Some economic experts have embraced the VSL as a mechanism for monetizing the loss of enjoyment of life, but the VSL is not well suited to such a compensatory damages role. The VSL is, however, ideal for providing the monetary signals to establish efficient levels of safety, which can assist in making judgments of liability and in setting total damages levels in deterrence situations. When making determinations of negligence with respect to the levels of product safety, application of the VSL can assist in determining whether the company has struck a suitable balance between risk and cost. The damages role of the VSL emerges in contexts where safety incentives

are paramount, such as when punitive damages are warranted. Setting the total damages award equal to the VSL will establish efficient levels of deterrence. There consequently is a strong rationale for expanding the role of the VSL in the legal system to exploit its legitimate economic function. However, this enhanced role does not encompass matters for which the VSL is not well suited.

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References

Ireland, Thomas R. 2000. Recent Legal Decisions Regarding Hedonic Damages: An Update. *Journal of Forensic Economics* 13 (2): pp. 189–204.

Ireland, Thomas R. 2009. The Last of Hedonic Damages: Nevada, New Mexico, and Running a Bluff. *Journal of Legal Economics* 16 (1): pp. 91–109.

Ireland, Thomas R. 2012. Trends in Legal Decisions Involving Hedonic Damages from 2000 to 2012. *Journal of Legal Economics* 19 (1): pp. 61–88.

Ireland, Thomas R. 2019. *Huncovsky v. The Gates Rubber Company*: A 1990 Case That Still Has Currency in 2019. *Journal of Legal Economics* 25(1-2): pp. 113–122.

Polinsky, A. Mitchell, and Steven Shavell. 1998. Punitive Damages: An Economic Analysis. *Harvard Law Review* 111 (4): pp. 869–962.

Posner, Eric A., and Cass R. Sunstein. Dollars and Death. *University of Chicago Law Review* 72 (2): pp. 537–598.

Shavell, Steven. 2004. *Foundations of Economic Analysis of Law*. Cambridge: Harvard University Press.

Sunstein, Cass R., Reid Hastie, John W. Payne, David A. Schkade, and W. Kip Viscusi. 2002. *Punitive Damages: How Juries Decide*. Chicago: University of Chicago Press.

U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation. 2016. Guidelines for Regulatory Impact Analyses.

U.S. Department of Transportation. 2015. Guidance on Treatment of the Economic Value of a Statistical Life (VSL) in U.S. Department of Transportation Analyses—2015 Adjustment, June 17, 2015.

U.S. Environmental Protection Agency. 2016. Valuing Mortality Risk Reductions for Policy: A Meta-Analytic Approach, February 2016.

Valukas, Anton. R. 2014. *Report to Board of Directors of General Motors Company Regarding Ignition Switch* Recalls, May 29, 2014.

Viscusi, W. Kip. 2018. *Pricing Lives: Guideposts for a Safer Society*. Princeton: Princeton University Press.

Viscusi, W. Kip. 2019a. Risk Guideposts for a Safer Society: Introduction and Overview. *Journal of Risk and Uncertainty* 58 (2-3): pp. 101-119.

Viscusi, W. Kip. 2019b. Utility Functions for Mild and Severe Health Risks. *Journal of Risk and Uncertainty* 58 (2-3): pp. 143–166.

Voilas v. General Motors Corp., 73 F. Supp. 2d 452 (D.N.J. 1999).

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