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Article
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MARKETS FOR ARSENIC

INTRODUCTION

In 1990, North Carolina scientists testing for contaminants in the local water supply decided to use Perrier as a control sample. Clearly, they figured that Perrier would be free of the contaminants for which they were testing. They figured wrong: Perrier contained benzene. Not only that, Perrier contained benzene at levels far exceeding the U.S. Environmental Protection Agency's standard for benzene in drinking water. Perrier responded by voluntarily recalling its U.S. inventory while asserting that the rest of its worldwide inventory contained no benzene. Soon thereafter, benzene was found in Perrier bottles in Europe. Perrier then recalled its entire worldwide inventory — approximately 230 million bottles. The recall and relaunch of the product cost over $250 million. [1]

Perrier has never recovered from the benzene episode. Before 1990, the Perrier brand produced fifteen percent of the revenues of Perrier's U.S. subsidiary; now it produces just three percent. As of early 2000, Perrier's revenue was still forty percent below the revenue it earned in 1989. This, in a bottled water market that has grown by almost ten percent every year in the past decade; in that same period, the bottled water industry has almost tripled, making it a $60 billion global industry. [2] In the midst of all this prosperity, Perrier has experienced fame primarily as a business-school case study about how a good business can go bad.

Perrier's unhappy experience with benzene leads to two simple observations. People do not like to have carcinogens in their drinking water. When given a choice, they are anxious to opt out of the carcinogenic-drinking-water market entirely.

Indeed, imagine that Perrier had decided not to recall its 230 million bottles of water. Suppose that, instead, Perrier had offered its benzene-contaminated water at a reduced price, alongside higher priced Perrier containing no benzene. And suppose the bottles had been clearly marked: ***2312** some said "new, improved! contains no benzene!"; the others said "contains benzene, a known human carcinogen." What do you suppose the market response would have been?

It seems reasonable to speculate that *no one* would have bought the benzene-laced water deliberately. Although people buy bottled water for many reasons, prominent among them is the belief that bottled water is safer and healthier than tap water. This belief helps convince people to pay up from 240 to 10,000 times more for bottled water than for tap water.[3] One could plausibly assume that the very reason Perrier voluntarily recalled millions of bottles at a cost of almost a dollar a bottle was that Perrier knew the market would never forgive it if it did not.

When the Environmental Protection Agency (EPA) was trying to decide whether to strengthen the standard for arsenic in drinking water, it faced a situation not unlike the one Perrier confronted in 1990. Operating under a statutory mandate to consider the results of cost-benefit analysis in setting standards for drinking water,[4] the EPA was obliged to consider the likely market response to the presence of a known carcinogen in drinking water. Considering Perrier's unhappy experience with benzene, one might have expected that the EPA would reduce arsenic in drinking water to as low a level as possible on the theory that, surely, consumers of drinking water would demand this result in a competitive market.

If one expected this, one would be disappointed. In setting a new standard for arsenic in drinking water, the EPA did not rely on the likely consumer response to the presence of a known carcinogen in drinking water; rather, it relied on the increased wage some workers in the 1970s received in exchange for accepting a heightened risk of on-the-job injury. With workplace valuations of risk as its guide, the EPA rejected a more protective standard for arsenic in drinking water—one that would have cost consumers at most an extra three cents per day. In a market that seems never to have forgiven Perrier for allowing a known carcinogen to appear in its drinking water, it seems likely that consumers would be willing to spend three cents a day or less to reduce arsenic in their drinking water. The EPA's decision to reject this trivially more expensive but nontrivially more protective rule, under a statutory provision directing the agency's attention to "consumer willingness to pay for reductions in health risks from drinking water contaminants,"[5] is inexplicable.

In his Article on the EPA's decision on arsenic in drinking water, Professor Sunstein embraces the EPA's use of cost-benefit analysis, including its use of willingness to pay as a measure of the value of reducing arsenic in ***2313** drinking water, but criticizes the EPA's specific estimates of the benefits of reducing arsenic in drinking water. [6] Professor Sunstein's arguments imply that, in some ways, the EPA's estimates of benefits were too high and, in some ways, too low. In the end, however, his downward adjustments to the EPA's estimates of benefits—in particular, his proposal to discount future deaths and illnesses [7] and his proposed manipulations of the dose-response curve for arsenic-related cancers [8] —outweigh any of his upward adjustments to the EPA's estimates because they exponentially reduce benefits. In any event, Sunstein himself does not offer a precise estimate of the benefits of the EPA's rule. On the contrary, he claims that the dollar benefits of the arsenic rule plausibly range from zero to half a billion. [9] Undaunted by this astonishingly wide range, Sunstein argues that cost-benefit analysis is useful to decisionmakers because it helps them to escape the grip of "intuitive toxicologists" (that is, those of us who are not experts in matters of risk) and to make their decisions more transparent. [10]

In this Article, I will criticize the EPA's decision, and Professor Sunstein's discussion of it, on two grounds. First, the EPA's decision failed to take adequate account of the numerous differences between the kind of risk involved in the wage-risk studies on which it relied and the kind of risk it faced—the risk of a latent disease (cancer) and other diseases resulting from passive exposure to a contaminant in household drinking water. The EPA's failure to adjust its valuation based on the special nature of the risk it confronted led it to undervalue this risk in some ways and to overvalue it in others. Nothing gives us reason to hope that these errors simply cancelled each other out.

Second, and more fundamentally, the entire project of setting environmental standards based on decisions ostensibly made in commercial markets is misguided. In trying to assess the wisdom of public policies by considering private "willingness to pay," cost-benefit analysis inevitably must fail. Too many divides created by this effort are unbridgeable: the divides between consumers and citizens, the present and the future, prospective and retrospective perspectives, real lives and statistical lives, and real markets and hypothetical ones. Cost-benefit analysis cannot tell us how to reconcile these dichotomies, and in fact, it does not even try. It leaves all of the really important matters—the collective good, the importance of the future, inequalities in wealth, the value of life, and the irrationalities of the modern marketplace—for another day, and generates a series of numbers that are almost comically meaningless if one really understands them.

*2314 I. REGULATORY STOPPING POINTS AND COST-BENEFIT ANALYSIS

Most environmental standards are set with an eye on costs. All of the statutory provisions Professor Sunstein criticizes [11] direct the EPA's attention to the costs of the standards set under them. [12] Before delving into the details of the EPA's cost-benefit analysis of the arsenic rule, it will be helpful to clarify the difference between cost-benefit analysis and other decisionmaking approaches that take costs into account.

The way costs are taken into account in setting most environmental standards is by using costs (among other factors) to choose the best available means of controlling pollution. The brake on regulation under these laws is the technical and economic feasibility of various methods for controlling pollution. When economic costs and technical constraints begin to rise steeply in comparison with the pollution reduction achieved—the so-called "knee of the curve"—the regulator typically stops requiring further pollution control. [13]

Cost-benefit analysis, by contrast, attempts to reduce the advantages and disadvantages of regulatory alternatives first to numbers and then to dollars. The basic idea is that regulatory policies should be evaluated according to their full social consequences and the social utility they produce, and the consequences, both good and bad, should be evaluated according to how much money people are willing to pay to enjoy or to avoid them. I am not sure that anyone has ever said explicitly that the only way, in principle, to measure human utility is to look at how much money people spend on various items. In practice, however, cost-benefit analysis proceeds by assuming that consumer purchasing decisions are a proxy for human preferences and that preferences are a proxy for utility. [14]

When there are existing markets for the consequences of regulatory policy—such as the markets for, say, pollution control equipment—then it is a relatively straightforward matter to identify a dollar value for these consequences. (Even here, however, there are complexities: Regulatory analysis is notorious for failing to take into adequate account the technological innovations that ultimately make many regulations cheaper to implement than regulators anticipate.) [15] When, however, there is no direct market for the consequence of a regulatory policy, things become very complicated.

***2315** In this situation, the regulatory analyst may do one of three things. First, the analyst may try to identify the "shadow price" for the consequence in question—a kind of indirect price found through application of econometric analysis to a body of

data concerning both price and the variables that may determine price. In wage-risk studies, for example, analysts study the relationship between wages and workplace risk. Although risk is not bought and sold directly, economic analysts have purportedly found through econometrics that risk has an indirect value in the workplace marketplace. [16]

In some cases, however, there is no existing empirical evidence regarding the market's response to the regulatory consequence of concern. In such cases, the regulatory analyst may try to identify an analogue to the consequence in question that does have a current and identifiable market value. The analyst would use the market value of the analogue to estimate the value of the regulatory consequence of concern. This is known in the economic parlance as "benefits transfer." The most prominent example of benefits transfer is the use of wage premiums paid for risky work in valuing the benefits of reducing nonworkplace-related risk, such as environmental risk. In setting the new arsenic standard, the EPA used this approach: It estimated the monetary benefits of reducing risks from arsenic in drinking water by relying on an amalgam of estimates from wage-risk studies. [17]

"Contingent valuation" is the third approach to valuing regulatory consequences when no direct market exists. The aim is to create—or, rather, contrive—the relevant market. This is accomplished by developing surveys designed to elicit the monetary value people place on goods for which no commercial market exists. The valuation is "contingent" because the valuation produced is contingent upon the hypothetical market that was contrived. A famous example is the large-scale survey taken in the wake of the Exxon Valdez oil spill, which sought to elicit the monetary value citizens around the country placed on avoiding another comparable spill. The numbers gleaned from this survey were fantastic: The survey concluded we would be willing to pay as much as $9 billion as a nation to avoid just the noneconomic losses associated with another oil spill like the Exxon Valdez. [18]

In short, in cost-benefit analysis, the regulator chooses the stopping point for ***2316** regulation by considering how much the benefits of regulation are "worth" in comparison to the costs and assesses the worth of the benefits by reference to consumer willingness to pay. Here, then, the brake on regulation is neither economic nor technological feasibility, but limits on the price people are willing to pay for analogous benefits offered in commercial markets. The difference between cost-benefit analysis and other kinds of decisionmaking approaches is not that the latter require no consideration of benefits in comparison to costs; Professor Sunstein's suggestion to the contrary is incorrect. [19] The difference is that no other decisionmaking approach makes regulatory policy turn on consumer decisions in private market transactions.

II. VALUING ARSENIC-RELATED DEATHS

In announcing a new standard for arsenic in drinking water in January 2001, the EPA did something that it had done only once before in its thirty-year history: It set a standard based on formal cost-benefit analysis. [20] Moreover, it set a less stringent standard than it would have set under a more traditional test—one based on the feasibility of current technologies for reducing arsenic in drinking water. As I have said, the agency has often —in fact, almost always—set standards based in some measure on costs. But the agency had not previously based an environmental standard on its estimate of the monetary value of human lives and health.

In deciding whether and how much to reduce arsenic in drinking water, the EPA used an estimate based on studies of the relationship between wages and workplace risks. This yielded a valuation of $6.1 million for each "statistical life" saved by the standard. [21] The agency declined to adjust this number based on any of the distinguishing features of the setting it faced: that is, a latent risk posed by passive exposure to a known carcinogen in household drinking water. [22] As I explain in this Part, the EPA's failure to adjust its valuation based on the special nature of the risk it confronted led it to misstate this risk in numerous ways, sometimes by understating and sometimes by overstating it. Several of the distinctions I draw between workplace risk and drinking water risk will be familiar to any student of economic analysis as applied to environmental problems, but in several cases, I believe this distinction points in the opposite direction from what is suggested typically.

*2317 A. BUYING VS. SELLING

Conventional economic theory assumes that a person who is asked how much she would pay for a certain good will state roughly the same amount as when she is asked how much she would accept to sell the good. Numerous empirical studies have exposed the unreality of this assumption. [23] As it turns out, people often demand much more money to give up the things they have than they will spend to acquire them in the first place. In that case, placing market decisions in the "willingness-to-accept" format will likely yield much larger economic values than will placing them in the "willingness-to-pay" format. Indeed the "willingness-to-accept" format has been rejected for cost-benefit studies in some contexts due to the very high (unrealistically high, critics say) numbers it generates. [24]

Ironically enough, the studies that have dominated the willingness-to-pay literature for two decades—the studies considering wage premiums for risky work—are actually willingness-to-*accept* studies: Workers accept (demand) a higher wage in return for accepting riskier work. Presumably, given the evidence of a disparity between willingness to pay and willingness to accept, the values generated by the wage-risk studies are much higher than they would have been if framed according to willingness to pay. In the context of drinking water, when consumers will be paying for any risk reductions they enjoy, one may argue that willingness to pay is the appropriate framework for valuation. [25] If this is right, then the EPA's use of willingness-to-accept studies in valuing the risk from arsenic in drinking water likely biased that value upward. In simple terms: If willingness to pay is the correct criterion of value here, the EPA's figure of $6.1 million is too high.

B. THE CANCER PREMIUM

None of the wage-risk studies that served as the basis of the EPA's estimate of the value of a statistical life dealt with cancer. Instead, they dealt with workplace accidents. There exists limited, but statistically rigorous, evidence that people are willing to pay considerably more to avoid cancer than to avoid other causes of death. [26] There is also considerable anecdotal evidence to this effect— ***2318** evidence that, indeed, lies just beneath the surface of many regulatory critics' claims that, for too long, we have fixated our regulatory attention predominantly, if not exclusively, on preventing cancer; these claims implicitly take for granted the special fear of cancer. [27] This evidence suggests that estimating the value of reducing the risk of cancer by looking at the value of reducing the risk of, say, being involved in an explosion in a grain elevator is misguided and tends to lead to understatements of the former value.

C. LATENCY

Cancer is a disease with a latency period that ranges from several years to several decades. Yet, as just discussed, people appear to be more afraid of it than of other diseases. The widespread aversion to cancer casts considerable doubt on the casual claim of Professor Sunstein and many others that people inevitably prefer latent to immediate risks. [28] The evidence that people are more afraid of cancer and willing to pay more money to avoid cancer than other causes of death—and Professor Sunstein's apparent acceptance of this evidence [29] —render quite puzzling his argument that the EPA should have discounted the benefits of the arsenic standard to take into account the latency period of cancer.

For its part, the EPA refused to discount the benefits of its rule because it found itself unable to identify credibly the latency period for arsenic-related cancer.[30] The result is correct, but the reasoning is too narrow. Certainly, the EPA cannot simply pick a latency period out of thin air when it lacks credible scientific evidence about what that period is. The EPA should also recognize, however, that discounting for latency ignores the evidence that people are especially afraid of cancer. Even more important, discounting for latency also ignores the fact that the EPA's monetary valuations are of risk, not life. The ***2319** benefit of reducing risk occurs immediately upon reducing arsenic in drinking water, even if the cancers caused by arsenic are not clinically detectable until years after they have begun running their course. To discount monetary valuations from the date when physical illness becomes manifest (the end of the latency period) is to transform invisibly the benefit being valued from risk to life itself.

D. PASSIVE VS. ACTIVE RISKS

Another feature that distinguishes the workplace risks involved in wage-risk studies from the risks posed by arsenic in drinking water is that most of the workplace risks were what I would call "active" risks—risks of sudden death from being crushed by machinery, or buried in a mine disaster, or being present during an explosion—rather than "passive" risks like those posed by drinking water contaminated with arsenic. Working with heavy machinery, for example, might induce a sense of personal skill, maybe even a *thrill*, that passive exposure to toxic chemicals just does not. Indeed, many people *pay money* to be allowed to experience active risks. They pay to go skydiving, bungee jumping, and snowboarding; they pay to go on wilderness trips with outfits like Outward Bound; they pay to be brought by helicopter to remote mountains so that they can ski down avalanche-ridden slopes. Active risk can be thrilling; at the very least, it can provide a sense of satisfaction when things turn out all right. No one, to my knowledge, has ever claimed that passive risks—like drinking water with arsenic in it or inhaling benzene vapors over a lifetime—are thrilling or satisfying. In this way, too, wage-risk studies likely understate the value of avoiding risks associated with passive exposures.

E. GENDER

The wage-risk studies that form the basis of the EPA's valuation of a statistical life involved mostly men. There is considerable evidence that men and women view risks differently; women tend to be like Professor Sunstein's "intuitive toxicologists," seeing risks when experts would not.[31] There is even evidence that female experts on risk (such

as toxicologists) view risks differently from male experts.[32] Women are, moreover, the primary purchasers of household goods.[33] They are likely to be the ones who make a household's spending decisions concerning drinking water. Valuing the risks of arsenic in drinking water by reference to the views of men—who probably, as a group, ***2320** view the risks as less serious than do women and who are not the people likely to be making market decisions about households' drinking water—also understates the value of minimizing arsenic in drinking water.

F. OUTDATED DATA

Another problem with the wage-risk studies on which the EPA relied is that the data underlying them are *very old*. The most recent of the U.S. data underlying the EPA's results come from 1982; the other U.S. data underlying these results are even older.[34] The EPA adjusted its twenty-plus-year-old data for inflation, but not for the economic growth that has occurred in this period. Assuming, as seems reasonable,[35] that willingness to pay for reductions in risk grows proportionately with economic growth and considering that the rate of economic growth in this country has outstripped the rate of inflation during the period that has passed since the EPA's underlying data were collected, the EPA's estimate of the value of a statistical life is understated. Professor Sunstein, like the EPA, attempts to account for the growth in income over the last several decades by adjusting the $6.1 million figure upwards, but also like the EPA, he does so using the wrong baseline year; that is, he starts with 1991, rather than the 1970s.[36] If one took into account the per capita growth in economic activity that has occurred in the whole period since the EPA's underlying data were collected, the value of a statistical life would grow to about $11 million— more than double the figure used in EPA's analysis.[37]

G. SEGMENTATION OF LABOR MARKETS AND CONSUMER CHOICE

The wage-risk estimates on which the EPA relied do not take into account the segmentation of labor markets: They do not consider whether workers in the primary labor market (characterized by more education, better skills, greater mobility, etc.) receive a higher wage premium than workers in the secondary labor market (characterized by less education, fewer skills, less mobility, etc.). Some years ago, the late economist Don Shakow and collaborators studied the potential effect of labor market segmentation on wage premiums for risky work. They found that wage premiums in the secondary labor market were either far lower than those in the primary market or even disappeared altogether.[38] This ***2321** evidence contradicts the

assumption of mainstream economic theory that people need to be paid to take on jobs with unattractive characteristics as compared to other jobs. [39] But if Shakow's empirical evidence is correct, then the EPA's average value for statistical life is an overestimate for some workers and an underestimate for others. The difference depends on the education, skills, and other background circumstances of the workers involved. In this regard, therefore, whether the EPA's estimate of the value of reducing arsenic in drinking water overstates or understates the "true" value to the consumer of drinking water depends on the individual circumstances of the communities exposed to arsenic in their drinking water.

H. WEALTH

The last point raises another related idea: as Professor Sunstein notes, the wage-risk studies on which the EPA relied involved workers whose average wage was below the wage of the average American. [40] He suggests increasing the estimated value of reducing arsenic in drinking water to account for this differential in wealth. [41] If the communities exposed to arsenic in their drinking water are as poor as the workers in the wage-risk studies, or even poorer, this increase will have the effect of overstating the value of reducing arsenic. Likewise, if these communities are richer than the average American worker, Professor Sunstein's adjustment will not adequately reflect the value of reducing arsenic. Strict adherence to a willingness-to-pay approach to policymaking implies that the EPA's uniform value for a statistical life likely gets the value wrong in most individual cases; the value is probably most often either too high or too low, depending on the socioeconomic characteristics of the people exposed to the risk that the EPA is trying to reduce.

Lurking in the issues of worker/consumer choice and wealth is the question of whether the EPA *should* be concerned about the education, skill level, and wealth of the individuals it is charged with protecting in setting environmental standards—and, more controversially, whether it should be in the business of reducing protections to those individuals with the least to offer along these dimensions. Professor Sunstein's perspective is internally contradictory on this point. On one hand, he proposes increasing the value of statistical life for purposes of analyzing the arsenic standard to account for the greater average wealth of the people exposed to arsenic as compared to the workers involved in the wage-risk studies; on the other hand, he chides the EPA for not including information on the income levels of the people most adversely affected by the costs of the new arsenic standard. [42] Exactly what role Sunstein envisions for the ***2322** socioeconomic characteristics of exposed humans in regulatory analysis remains obscure. Paying attention to the socioeconomic characteristics of the population

at risk—as Sunstein suggests we should, in proposing a higher value for richer people [43] —ensures that risks will be unevenly distributed; indeed, it condones uneven distribution. This result is at odds with Sunstein's concerns about distribution and also at odds with much of his previous work on equality under the law (he is in favor of it). [44]

I. INFORMATION

The wage-risk studies that formed the basis for the EPA's estimate of the value of a statistical life did not involve putting any direct questions to workers about the way they valued risk to themselves; nor did the researchers ask the workers how much risk they believed they faced on the job. Instead, these studies typically consider objective evidence of the risks posed by various jobs and the wages paid for those jobs. The analyst performs a regression analysis aimed at identifying the role risk plays in the wage structure for a particular occupation, controlling for other job features that also may determine wages. The premise of using these studies in cost-benefit analysis—that they provide a good measure of the amount of money people are willing to accept to take on heightened risk—depends on an assumption that the workers know what risks they face on the job and have chosen to run those risks in exchange for money.

The evidence about workers' information about and understanding of the risks they face on the job, however, is very thin. Professor Viscusi is one of the few economists who has paid sustained attention to the question whether workers know and understand the risks they confront on the job. He has found, for example, that workers' perceptions of whether their jobs are “dangerous” or “unhealthy” tend to correspond with the injury rate in the industries in which they work. [45] But this is a very blunt measure of workers' risk perceptions; workers could be wildly wrong about their actual probability of being killed on the job even if their answers to the “dangerous” or “not dangerous” question were correlated with whether their jobs were unusually risky.

Nevertheless, the great majority of studies on wage-risk tradeoffs are not based on evidence of workers' actual risk assessments and perceptions. Instead, these studies simply consider overall industry and mortality rates in attempting to estimate workers' wage-risk tradeoffs. The assumption, implicit and unproven, is that these precise rates correspond to workers' perceptions. [46] Yet, ***2323** without knowing the wage-risk studies on which the EPA based its analysis in the arsenic rulemaking are inherently unreliable. Because these studies are inherently unreliable, we cannot know whether the numbers they generated are too high or too low as applied to consumers of drinking water. If, however, the workers in these studies were as confused and as irrationally fearful as Professor Sunstein believes the ordinary citizen is, then they likely

overestimated, rather than underestimated, the risk they faced. In that case, the estimates of the value of statistical life generated by these studies would be too high. To illustrate this point, assume that the actual risk of dying on the job is 1 in 1,000 and that regression analysis indicates that a worker receives a $1 wage premium for this risk. Wage-risk studies would conclude that the value of a statistical life in this example is $1,000. Now suppose that it turns out that this worker actually *believes* the workplace risk to be 1 in 100. The worker's wage has not changed; only the perceived risk has changed. Yet the risk premium in the second example is only ten cents for a risk of one in 1,000, a tenfold decrease. The wage premium *per unit of risk* decreases proportionately to the amount the perceived risk increases. Thus, a study will overestimate the monetary value of risk if it relies on actual risk rather than perceived risk and ignores the possibility that workers behave like Professor Sunstein's intuitive toxicologists and systematically overestimate risk.

J. THE PROBLEM OF PUBLIC GOODS

Wage-risk studies estimate the value of risk in settings in which it is at least sometimes plausible to imagine that the avoidance of risk is not a public good. One can imagine, for example, one worker being given a respirator or other personal protective equipment to avoid risk without every worker being given this equipment. This is not true of drinking water supplied by public drinking water systems. In this setting, if arsenic is removed from one person's drinking water, it is removed from every person's drinking water. This fact raises the familiar problem of public goods: People may be tempted to “free ride” on the efforts of others to remove arsenic from drinking water because they know that they will benefit from these efforts even if they pay nothing for them. Likewise, the person who does want to do something to remove arsenic from drinking water will receive only part of the benefit of doing so— that benefit of having less arsenic in her own drinking water—yet, at the same time, that person must pay the full cost of doing this for everyone. The EPA's use of wage-risk studies to evaluate the benefits of removing arsenic from drinking water likely results in an *overstatement* of these benefits insofar as clean drinking water is a public good for which people are likely to pay less on an individual basis.

There are two powerful objections to the argument I have just described. First, one could point out that public goods result in a failure of markets; thus, the EPA should not rely on the lower economic value of public goods to diminish the value of obtaining them through regulation. The EPA should figure ***2324** out how much money people collectively would be willing to pay for enhancement of the public good rather than trying to figure out the lower—and misleading—amount they would be willing to pay individually. But cost-benefit analysis by its nature turns on individual willingness to

pay, not collective willingness to pay; indeed, asking people individually how much they would be willing to contribute to a collective effort to enhance a public good begins to look very much like the public, collective, political process that cost-benefit analysis has tried to supplant.[47] I return to this general point in Part III.

A second objection to the argument that the public goods character of drinking water means that the EPA overstated the benefits of reducing arsenic in drinking water is that, although *tap water* from public drinking water supplies is almost by definition a public good, *drinking water* is not. The market for bottled drinking water is immense. If a person wants to reduce or remove arsenic from her drinking water, all she needs to do is buy bottled water. (This assumes that bottled water is itself free of arsenic, which is not always true.)[48] Seen in this light, drinking water is not a public good, and the EPA was correct not to adjust its valuation based on this consideration.[49]

K. MARKET ANALOGUES

The latter response, however, serves only to undermine the EPA's analysis in another way. Because a thriving market for bottled water exists and because a desire for safe and healthy drinking water drives much of this market, the EPA's choice to use wages for risky jobs as a proxy for the value of clean drinking water is problematic. There is a commercial market in the very item the EPA was valuing, but the EPA ignored it. What might this commercial market have told us about the value of reducing arsenic in drinking water?

One possibility is that the EPA could have concluded, as is sometimes suggested, that people buy bottled water largely because of the taste and not because of its perceived health and safety benefits.[50] Thus, the existing market for bottled water may provide little information about the value of clean drinking water to the consumer.

***2325** Let us try another tack. Recall that one of the ways to establish a dollar value for goods not directly bought and sold in markets is to develop surveys designed to elicit values for such goods by describing hypothetical markets in these goods. Suppose that such a survey was developed to test the value of reducing arsenic in drinking water. Because no such survey was developed, I hope the reader will indulge some speculation as to its likely results.

The EPA was faced with valuing the consequences of two different levels of regulatory choice. First, it had to decide whether to change the existing standard for arsenic in drinking water or simply to leave it at the 50 parts-per-billion (ppb) level at which it had

remained since 1942. Second, if the EPA chose to set a new standard, it had to decide the level for the new standard.

Most people, apparently including Professor Sunstein, assume that the latter question was the hard one for the EPA.[51] The EPA had, after all, been told in 1999 by the National Academy of Sciences that it should revise the standard downward "as promptly as possible."[52] The World Health Organization also recommended a lower standard of 10 ppb. Congress, moreover, had told the EPA in 1996 to study a new standard for arsenic,[53] and although the EPA technically had latitude under this directive either to refuse to change the standard or, perhaps, even to make it more lenient, Congress's expectation was that arsenic deserved special emphasis because of evidence that it was more harmful than people had thought sixty years ago, when the 50 ppb standard was originally established.[54] Even the Bush Administration, in withdrawing the new 10 ppb standard set by the Clinton Administration, did not propose any standard higher than 20 ppb. In this setting, therefore, it seems appropriate to concentrate on the EPA's choice of a new level, rather than its more basic decision as to whether to set a new standard at all.

So, let us ponder the average person's likely response to a survey designed to elicit the value of reducing arsenic in drinking water to the alternative levels of 3, 5, 10, and 20 ppb—the levels evaluated by the EPA in both the Clinton and Bush Administrations.[55] The costs associated with these levels are presented in ***2326** Professor Sunstein's Table 1.[56] I present these same costs in a somewhat different form to reflect the cost of each of the alternative standards relative to a 20 ppb baseline, rather than relative to a 50 ppb baseline. Here is a reconfigured table using the same information presented in Professor Sunstein's Table 1:

Table 1

Mean Annual Costs Per Household (in 1999 dollars)

SYSTEM SIZE	3 PPB	5 PPB	10 PPB
Less than 100	-34.15	-32.89	-24.33
101-500	0.19	-2.70	-4.22
501-1000	6.57	4.87	2.48

1001-3300	9.40	7.58	3.88
3301-10,000	8.21	5.55	3.08
10,001-50,000	9.35	7.02	3.32
50,001-100,000	8.99	6.81	2.17
100,001-1,000,000	6.03	4.08	1.26
More than 1,000,000	7.26	2.64	0.71
All Categories	17.39	13.00	7.90

Several things are striking about these figures. First, households whose drinking water suppliers serve fewer than 100 households *save* money with a lower standard. Indeed, they save *more* money as the standard is lowered. Second, the most the average household will pay in additional costs as a result of going all the way down to 3 ppb (rather than staying at 20, 10, or 5 ppb) is $9.40 per year. This equals just seventy-eight cents a month, or three cents a day. The vast majority of households will pay even less. Third, if the choice is between 10 ppb and either of the lower standards, the cost differential becomes even smaller.

It is hard to believe that the average household would even notice an extra expenditure of three cents per day, $9.40 per year. If a household did notice it, I suspect that the householders would be willing to fork over the extra three cents per day to reduce their exposure to arsenic in drinking water. The amount is truly trivial, by any assumptions or standards one may care to employ. Any contingent valuation survey designed to elicit whether consumers would be willing to pay up to (and in most cases less than) this amount for additional protection against arsenic in drinking water, I venture to suggest, would inevitably ***2327** find a high level of consumer willingness to pay. Market experience with bottled water corroborates this intuition: Recall that consumers are willing to pay up to 10,000 times more for bottled water partly because of their perception that it is safer and healthier.

It simply boggles the mind to think that the EPA used consumers' supposed unwillingness to pay for a more stringent arsenic standard as a reason to refuse setting a more stringent standard. If the EPA were a court, I believe it could take judicial notice that the citizens of a country that continues to give Perrier a cold shoulder a decade after benzene was found in its product would be willing to pay three cents or less per day to do the best we can to remove arsenic from drinking water. Seen in this light, cost-benefit analysis is really just a fancy and expensive way of helping us to do the wrong thing.

L. VOLUNTARINESS AND INVOLUNTARINESS

A final possibility, urged by Professor Sunstein, is that the EPA also erred in refusing to adjust estimates of the value of statistical life because the wage-risk studies involved voluntary risk, whereas the risks from arsenic in drinking water are involuntary or at least less voluntary than workplace risks.[57] This adjustment would, according to Professor Sunstein and others, entail increasing the valuation in this context because people reportedly are willing to pay more to avoid involuntary risks than to avoid voluntary ones.[58]

Don Shakow's evidence suggesting that workers in the secondary labor market receive little or no wage premium for riskier work belies the assumption that workplace risks are borne voluntarily. This evidence implies that some employers need not provide such wage premiums because some workers have little or no choice about whether to take the riskier job.[59] Consumers of drinking water, on the other hand, face a thriving market in bottled water, providing an alternative for consumers worried about contaminants in their tap water.[60] In addition, consumers of tap water now receive periodic reports on the contaminants found in their drinking water, including arsenic.[61] Thus, it cannot be said that consumption of drinking water containing arsenic is involuntary because of a complete lack of information. With this in mind, workplace risks may even rate higher on the involuntariness scale than risks from drinking water; therefore, perhaps the EPA in this way, too, overstated the benefits of reducing ***2328** arsenic in drinking water. From this perspective, voluntariness is important in assessing monetary valuations of risk, but in this case it cuts the opposite way from that suggested by Professor Sunstein.

A predictable, but unconvincing, objection to this line of analysis would be to point out that poor people probably have little choice but to drink tap water; consumers of bottled water probably tend to be wealthier than the average person. Thus, it could be argued that consumption of arsenic-laced tap water is essentially involuntary for lower-income groups. However, the same could be said of poor people and job choice; poor people have little choice but to take a job even if it is riskier than they would like. This is an objection to the whole project of evaluating public policy according to the market choices of an economically stratified society; it is not an adequate response to the claim that workplace risks are plausibly viewed as less voluntary than drinking water risks.

In the end, it is simply incoherent to try to figure out the market value of an "involuntary" risk. Once we conclude that it is plausible to identify a market value for a risk, we are, at the same time, concluding that money changes hands in distributing that risk. Person A either pays Person B to reduce or eliminate the risk, or Person A accepts

money from Person B to suffer the risk. In either case, the exchange is, by hypothesis, voluntary. Indeed, one of the philosophical premises underlying cost-benefit analysis is that consensual transactions best reflect the value of the consequences of regulatory policy. If a commercial exchange is involuntary, the forced exchange would be excluded from cost-benefit analysis as an example of market failure. No cost-benefit analyst I know of, for example, would use the amount of money a robbery victim pays her robber, or the ransom a kidnapping victim pays his captors, to value the benefits of life-saving regulation.

If a risk is truly involuntary, then there is no reliable market value for it. Where Professor Sunstein and others have gone wrong is in thinking that the distinction between voluntary and involuntary risks implies merely a difference in degree (an increased monetary value for involuntary risks) rather than a difference in kind (no market value for involuntary risks makes any sense). The very notion of a market, at least the kind of consent-based market cost-benefit analysts laud, depends on free choice. Once a regulatory analyst concludes that it is reasonable to say that risks due to arsenic in drinking water may be valued according to market criteria—that is, a market value may be plausibly assigned to it—then the regulatory analyst has perforce concluded at the same moment that these risks are voluntary. There are no involuntary risks in a cost-benefit world. This is one of the many ways in which the cost-benefit world is different from the world in which we actually live.

M. SUMMING UP

Workplace risk differs from risks from arsenic in drinking water in numerous important ways. I have suggested that some of the differences imply that the ***2329** EPA's valuation of drinking water risks was too low and others imply that it was too high. With enough time and money, one could presumably produce an estimate more clearly tied to the specific setting the EPA faced. Yet, as I will argue in the next section, this is like trying to save the Ptolemaic theory of the solar system by generating more epicycles. It is better to abandon an intrinsically flawed theory than to embrace ever more elaborate, yet futile, reconstructions of it.

III. PRIVATE MARKETS AND PUBLIC POLICY

Cost-benefit analysis differs from other approaches to regulatory decisionmaking insofar as it makes public policy turn on private willingness to pay for the benefits of regulation. In this section, I explain why this criterion is intrinsically flawed and why no amount of further research on real and hypothetical markets will do anything but

enrich and empower economists. Ironically, many of my criticisms of willingness to pay as a measure of value owe a large debt to the work of Cass Sunstein. A good deal of Professor Sunstein's early scholarship was devoted to defending policy outcomes that departed from private preferences. [62] It is thus not surprising that he continues to express some discomfort with making regulatory policy turn on private willingness to pay. [63] Yet, despite his evident ambivalence about willingness to pay, Professor Sunstein at this point enthusiastically embraces cost-benefit analysis for two basic reasons.

First, he believes that cost-benefit analysis results in a cognitively superior decisionmaking process. [64] Too many people, he claims, are "intuitive toxicologists," exhibiting irrational, even hysterical, responses to risk. [65] Cost-benefit analysis, in Professor Sunstein's view, helps to reduce the role of irrationality in public policy. [66] Second, Professor Sunstein argues that cost-benefit analysis makes regulatory decisions transparent: It reminds us that a decision like the arsenic rule is hard and it helps us to understand why it is hard. [67] In the course of explaining how cost-benefit analysis fails on the counts of rationality and transparency, my reasons for concluding that cost-benefit analysis is intrinsically flawed and cannot be resuscitated by ever more elaborate economic research will become plain.

A. RATIONALITY

Professor Sunstein is not alone in claiming that cost-benefit analysis will lead ***2330** to more rational regulation. [68] I do not share his grim view of current regulation. [69] Even if I did, however, I would not, for the reasons that follow, conclude that basing public policy on consumer willingness to pay is the solution.

1. Intuitive Toxicology and Cost-Benefit Analysis

Professor Sunstein turns to cost-benefit analysis as a way to avoid the irrational impulses of intuitive toxicologists. But the same people who are intuitive toxicologists are the ones making the market decisions on which cost-benefit analysis relies. Professor Sunstein, at least, gives no reason to think they are different people. For example, he offers no reason to believe that the workers whose choices were evaluated in the wage-risk studies are fundamentally different in their response to risk than the people who responded so critically and vehemently to the Bush Administration's initial decision to withdraw the new arsenic standard or the people who responded dramatically (even hysterically, Sunstein thinks) to news about Alar's risks some years ago. [70] There is no reason to believe that people are better at assessing risk when they are making decisions

about jobs—or household products or drinking water or anything else they buy—than when they are making decisions about what form they would like public policy to take. If people are as systematically confused as Sunstein appears to believe, then this confusion will permeate their market decisions as much as it, on his view, permeates their political preferences, and cost-benefit analysis will not rid public policy of the toxicological intuitions that Sunstein criticizes.

2. Consumers and Citizens

Perhaps Professor Sunstein believes that people making decisions in private markets will act more rationally than the same people making decisions in the public sphere —that consumers, in other words, behave more rationally than citizens. In that case, making public policy turn on private market decisions would, indeed, produce more rational policy. For several reasons, however, that premise does not hold.

First, modern markets are shaped by advertising that attempts to cater to or ***2331** even exploit consumers' irrational impulses, rather than to moderate them. [71] In some cases, this means downplaying a risk; in others, it means exaggerating one. In either event, to say that using market decisions to evaluate public policy will mean more rational public policy ignores the pervasive influence of modern advertising on market decisions. Professor Sunstein has decried the influence of what he believes are sensationalistic media accounts of risk on the policymaking process, [72] but nowhere does he recognize the influential role of advertising in shaping the private preferences that underlie cost-benefit analysis.

Second, to argue that "consumer" decisions are more likely to be rational than "citizen" decisions ignores the irrationality of treating collective decisions as though they are individual decisions. The tragedy of the commons reflects a failure of human rationality and it comes about precisely because the people using the commons have failed to recognize that they are in the grip of a collective problem rather than an individual opportunity. Looking at individual willingness to pay is a crazy way to value collective goods. Even if individuals are asked to state their willingness to pay based on an assumption that others will be willing to pay the same amount, they are not able to consult other people about the reasons underlying their willingness to pay and thus cannot engage in the process of reason-giving and deliberation that marks rational decisionmaking. [73]

Third, using private willingness to pay as the measure of value in public policy ignores the reality that people often look to the government to help them control the influence of

their own preferences on their lives. Professor Sunstein's early writings ably explored many of the reasons why people may want the government to interfere with their own private preferences. [74] The basic idea is that sometimes people are smart enough—or rational enough—to know when they need help, and sometimes they ask the government for that help. In that case, to assess the wisdom of public policy by looking at the private preferences people may want to escape is perverse.

3. The Present and the Future

One way in which consumer and citizen preferences frequently diverge is worth separate discussion. People often make very short-sighted decisions in their capacity as consumers, although in their capacity as citizens, they often seek laws that take a longer view. Here in the United States, people save very little money for the future on their own, but they love Social Security. Consumers are willing to pay very little for more efficient light bulbs and electrical ***2332** appliances, yet mandated efficiency standards are widely accepted in policy debates. [75] Once again, maybe people are just smart enough to realize when they need help in following through on a course that they know is best for them but that is also difficult to pursue consistently on their own because it requires a long-term commitment.

In this way, Professor Sunstein could try to make sense of his seemingly contradictory claims that people both highly value avoiding cancer and discount future harms. [76] People do not want to get cancer, to be sure, but if given a choice, they will not make a long-run commitment to avoiding it either. The preference for the present over the future outweighs the aversion to cancer.

This line of argument, however, ignores the possibility that people would want to moderate their temporal myopia through government regulation, as they do in favoring Social Security and in supporting rules on energy efficiency. Rules on carcinogens in drinking water and, indeed, much of environmental law, can be understood in just this way: They are efforts to overcome, through law, our own short-sightedness. [77] Failing to recognize one's own myopia and to take steps to moderate it seems to me to be the opposite of mature and rational behavior.

4. Endogeneity

As Professor Sunstein himself has explained in previous writing, people's preferences are often a product of the circumstances they face. In the legal setting, preferences can

be endogenous to the very legal rules one is considering. [78] In that case, one cannot, without circularity, justify a refusal to change the existing legal rules by reference to existing preferences; once those rules are changed, the preferences will change along with them.

Where drinking water is concerned, it is plausible to conclude that existing legal rules influence private preferences and thus private willingness to pay. One probable reason why people reacted so strongly to the discovery of benzene in Perrier was that the levels of benzene exceeded federal legal limits. If the limits had been different—lower—consumers' reactions might have been more muted. This divergence between preferences as they exist before regulation and preferences as they exist after regulation makes it highly problematic to justify regulatory inaction by reference to preregulation willingness to pay.

*2333 5. Summing Up

Decisions about environmental protection involve collective goods, stretching far into the future, which look very different after one has them than they do before. Decisions in the market involve individual goods valued in the moment, often with little attention to future consequences. These are very different kinds of decisions and it is only rational to provide different decisionmaking structures for them. It is hard to see how it is better—or more rational—to pretend instead that decisions in the modern marketplace are well-reasoned, that collective goods are actually private goods, that reasonable people do not seek help in committing to long-term goals, and that people do not come to value goods once they have them more than they valued them before they had them.

B. TRANSPARENCY

Besides rationality, Professor Sunstein also offers transparency as a reason to support cost-benefit analysis of environmental protection. One may wonder how a decisionmaking method that starts from the false premises I have just described can be anything but dishonest. Even leaving the preceding points aside, however, a closer look at cost-benefit analysis in operation reveals two lies at the heart of cost-benefit analysis—lies that cannot help but make decisions based on this analysis less rather than more transparent to the people affected by them. In addition, consideration of the EPA's explanation for its ultimate decision on arsenic shows that cost-benefit analysis leaves much to be desired from the standpoint of transparency.

1. Real Lives and Statistical Lives

Everyone seems to recognize that it is impossible to value a real person's life according to her willingness to pay to save it. [79] This is why economists talk of the value of a "statistical life," where a statistical life reflects the aggregation of individual risks of harm. But there are no statistical people; if anyone is going to die as a result of arsenic in drinking water, it will be a real person, not a statistical one. By taking into account only risk, and not life itself, cost-benefit analysis of life-saving programs greatly misstates the value of these programs. [80] Yet, cost-benefit analysis based on willingness to pay cannot escape this flaw. When the "good" being valued is life itself, cost-benefit analysis breaks down regardless of whether it is framed in terms of willingness to pay or willingness to accept. When the problem is framed in the "willingness-to-pay" format, I will pay up to the total amount of wealth I possess to stop someone from killing me—thus the value will be completely dependent on my ability to pay. When ***2334** "willingness to accept" is the measure of value, I will simply not accept any amount of money to be killed—thus there will be no market price at all. Cost-benefit analysis would be stopped in its tracks if it tried to value life itself. But life itself is what is at stake in the arsenic rule and many others. Cost-benefit analysts can save their methodology only by claiming that they are not valuing life itself, but only risk—but this also means pretending that the stakes in regulatory disputes are not a matter of life and death.

2. Real Markets and Hypothetical Markets

In real markets, buyers and sellers are not forced to buy and sell goods. In real markets, a person can refuse to buy or sell based on any reason she likes. She can refuse to buy a perfectly good shirt because it is in a color she does not like; she can refuse to sell an ordinary piece of costume jewelry because her mother wore it; she can refuse to buy a toy because children made it. In real markets, human whims, attachments, and moral qualms are allowed free rein. Much of modern advertising depends on this basic insight.

If one reads the economic literature on valuing regulatory consequences, one gets the distinct impression that there is a hierarchy of valuation methodologies and that direct evidence from markets is at the top of the hierarchy. Indeed, one gets the impression that all of the other methodologies for valuation—shadow pricing, benefits transfer, and contingent valuation— aspire to replicate the result that would be achieved if a direct market for the good being valued existed.

This impression begins to evaporate when one looks closely at cost-benefit analysis in practice. First, in constructing the hypothetical markets involved in contingent

valuation, analysts carefully cull responses that are outside the bounds of their expectations. In contingent valuation surveys, responses that are considered too high—or too low for that matter—are typically discarded as "protest votes"—even when the valuation question is offered in the "willingness-to-accept" rather than "willingness-to-pay" format. In other words, suppose that a survey respondent stated that she would not accept any amount of money to allow another oil spill like the Exxon Valdez to occur. Her response would be thrown out as a protest vote. Respondents in cost-benefit surveys are not allowed *not* to state a price for the good that is being valued; they are not allowed to refuse to sell.[81] But people refuse to sell goods all the time. In a real market, people are not forced to sell (or to buy) anything. Excluding such refusals from the results of cost-benefit analysis does not help cost-benefit analysis mimic markets; it helps it mimic the behavior that cost-benefit analysts like Professor Sunstein wish people would exhibit.

***2335** Other evidence of the contrived divergence between ordinary consumer choice and cost-benefit analysis comes from the design of contingent valuation surveys. As now designed, these surveys begin by placing the respondent's ultimate valuation decision in the context of other spending decisions; the respondent is reminded, for example, that she probably has many other needs and desires that require money to be satisfied—and if she "agrees" to spend money on the good being valued, she will have less money to spend on these other things.

It is not hard to see how this survey design would transform the choices of the ordinary consumer. Imagine that every time you went to buy something at a store, the clerk asked you to think about your other spending priorities before letting you purchase the item. Entire industries depend on the impulse purchase, the crazy indulgence, the ill-considered splurge. Not only the ordinary consumer, but the market itself, would be transformed by a purchasing process that insisted on reminding consumers of their competing priorities.

This is not to say that it is a bad idea to think before buying; indeed, a large strand of environmentalism urges a more judicious approach to getting and spending.[82] It is to say, however, that pretending that carefully shaped survey responses are good proxies for ordinary market behavior is deeply misleading.

3. Transparent Rationality?

Professor Sunstein has elsewhere criticized the EPA for failing adequately to explain the basis for its decisions, and in doing so, he has gone into great detail about exactly

how the agency justified (or failed to justify) its choice of standards in other settings. [83] Here, however, Sunstein is silent about the EPA's explanation of its ultimate decision. A closer look at the EPA's explanation for setting the standard at 10 ppb shows the error in assuming that cost-benefit analysis will produce more transparent decisionmaking.

In setting the standard for arsenic at 10 ppb, the EPA was statutorily required to explain why it had chosen to depart from the lowest feasible level for the standard (3 ppb). Here is the EPA's explanation of this decision:

> In comparing the benefits and the costs at this level ..., we note that it has the highest projected total national costs (relative to the other MCL options considered). In addition, while the benefits are highest at this level relative to the other MCL options, both the net benefits and the benefit/cost disparity at the feasible level are the least favorable of the regulatory options considered. ***2336** For these reasons, we believe benefits of the feasible level do not justify the costs. [84]

The EPA also explained why it chose to depart from its original proposal to set the standard at 5 ppb:

> In comparing [the 5 ppb] level to 10 [ppb], we note that both the net benefits and the benefit-cost relationships are less favorable for 5 [ppb] as compared to 10 [ppb]. Total national costs at 5 [ppb] are also approximately twice the costs of an MCL of 10 [ppb]. At 10 [ppb], EPA notes that the lung and bladder cancer risks to the exposed population after the rule's implementation are within the Agency's target risk range for drinking water contaminant of 1×10^{-6} to 1×10^{-4} or below. EPA recognizes that there is uncertainty in this quantification of cancer risk (as well as other health endpoints) and this risk estimate includes a number of assumptions, as discussed previously. EPA did not directly rely on the risk range in selecting the final [standard], since it is not part of the [statutory] criteria; however, it is an important consideration, because it has a direct bearing on our estimates of the benefits of the rule. [85]

And, finally, the agency explained its decision in more general terms:

> Strict parity of monetized costs and monetized benefits is not required to find that the benefits of a particular MCL option are justified under the statutory

> provisions of [the Safe Drinking Water Act]. However, EPA believes that, based on comparisons of cost and benefits (using the various comparison tools discussed), the monetized benefits of a regulatory level of 10 [ppb] best justify the costs. In addition, as discussed in section III.D. and elsewhere in today's preamble, our further qualitative consideration of the various sources of uncertainty in our understanding of arsenic since the proposal (e.g., such as that surrounding the mode of action), has led us to conclude that our estimate of risk (for the risks we have quantified) is most likely an upper bound of risks and that the higher MCL of 10 [ppb] is appropriate. Finally, as discussed in section III.E. of this preamble EPA believes that there are a number of not yet quantified adverse health effects and potentially substantial non-monetized benefits at 10 [ppb] that increase the overall benefits at this level.
>
> In summary, based on our reanalysis of costs, benefits, and health risk reduction, and factoring in the uncertainties in these analyses and the degree and nature of risk, EPA believes the final MCL of 10 [ppb] represents the level that best maximizes health risk reduction benefits at a cost that is justified by the benefits and that the other regulatory options considered in the proposed rule do not satisfy the statutory requirements of section 1412(b)(6) of [the ***2337** Safe Drinking Water Act]. We are therefore exercising our discretionary authority under the statute to establish an MCL at a level higher than the feasible level and setting that level at 10 [ppb]. [86]

To put these explanations in plainer English, it seems fair to say that the EPA chose the standard of 10 ppb because: (1) the quantified costs of this standard were lower than the costs of stricter standards; (2) the quantified benefits of this standard were lower than the benefits of stricter standards, but not as much lower as the costs of stricter standards were higher; (3) the individual risk allowed by the new standard was acceptable, and it was at once important to the decision yet not considered by the agency; (4) the quantified benefits stated in terms of lives saved were not likely to be higher than the agency had estimated; (5) the existence of unquantified benefits from regulating arsenic in drinking water may have meant that the agency's quantified estimate of benefits was too low; and (6) the agency was meeting statutory requirements in setting the standard.

It is hard to see how this explanation is any more transparent than other decisions the EPA has made under standards that do not include cost-benefit analysis. Claim (6) is utterly conclusory, reminiscent of what Professor Sunstein has called the EPA's

mantra-like recitation of the statutory standard in the rulemaking proceeding at issue in *Whitman v. American Trucking Ass'ns.* [87] Claim (3) is internally inconsistent and claims (4) and (5) point in opposite directions. Finally claims (1) and (2) inspire reference to the D.C. Circuit's opinion in *American Trucking* invalidating the EPA's longstanding interpretation of the Clean Air Act on the ground that it violated the nondelegation doctrine by providing no clear "stopping point" for regulation. Purporting to paraphrase the EPA's explanation of its standard, the court stated:

> Effects are less certain and less severe at lower levels of exposure. This seems to be nothing more than a statement that lower exposure levels are associated with lower risk to public health .... EPA's formulation of its policy judgment leaves it free to pick any point between zero and a hair below the concentrations yielding London's Killer Fog. [88]

***2338** The D.C. Circuit suggested that cost-benefit analysis could supply the stopping point it thought constitutionally required. [89] But the EPA's explanation of its choice of the standard for arsenic in drinking water is no more transparent than its explanation of the standards at issue in *American Trucking*, despite the application of cost-benefit analysis. Cost-benefit analysis fares even worse from the standpoint of transparency if Professor Sunstein's very large benefits range is taken seriously, as it vastly enlarges the permissible range of the EPA's discretion and makes reasoned analysis of the choice within this range even harder to imagine.

The argument from transparency becomes almost risibly weak when one considers the denouement of the controversy over arsenic. After withdrawing the proposed 10 ppb standard, announcing a reanalysis of the science and economics underlying the standard, convening three different expert panels to review the science and economics, and asking the National Academy of Sciences to report again on the health effects of arsenic in drinking water, the EPA announced eight months later that it was adhering to the initial standard. The agency issued a press release and Administrator Whitman gave a press conference. [90] The agency did not, however, officially explain, in the Federal Register or anywhere else, why it had chosen this course.

4. Summing Up

Many people have claimed that cost-benefit analysis is a good way to make decisions about the environment because it makes the decisionmaking process more transparent.

Most of these people are economists or law professors who have a special interest and expertise in economics. Perhaps cost-benefit analysis is more transparent to these experts because they speak its language. But for other people, references to "statistical lives" will either be incomprehensible or seem irrelevant to real people; references to market decisions will be taken to mean real markets, like the ones with impulse shopping and pervasive advertising, rather than markets contrived to make the shoppers more careful; and saying that benefits you can count are bigger than benefits you cannot will not be decisive on any issue of real importance.

CONCLUSION

To his credit, Professor Sunstein does not flinch from admitting that, based on assumptions that he believes to be credible, the benefits of reducing arsenic in drinking water to 10 ppb range from zero to over half a billion dollars. However, rather than taking this huge range to be evidence of the basic ***2339** indeterminacy of cost-benefit analysis, Sunstein gamely tries to convince us that cost-benefit analysis is nevertheless useful because it shows us that the decision on arsenic was hard. I think quite the opposite is true: Cost-benefit analysis is unhelpful because it makes even easy decisions unduly complicated. It also gives agencies plenty of reasons to do the wrong thing.

Once the EPA set itself on a course of lowering the standard for arsenic in drinking water, setting the new standard at 3 ppb would have cost households at most three cents per day. This amount should be considered trivial under any decisionmaking framework. To refuse to spend that amount under the guise of making a decision that reflects consumer choices—in a nation that has never forgiven Perrier for allowing benzene in its sparkling water—is especially ridiculous.

Footnotes

a1 Professor of Law, Georgetown University Law Center. My perspective on all of the issues discussed in this essay has been informed and enriched by my collaboration with Frank Ackerman on our book, PRICELESS: HUMAN HEALTH, THE ENVIRONMENT, AND THE LIMITS OF THE MARKET (forthcoming 2003). I am also grateful to John Echeverria for helpful comments and to Marguerite McLamb for excellent research assistance.

1 For a discussion of this episode, *see* Russ Banham, *Don't Let Branding Burn You*, CFO MAG., Feb. 1, 2000, *available at* www.cfo.com/article/1,5309,857,00.html; George James, *Perrier Recalls Its Water in U.S. After Benzene Is Found in Bottles*, N.Y. TIMES, Feb. 10, 1990, at A1; Alan Riding, *Perrier Widens Recall After New Finding*, N.Y. TIMES, Feb. 15, 1990, at D1.

2 *Bottled Water Maintains Momentum*, BEVERAGE INDUS., June 1, 2001, at 24.

3 *See* NAT. RES. DEF. COUNCIL, BOTTLED WATER: PURE DRINK OR PURE HYPE?, ch. 2 (1999), *available at* http://www.nrdc.org/water/drinking/nbw.asp.

4 42 U.S.C. § 300g-1(b)(6)(A) (2000).

5 42 U.S.C. § 300g-1(b)(3)(C)(iii) (2000).

6 Cass R. Sunstein, *The Arithmetic of Arsenic*, 90 GEO. L.J. 2255 (2002).

7 *Id.* at 2287-89.

8 *Id.* at 2282.

9 *Id.* at 2255.

10 *Id.* at 2266.

11 *Id.* at 2263 n.45.

12 *See* 33 U.S.C. § 1314(b)(1)(B) (1994); 42 U.S.C. § 7411(a)(1) (1994); 42 U.S.C. § 7412(d)(2) (1994); 42 U.S.C. § 7475(a)(4) (1994); 42 U.S.C. § 7479(3) (1994); 42 U.S.C. § 7502(c)(1) (1994).

13 *See, e.g.*, Weyerhaeuser Co. v. Costle, 590 F.2d 1011, 1044-49 (D.C. Cir. 1978) (describing and upholding the EPA's approach to technology-based regulation under the Clean Water Act).

14 For more extensive discussion, *see* Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection*, 150 U. PA. L. REV. 1553 (2002).

15 For evidence that regulatory costs are often overstated in advance of regulatory implementation, see, e.g., Winston Harrington et al., *On the Accuracy of Regulatory Cost Estimates*, 19 J. POL'Y ANALYSIS & MGMT. 297 (Spring 2000); Eban Goodstein & Hart Hodges, *Polluted Data*, AM. PROSPECT, Nov-Dec. 1997, at 64. For a discussion of research showing how firms can *save* money as a result of regulation, see, e.g., Claudia H. Deutsch, *Together at Last: Cutting Pollution and Making Money*, N.Y. TIMES, Sept. 9, 2001, at A1.

16 *See, e.g.*, W. KIP VISCUSI, RATIONAL RISK POLICY 46-47 (1998).

17 National Primary Drinking Water Regulations; Arsenic and Clarifications to Compliance and New Source Contaminants Monitoring; 66 Fed. Reg. 6976, 7012 (Jan. 22, 2001) (to be codified at 40 C.F.R. pts. 9, 141, 142).

18 *See* RICHARD T. CARSON ET AL., CONTINGENT VALUATION AND LOST PASSIVE USE: DAMAGES FROM THE EXXON VALDEZ, REPORT SUBMITTED TO THE ALASKA ATTORNEY GENERAL 56 (Nov. 1992). By "non-economic" losses, I am referring to losses associated with values unconnected to the actual use of or engagement with the natural resources damaged by the spill, including, for example, the loss of the opportunity to visit Prince William Sound in its pristine state.

19 *See supra* text accompanying notes 11-12.

20 The first time the agency had done so was the month before, in issuing standards for radionuclides in drinking water. *See* National Primary Drinking Water Regulation; Radionuclides; Final Rule, 65 Fed. Reg. 76708, 76712 (Dec. 7, 2000) (to be codified at 40 C.F.R. pts. 9, 141, 142).

21 *See* National Primary Drinking Water Regulations; Arsenic and Clarifications to Compliance and New Source Contaminants Monitoring; 66 Fed. Reg. at 7012; ABT ASSOCS., ARSENIC IN DRINKING WATER RULE ECONOMIC ANALYSIS, EPA 815-R-00-026, at 5-22-24 (Dec. 2000), *available at* http:// www.epa.gov/safewater/ars/econ_analysis.pdf.

22 *Id.*

23 *See, e.g.*, Cass R. Sunstein, *Endogenous Preferences, Environmental Law*, 22 J. LEGAL STUD. 217, 225-30 (1993).

24 *See* Ohio v. U.S. Dep't of Interior, 880 F.2d 432, 477 n.82 (D.C. Cir. 1989) (upholding regulation stipulating that natural resource damages at hazardous waste sites should be calculated according to the "willingness-to-pay" format because the "willingness-to-accept" framework "yielded disproportionately high dollar assessments").

25 For a discussion of why willingness to accept may be the appropriate framework in this context, *see* Thomas O. McGarity, *Professor Sunstein's Fuzzy Math*, 90 GEO. L.J. 2341, 2370-71 (2002).

26 Richard L. Revesz, *Environmental Regulation, Cost-Benefit Analysis, and the Discounting of Human Lives*, 99 COLUM. L. REV. 941, 973-74 (1999) (discussing George S. Tolley et al., *State-of-the-Art Health Values, in* VALUING HEALTH FOR POLICY: AN ECONOMIC APPROACH (George S. Tolley et al. eds., 1994)).

27 *See, e.g.*, Timur Kuran & Cass R. Sunstein, *Availability Cascades and Risk Regulation*, 51 STAN. L. REV. 683, 691-702 (1999) (criticizing public fears of and responses to Love Canal and revelations about the carcinogenic properties of the pesticide Alar); John F. Morrall III, *A Review of the Record*, REG., Nov.-Dec. 1986, at 25.

28 *See* Sunstein, *supra* note 6, at 2287. For casual empiricism, the study on arsenic conducted by Jason Burnett and Robert Hahn takes the cake. With regard to latency, Burnett and Hahn first assumed—without a shred of evidence to back them up—that the latency period for arsenic-related cancers is thirty years. JASON K. BURNETT & ROBERT W. HAHN, EPA'S ARSENIC RULE: THE BENEFITS OF THE STANDARD DO NOT JUSTIFY THE COSTS, REGULATORY ANALYSIS 01-02, at 6 (2001), *available at* http://aei.brookings.org/admin/pdffiles/reg_analysis_ 01_02.pdf. Then, in a later study, they assumed that the latency period was twenty years—without explaining the departure from their previously stated assumption. Jason K. Burnett & Robert W. Hahn, *A Costly Benefit*, 24 REG. 44, 46 (2001). The change in stated assumptions, however, did not affect their results; the estimates they derived in their initial study cannot be squared with their stated assumptions, but can be explained only if one assumes that Burnett and Hahn actually used a twenty-year latency period in their initial study—not thirty years as they claim. Professor Sunstein's "peer reviewers" could apparently use a little peer review themselves.

29 *See* Sunstein, *supra* note 6, at 2285.

30 *See* National Primary Drinking Water Regulations, 66 Fed. Reg. 7013 (Jan. 22, 2001) (to be codified at 40 C.F.R. pts. 9, 141, 142).

31 Paul Slovic, *Trust, Emotion, Sex, Politics, and Science: Surveying the Risk Assessment Battlefield*, 1997 U. CHI. LEGAL F. 59, 68-69.

32 *Id.*

33 *See, e.g.*, Don Walker, *Survey Says: Women Like, Will Support Baseball; Research on 3,000 Women Shows Good Signs for Game*, MILWAUKEE J. SENTINEL, July 30, 2000, at 6C; Rachel X. Weissman, *Will Oxygen Media Click with Women*?, AM. DEMOGRAPHICS, July 1999, at 30.

34 Frank Ackerman & Lisa Heinzerling, If It Exists, It's Getting Bigger: Revising the Value of a Statistical Life 15 (unpublished manuscript, on file with author).

35 *Id.* at 17-19.

36 *See* Sunstein, *supra* note 6, at 2285 & n.194 (citing EPA preamble to arsenic rule).

37 Ackerman & Heinzerling, *supra* note 34, at 19.

38 *See* Julie Graham et al., *Risk Compensation—In Theory and in Practice*, 25 ENV'T 14, 20 (1983); Don M. Shakow, *Market Mechanisms for Compensating Hazardous Work: A Critical Analysis, in* EQUITY ISSUES IN RADIOACTIVE WASTE MANAGEMENT 277 (Roger E. Kasperson ed., 1983). Peter Dorman's work is also illuminating on this topic. *See generally* PETER DORMAN, MARKETS AND MORTALITY: ECONOMICS, DANGEROUS WORK, AND THE VALUE OF HUMAN LIFE (1996).

39 Graham, et al., *supra* note 38, at 16.

40 Sunstein, *supra* note 6, at 2286.

41 *Id.*

42 *Id.* at 2301.

43 *Id.* at 2286.

44 *See generally* Cass R. Sunstein, *The Anticaste Principle*, 92 MICH. L. REV. 2410 (1994).

45 *See* W. KIP VISCUSI, FATAL TRADEOFFS: PUBLIC & PRIVATE RESPONSIBILITIES FOR RISK 36-37 (1992).

46 VISCUSI, *supra* note 16, at 54-57 (1998) (providing tables showing data used in wage-risk studies). For a study providing chemical workers' own accounts of their lack of information about workplace risks, see DOROTHY NELKIN & MICHAEL S. BROWN, WORKERS AT RISK: VOICES FROM THE WORKPLACE 49-62 (1984).

47 *Cf.* Amartya Sen, *The Discipline of Cost-Benefit Analysis*, 29 J. LEGAL STUD. 931, 948-50 (2000) (arguing that the public goods nature of environmental problems renders it meaningless to try to solve these problems with reference to individual willingness to pay).

48 *See generally* NAT. RES. DEF. COUNCIL, *supra* note 3; CATHERINE FERRIER, WORLD WILDLIFE FUND, BOTTLED WATER: UNDERSTANDING A SOCIAL PHENOMENON (April 2001), *available at* http:// www.panda.org/livingwaters/pubs/bottled_ water.pdf (last visited Jul. 15, 2002).

49 This also assumes that the only risk from tap water containing arsenic comes from *drinking* the water, rather than from bathing in it, showering in it, etc. This assumption is questionable. SUBCOMM. ON ARSENIC IN DRINKING WATER, NAT'L RESEARCH COUNCIL, ARSENIC IN DRINKING WATER: 2001 UPDATE 47 (2001).

50 Things are more complicated than this, however, because it appears that people tend to associate the taste of drinking water with its healthfulness (or the opposite). *See* U.S. EPA OFFICE OF WATER, CONSUMER FEEDBACK FOCUS GROUP RESULTS: EXECUTIVE SUMMARY, *at* http:// epa.gov/safewater/consumer/exsum.html (last modified June 28, 2002).

51 *Cf.* BURNETT & HAHN, *supra* note 28, at 9 (suggesting possibility that even current standard of 50 ppb is too strict).

52 NAT'L RESEARCH COUNCIL, *supra* note 49, at 8-9.

53 42 U.S.C. § 300g-1(b)(12)(A) (2000).

54 *See* H.R. REP. 104-632, at 33 (June 24, 1996), *reprinted in* 1996 U.S.C.C.A.N. 1366, 1396 (noting that existing standard "does not take into account possible carcinogenic effect from exposures to arsenic").

55 National Primary Drinking Water Regulations; Arsenic and Clarifications to Compliance and New Source Contaminants Monitoring; 66 Fed. Reg. 6976, 6979 (Jan. 22, 2001) (to be codified at 40 C.F.R. pts. 9, 141, 142) (Clinton); National Primary Drinking Water Regulations; Arsenic and Clarifications to Compliance and New Source Contaminants Monitoring; Notice of Proposed Rulemaking, 66 Fed. Reg. 37617, 37617 (July 19, 2001) (to be codified at 40 C.F.R. pts. 141, 142) (Bush).

56 Sunstein, *supra* note 6, at 2272.

57 Sunstein, *supra* note 6, at 2285.

58 Revesz, *supra* note 26, at 968-71.

59 Graham et al., *supra* note 38 and accompanying text.

60 Again adding, of course, the qualification that bottled water may not always be so very different from tap water. *See supra* note 50.

61 *See* 42 U.S.C. § 300g-3(c)(4) (2000); *see also* U.S. EPA OFFICE OF WATER, LOCAL DRINKING WATER INFORMATION, *at* http:// www.epa.gov/safewater/dwinfo.htm (last updated June 11, 2002) (providing links to "consumer confidence" reports provided by local drinking water systems pursuant to Safe Drinking Water Act).

62 *See, e.g.*, Cass R. Sunstein, *Legal Interference with Private Preferences*, 53 U. CHI. L. REV. 1129, 1131 (1986) (arguing that "the legal system should not take private preferences as exogenous variables").

63 Sunstein, *supra* note 6, at 2265-66.

64 *Id.* at 2266.

65 *Id.* at 2257.

66 *Id.; see also* Cass R. Sunstein, *Cognition and Cost-Benefit Analysis*, 29 J. LEGAL STUD. 1059, 1065-73 (2000) (arguing that cost-benefit analysis reduces the role of irrationality in public decisionmaking).

67 Sunstein, *supra* note 6, at 2259.

68 *See generally* John D. Graham, *Making Sense of Risk: An Agenda for Congress, in* RISKS, COSTS, AND LIVES SAVED: GETTING BETTER RESULTS FROM REGULATION 183 (Robert W. Hahn ed., 1996) (arguing that a risk-analysis approach to public decisionmaking will help Congress allocate resources appropriate to the level of harm targeted); Robert W. Hahn, *Regulatory Reform: What Do the Government's Numbers Tell Us?, in* RISKS, COSTS, AND LIVES SAVED: GETTING BETTER RESULTS FROM REGULATION 208 (Robert W. Hahn ed., 1996) (arguing that applying cost-benefit analysis to environmental, health, and safety regulations would result in more lives saved).

69 *See generally* Lisa Heinzerling, *Regulatory Costs of Mythic Proportions*, 107 YALE L.J. 1981 (1998) (arguing that the U.S. regulatory system generally saves lives at a reasonable cost).

70 Kuran & Sunstein, *supra* note 27, at 698-701 (arguing that media attention on the risks of Alar resulted in hasty, ill-informed decisionmaking).

71 *See, e.g.*, Lawrence Osborne, *Consuming Rituals of the Suburban Tribe*, N.Y. TIMES MAGAZINE, Jan. 13, 2002, at 28 (discussing ethnographic market research).

72 Kuran & Sunstein, *supra* note 27, at 691-703, 742-46.

73 *See generally* Henry S. Richardson, *The Stupidity of the Cost-Benefit Standard*, 29 J. LEGAL STUD. 971 (2000).

74 Sunstein, *supra* note 62, at 1135, 1138-40.

75 *See, e.g.*, Howard Fineman, *W's Green War*, NEWSWEEK, Apr. 23, 2001, at 26; Cindy Skrzycki, *The Regulators a Matter of Degrees: Air-Conditioning Standards Chilled*, WASH. POST, May 8, 2001, at E1; Jenifer Warren, *State Joins Challenge to Bush on Air-Conditioner Standards*, L.A. TIMES, June 20, 2001, at B7.

76 Sunstein, *supra* note 6, at 2285, 2287.

77 For further discussion, *see generally* Lisa Heinzerling, *Environmental Law and the Present Future*, 87 GEO. L.J. 2025 (1999); Lisa Heinzerling, *The Temporal Dimension in Environmental Law*, 31 ENVTL. L. REP. 11055 (2001).

78 Sunstein, *supra* note 23, at 221-35 (1993).

79 *See, e.g.*, VISCUSI, *supra* note 45, at 17-18.

80 For further discussion, *see* Lisa Heinzerling, *The Rights of Statistical People*, 24 HARV. ENVTL. L. REV. 189 (2000).

81 *See, e.g.*, W. Kip Viscusi et al., *An Investigation of the Rationality of Consumer Valuations of Multiple Health Risks*, 18 RAND J. ECON. 465, 477 (1987) (reporting that in contingent valuation survey regarding household products, vast

majority of parents with children living in their homes refused to accept the discounted or free riskier product, but not incorporating these responses into numerical survey results).

82 For an old classic regarding this approach, *see* E.F. SCHUMACHER, SMALL IS BEAUTIFUL: ECONOMICS AS IF PEOPLE MATTERED (1973); for a new one, *see* BILL MCKIBBEN, HUNDRED DOLLAR HOLIDAY (1998).

83 Cass R. Sunstein, *Is the Clean Air Act Unconstitutional*?, 98 MICH. L. REV. 303, 327-30 (1999).

84 National Primary Drinking Water Regulations; 66 Fed. Reg. 6976, 7022 (Jan. 22, 2001) (to be codified at 40 C.F.R. pts. 9, 141, 142).

85 *Id.*

86 *Id.* at 7022-23.

87 531 U.S. 457 (2001) (addressing rulemaking procedure for national ambient air quality standards for ozone and particulate matter); *see also* Sunstein, *supra* note 83, at 326 ("[F]requently EPA repeats what appears to be a key phrase, almost a mantra, to the effect that the data 'provides the basis for decisions on standard levels that would reduce risk sufficiently to protect public health with an adequate margin of safety, recognizing that such standards will not be risk-free.'" (quoting National Ambient Air Quality Standards for Particulate Matter, 62 Fed. Reg. 38,652 (1997) (to be codified at 40 C.F.R. pt. 50))).

88 Am. Trucking Ass'ns v. EPA, 175 F.3d 1027, 1037 (D.C. Cir. 1999) (holding that the EPA's failure to articulate "intelligent principle[s]" in applying factors used to determine degree of public health concern associated with ozone and particulate matter constitutes violation of nondelegation doctrine), *aff'd in part, rev'd in part by* Whitman v. Am. Trucking Ass'ns, 531 U.S. 457 (2001).

89 *American Trucking Ass'ns*, 175 F.3d at 1038.

90 Press Release, EPA, EPA Announces Arsenic Standard for Drinking Water of 10 Parts Per Billion (Oct. 31, 2001) (on file with author), *available at* http://yosemite.epa.gov/opa/admpress.nsf (Oct. 31, 2001).

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