Secondhand Smoke

Facts and Fantasy

W. Kip Viscusi

The regulation of public smoking has become an increasingly prominent policy issue. Many public and private institutions have instituted policies to restrict public smoking. Some have banned public smoking altogether. At a governmental level, the Occupational Safety and Health Administration (OSHA) has proposed banning all public smoking in the workplace, except for smoking in lounges that meet highly restrictive requirements. Recently the U.S. Environmental Protection Agency (EPA) also issued a report in support of legislation banning all public smoking.

The debate over taxing cigarettes has intensified as well. Advocates of higher cigarette taxes cite the health care costs inflicted by smokers on the rest of society. In 1994, for example, the proposed Clinton health care plan included a tax of 99¢ per pack of cigarettes, and a health care bill from the House Education and Labor Committee would have imposed a tax of $2.00 a pack. Unlike smoking restrictions of various kinds, taxes are not targeted mechanisms for addressing societal costs associated with environmental tobacco smoke (ETS), as opposed to reducing smoking more generally.

Smoking restrictions are a sensible and appropriate policy tool for limiting exposure to cigarette smoke. However, that does not mean that all public smoking should be banned. The key policy issues are how broad such public smoking restrictions should be and who should have the responsibility for setting the restrictions. As with all regulatory policies, the overall benefits to society from such efforts should exceed the costs they generate.

As the percentage of nonsmokers in society has risen, the expectations of nonsmokers with respect to anti-smoking policies have steadily risen. Consider the following Gallup Poll results. In 1978 only 43 percent of all respondents believed that smoking on commercial airplanes should be banned completely. Similarly, in 1977 only 16 percent of respondents believed that smoking in public places should be banned. By 1987 the fraction of respondents supporting a complete ban on smoking in all public places had risen to 55 percent, and in 1988 it reached 60 percent. Within the course of only a decade there was dramatic surge in the strength of public support for smoking restrictions.

The presence of ETS is a classic externality problem. Smokers derive pleasure from their smoking activity, but it gives rise to a side effect that is undesirable for those exposed to the smoke. Clearly, we can restrict smoking activity, but doing so will decrease the welfare of smokers. How should we think about regulating smoking, and what is the appropriate extent of the

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regulation?

The Risks of Environmental Tobacco Smoke

For many years nonsmokers viewed ETS as a smelly annoyance. Recently the stakes have been raised as opponents of smoking have begun to characterize ETS as a threat to individual health. The health dimension has changed the terms of the debate, greatly increasing the moral authority that nonsmokers are bringing to bear. It is therefore useful to inquire whether ETS is in fact a major threat to the health of nonsmokers.

Cancer researchers generally note that the body is resilient in the presence of some carcinogens. One whiff of ETS is proportionately less likely to be risky than massive and sustained exposures. Government agencies such as the EPA and OSHA have not made such distinctions, focusing instead on linear dose-response relationships. It is nevertheless instructive to assess the extent of the risks that the agencies have estimated. It should be noted at the outset that the consensus among economic researchers, including the Congressional Research Service, is that the state of science with respect to ETS is too uncertain to warrant estimation of the health consequences.

There are two classes of health hazards that have been linked to ETS: lung cancer and heart disease. Most of the public discussion has focused on the lung cancer estimates, whereas the heart disease estimates are both more speculative and much larger in magnitude. Let us consider each of these in turn.

The EPA's assessment of the lung cancer risks was based on a review of 11 studies of family members exposed to ETS. Only one of the 11 studies indicated statistically significant effects at the 10 percent confidence level, and in some cases the influences were in the "wrong" direction. Such statistically significant results can occur on a random basis. Rather than dismissing the linkages as not well established, the EPA averaged the implications of the studies to obtain a risk estimate. OSHA reviewed the same set of studies and applied different weights to derive a somewhat lower risk estimate.

The scientific studies used for the EPA and OSHA risk assessments in no way adjusted for the changing character of the cigarettes between the time of exposure and the current period, when tar levels in cigarettes are much reduced.

In addition, studies of household members, as in all existing ETS studies, involve individuals exposed to much greater concentrations and longer durations of cigarette smoke than in public smoking contexts. The difference is particularly important if there is a no-risk threshold or nonlinear dose-response relationship.

More fundamentally, the studies failed to include the usual kind of detailed multivariate controls that are the norm in economic analysis. Smokers who choose to live in polluted areas or who are married to other smokers will tend to

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incur nonsmoking risks correlated with ETS because of a difference in risk-taking propensities. For example, my past research with Joni Hersch of the University of Wyoming has established that cigarette smokers and those who do not wear seatbelts are much more willing to work at hazardous jobs. A higher cancer risk for family members of smokers would be consistent with that type of pattern.

In terms of an overall cancer estimate, the EPA estimates that each year 2,200 people die from ETS exposures. Overall, 1,694 deaths are caused by exposures outside of the home. In the OSHA estimates of the risk levels, the total number of ETS deaths outside the home ranges from a lower bound of 444 to an upper bound of 1,150. Focusing solely on the workplace, the OSHA ETS risk range is from 171 to 880 lung-cancer deaths per year. Neither estimate is discounted or adjusted for the duration of life at risk.

The estimates of heart disease costs associated with ETS are considerably higher. The EPA estimates that 8,760 to 17,520 heart disease deaths per year are attributable to ETS. The estimates are based on a single study in the literature, a study that is replete with caveats made by the author, such as the following: "While the lung-cancer risk among never-smokers exposed to ETS is well established, a possible risk of heart

disease due to ETS is more controversial. . . . There are many risk factors for heart disease, and it is difficult to control well for all of them. . . . A number of assumptions are involved in estimating the disease mortality due to ETS, adding an unfortunate level of uncertainty."

Perhaps the most important deficiency of the EPA and OSHA estimates is that the risk estimates for heart disease induced by ETS are implausibly large relative to the lung cancer risks for ETS, and given the direct estimates of the heart disease risk and other risks to the smokers themselves. Personal characteristics, which are likely to be correlated with risk and the social status of smokers, were omitted from the analysis.

Are the Risks Significant?

In justifying its regulatory initiative with respect to public smoking in the workplace, OSHA maintains that it is obligated by its enabling legislation and related court decisions to regulate all "significant" risks. OSHA concludes that the lung cancer risks alone, which are the better established of the ETS risks, are significant, and consequently merit regulation. Since OSHA's interpretation of its regulatory mandate differs from the usual economic prescription that agencies should take a balanced view and pursue regulations that are in society's overall best interest, recognizing both benefits and costs, it is instructive to examine this risk-based rationale more closely.

In terms of the statistical significance of the effects, 10 of the 11 studies cited to justify the regulation fail to indicate a statistically significant linkage. But is the magnitude of the effects substantial, although perhaps not precisely established? In the 1980 OSHA *Benzene* case (*AFL-CIO v. American Petroleum Institute*), the Supreme Court indicated that a one in a billion risk from drinking chlorinated water would not be considered significant, but a one in a thousand risk from gasoline vapors would be significant. Are the risks from ETS significant?

To answer that question, OSHA took a lifetime risk perspective, and it is useful to apply that approach to the Supreme Court's view that a one in a billion risk from chlorinated water would not be significant. The amount of water people drink per day from different sources ranges from 2.1 to 2.9 quarts. To be conservative, I will assume that people drink nine glasses of chlorinated water per day (that may come, for example, from sodas or other products). The individual who drinks nine glasses per day each year for 70 years will drink 229,950 glasses during his lifetime. If the risk per glass is one in a billion, as hypothesized by the Court, the lifetime risk is two in ten thousand.

Now let us consider ETS. OSHA estimates that between 144 and 722 people will die from lung cancer each year because of ETS. If the 74 million nonsmoking American workers exposed to ETS are exposed over their entire 40-year employment expectancy, their lifetime risk ranges from one in ten thousand to four in ten thousand. Thus, the risk of drinking chlorinated water falls between the two bounds of the risk range estimated by OSHA for ETS. When translated into lifetime risks as opposed to risks from a particular exposure, so that both the ETS risks and the chlorinated water risks being discussed by the Court are in the same time dimension, we find that the risks are quite comparable and are of the same general magnitude.

Even if the flawed scientific evidence is taken at face value, the case for banning smoking in the workplace on risk-based grounds is not compelling. Quite simply, there are more important and fundamental threats to workers' lives than ETS. That does not mean that ETS should not be a matter of concern, but rather that one should take a balanced view and assess the overall merits of such regulation.

The Role of Market Forces

The market will in fact respond to ETS as it does in the case of other environmental amenities. After all, ETS is not the only aspect of the restaurant business that partakes of a public goods character; others include the music that is played and the general ambiance of the restaurant. If the restaurant is unpleasant, whether it be because the music is too loud or the ETS is annoying to nonsmokers, the customers will go elsewhere. Restaurants in turn will establish nonsmoking areas, since they have a financial interest in keeping their nonsmoking customers.

A similar kind of phenomenon occurs in the workplace. If workers perceive their exposures to ETS as unpleasant or risky, they will demand compensating differentials for those exposures. The resulting costs will in turn raise the cost to

the employer of hiring smokers. Company responses may include the provision of smoking lounges or instituting local smoking restrictions in contexts where they are appropriate. One would expect such private bargains to be more balanced than regulations such as those initiated by OSHA, since the decisionmaker has an incentive to reflect on the consequences of the smoking restrictions both for smokers and nonsmokers.

For private-sector responses to work, there must be information to enable the parties to make sound decisions. To the extent that ETS has an unpleasant odor, this is a readily monitorable attribute. However, the potential risks associated with smoking are less easily assessed. Although risk perceptions may not be perfect, the nature of the systematic bias is that as a whole, people tend to overestimate the risk level. The direction of the bias is consequently the opposite of what would be needed to have a market failure that warrants government intervention.

In my past research, I have shown that the average American adult assesses the risk of lung cancer from smoking to be 0.43, far above the estimates based on the surgeon general reports that peg the risk at between 0.05 and 0.10. Similarly, people overestimate the overall smoking-mortality risk level, which they believe to be 0.54. In contrast, estimates based on the reports by the U.S. surgeon general peg that risk in the range of 0.18 to 0.36. People assess life expectancy loss from smoking as 11.5 years, which also greatly exceeds the estimated life expectancy loss based on available scientific evidence.

The ETS risks are also likely to be overestimated because of the substantial publicity they have received. The current public debate over smoking and ETS involves prominent officials from the EPA, OSHA, and the FDA. Most workers are aware of the ETS debate. Indeed, OSHA cites evidence indicating that "88 percent of nonsmokers are aware of the negative health consequences of ETS." The substantial publicity given to ETS issues may have led to exaggerated risk perceptions. The literature on the economics and psychology of risk perception clearly documents that highly publicized risks tend to be overestimated. The potential hazards of smoking are among the most highly publicized and widely discussed risks in our society.

The implication from the standpoint of compensating differentials is that the market response to the risk of smoking may in fact be excessive. Rather than leading to too little market accommodation of the preferences of nonsmokers, an exaggerated perception of the risk will lead to excessive restrictions on smoking in the workplace. Thus, it may be the case that the actions that have been undertaken are already too stringent from the standpoint of their overall social desirability.

Restrictions on workplace smoking are already quite widespread. A 1991 survey of company smoking policies found that 85 percent of all firms had smoking policies. Of those policies, 34 percent were bans, and another 34 percent involved prohibition of smoking in all open work areas. Moreover, over 90 percent of nonmanufacturing establishments also had smoking policies. As one might expect, smoking policies are more common in larger establishments than in smaller enterprises. There should be economies of scale in providing smoking areas in larger work environments and also a greater need to standardize smoking policies as opposed to letting the voluntary discussions of small workers' groups address the appropriate smoking policy on a decentralized basis.

Insurance Costs of Smoking

Perhaps the most misunderstood element of the smoking debate is the health insurance cost of smoking. Smoking restriction advocates pegged this number at as high as one to two dollars per pack—without providing supporting evidence. Government agencies frequently make reference to additional insurance costs to justify restricting public smoking.

However, the nature of the insurance cost is mixed. If one assesses the insurance ramifications from smoking based on the assumption that smoking is a very risky and dangerous activity, then the consequences involve much more than higher health insurance costs from smokers being treated for illnesses. If substantial risks are indeed present, then smoker mortality rates will be higher as well. The earlier deaths of smokers, who are less likely on average to live through their post-retirement years, will in fact provide insurance savings.

The cost-per-pack figures shown in Table 1 (page 46) are based on the assumption that the adverse health consequences of smoking occur over a 20-year period, so that, for example, smok-

Table 1

External Insurance Costs per Pack of Cigarettes
With Tar Adjustments

	20-Year Moving Average 1993 Cost Estimates		
	Discount Rate		
	0%	3%	5%
Costs			
Medical Care under 65	0.267	0.302	0.331
Medical Care 65 or over	0.334	0.153	0.083
Total Medical Care	0.601	0.455	0.414
Sick Leave	0.003	0.011	0.017
Group Life Insurance	0.202	0.114	0.077
Nursing Home Care	-0.520	-0.197	-0.066
Retirement Pensions	-2.419	-1.000	-0.306
Fires	0.014	0.016	0.018
Taxes on Earnings	0.715	0.326	0.099
Total Net Costs	-1.405	-0.274	0.253

Source: W. Kip Viscusi, "Cigarette Taxation and the Social Consequences of Smoking," Cambridge: National Bureau of Economic Research, Working Paper No. 4891, October 1994, Table 5.

ers do not die immediately upon lighting a cigarette. The estimates for other reasonable time distributions are similar. For concreteness, I focus on the set of results using a real discount rate of 3 percent. Overall, smokers impose higher medical-care costs of 46¢ per pack; higher sick-leave costs of 1¢ per pack; greater life-insurance costs of 11¢ per pack; additional costs due to fires of 2¢ per pack; and foregone Social Security taxes on their earnings of 33¢ per pack.

If, however, one counts the insurance costs associated with smoking, for symmetry one should also recognize the insurance benefits. Since smokers are estimated to die sooner, they will spend less time in nursing homes, and fewer will live long enough to collect their retirement pensions. As a result, smokers save society 20¢ per pack in nursing-home care and $1.00 per pack in terms of lower pension and Social Security costs. On balance, smokers save society 27¢ per pack from an insurance standpoint. This amount excludes the role of the taxes smokers pay, which average 53¢ per pack of cigarettes.

If we also recognize the costs associated with secondhand smoke, then the calculus becomes more even. Using the upper-bound EPA estimates of the ETS body counts in conjunction with a figure of $5 million per life lost, I have estimated that the external cost per pack of cigarettes is as high as 41¢ per pack. Since this amount is also below the taxes smokers pay per pack, even the highest estimate of the smoking externalities that has been put forth by any government agency fails to indicate that smoking is a losing monetary proposition for society.

The social desirability of smoking clearly hinges on much more than the insurance-cost tally. However, an accurate accounting of the insurance costs is essential to avoid distorting the legitimate issues associated with public policy toward smoking.

Losses to Smokers

Virtually all of the public debate over smoking restrictions has focused on the costs borne by nonsmokers. However, any restrictions will necessarily reduce the welfare of smokers, who will have to forgo a consumption activity they enjoy. If smoking is banned in the workplace or sub-

stantially limited, smokers will have fewer opportunities to smoke. If smokers are relegated to a specific smoking area, their welfare will also be decreased, and their productivity may be affected as well.

Consider first the magnitude of the lost consumers' surplus (the difference between how much consumers pay for cigarettes and what they would be willing to pay) from the decrease in demand for cigarettes that will result from limitations on workplace smoking. To estimate the amount of the consumers' surplus for the market, the critical component is the shape of the consumer demand curve. More specifically, what is the elasticity of demand, or the percentage change in the quantity of the good purchased that will result from a unit percentage change in its price?

Table 2 (page 48) presents estimates of lost consumers' surplus for five different elasticity estimates ranging from -0.2 to -1.4. Most of the demand elasticities cluster in the range of -0.4 to -1.0, and estimates for teenagers have pegged the elasticities at the high end of -1.4. For illustrative purposes, I will focus on the demand elasticity of -0.4.

At that demand elasticity, before the enactment of the OSHA regulations, consumers would reap a surplus of $53 billion annually. In other words, smokers would be willing to pay $53 billion more for cigarettes than they are actually charged. The loss in consumers' surplus depends on the effect of the smoking restrictions on the level of smoking. The estimates in Table 2 pertain to three different scenarios in which restrictions reduce the total consumption of cigarettes by 10 percent, 20 percent, and 30 percent, respectively. Focusing on the midpoint of this range, after the smoking reduction one has a consumers' surplus of $34 billion, leading to a total consumers' surplus loss of $19 billion annually. For demand elasticities that indicate less responsiveness to price, there will be a larger estimated consumers' surplus loss, and for demand elasticities indicating a greater responsiveness to price, there will be a smaller welfare loss.

The second party that loses because of the decrease in smoking is the tobacco industry or, more specifically, the shareholders of those firms. Panel B of Table 2 reports a series of calculations that assume for simplicity's sake that profits are proportional to sales. A 20 percent reduction in cigarette consumption will lead to a loss in profits of approximately $0.2 billion per year. That calculation excludes the lost profits to tobacco farmers and other groups whose economic well-being is dependent on the tobacco industry.

The final component of the societal loss that I have calculated pertains to the lost tax revenue from a reduction in smoking. If there is a 20 percent reduction in cigarette consumption, the total loss of tax revenues will be $2.3 billion, with the loss being roughly evenly split between federal and state governments.

My calculations suggest that the effect of the proposed regulation in reducing smoking in the workplace and smoking overall will be nontrivial. Moreover, the group with the greatest amount to lose will not be the tobacco industry, but rather the individual smokers who will suffer an annual welfare loss on the order of $11 billion. The group that will suffer the second greatest loss will be the recipients of the cigarette taxes. The federal and state tax loss will exceed the loss in profits to companies by a factor of 10. None of those effects of the proposed OSHA regulation were addressed in the regulatory impact analysis prepared by OSHA.

OSHA's neglect of the cost component of the regulation is even more extensive. OSHA estimates the overall cost of eliminating ETS exposures as ranging from zero to $68 million. One might wonder how the agency could ban smoking in the workplace and mandate restricted smoking areas meeting stringent ventilation requirements without imposing any costs. OSHA's strikingly low cost figures should serve as a red flag for anyone considering the reasonableness of the cost estimates.

OSHA was able to get such low numbers by neglecting the capital cost for creating nonsmoking areas. Although OSHA did recognize that there may be costs involved in setting up appropriate ventilation systems, it assumed that every workplace in the country, ranging from barber shops and greeting-card stores to large factories, had available at no cost rooms that could be converted to smokers' lounges. In effect, OSHA treated office space as a free good in excess supply. The notion that every enterprise in the country has a 150-square-foot room available at no cost to set aside for smokers is certainly implausible.

More generally, the indoor air quality regulation, which includes restrictions other than those pertaining to ETS, has associated direct costs estimated by the agency to be $8.1 billion annually. However, OSHA estimates that there will be cost savings of $15 billion to firms annually from improving workplace air quality. In effect, OSHA claims that the regulation is not only a no-lose proposition for business, but will in fact be a

Table 2

LOSSES FROM SMOKING RESTRICTIONS

Panel A: Loss of Consumers' Surplus

Elasticity	Billions of Packs Sold (1993)	Average Price (1993)	Pre-Ban Consumers' Surplus (Billion $)	Post-Ban Consumers' Surplus (Billion $) Assumed Smoking Reduction			Loss of Consumers' Surplus From Ban (Billion $) Assumed Smoking Reduction		
				10%	20%	30%	10%	20%	30%
-0.2	25.1644	1.693	$106.51	$86.27	$68.17	$52.19	$20.24	$38.34	$54.32
-0.4	25.1644	1.693	$ 53.25	$43.14	$34.08	$26.09	$10.12	$19.17	$27.16
-0.7	25.1644	1.693	$ 30.43	$24.65	$19.48	$14.91	$ 5.78	$10.96	$15.52
-1	25.1644	1.693	$ 21.30	$17.25	$13.63	$10.44	$ 4.05	$ 7.67	$10.86
-1.4	25.1644	1.693	$ 15.22	$12.32	$ 9.74	$ 7.46	$ 2.89	$ 5.48	$ 7.76

Panel B: Loss of Producers' Surplus

	Tobacco Industry Profits 1993 (Billion $)	Loss of Producers' Surplus Assumed Smoking Reduction		
		10%	20%	30%
Fortune 500	$0.91	$0.09	$0.18	$0.27
Forbes 500	$1.17	$0.12	$0.23	$0.35

Note: Profits are for U.S. sales only.

Panel C: Loss of Tax Revenue

	Tax Revenue (Billion $ 1993)	Loss of Revenues (Billion $) Assumed Smoking Reduction		
		10%	20%	30%
Federal	$ 5.53	$0.55	$1.11	$1.66
State	$ 6.18	$0.62	$1.24	$1.85
Local	$ 0.19	$0.02	$0.04	$0.06
Total	$11.89	$1.19	$2.38	$3.57

source of increased profits.

One might wonder why American entrepreneurs are so ignorant that they fail to recognize an opportunity to make almost two dollars for every dollar expended in implementing smoking restrictions. Such entrepreneurial shortcomings cannot be attributed to market imperfections such as an alleged lack of worker information about the risks of ETS, since the cost savings OSHA projects yield productivity gains and other effects on firms' profitability. If a regulation has positive net financial effects even if we do not take into account any of the health benefits, then surely profit-seekers would jump on the opportunity. The fact that firms have to be coerced into taking such measures is a signal of the lack of internal consistency and plausibility of the cost estimates that have been put forth.

Thinking about Smoking Restrictions

The anti-smoking fervor has led to the support of a variety of initiatives that would dramatically restrict public smoking. The linchpin of those efforts has been the estimated health impact of ETS on nonsmokers. However, the existence of health effects has led many participants in the debate to lose sight of the competing interests involved.

The existing scientific evidence is highly speculative. Existing studies focus only on exposure of other household members and fail to control adequately for household characteristics correlated with a smoking spouse that may lead to risks of lung cancer and heart disease. What is needed is a rational assessment of the risks, rather than an advocacy perspective from either side. Instead of focusing on worst-case scenarios, we should be seeking out the best available scientific evidence. Available scientific studies may not be conclusive, but that fact alone should not necessarily be a rationale for inaction. On the other hand, we should not be swayed by fragmentary evidence that is inconsistent with other, better-established relationships, such as the magnitude of the risks to smokers themselves.

Regardless of which ETS risk estimates one employs, the ETS costs to society are clearly not infinite. Indeed, if we calculate the costs of ETS as well as the other insurance-related costs generated by smokers, cigarette smokers still pay their own way, given the taxes they pay for consuming the product. The financial merits of the case, even after monetizing the ETS costs, in no way justify restrictions on public smoking.

That is not to say that some form of smoking regulation in particular contexts would not be desirable. Nonfinancial concerns are also relevant. However, when we examine the desirability of smoking regulations, we should recognize the competing effects such efforts have. Smokers lose a substantial benefit to their welfare by having their smoking activity restricted, and losses accrue to society in terms of foregone taxes. Companies suffer foregone profits. There are also direct costs of restrictions, such as the expense associated with setting aside smoking areas and the possible productivity loss from impeding smoking behavior.

In many contexts, the market is well equipped to deal with such tradeoffs by reflecting the competing costs and benefits of restricting smoking. Indeed, most enterprises in the United States have enacted smoking-related policies. Provided that such efforts are not motivated by excessive reactions to publicity associated with ETS, they will be well founded.

For the government to promulgate sound regulations, it should follow the same kind of thought process that would be adopted in the market. Indeed, a useful starting point would be for there to be an assessment of which situations the market will not deal with adequately, since otherwise there is no need for government intervention. In any event, there is a need for reason and balance in recognition of the welfare consequences of smoking restrictions, not only for nonsmokers but for smokers and society at large.

Selected Readings

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