‘Green’ Preferences as Regulatory Policy

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Abstract

We examine the suggestion that if consumers in sufficient numbers are willing to pay the premium to have power generated using low-emission technologies, tax or permit policies become less necessary or stringent. While there are implementation difficulties with this proposal, our purpose is more fundamental: can economics make sense of using preferences as a regulatory instrument? If “green” preferences are exogenously given, to what extent can or should they be regarded as a substitute for other policies? Even with green preferences, production and consumption of polluting goods continues to impose social costs not borne in the market. Moreover, if green preferences are regarded as a policy instrument, the “no policy” baseline would require a problematic specification of counterfactual “non-green” preferences. Viewing green preferences as a regulatory policy instrument is conceptually sensible if the benchmark for optimal emissions is based on value judgments apart from preferences consumers happen to have. If so, optimal environmental protection would be defined by reference to ethical theory or, even less favorably, by prescriptions from policy advocates who give their own preferences great weight while giving those of the public at large (and the costs they bear) very little consideration.

Key Words: Environmental regulation, preference change

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I. Introduction

Among the many concerns receiving intensive attention in the efforts to expand competition in the electricity industry is a renewed focus on policies dealing with environmental pollution (generally airborne emissions) associated with electricity generation. The simultaneous debate over international treaties to control greenhouse gases also fuels controversies associated with these policies. Among the proposals put forth to reduce emissions are the familiar options of carbon taxes, tradable permits, or a blend of the two. An example of a blended proposal would be to reduce risk by setting a ceiling on abatement costs through government sale of permits to meet demand at a fixed price.[1]

While the net empirical benefits of these proposals remain a ripe subject for analysis—particularly in a general equilibrium framework—their theoretical properties are well known. Less well understood in economic terms is the suggestion that environmental problems can be mitigated under retail electricity competition through consumer choice of so-called green power producers. According to green power proponents, if consumers in sufficient numbers are willing to pay the premium to have power generated using low-emission technologies, tax or permit policies become less necessary or stringent.

Reliance on consumer demand for environmentally friendly electricity is subject to criticism on at least two grounds. The first is somewhat political, in that technologies that conserve natural resources or reduce air emissions are sometimes not regarded as green, most notably nuclear and hydroelectric power. Second, one would not predict that consumers would be willing in great numbers to pay a premium to bring about environmental benefits for which the benefits to all exceed the benefits to any particular individual.

The first criticism could presumably be addressed through better information, and the latter is, at heart, an empirical question. The purpose of this paper is not to examine these issues, but to address a more fundamental question: can economics make sense of encouraging particular preferences as a regulatory instrument? Conceptual difficulties

* The author is grateful for comments from Andrew Kleit, Colin Loxley, Ming Miu, Timothy Mount, Peter Schwartz, and other participants in the 19th Annual Rutgers University Advanced Workshop in Regulation and Competition. Errors remain those of the author.

[1] W. Pizer, "Prices vs. Quantities Revisited: The Case of Climate Change," Resources for the Future Discussion Paper 98-02, 1998, available at www.rff.org/disc_papers/PDF_files/9802.pdf.

arise because the economists' measuring stick for policy evaluation, efficiency, presupposes exogenous preferences. If green preferences are exogenously given, to what extent can or should they be regarded as a substitute for other policies?[2]

We will show that even with green preferences, production and consumption of polluting goods continues to impose social costs not borne in the market. Conversely, if green preferences should be regarded as a policy instrument, we need a "no policy" baseline. Such a baseline would have to be based on the level of emissions one would see if consumers had some counterfactual ("brown?") preferences. Hence, evaluating green preferences as regulatory policy implies that we specify what these brown preferences might be. One question such a specification question suggests is whether considering external costs using green-preference demand curves involves a double counting, in taking into account both B's willingness to pay for cleaner air and A's willingness to pay to give B cleaner air.

Viewing green preferences as a regulatory policy instrument is conceptually sensible if the benchmark for optimal emissions is based on value judgments apart from the preferences consumers happen to have. Examples of such nonconsumerist judgments include situations where demand for environmental protection is perfectly inelastic, (e.g., when ambient levels of a pollutant above a certain point are necessary and sufficient causes of major adverse health effects). More problematic settings would be when the optimal environmental protection is defined by reference to ethical theory or, even less favorably, by prescriptions from policy advocates who give their own preferences great weight, while giving those of the public at large (and the costs they bear) very little consideration.

II. Background

A. Green Preference Proposals

The U.S. government, environmental advocacy groups, and commercial marketers of green power have endorsed using green preferences as a tool to achieve policy goals.

Much of the government's statements in this area have been associated with proposals to open electricity markets to retail competition. Partly to mollify the concerns of environmentalist that cheaper electricity and competitive markets will worsen the

[2] Peter Schwartz suggests that an alternative policy, which would achieve the same end, would be to persuade suppliers to internalize external costs. While the analysis here could cover that scenario, we focus on the demand side. First, as discussed below, the environmental policy justifications for opening retail electricity markets hinge on encouraging consumers to choose power according to green preferences. Second, and more fundamentally, if we assume that producers are primarily interested in profits rather than a broader concept of "utility," the scope for encouraging them to take nonmarket revealed costs into account is smaller than it is for buyers, at least for noncommercial customers.

damages caused by electric utility emissions, government advocates of electricity restructuring have invoked the opportunity of people to buy green. According to the Clinton administration's statement of the benefits of its proposed Comprehensive Electricity Competition Act, "Competition also provides opportunities for consumers to vote with their wallets for green power and facilitates the marketing of energy efficiency services along with electricity."[3] The proposal also includes "consumer information requirements to ensure that consumers can choose to purchase power from cleaner sources."[4] Carol Browner, Administrator of the U.S. Environmental Protection Agency (EPA), has elaborated these ideas:

> These reductions will come not only from increased efficiency, innovative power distribution techniques, but also a burgeoning market for the clean energy the public wants.
>
> This package takes yet another step for the public's right to know. Just as this administration has given citizens more information about what is in their drinking water, and about toxic releases from local industries—we are now giving them information about where their power comes from and how much pollution it is generating. With this information, people can make informed decisions when choosing an energy company and take actions themselves to cut energy use, reduce pollution and save money.
>
> We see a trend around the country that when consumers are informed about the pollution effects of their energy use, some of them will choose to get their electricity from renewable sources like wind, solar, geothermal or biomass.[5]

Statements from environmental quality advocacy groups parallel Administrator Browner's green preference rationale. Environmental Defense (better known by its former name, the Environmental Defense Fund, or EDF), maintains a website devoted to encouraging consumers to purchase green power. According to the organization, "Buying green electricity is a simple and effective way for people to make an immediate environmental difference and help build a sustainable future."[6] The Go Green Power Campaign states: "Electric generation is the single greatest source of climate change gases and air pollution. By switching to a green power product, you can help play a role in solving both these problems."[7] The Environmental Resources Trust offers a

[3] U.S. Department of Energy (DOE), "Comprehensive Electricity Competition Act, Benefits of the Proposal," home.doe.gov/policy/cecfact1.pdf, 1999.

[4] The White House, "The Clinton Administration's Comprehensive Electricity Competition Plan," www.pub.whitehouse.gov/uri-res/I2R?urn:pdi://oma.eop.gov.us/1998/3/26/4.text.1, March 25, 1998.

[5] Carol M. Browner, Remarks Prepared for Delivery, Electricity Restructuring News Conference, U.S. Environmental Protection Agency (EPA), Washington, DC, April 15, 1999.

[6] Environmental Defense, "Coming Soon to an Outlet Near You: Green Electricity," www.edf.org/programs/Energy/green_power/, 2000.

[7] Go Green Power Campaign, "Climate Change and Pollution," www.gogreenpower.org/moreinfo/climate.html, 2000.

"UtilityGuide" to consumers interested in green power, including the possibility that consumers may have finely tuned green preferences:

> To help you to understand the environmental impacts of electricity production, UtilityGuide has developed a summary table identifying the environmental advantages and disadvantages of different electricity generation technologies.
>
> But this isn't enough. The answers to these questions also depend in part on your own personal convictions.
>
> For example, if you are concerned about global warming, you may want to buy electricity generated by hydropower plants, since these kinds of power plants produce electricity without emitting air pollutants that contribute to global warming. On the other hand, if you want to preserve river ecosystems, you may want to avoid purchasing electricity generated by hydropower plants and instead purchase wind or solar power.[8]

Not surprisingly, commercial power marketers have stepped up to the plate to satisfy green preferences for electricity. Probably the best-known provider is Green Mountain Power, currently marketing power in California, New Jersey, and Pennsylvania. Under the heading "Become Part of the Solution to Reduce Air Pollution!" its message is:

> When you buy from us, you help create demand for cleaner energy instead of coal and nuclear. In time, that means less air pollution and more renewables like wind turbines!
>
> Together, we will help make the world a better place for our children. That's the power of the marketplace. And that's the power you have as a consumer.[9]

Another environmentally oriented power marketer in California, Go-Green, includes in its pitch that, "Deregulation is your chance to decide where the power comes from; nuclear and fossil fuel OR sources that reduce pollution and provide a cleaner environment for our children."[10]

Some studies indicate a modicum of market potential for these initiatives. Surveying market research, Farhar (1999) found that 70% of utility customers would be willing to pay $5 for renewable power sources, and 21%, at least $15 per month more. These percentages tend to increase as customers learn more about green power, and if the price difference represents a choice to forego a price reduction as opposed to having to pay a higher price.[11] Swezey and Bird (1999) found some response to this potential demand,

[8] Environmental Resources Trust, "Green Choices: What Is Green Power?" www.utilityguide.com/1common/gpower.html, 2000.

[9] Green Mountain Power, "Become Part of the Solution to Reduce Air Pollution!" www.greenmountain.com/electricity/, 2000.

[10] Go-Green.Com, "Plug Into Renewable Power," www.go-green.com/about_us.htm, 2000. Go-Green also pledges to donate a percentage of the profits to California "environmental causes and organizations."

[11] B. Farhar, "Willingness to Pay for Electricity from Renewable Resources: A Review of Utility Market Research," DOE National Renewable Energy Laboratory, Golden, CO, July 1999.

listing 13 green power providers in California (despite only 1.1% of residential customers switching from the incumbent) and three green power suppliers in Pennsylvania, with premiums averaging about 2 cents per kilowatt-hour.[12] In California, Green Mountain Power charges about $6 more on a $100 electricity bill for renewable power, and $20 more for wind power—what it calls a "small price to pay."[13]

B. Literature on Preference Change

Understandably, economics does not have much to say on policies that involve appeals to change apparent preferences for a particular product. Answering efficiency questions in assessing whether there is a policy-relevant market failure—whether we make anyone better off without making anyone else worse off—presupposes a prior set of preference orderings that give the phrases "better off" and "worse off" their meaning. Without stable preferences, economists may have little to offer as policy evaluators (Rhoads, 1985 at 154-55).[14]

Perhaps the most direct economic response to the views of some other social scientists and critics that preference change is an obvious aspect of real life was from Stigler and Becker (1977).[15] They essentially argue not merely against preference change but against preference difference, claiming that differences in choices across consumers, and behaviors that seem to involve preference change—addictions, following fashions, acquired tastes—nevertheless are consistent with stable and identical preferences. One can explain differences in revealed preference across persons and over time by appealing to differences in the information they have and the intellectual capital they have amassed as a result of differences in experience.

One of the few discussions by economists that accepts the possibility of preference change is Dixit and Norman (1978).[16] Their focus was advertising, in particular, the question of whether there is, as many non-economists believe, too much advertising. It is not difficult to show that there can be too much advertising if the effect of the advertising is to reallocate demand among firms in a less-than-perfectly competitive market, when price exceeds marginal cost, but that argument takes preferences as given.[17] Dixit and

[12] B. Swezey and L. Bird, "Information Brief on Green Power Marketing, Fourth Edition," DOE National Renewable Energy Laboratory, Golden, CO, August 1999.

[13] Green Mountain Power, "A Small Price to Pay for a Healthier Planet," www.greenmountain.com/electricity/products/default.asp, and "EcoCalculator," www.greenmountain.com/electricity/products/compare_ca.asp#EcoCalculator, 2000.

[14] S. Rhoads, *The Economist's View of the World* (New York: Cambridge University Press, 1985).

[15] G. Becker and G. Stigler, "De Gustibus Non Est Disputandum," *American Economic Review* 67 (1977): 76-90.

[16] A. Dixit and V. Norman, "Advertising and Welfare," *Bell Journal of Economics* 9 (1978): 1-17.

[17] The marginal private gain from reallocating demand must exceed the net social gain, if the other firms were earning marginal profits on their sales. But that marginal private gain must equal the marginal cost of advertising, which is a social cost. Putting these together implies that the social gain from

Norman look at this question when the effect of advertising is to change taste. They propose that one can unambiguously test claims about advertising in calculating social welfare at the margin using both pre-advertising and post-advertising preferences. By that rigorous test, advertising can still be excessive. However, as Hahn (1982 at 190-95) points out, this strict test is unlikely to apply over the broad range of policies and actions for which preferences may be in flux.[18]

Not surprisingly, philosophers, less committed to stable preferences as a tenet of either positive descriptions of human nature or ethical judgments of human behavior, have had more to say about the possibility of preference change. Among the most influential conceptualizations of preference change has involved the idea that people can, do, and should choose and bear responsibility for the preferences they have. The leading modern discussion of this idea appears in Frankfurt (1971),[19] which, in trying to make sense of the concept of "will," distinguishes between first-order, behaviorally revealed preferences and higher, second-order preferences regarding what first-order preferences one wants to have. Simply put, a "willed" action is one in which what one wants to do (first-order preferences) is what wants to want to do (second-order preferences). Jaworska (1999) applies these ideas to understand the ethical consequences of the ability to reconcile first-order and higher-order preferences in assessing the extent to which the former have moral weight.[20]

There have been some connections between these philosophical insights and the analytical techniques of social sciences. George (1993) models preference hierarchies, highlighting the possibility that markets may reduce welfare by making it more costly to undertake activities to change preferences and bring them in line with "preferred preferences."[21] Elster (1983) combines philosophy, economics, and social theory to look at preference change as an adaptation to circumstance.[22] Brennan (1994) discusses the possibility that public support of education and the arts could be a response to a

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advertising at the margin must be less than its social cost. The argument parallels that for why there can be too many firms in an oligopoly market. See N. G. Mankiw and M. Whinston, "Free Entry and Social Inefficiency," *RAND Journal of Economics* 17 (1986): 48-58.

[18] F. Hahn, "On Some Difficulties of the Utilitarian Economist," in A. Sen and B. Williams (eds.), *Utilitarianism and Beyond* (New York: Cambridge University Press, 1982): 187-98.

[19] H. Frankfurt, "Freedom of the Will and the Concept of a Person," *Journal of Philosophy* 68 (1971): 5-20.

[20] A. Jawoska, "Respecting the Margins of Agency: Alzheimer's Patients and the Capacity to Value," *Philosophy and Public Affairs* 28 (1999): 105-38.

[21] D. George, "Does the Market Create Preferred Preferences," *Review of Social Economy* 51 (1993): 323-46.

[22] J. Elster, *Sour Grapes: Studies in the Subversion of Rationality* (New York: Cambridge University Press, 1983).

hypothetical market failure if current preferences undervalue any change in preferences that these institutions could produce.[23]

This very brief survey can do nothing more than suggest the breadth of positive and normative issues that arise absent a methodological commitment to stable preferences. But, as Stigler and Becker (1977) point out, it may be difficult to distinguish activities that change preferences from activities that change behavior by altering the available information that might be used to maximize utility given a set of stable preferences. In the case of green power, the blurry distinction would be between activities that increase one's underlying preference for environmental protection and those that give consumers information to act on environmental preferences they already have.

As we will see below, the benefits of assuming that shifts in demand result in changes in information, rather than underlying preference, come at some cost. Opening retail electricity markets to allow green power companies to inform consumers of their supplies and allow them to purchase green power is, for all appearances, a good thing. But, as we show below, the shift in the demand curve for polluting power induced by an information change fails to eliminate the externality and reduces the optimal level of consumption below what we would have seen prior to release of the new "information." If the preferences people happen to have depend critically on potentially incomplete information, they lose their privileged status as the basis for efficiency tests of market failure and consumer surplus-based measurements of welfare.[24]

III. Can Green Power Purchases Eliminate Environmental Externalities?

The problem begins with the conceptual difficulty in viewing green preferences as a policy instrument, while retaining the status of preferences as the basis for policy evaluation. Consider the "Econ 101" diagram of the welfare losses created by negative environmental externalities associated with the consumption of a particular good, in this case, fossil fuel-generated electricity. In Figure 1, PMC, for "private marginal cost," is the supply curve of such electricity. SMC, the social marginal cost of electricity, includes both the PMC and the external cost associated with emissions of air pollutants associated with power generation.[25] DD reflects the given demand for fossil fuel

[23] T. Brennan, "Markets, Information, and Benevolence," *Economics and Philosophy* 10 (1994): 151-68.

[24] A philosophical technique to justify paternalistic interventions is that they can get people to do what they would do if they were "fully informed." The meaning of fully informed in practice is problematic. Were someone fully informed about the importance of the environment, caring about others, doing good, or however high up the ethical ladder one wants to go, perhaps that an individual would, of course, see things just as we do. That difficulty makes it empirically difficult to distinguish changes in "information" from changes in "taste." Hence, looking at shifts in demand as only based on changes in information does not erase many of the conceptual difficulties brought out below.

[25] To use a graph based on production of a good, the level of emissions needs to be uniquely associated with the quantity of fossil-fuel electricity produced. Such a diagram posits no possibility of abatement

generated electricity.[26] The market output of electricity, where PMC intersects DD, is Q_M; the efficient level of output, where SMC intersects DD, is Q_E.

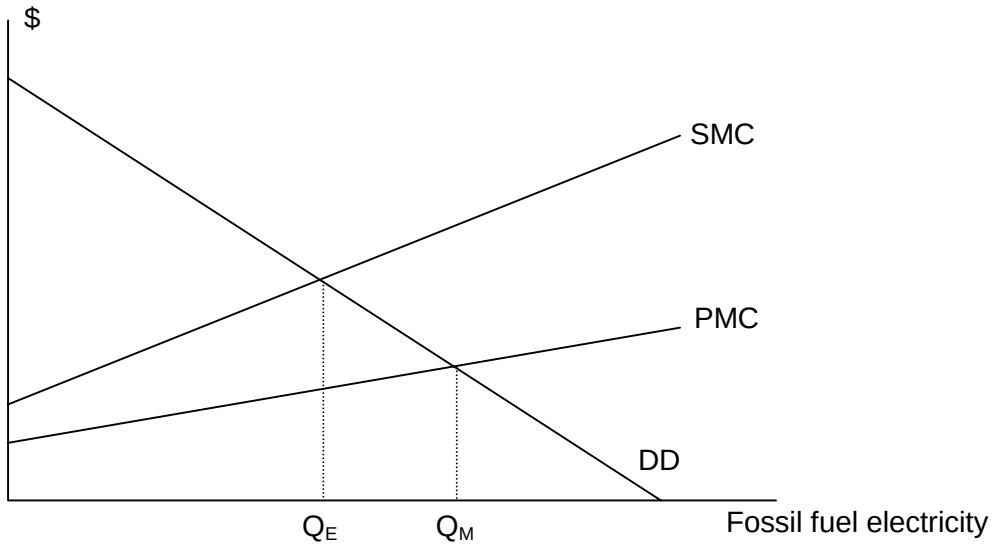

Figure 1: Basic externality effect

Suppose—"imagine" might be a better verb—that demand for fossil-fuel electricity can be changed at relatively negligible cost (e.g., through a mailing campaign that leads people to become more altruistic regarding the cleanliness of the air their neighbors breathe). Specifically, let Z be the difference between SMC and PMC at Q_E. Z is the marginal external cost of the pollution from using fossil-fuel electricity at the optimal use level. We assume that this campaign to change demand brings about an aggregate reduction of Z in the willingness to pay for electricity, shifting the demand curve down from DD to the altered demand curve DD_{ALT}, as shown in Figure 2.

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holding output constant, through fuel switching (low sulfur coal or natural gas for high sulfur coal) different generation technologies (higher heat rates), or pollution removal devices (scrubbers).

We could incorporate these possibilities easily by using a diagram based on emissions directly rather than electricity. In such a diagram the "marginal cost" curve reflects the cost imposed by the externalities, and the "marginal benefit" curve reflects the economic value of being able to pollute by one more unit (from increased output or reduced abatement expense). A change in preferences that makes consumers less willing to buy dirty power would be reflected by a fall in this marginal benefit curve.

Because the market manifestation of a change in preferences is likely to involve demand for the product (e.g., substituting renewable power for fossil-fuel electricity) rather than the pollutant (for which there is no market), analyzing preference change as a policy instrument seems clarified by looking at the product. However, one could do the analysis using a more general model based on pollution rather than the product, without any change in the conclusions.

[26] A more general analysis could take into account the ability of power sellers to increase demand (i.e., shift DD to the right, through advertising).

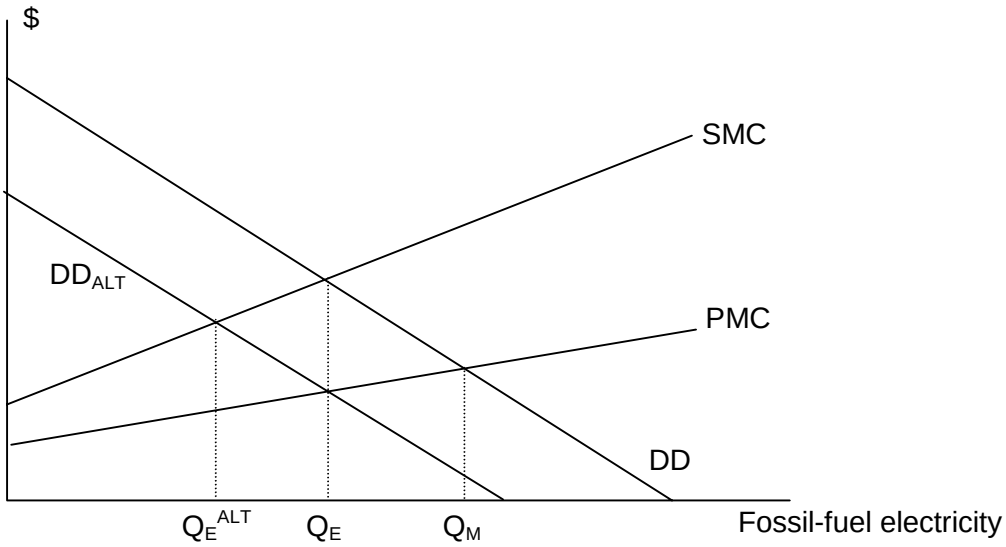

Figure 2: Altered demand

If we can alter the willingness of people to give up something they would otherwise prefer to buy in the interests of environmental protection to shift the demand for fossil-fuel electricity from DD to DD_{ALT}, the new market outcome will be at the intersection of DD_{ALT} and PMC. The output of fossil-fuel electricity is Q_E, the policy goal before. In that sense, changing preferences is a policy tool, in this case a "free" tool, to achieve the policy goal.

But if DD_{ALT} is now the demand curve, the optimal amount of electricity falls from Q_E to Q_E^{ALT}, where Q_E^{ALT} is the output level where the new demand DD_{ALT} intersects SMC. Although the quantity demanded shifts back to Q_E after we alter demand, there is still a marginal external harm being imposed by fossil-fuel electricity use at that point. Using DD_{ALT} as the reference point, there remains a need for some environmental policy tool—fossil-fuel taxes, emissions taxes, or marketable permits—to reduce pollution (via reduced fossil-fuel electricity use) to the reduced, more stringent optimum. For example, if the difference between SMC and PMC is constant over the relevant range of fossil-fuel electricity consumption, the optimal tax will be the same after the change in preferences as it was before. In short, changing preferences does not seem able to fulfill a promise to substitute for conventional environmental policies.

Moreover, and as we will see in more detail below, the choice of Q_E^{ALT} itself may be arbitrary, depending on exactly how DD shifts. To hit the target of Q_E, DD_{ALT} needs to intersect PMS at Q_E. In Figure 2, DD_{ALT} was constructed to be parallel to DD, reflecting a constant reduction in aggregate consumer willingness to pay for fossil-fuel electricity. But that need not be the case. Roughly speaking, if the preference change generates a DD_{ALT} more (less) elastic than that produced by a parallel shift in DD, Q_E^{ALT} will be less (more) than that shown in Figure 2.

Can preference change be a policy tool that substitutes for taxes, permits, or command-and-control rulemaking? Is the right target the original Q_E? Q_E^{ALT}? Which Q_E^{ALT}? We now turn to those questions.

IV. Counterfactual Preferences

One response to this puzzle would be to appeal to a standard that is independent of fostering green preferences, to get an unambiguous target. There may be some privileged set of preferences that should be the demand curve, which counts in deciding the optimal level of pollution, essentially ignoring changes in the calculated optimum that arise with altered preferences. In terms of the above illustrations, one could say that DD is the standard for determining optimal pollution, Q_E. The post-change demand curve DD_{ALT} matters only as a tool for getting the market outcome to be Q_E. That the DD_{ALT}-optimum output is different, at Q_E^{ALT}, is irrelevant.

Philosophical thinking on utilitarianism provides some justification for this response to the puzzle, in that when assessing aggregate utility, one ought to disregard contributions to one person's utility based upon the utility levels of others. From an ethical standpoint, counting "other-regarding" preferences leads to a kind of double counting that penalizes the altruistic. We can formally illustrate this argument. Imagine a world with two individuals, A and B, and a fixed quantity of a single good X, which can be allocated between them as X_A and X_B, where $X_A + X_B = X$. Let $U_A(X_A)$ and $U_B(X_B)$ be the utility A and B get respectively from X_A and X_B. We assume these functions are identical, increasing ($U_A' , U_B' > 0$), with diminishing marginal utility (U_A'', $U_B'' < 0$). In addition, assume that A is an altruist, who also gets utility $kV_A(X_B)$ from knowing how much B is consuming, where k is a variable parameter indicating the strength of the altruistic preference and $V_A' > 0$.[27] Hence, A's total utility is $U_A(X_A) + kV_A(X_B)$.

Choosing X_A to maximize the sum of A's and B's total utility, $U_A(X_A) + kV_A(X_B) + U_B(X_B)$, recognizing that $X_B = X - X_A$, gives the equilibrium condition

$$U_A' - kV_A' = U_B'.$$

A positive k implies that $U_A' > U_B'$; functional identity and diminishing marginal utility from consuming X imply that $X_A < X_B$. A loses because his altruism leads B's interests to be counted more than once.

[27] Noneconomists may be more comfortable with having B's utility, rather than consumption, contribute to B's utility function. The advantage of focusing on consumption is that it is easier to observe and measure than utility. However, when taking utilitarianism (rather than only efficiency) seriously, we presume that the ethicist can at least judge utility magnitudes in some rough comparative sense, reducing the conceptual advantage that consumption has over utility in this particular setting.

Some leading moral theorists have based their arguments on the premise that only self-regarding preferences should count in the construction and evaluation of social institutions. To avoid complications and distortions relating to envy, just benevolence, and altruistic preferences, John Rawls bases his principles of justice on hypothetical choices that risk averse individuals, operating behind a "veil of ignorance" regarding their capabilities and aspirations, would make to promote the "mutually disinterested" well-being of the worst-off class of persons.[28] Dworkin (1977 at 77-83) argues that those "external" preferences are based on the well-being of others "corrupt" utilitarianism, whether negative (racism) or positive (altruism). Dworkin uses this argument to oppose admissions policies that discriminate against minorities (based on the external preference of racism), while supporting redistributive affirmative action policies as increasing aggregate utility (as calculated from internal "personal" preferences).[29]

Controversial aspects of Rawls's and Dworkin's specific applications aside, the principle that policies should be judged according to only those preferences people would have absent any direct consideration for the welfare of others, seems a plausible way to resolve the puzzle posed in the preceding section: Should one use *ex ante* or *ex post* demand curves to determine the optimal intensity of environmental policy? But this potential answer leads to another, empirical question: Is the original, observable demand curve free of such external preferences?

All we know about the original demand curve, DD in Figures 1 and 2, is that it is the demand curve prior to the implementation of policies designed to encourage persons to take into account the environmental effects of their choices on the well being of others. But nothing precludes the possibility that, to some extent, some people act somewhat altruistically in their energy choices, even absent explicit policies to encourage environmental awareness. Surely it is not extremely unusual (except perhaps among economists) that persons reduce air conditioning use, purchase energy-saving appliances, or turn out the lights partly out of an internalized belief that conserving energy is "politically correct" social behavior. If so, should the pollution policy target, whether achieved through taxes, marketable permits, command and control, or preference change, exceed Q_E, because revealed preferences understate the purely self-regarding willingness of consumers to pay for fossil fuel electricity?

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[28] J. Rawls, *A Theory of Justice* (Cambridge, MA: Harvard University Press, 1971, esp. §§24-26, 30). Rawls (*Id*. at 147-48) also notes that ethical theories should give primacy to direct utility in terms of the evaluating justice is not the same thing as saying the people should care only about themselves. In *A Theory of Justice*, appeals to a disposition to act according to principles of justice also support the principles that liberty should be maximized and, then, that the well-being of the worst-off class of individuals should be maximized (the "maximin" principle).

In later writings, Rawls attempts to justify these principles as necessary for political stability in a society where people in fact have different but hopefully overlapping comprehensive moral doctrines. J. Rawls, *Political Liberalism* (New York: Columbia University Press, 1993, esp. pp. 133-58.

[29] R. Dworkin, "DeFunis v. Sweatt," in M. Cohen, T. Nagel, and T. Scanlon (eds.), *Equality and Preferential Treatment* (Princeton: Princeton University Press, 1977): 63-83.

A thought experiment may illustrate the scope of the potential discrepancy between the observed and hypothetical optimal points when other-regarding preferences are neglected. First, consider the optimal crime rate given current preferences for law-abiding behavior, balancing the marginal cost of the law enforcement system against the marginal benefit of crime reduction (however construed). Then, imagine what the crime rate would be holding law enforcement costs constant, but assuming that everyone lacked an internalized moral code that motivated them to obey the law even when the probability of being caught was negligible.[30]

The two crime rates seem quite different. Is aiming at the second target appropriate, implying that we should be tolerating more crime than we have now? Or should we take advantage of internalized codes of conduct, and if so, how much? If, as I suspect, most would opt for using the internalized codes of conduct, then at least in that case, "self-regarding" preferences is not the appropriate standard for setting policy targets. That standard presents both empirical quandaries in determining what those preferences really are, and normative quandaries regarding the acceptability of the outcomes such a standard may imply.

V. Preference-Change Equilibria and Inelastic External Costs

A. Definition

One response to the problem presented in Figure 2, the difference between the prechange and postchange optimal outcomes, would be to change preferences again to make the postchange outcome the market outcome. Presumably, of course, this could create a new "post-two changes" outcome with even tighter pollution standards. But perhaps we could get to a point where, after enough changes, there is no difference between the prechange and postchange optimal points, making the ambiguity in policy targets disappear. We call this a "preference change equilibrium," or PCE.

A PCE would exist when the pollution target defined after changing demand is the same as the target aimed at prior to changing demand. Following Figures 1 and 2, let PMC(Q) be the private marginal cost of producing the polluting good—the supply curve, assuming competition in the sale of the polluting good—and let SMC(Q) be the total cost of producing Q, including the external damages. As before, let DD(Q) be the pre-change demand for the good, and let $DD_{ALT}(Q)$ be the post-change demand curve.

The target defined after changing demand will be the value of Q for which

$$DD_{ALT}(Q) = SMC(Q). \qquad (V.1)$$

[30] J. Elster, "Selfishness and Altruism," and C. Jencks, "Varieties of Altruism," in J. Mansbridge (ed.), *Beyond Self-Interest* (Chicago: University of Chicago Press, 1990): 44-52, 53-67.

If the change in demand was as designed, so that the postchange market equilibrium equals the prechange target output, then

$$DD_{ALT}(Q) = PMC(Q). \quad (V.2)$$

A desirable property of a PCE is that it should meet the prechange target. If Q is the prechange target, it was defined by the prechange social optimum condition

$$DD(Q) = SMC(Q), \quad (V.3)$$

and the need for environmental policy at this point implies that

$$DD(Q) > PMC(Q). \quad (V.4)$$

At a PCE point meeting the prechange target, the same output level Q must satisfy all four of these equations. Let Q_{PCE} be such a point. This may occur in one of two ways, requiring perfectly inelastic external cost or perfectly inelastic post-change demand.

B. Inelastic external cost

The first way these equations can all hold comes from the cost side, assuming that DDALT is not perfectly inelastic. From equations V.1 and V.2, $SMC(Q_{PCE}) = PMC(Q_{PCE})$, implying that at Q_{PCE}, the target level of output, external costs are zero. However, V.3 and V.4 imply that $SMC(Q_{PCE}) > PMC(Q_{PCE})$, since Q_{PCE} was the pre-change target level of output. These two relationships can hold only if SMC can take both zero and a positive value at Q_{PCE}. Geometrically, this implies a kink in the SMC curve at Q_{PCE}, which implies inelastic external cost at Q_{PCE}, as illustrated by Figure 3,

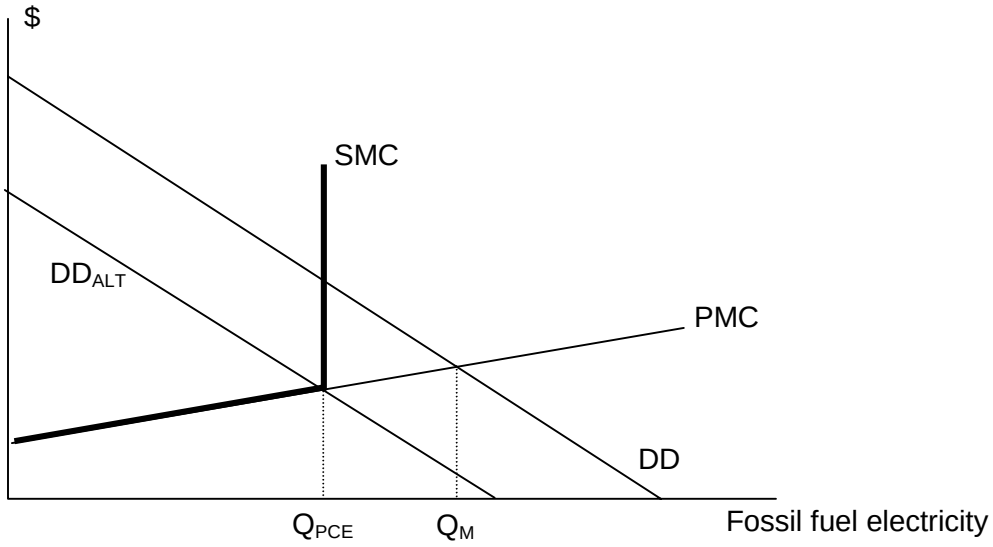

Figure 3: Inelastic external costs

where the heavy line indicates the social marginal cost curve.[31]

If the SMC looks as it does in Figure 3, the optimal level of polluting output (fossil-fuel electricity, here) is largely independent of the level of demand. The harm below that level of output is negligible, so pollution does not matter. At that level, the marginal cost is so high that we would never want to exceed it. Hence, the empirical problem of which preferences to use disappears, if the target level of pollution is essentially independent of that value.

Unfortunately, few if any pollutants meet this criterion; in particular, there may be no point below which the external costs are zero. Portney (1990 at 32-33) cites medical studies suggesting that some people are sufficiently sensitive to some pollutants so that virtually any level can cause some illness or discomfort they would want to avoid.[32] Unless there is a perfectly safe level, equations V.1 and V.2 cannot hold unless demand is inelastic. Even if there is a perfectly safe level, V.3 and V.4 will not hold unless the harms are discontinuously large at that crucial juncture. Absent any indication that any pollutant meets these criteria, we should examine the inelastic demand possibility.

C. Inelastic Green Demand for Polluting Goods: Do Preferences Matter?

If there is no value of $SMC(Q_{PCE}) = PMC(Q_{PCE})$, then the only way equations V.1 and V.2 can hold, with $DD_{ALT}(Q_{PCE})$ equal to both $SMC(Q_{PCE}) = PMC(Q_{PCE})$, is if the postchange demand curve is perfectly inelastic at Q_{PCE}. But if Q_{PCE} meets the initial target, i.e., if V.3 holds, it and V.1 together imply that

$$DD_{ALT}(Q_{PCE}) = DD(Q_{PCE}) \; (= SMC(Q_{PCE})).$$

The most obvious postchange demand curve meeting this criterion is where DDALT = DD for Q < QPCE, and is inelastic at QPCE, as indicated by the heavy line in Figure 4.[33]

[31] The SMC curve need not be vertical indefinitely. Nonconvexity (i.e., the fact that beyond some point the marginal cost of pollution falls because people eventually leave the polluted area) implies that at some point the external marginal costs fall, perhaps back to zero. The optimal response may be to do nothing about pollution at all, for example, if potential victims can relocate at a cost less than the cost associated with abatement or foregone output. W. Baumol and W. Oates, *The Theory of Environmental Policy* (New York: Cambridge University Press, 1988): 110-31.

[32] P. Portney, "Air Pollution Policy," in P. Portney (ed.), *Public Policies for Environmental Protection* (Washington: Resources for the Future, 1990). A recent D.C. Circuit Court of Appeals decision vacated recent particulate matter standards, and remanded ozone standards on the grounds that because there was no perfectly safe level, the Environmental Protection Agency had inadequate delegation from Congress to set any standard. *American Trucking Assn., Inc. v. U.S. Environmental Protection Agency*, D.C. Circ. No. 97-1440, May 14, 1999, available at http://www.ll.georgetown.edu/Fed-Ct/Circuit/dc/opinions/97-1440a.html.

[33] More generally, any postchange demand curve will satisfy the equations for a PCE that is inelastic at Q_{PCE} between SMC and PMC, and nonincreasing everywhere else.

One can imagine achieving a demand curve of this sort by convincing people that it is ethically mandatory to cut out certain kinds of uses of electricity or to curtail purchases above some given amount.

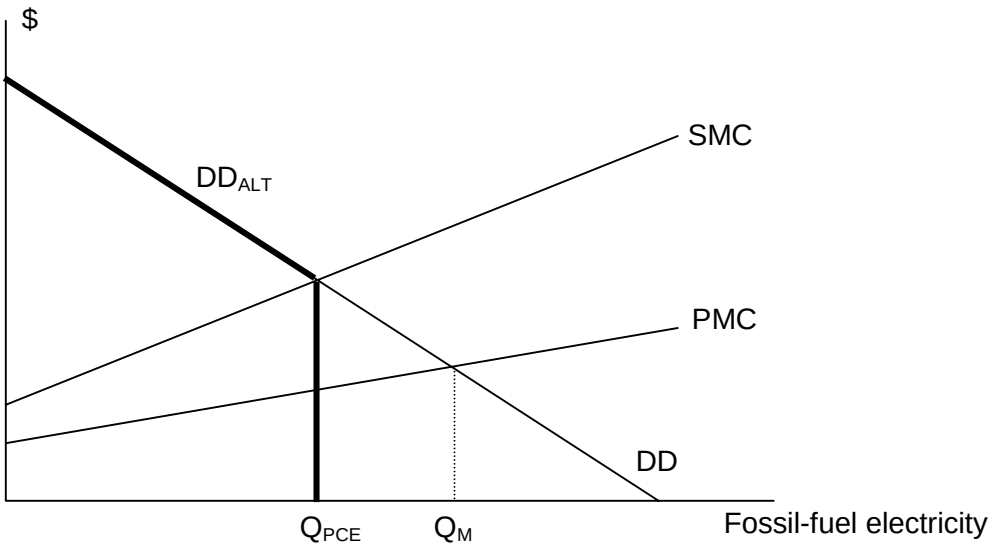

Figure 4: Inelastic postchange demand

Such a specific change in demand may be as unfeasible as it is unlikely that the harms from a pollutant are sufficiently inelastic to justify a PCE, as described in the preceding subsection. More problematic, however, is that any postchange demand curve that is inelastic at some Q between SMC and PMC will be a PCE, although not one that meets the initial target. Figure 5 sets out two examples. If postchange preferences were described by the heavy line with the inelastic portion on the left, the PCE would be at a level of output (and pollution) at Q_1, stricter than the target level, Q_E. If those preferences produce a demand curve with the inelastic portion on the right, the PCE will be at Q_2 exceeding Q_E.

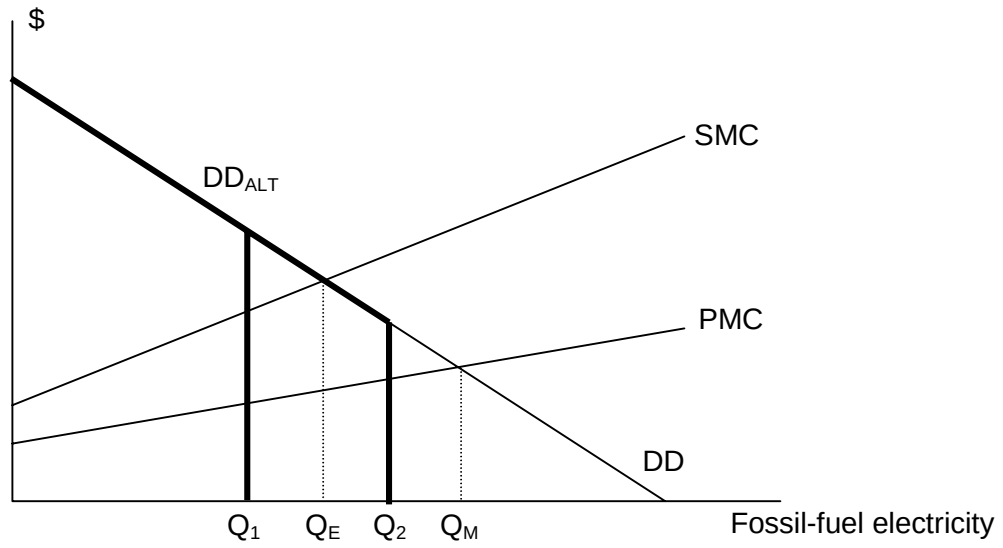

Figure 5: Multiple postchange equilibria

If avoiding the need to consider additional policy following the change in preferences is the criterion for setting policy, then the fact that the new equilibria do not agree with the target under the original preferences is of no concern. But this leads to the question of how to choose the target, if any output level can be a PCE. In other words, if preferences (or at least demand curves) are sufficiently malleable, being a PCE is not a constraint. Moreover, we still need to decide which target is the right target.

Malleability to this degree also raises the policy issue of why we focus on changing preferences regarding demand for the polluting product. Why not change the willingness to pay to avoid the externality? If we can eliminate the willingness to pay to avoid the externality, at least up to the market outcome Q_M, there is no need for any policy to reduce pollution. Perhaps we could convince persons that a little coughing (fashionably throaty voices) or shorter life expectancy (reduced chronic illness risk) is not worth paying much to avoid. Maybe an advertising campaign could convince the public that viewing old Grand Canyon pictures over the Internet is as good as being there, to eliminate any willingness to pay to avoid haze.

VI. Bottom Line: Do Preferences Matter at all?

The point of these progressively more absurd examples is not to suggest that environmental policy is inherently arbitrary or that we ought to consider solving the pollution problem by getting people to not mind it. The lesson from the above is that adding preference change to the policymaker's toolkit creates a huge range of ambiguities for the economist's appraisal of policy effectiveness. This should not be surprising; to

expect otherwise would be to expect that preferences could be both policy instrument and policy criterion, i.e., both the means and the end of policy.

In other words, the widespread advocacy of green preferences among public officials, environmental activists, and renewable energy service companies seems to makes sense only if preferences do not count in the evaluation. Making green preferences sensible as a policy instrument may require rejecting the economist's method of basing policies on preferences. Such a view better fits the ecologist's view of environmental policy, where the right level of pollution is defined by criteria drawn from biology and perhaps environmental ethics, rather than from estimated willingness to pay for environmental public goods. It may also fit conceptions of policy choices as being based on deliberations regarding the public welfare rather than mere self-interested, "naked" preferences (Sagoff, 1986; Sunstein, 1990).[34]

Last but not least, the philosophical view that preferences for the goods associated with pollution ought not count for much compared to environmental values implies a conception of ethical objectivity. As most normally regard the truth of a scientific proposition, the truth or validity of an ethical proposition may depend upon "holding up against all rivals through and impartial and informed examination" (Frankena, 1973 at 109) rather than what people in a particular time or place happen to believe.[35] This paper is hardly the place to recapitulate the debate between objective and relativist ethics. However, the bottom line in assessing green preferences as regulatory policy may well involve addressing questions such as these, rather than the efficiency questions with which economists are more comfortable. The institutional means for addressing these questions will inherently rely more political processes than efficiency criteria or cost-benefit analysis, or other conventional, technical tools for policy evaluation—likely with all of the distortions such processes imply.

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[34] M. Sagoff, "Values and Preferences," *Ethics* 96 (1986): 301-16; C. Sunstein, "Political Self-Interest in Constitutional Law," in J. Mansbridge (ed.), *Beyond Self-Interest* (Chicago: University of Chicago Press, 1990): 209-23.

[35] W. Frankena, *Ethics* (Englewood Cliffs, NJ: Prentice-Hall, 1973).