

Economists' Opinions on Environmental Policy Instruments: Analysis of a Survey

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Incentive instruments (effluent charges) are theoretically expected to be preferred to direct regulations (individual emission ceilings) by university-employed, theoretically inclined politically right-wing, professional economists living in a market-oriented country, *ceteris paribus*. Public sector employed, politically left-wing, professional economists living in a country with a long tradition of government involvement prefer the regulatory approach, *ceteris paribus*. These theoretical hypotheses tend to be supported by a bivariate probit analysis based on a survey of more than 1400 economists in five countries. © 1985 Academic Press, Inc.

I. INTRODUCTION

With few exceptions, the economic literature, as evidenced in journal articles and textbooks,² is strongly in favor of using incentive-based instruments for environmental policy, in particular effluent taxes, but also corresponding subsidies or tradeable pollution certificates. The "regulatory approach," on the other hand, the direct prescription of pollution ceilings to individual firms is, with few exceptions, rejected. However, there are but few cases in which incentive-based instruments have been applied in practical environmental policy; regulation is the dominating approach.³

In this context, it is important to inquire whether the view held by professional economists about the desirability of various environmental policy instruments is really so monolithic as it appears from the literature. Are there factors which in a theoretically predictable way induce economists to prefer incentive-based instruments over regulation, or the reverse? More specifically: do, for example, an economist's occupation, professional orientation, political ideology, and country of

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²Ethridge [8], Orr [16], Siebert [20], Kneese [12], and Baumol and Oates [2].

³Kneese *et al.* [13], Kneese and Schultz [14], Johnson and Brown [10], Baumol and Oates [3, Chap. 20], and Downing [6].

living systematically influence his or her preferences toward desirable environmental policy instruments?

This paper develops hypotheses on the likely influences of such factors (Section II) and tests them with the help of bivariate probit analyses on data collected by a survey among more than 1400 professional economists in five countries (Section III). The results suggest that the economists' opinions on the desirability of environmental policy instruments depend in fact on the factors mentioned: Working at a university, being theoretically inclined, politically right-wing, and living in a market-oriented country each, *ceteris paribus*, lead to a support of the use of incentive-based instruments (effluent taxes), while being employed in the public service, being politically left-wing, and living in a country with a long tradition of government intervention (France and Austria) each, *ceteris paribus*, lead to a support of the use of regulatory instruments.

II. HYPOTHESES

It is theoretically expected that academic economists' views on environmental policy instruments depend on (1) occupation, (2) professional orientation, (3) political ideology, and (4) country of residence. The hypotheses advanced in the following are based on the economists' self-interest model of behavior, as well as on influences of tradition and culture.

1. Occupation

The place of work is one of the important determinants of every person's welfare. The views expressed on the desirability of environmental policy instruments therefore depend (among other things, i.e., *ceteris paribus*) on the extent to which an instrument serves to augment the utility derived from one's own work. Mostly, these views are not chosen consciously, but are "internalized" (to use a sociological term) in the course of daily life. The adoption of views based on occupational advantages may also be psychologically explained by the desire of individuals to minimize the tension between what they proclaim in their occupational roles and what they privately think (reduction of "cognitive dissonance"). The position adopted by economists is thus taken to correspond closely to the interests of their particular occupation.

Two occupations are distinguished:

(a) *University scholars* (professors and other teaching or research staff). This occupational group has a vested general interest in maintaining accepted economic science as it is. The university scholars have attained their position by proving that they are competent in mastering a subject, they have (partly) contributed to its creation, and would therefore lose part of their accumulated "intellectual capital" if it would be radically put into doubt, changed, or even rejected. Moreover, most of them teach (or have to teach) what is regarded as accepted economics to their students, and it would put them under too much strain to privately hold another opinion than the one they teach and expect students to know in examinations. This basically conservative tendency of the university based economists⁴ leads to the hypothesis that they tend to support the "textbook" view that incentive-based

⁴The view that economists are basically conservative has been stressed by Stigler [21].

instruments are better suited to fight environmental degradation than are regulations.

(b) *Public officials.* Following the economic theory of bureaucracy (see Tullock [22], Downs [7], Niskanen [15], Breton and Wintrobe [5]) it may be assumed that economists in public employment are quite interested in increasing the influence of the public sector and the number and intensity of government interventions. Increasing public activities give them the opportunity to be more influential, to enjoy higher prestige and to, at least indirectly, raise their income. The hypothesis is that they thus tend to support the regulatory rather than the incentive approach to environmental policy.

No specific hypotheses about the opinions of economists in other occupations are advanced.

2. Professional Orientation

For similar reasons as mentioned above, it may be expected that more *theoretically* inclined economists generally support incentive instruments, whereas economists who consider themselves to be *practically* oriented support direct government interventions by regulations.

3. Political Ideology

In the most simple terms, the following distinction of political ideologies along the right-left spectrum is possible: The right has a long record of distrust of government intervention (as it infringes on individual liberty) and prefers the use of anonymous market forces. On the other hand, the left is suspicious of the market (mainly because of its undesirable distributional consequences) and calls for government intervention to cure social ills such as environmental degradation. The hypothesis is that professional economists who consider themselves to be of the right will tend to support incentive instruments, while economists of the left will tend to support regulations.

4. Country

The country an economist lives and performs in must be expected to have some effect on his or her opinions. It is difficult or even impossible to disassociate oneself from the prevailing general outlooks and traditions of one's society. Two groups of countries may be distinguished for our purposes:

(a) *Market-oriented countries*, such as the Federal Republic of Germany and Switzerland, which since World War II have been strongly influenced by the United States. This influence also relates to the prevailing type of economic theory as advanced in American neoclassics-dominated textbooks (e.g. Samuelson [18]). It is theoretically expected that economists from countries of this group tend to prefer the incentive over the regulatory approach.

(b) *Countries with a long history of government intervention.* In Austria, for instance, the government's role in economic affairs goes back to the Hapsburg monarchy and has been intensified in the interwar years, i.e., long before the

"Keynesian Revolution." The Austrian government has also played a very important role in the postwar economy, exemplified by the fact that it owns more than half the shares of industrial corporations.⁵ Another prominent case is France where the government's involvement in the economy has an even longer and more pronounced record, which dates (at least) back to the Mercantilists ("Colbertism") and is vigorous up to the present, as exemplified by the French "planification." It is hypothesized that economists living in such countries *ceteris paribus* tend to prefer the regulatory over the incentive approach.

It goes without saying that these hypotheses are always thought to hold when all other influences are kept constant. Support or preference for either incentive or regulatory instruments should not be taken in any absolute sense but relative to the opposite kind of instrument.

To summarize: It is expected that professional economists *ceteris paribus* are more likely to support the incentive approach to environmental policy (instead of the regulatory approach), the more they are

- occupied at a university;
- theoretically oriented;
- ideologically on the right;
- of a market-oriented country strongly influenced by the United States (such as West Germany, Switzerland or, of course, the United States itself).

On the other hand, it is theoretically expected that professional economists *ceteris paribus* more likely support the regulatory approach (over the incentive approach) when they are

- occupied in the public sector;
- practically oriented;
- ideologically on the left;
- of a country with a long tradition of government intervention (such as Austria and France).

III. EMPIRICAL TESTS

1. The Survey

In spring and summer 1981, a stratified random sample of 1472 economists was anonymously asked in writing to respond to two (among other)⁶ propositions concerning the desirability of using the incentive and the regulatory approach to environmental policy. The first proposition stated was "Effluent taxes represent a better approach to pollution control than imposition of pollution ceilings." The second was "The maximum emission of pollutants should be prescribed to the

⁵See, for example, Abele *et al.* [1].

⁶The survey contains 44 propositions. The general results referring to the individual countries have been published in French and German in Bobe and Etchegoyen [4], Frey *et al.* [9], Schneider *et al.* [19], and Pommerehne *et al.* [17].

TABLE I
Responses to the Proposition "Effluent Taxes Represent a Better Approach
to Pollution Control than the Imposition of Pollution Ceilings"^a

	Generally agree (%)	Agree with provisions (%)	Generally disagree (%)	No answer (%)	Total number (= 100%)
Occupations					
University staff	29.0	28.7	40.1	2.2	314
Public sector	25.1	29.8	40.9	4.2	191
Private sector	27.3	30.0	39.5	3.2	220
					$\chi^2 = 13.3^b$
Countries					
Austria	20.9	22.0	54.9	2.2	91
France	27.2	27.2	40.7	4.9	162
Germany (FR)	34.4	29.7	33.0	2.9	273
Switzerland	21.1	34.2	42.7	2.0	199
					$\chi^2 = 41.7^b$
All occupations and countries					
%	27.4	29.4	40.2	3.0	
Total number	199	213	291	22	725

^aResults according to three occupations and four countries ($N = 725$).

^bThe likelihood-ratio test (χ^2) over the frequencies at the four response categories indicates that there is a significant difference between occupations as well as countries in the responses.

individual firms." This second proposition serves as a check on how well the first proposition was understood, and how seriously it is answered. Naturally, an answer contrary to the one given on the first proposition is expected. The respondents could either "generally agree," "agree with provisions," "generally disagree," or they could refuse to answer one or both of the statements; 725 complete replies were sent back and could be used for the study, implying a quite satisfactory return rate of 49.3% for such a type of survey, for which due to the anonymity no reminder was possible. The survey covers economists from the four countries Austria, France, Germany (Federal Republic) and Switzerland, chosen from a list of the members of professional associations of the respective countries.⁷ The responses to the first statement on effluent taxes vs pollution controls are listed in Table I, divided according to three occupational groups and to four countries.

Table II shows the corresponding results for the second statement on the desirability of direct emission controls. The two tables are self-explanatory. It may be seen at once that the answers differ with respect to the occupation and nationality of the respondents.

⁷The professional associations are in Austria and Germany the Gesellschaft fuer Wirtschafts- und Sozialwissenschaft, Verein fuer Socialpolitik, in Austria furthermore the Nationaloekonomische Gesellschaft; in France the Association Nationale des Docteurs en Sciences Economiques, the Association Française de Science Economique and the Centre National de la Recherche Scientifique; in Switzerland the Schweizerische Gesellschaft fuer Statistik und Volkswirtschaft.

TABLE II
Responses to the Proposition "The Maximum Emission of Pollutants Should
Be Prescribed to the Individual Firms"^a

	Generally agree (%)	Agree with provisions (%)	Generally disagree (%)	No answer (%)	Total number (= 100%)
Occupations					
University staff	59.9	23.9	14.9	1.3	314
Public sector	67.0	23.6	9.4	0.0	191
Private sector	58.2	29.5	11.8	0.5	220
					$\chi^2 = 10.6^b$
Countries					
Austria	69.2	25.3	4.4	1.1	91
France	77.8	14.8	6.8	0.6	162
Germany (FR)	51.6	29.4	18.3	0.7	273
Switzerland	57.3	29.1	13.1	0.5	199
					$\chi^2 = 24.0^b$
All occupations and countries					
%	61.2	25.5	12.6	0.7	
Total number	444	185	91	5	725

^aResults according to three occupations and four countries ($N = 725$).

^bSee Table I, footnote b.

2. Probit Analysis

The theoretically derived hypotheses set forth are tested with the help of bivariate probit analyses. (Probit, rather than simple linear regression, is in order because the set of responses to a proposition is restricted to two categories⁸ and sums to 1). For this purpose, the data contained in Tables I and II on occupations and-nations are used. Moreover, the survey has collected data on the respondents' self-evaluation as to whether they consider themselves to be "practically" (coded +1) or "theoretically" (coded -1) oriented: 59.6% of the respondents indicated that they are "practically" and 40.4% that they are "theoretically" inclined. The respondents could also indicate their self-evaluated political position on a normalized right-left scale, running from +1 (right) to -1 (left).

The logit estimates for the two propositions are presented in Table III, Eqs. (1) and (2). (Due to missing information 42 and 27 respondents, respectively, have to be excluded, so that $N = 683$ and 698, respectively.)

According to the statistical test criteria, the two equations perform well. The χ^2 statistic indicates that the answers given ("agree"/"disagree") can be explained to a high degree by the variables used here. The values of ρ indicate the approximate likelihood of the influence of the independent variables on the dependent one. It may also be seen that the theoretically expected change of signs (at least of the statistically significant parameters) holds true in each case, i.e., the estimates of the two equations reinforce each other.

⁸For the sake of estimation, the categories "generally agree" and "agree with provisions" are put together and confronted with "generally disagree." The no answer category is omitted.

TABLE III
 Probit Estimate of the Determinants of the Responses to the Two Propositions (in Parentheses: Approximate *t*-Values)^a

Proposition	Occupation			Professional orientation			Ideological position			Country			Interaction term ^b		Test Statistics		
	Constant	University staff	Public sector	Private sector	Theoret. (-1)	Practice. (+1)	Right (+1)	Left (-1)	Austria	France	Germany	Switzerland	United States (only ⁽¹⁾)	Public service in France		University staff in Germany	χ^2
(1) "Effluent taxes represent a better approach to pollution control than imposition of pollution ceilings" (N = 683)	0.27* (2.06)	0.31** (3.41)	-0.26* (2.34)	0.04 (0.62)	-0.41* (-1.98)	0.96** (2.91)	-0.21* (2.16)	-0.10 (-1.10)	0.18* (2.34)	0.11 (0.99)	-	-0.16* (-2.34)	0.14* (2.34)	-	-	264.3	0.75
(2) "The maximum emission of pollutants should be prescribed to the individual firms" (N = 698)	1.70** (12.9)	-0.08 (-0.81)	0.23** (2.89)	-0.10 (-0.36)	0.12 (1.06)	-0.23** (2.89)	0.12 (1.23)	0.09 (1.04)	-0.77** (-4.07)	-0.46* (-2.66)	-	0.12** (3.89)	-	-	275.2	0.89	
European countries and United States																	
(1') "Effluent taxes represent a better approach to pollution control than imposition of pollution ceilings" (N = 903)	0.17 (0.66)	0.08 (0.94)	-0.11 (-1.90)	-0.04 (-0.81)	-	-	-0.26 (-1.90)	-0.08 (-1.03)	0.20* (2.56)	0.04 (1.07)	0.23** (5.41)	-	-	-	-	20.7	0.15

^aOne asterisk indicates statistically significant parameters at the 95%, two asterisks at the 99% confidence level.

^bIn order to keep the table clear, only the statistically significant interaction terms are reproduced.

The first proposition on effluent taxes has in the aggregate been agreed to by 59%, and rejected by 41% of the respondents. An ex post forecast of the answers on the basis of the independent variables and the estimated parameters predicts 76% of the "agree" and "disagree" responses of the individual economists correctly, i.e., an ex post forecast on the basis of the estimated logit equation leads to a significantly better result than a forecast by chance (51% correctly predicted responses)⁹ or by projecting an "agree" for everyone in the sample (59% correctly predicted responses). The second proposition on maximum emissions of pollutants has an *a priori* distribution of 87% "agree" and 13% "disagree." The estimation equation allows a correct prediction of 94% of the answers which is again significantly superior to "guesstimates" on the basis of a forecast by a chance or a projection of an "agree" response for everyone.

The estimates shown in Table III, Eqs. (1) and (2), support most of the theoretical hypotheses about the causal factors influencing the responses given:

(1) The university staff economists have a higher tendency to support effluent charges rather than pollution ceilings, while economists in the public service tend to reject effluent charges and to support the direct imposition of emission ceilings. The corresponding estimated parameters are statistically highly significant.

(2) Also, the theoretical expectations about the influence of practical and theoretical orientation are supported by the estimates.

(3) The theoretical hypotheses on the influence of an economist's political ideology are strongly supported by the estimates: Right-wing economists tend to support effluent taxes, left-wing economists favor the regulatory approach.

(4) The hypotheses about the influence of the country of residence are supported by the signs of the estimated coefficient. However, of the two countries expected to be in favor of regulatory activities, only Austria yields a statistically significant sign in the case of proposition (1). The hypotheses for the market-oriented countries Germany and Switzerland are, on the other hand, quite well supported. The interaction terms suggest that the predilection of the regulatory approach does not hold in general in France but is heavily concentrated among the public officials in that country. The strongest supporters of effluent taxes seem to be the university-based economists in Germany.

3. Including the United States

A similar survey on the opinions of professional economists has some time earlier been undertaken for the United States (Kearl *et al.* [11]), based on a stratified random sample from the members of the American Economic Association. However, the survey is restricted to the first proposition, and no data on the self-evaluated professional orientation and on political ideology have been collected. Therefore, the responses to the propositions are explained by occupation and country of residence only. Table IV presents the survey results including the answers of 211 American economists. It may be seen that the American economists' opinions differ from those of European economists.

⁹The sample probability of an "agree" is 0.59 and of a "disagree" 0.41. Hence the percentage that would be correctly predicted by chance using these aggregate probabilities is $(0.59)^2 + (0.41)^2 = 0.51$.

TABLE IV

Responses to the Proposition "Effluent Taxes Represent a Better Approach to Pollution Control than the Imposition of Pollution Ceilings," for Five Countries Including the United States ($N = 936$)

	Generally agree (%)	Agree with provisions (%)	Generally disagree (%)	No answer (%)	Total number (= 100%)
Occupations (all countries)					
University staff	36.1	29.2	32.5	2.2	415
Public sector	27.4	29.0	39.0	4.6	241
Private sector	29.6	30.4	35.4	4.6	280
					$\chi^2 = 25.6^a$
United States	47.9	29.9	18.0	4.2	211
					$\chi^2 = 70.2^a$
All occupations and countries					
%	31.9	29.6	35.0	3.5	
Total number	299	276	328	33	936

^aSee Table I footnote b.

The results of the probit estimate¹⁰ are shown as Eq. (1') in Table III. The equation is able to forecast 69% correct responses (related to an *a priori* distribution of 64% "agree" and 36% "disagree"), and only two parameters are statistically significant. However, the signs of all independent variables are the same as in Eq. (1). This weaker performance may partially be due to the fact that the estimation equation is misspecified due to the exclusion of the professional orientation and ideological position. Nevertheless, the estimation equation tends to support the hypothesis that economists in the United States are particularly strong supporters of an effluent tax, the corresponding parameters being highly significant.

IV. CONCLUDING REMARKS

Our analysis indicates that the views of professional economists on the desirability of the incentive as opposed to the regulatory approach is significantly influenced by occupation, professional orientation, political ideology, and country of residence. This influence has been predicted on the basis of the economic model of self-interest. It turns out that economists employed in a university, being theoretically inclined, with an ideology biased to the right, and living in a market-oriented country such as Germany, Switzerland, or the United States, *ceteris paribus* prefer the use of an effluent tax to individual prescriptions of emission levels. On the other hand, economists working in the public sector, with an ideology to the left, and living in a country with a long tradition of government intervention, such as Austria or France, *ceteris paribus* prefer a regulatory approach in environmental policy.

The results of this analysis may be useful for several different purposes. They may, for instance, suggest that the setting of individual emission standards widely

practiced in practical environmental policy is not due to lack of information, or to insufficient training and knowledge of economics by public officials, because as our analysis shows, even professional economists when employed in the public sector tend to support the regulatory approach. Rather, the preference for regulations should be interpreted to be the result of the self-interest (rational) behavior of individuals working in the public sector. This may imply further that incentive-based instruments will only have a chance of being more widely used in practical environmental policy when they can be made to conform to the self-interest of those designed to implement them.

REFERENCES

1. H. Abele, E. Nowotny, S. Schleicher, and G. v. Winckler, "Handbuch der oesterreichischen Wirtschaftspolitik," Manz, Vienna (1982).
2. W. J. Baumol and W. E. Oates, "The Theory of Environmental Policy: Externalities, Public Outlays, and the Quality of Life," Prentice-Hall, Englewood Cliffs, N.J. (1975).
3. W. J. Baumol and W. E. Oates, "Economics, Environmental Policy, and the Quality of Life," Prentice-Hall, Englewood Cliffs, N.J. (1979).
4. B. Bobe and A. Etchegoyen, "Economistes en désordre: consensus et dissension," *Economica*, Paris (1981).
5. A. Breton and R. Wintrobe, "The Logic of Bureaucratic Control," Cambridge Univ. Press, Cambridge (1982).
6. P. B. Downing, A political economy model of implementing pollution laws. *J. Environ. Econ. Manag.* 8, 255-271 (1981).
7. A. Downs, "Inside Bureaucracy," Little, Brown, Boston (1967).
8. D. Ethridge, User charges as a means of pollution control: The case of sewer surcharges. *Bell J. Econ. Manag. Sci.* 3, 346-354 (1972).
9. B. S. Frey, W. W. Pommerehne, F. Schneider, and H. Weck, Welche Ansichten vertreten Schweizer Oekonomen? *Schweiz. Z. Volkswirtschaft. Statist.* 118, 1-40 (1982).
10. R. W. Johnson and G. M. Brown, "Cleaning Up Europe's Waters," Praeger, New York (1976).
11. J. R. Kearl, C. L. Pope, G. C. Whiting, and L. T. Wimmer, A confusion of economists? *Amer. Econ. Rev., Papers Proc.* 69, 28-37 (1979).
12. A. V. Kneese, "Economics and the Environment," Penguin, Harmondsworth (1977).
13. A. V. Kneese, S. E. Rolfe, and J. W. Harned, Eds., "Managing the Environment: International Cooperation for Pollution Control," Praeger, New York (1971).
14. A. V. Kneese and C. L. Schultze, "Pollution, Prices and Public Policy," Brookings Institution, Washington, D.C. (1975).
15. W. A. Niskanen, "Bureaucracy and Representative Government," Aldine, Chicago/New York (1971).
16. L. Orr, Incentive for innovation as the basis for effluent charge strategy. *Amer. Econ. Rev., Papers Proc.* 66, 441-447 (1976).
17. W. W. Pommerehne, F. Schneider, and B. S. Frey, Quot homines, tot sententiae? A Survey among Austrian Economists, *Empirica* 13, 93-127 (1983).
18. P. A. Samuelson, "Economics," 10th ed., McGraw-Hill, New York (1976).
19. F. Schneider, W. W. Pommerehne, and B. S. Frey, Relata referimus: Ergebnisse und Analyse einer Befragung deutscher Oekonomen. *Zeitschr. ges. Staatswiss.* 139, 19-66 (1983).
20. H. Siebert, "Analyse der Instrumente der Umweltpolitik," Schwarz, Goettingen (1976).
21. G. Stigler, The politics of political economists, *Quart. J. Econ.* 73, 522-532 (1959).
22. G. Tullock, "The Politics of Bureaucracy," Public Affairs Press, Washington, D.C. (1965).

¹⁰ In total, 33 questionnaires had to be excluded due to missing data, so that $N = 903$.