Public Support for Congestion and Pollution Fee Policies for Motor Vehicles: Survey Results

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Executive Summary

In this paper we report on the results of two telephone surveys conducted in Southern California during August and September 1996. The purpose of the surveys was to inform respondents about a set of rather complex pricing policies designed to reduce freeway congestion and motor vehicle emissions, and to estimate respondent support for those policies. After receiving extensive information about these policies, respondents were polled on whether they would support, i.e., vote for, any or all of these options. The subject of one survey was congestion fees and of the other, vehicle emission fees, termed pollution fees in the survey.

The congestion fee survey ascertained from all respondents their support for a plan that levied a fee of 5 to 10 cents per mile on freeway travel during rush hour (the "base fee policy"). Then the sample was split randomly into thirds and respondents were asked to indicate their support for one of the following three plans:

- *Congestion fees with fee/tax reductions.* Respondents were told that a percentage of the revenues would be returned to the public in the form of reductions in motor vehicle fees or sales taxes.

- *Congestion fees with coupons*. Respondents were told that a percentage of the revenues would be returned to the public as coupons that could be used for transit, high-speed buses, etc. This proposal was developed and supported by COALESCE.

- *Fast lanes.* Also called hot lanes. Respondents were told that the leftmost lane of freeways would be subject to fees. In a followup question, they were told that new toll lanes would be built. No rebates were associated with these options.

The results of the congestion fee survey suggest that nearly two out of five commuting motorists in Southern California will support congestion fees on the freeways of the region even without being told with any specificity how the revenues are to be used. Public acceptance is substantially enhanced by promising to return at least some of the revenues

in the form of reductions in other taxes. Indeed, a rebate of 50 percent of the congestion fee revenues garners 48 percent support (50 percent support from those expressing an opinion). The fast lanes are the most popular idea. If the congestion fees are applied only to newly constructed "fastlanes," support is 55 percent (57 percent of those expressing an opinion), with only 46 percent support if the leftmost lane of an existing freeway is converted to a toll.

The pollution fee survey elicited support for a plan that levied a fee on vehicles in the region, depending on the vehicle's emissions per mile and on the miles driven. The sample was then split in two, with half the respondents being told that a portion of the revenues would be returned to the public in the form of reductions in motor vehicle fees or sales tax reductions, and half told that these returns would be made in the form of coupons. These alternatives correspond to those provided in the congestion fee survey.

The results of the pollution fee survey were very similar to the congestion fee survey. Again nearly 40 percent of respondents agreed to support the base plan (42% of those expressing an opinion). More than 50 percent supported the fees with rebates, including support of 54 percent when all the available revenues are returned to the public (57% of the sample expressing an opinion). Support for the coupon policy was intermediate between the base and rebate policies, attracting 42 percent of the sample (45% of those expressing an opinion).

Extensive statistical analyses were performed on the data from both surveys to explain the voting patterns observed. Generally, the levels of support in both surveys were significantly affected by the design features of the plans, such as the size of the fee paid and the rebate, as well as by a host of socio-demographic and perceptual variables, such as ethnicity, age, political affiliation, expected efficacy of the policy, and the degree to which air pollution affects the respondent or his or her family. In general, however, support for pollution fees was more systematically related to these independent variables than was support for congestion fees. Examination of these statistical results may be useful in the development of congestion fee and pollution fee programs to present to the public, as well as in the design of public information campaigns and the allocation of marketing resources to win support for these programs.

I. Introduction

In this paper we report on the results of two telephone surveys conducted in Southern California during August and September 1996. The purpose of the surveys was to inform respondents about a set of rather complex pricing policies designed to reduce freeway congestion and motor vehicle emissions, and to estimate respondent support for those policies. After receiving extensive information about these policies, respondents were polled on whether they would support, i.e., vote for, any or all of these options. The subject of one survey was congestion fees and of the other, vehicle emission fees, termed pollution fees in the survey. Both surveys were developed after extensive focus group testing and in consultation with the REACH Task Force. The draft instruments were then pre-tested.

These two surveys are somewhat unusual because they elicited extensive information from the respondent on driving behavior and vehicle ownership and used this information to estimate for the respondent what his annual fee obligation would be. To personalize the fees in this way required the use of a Computer-Assisted Telephone Interview (CATI) protocol. Interview data was entered into the computer directly by the interviewer and then used to calculate the fees confronting the respondent. The information on personal, family, and driving characteristics, as well as respondent beliefs about a number of pertinent issues, were also useful in explaining the observed voting patterns elicited by the survey.

The surveys are also unusually explicit about the fate of the collected revenues, and in particular they include examination of policies that return a substantial portion of the revenues to the public, either in the form of cash (through reductions in sales taxes and vehicle registration fees or through income tax credits) or in the form of coupons to be used for vehicle emissions equipment repair, transit, and the like.

Survey samples. Both survey samples were stratified random samples of adults (age 18 or greater) in the 5-county SCAG region. Oversampling was necessary to ensure adequate geographical coverage; we undersampled in Los Angeles County and oversampled in the other four counties. For each county, the number of completed interviews in the two surveys and the sampling weights (persons represented by each respondent) are shown in Table I-1. In both surveys we also screen out some adults. In the congestion fee survey we screened out adults who reported that they did not travel on the freeways during rush hour, and in the pollution fee survey we screened out anyone who did not own or lease a motor vehicle. In both cases the excluded adults might be expected to be more supportive of the fee policies, as they will not be paying into the system but are likely to benefit from cleaner air, less congested freeways and government spending of the revenues. After adjusting for the oversampling, the samples appear to resemble the population of Southern California, with the exception that in the pollution fee survey there appears to be an excess of persons over age 65 (14% of respondents in the pollution fee survey versus 11.6% of the population in the 5-county area).

Table I-1 Number of Interviews and Sampling Weights				
	Congestion fee survey		Pollution fee survey	
County	Number of interviews	Sampling weights	Number of interviews	Sampling weights
Los Angeles	526	13,610	473	15,136
Orange	498	4,147	453	4,560
Riverside	216	4,806	191	5,435
San Bernardino	292	3,947	263	4,381
Ventura	211	2,595	196	2,794

Survey response data. In total, 1,743 interviews were completed in the congestion fee survey, and 1,715 were completed in the pollution fee survey. The cooperation rate, defined as the quotient of the total completed interviews and the total viable contacts who have the potential to pass through the screeners and speak the appropriate language, was 22 percent in the congestion fee survey and 30 percent in the pollution fee survey. Provision was made for speakers of Spanish only, and the number of interviews conducted in Spanish in the two surveys was 31 and 29 percent, respectively. From the pollution fee survey, 139 respondents were dropped who failed to provide essential information on the miles driven.

II. Congestion Fee Survey

The congestion fee survey consisted of three parts. In the first part the interviewer elicited from the respondent some fairly detailed information about the respondent's commuting behavior, including the number of rush-hour commutes per week, travel time and distance, travel mode, etc. This part of the survey generated useful information about commuting behavior, but its main purpose was to enable the CATI program to estimate the weekly and annual fees that would be paid by the respondent. The second part of the survey asked a set of standard demographic questions: age, marital status, education, family composition, work status and income. Because the personal nature of these questions often causes respondents to terminate the interview, this set of questions was placed at the end, after the opinion questions had been asked.

The third and most important part of the survey elicited opinions on several different congestion fee policies. All respondents had described to them a "base" policy, in which a fee of 5 to 10 cents per mile (depending on current congestion level) was to be levied on all freeways in the region. Respondents were told that, based on their reported commuting behavior, the policy would cost them an estimated X dollars in congestion fees each week, with the revenues to be used for a variety of transportation-related purposes. They were also given an estimate of the weekly time savings that would result from the policy. They were then asked whether they would support in a referendum the policy described. A follow-up question determined whether their support or opposition was “definite” or “probable.”

It was necessary to convey to the respondent a great deal of information about the congestion fees: information about the features of the basic plan, such as the transponder technology, treatment of carpools, and uses of the revenues. In order to keep the respondent engaged in the interview process, we presented this information to respondents in questions of the form, "Suppose X. Would you be more or less likely to support the fee policy?' In addition, we wanted to remind respondents of the different ways that people might respond to the fees, such as rescheduling some of their trips or using transit. We presented this information as a series of questions structured as: "Some people say that congestion fees will cause people to do X. Do you think this will happen most of the time, some of the time, or almost never?.

While the main function of these questions was to convey information to the respondent, the answers are also available for analysis. We found, however, that the responses to the features of the plan are difficult to interpret. For example, most of those opposed to the base fee described themselves as "less likely' to support any given feature. Such respondents were apparently choosing the most negative category to the question and did not want the interviewer to get the impression that they might support any feature of it. The responses to the "belief" questions appear to be more meaningful, and in general we found that those who thought the congestion fees would be effective at changing behavior were more likely to support the policy. It is difficult, however, to determine which is causing which.

As shown in Figure II-1, the sample was then split randomly into thirds, with each third getting a set of questions related to a variation of the congestion fee policy. The three policy alternatives examined are as follows:

(i) *Congestion fees with tax reductions*. Respondents were told that a certain portion of the fee revenues (25, 50 or 82 percent) would be used to reduce other taxes, such as sales tax or state gasoline taxes or DMV registration and license fees. The were also given a dollar amount of the tax reduction. For the purposes of the survey these tax-reduction amounts were computed by taking 25, 50 or 82 percent of the respondent's estimated congestion fee payments, although of course respondents were not informed of this. A follow-up question asked whether respondents would support the policy if the revenues were returned as a tax credit on the state income tax.

flow chart

(ii) *Congestion fees with coupons*. Respondents were told that they would be given coupons that could be used for a variety of transportation-related services, including public or private transit, jitney services, vehicle emission equipment repair, etc. This is the COALESCE proposal, as applied to congestion fees. The face values of the coupons being offered were 25, 50 or 82 percent of the respondent's estimated fee payments.

(iii) *Hot lanes*. Respondents were asked if they would support a policy in which fees would be charged only on the left-most lane of all freeways. It was made clear that this would mean a reduction in the number of lanes available for "free" travel. A separate question asked whether the respondent would support fees if they were levied only on newly-constructed lanes.

Results

For ease of comparison, the support and opposition to each of the policies examined are shown in Figure II-2. As shown the support for the base congestion fee policy is 37 percent, compared to 57 percent opposed and 5 percent undecided. For two of the three alternative policies the support increases substantially. Linking the fees to fee/tax reductions attracts the support of 45 percent of respondents, and the hot lane proposals were supported by 45 percent of respondents for existing lanes and 55 percent for new lanes. The coupon proposal on average failed to attract any more support than the base policy. However, there were significant difference in the levels of support for the different amounts of coupons distributed.

Table II-1 gives the mean commuting distance and time without the congestion fee policy, together with what we told the average motorist would be the cost and time saved by the base congestion fee policy. As is usually the case, these variables were highly skewed, as shown by comparing the means to the percentiles given in the table.

Table II-1
Respondent Commuting Distance and Time

	Mean	Percentiles				
		5	25	50	75	95
Commuting Distance (mi.)	24.5	0	5	15	30	75
Commuting Time (minutes)	65.2	0	12	50	90	195
Weekly congestion fee	$10.20	0	0	4	12	34
Weekly minutes saved	107	0	8	61	140	315

support chart

Base survey

As shown in Table II-2, a solid majority (56 percent) opposes the base congestion fee policy, with only 38 percent in favor. If we consider the intensity of preferences, we see that a much higher fraction of the opposers are "definites," suggesting that this policy enjoys soft support and faces hard opposition.

Table II-2
Support for Base Congestion Fee Policy

Support		Oppose		Don't Know
38%		56%		6%
Definite	Probable	Probable	Definite	
15%	23%	17%	40%	6%

The most common reason given for opposing the base policy is that it is nothing but another tax. As shown in Table II-3, fully a quarter of all respondents gave this as their reason for opposition. Another ten percent felt the time savings were not worth the estimated cost, and eight percent were skeptical about its ability to reduce congestion. About twelve percent cited unfairness to low-income people or those with long commutes.

Table II-3
Reasons Given for Opposition to the Base Policy
(percent)

No reason given, respondent just doesn't like idea	14.7
Doesn't understand the program	1.4
Too big a change, too sudden	1.8
Reported time savings not worth the reported cost	10.5
Just a tax increase	26.5
Spillover effects on other roads	1.3
Not fair to low-income people	4.5
Not fair to people with long commutes	8.8
Suspicious of electronics	4.2
Unaffordable in my household	7.1
Policy wouldn't effectively reduce congestion	8.3
This fee would be okay for me but would hurt other household members	1.4
Other	6.5
(Don't know/NA)	3.1
Total	100.0

The proportion of respondents favoring the plan does not vary much from one county to another. As shown in Table II-4, residents of Los Angeles County are slightly more likely, and those of Ventura slightly less likely than residents in the other counties to support the base policy. Only the difference between Los Angeles and Ventura is statistically significant (at the 5 percent level),

Table II-4
Support for the Base Policy by County

County	Support	Oppose	Don't know
Los Angeles	39	55	5
Orange	36	60	4
Riverside	36	57	7
San Bernardino	37	57	6
Ventura	32	63	5

Although support for other policies is stronger, the respondent's attitude toward this base question is by far the best predictor of the response to those other policies. This point can be illustrated by the data in Table II-5, a cross-tabulation of support for the base policy and the combined congestion fee/tax reduction.

Table II-5
Importance of Base Policy

	Support congestion fees with tax reductions?		
Support base policy? ↓	No	Yes	Don't know
No	74%	20%	6%
Yes	10%	88%	2%
Don't know	22%	48%	30%
Average support for fees/tax reduction	46%	49%	5%

The rows of Table II-5 can be thought of as the conditional support for the fees with tax reductions given their support or opposition to the base policy. Thus, among opponents of the base policy, 74 percent oppose the fees combined with tax reductions. An even higher percentage of base fee supporters -- 88 percent -- support fees with tax reductions. The fact that 20 percent of base fee opponents change their vote, compared to only 10 percent of supporters, is the reason that support for the fees with tax reductions is higher than support for the base policy.

Explaining base fee support. A large number of variables can be reasonably supposed to affect support for the base policy. To isolate the influences on support, we estimate a set of probit regression equations. The estimated dependent variable in these equations can be interpreted as the probability that an individual with the given characteristics will support the policy. The independent variables include (i) sociodemographic variables indicating gender, age, education income and ethnic identification; (ii) respondent's commuting habits, including travel time and distance during commutes, use of transit or carpools; and (iii) personalized impacts of the congestion fee proposal on the respondent. The coefficients on the independent variables indicate their influence on the probability of support.

Four different regression specifications were examined, and Table II-6 below summarizes the results (Full regression results are shown in Appendix Table A-II-1). After specification I we drop income, because its effect is small and it has an adverse effect on sample size. In specification II and III we split the time-saved variable into two parts, as explained below. Finally in specification IV we add a variable indicating the respondent's belief in the efficacy of congestion fees.

Evidently, few of these variables do a very good job of explaining support or opposition to congestion fees. Several variables are almost statistically significant, or are significant in some specifications but not others. They are not "robust," that is, their coefficients are strongly affected by the presence or absence of other variables in the equation or by slight changes in the sample. (The selection of variables affects the sample because of missing values on some observations.)

There are some surprises in these regression results, especially with respect to the demographic variables. It would have been reasonable to expect, for example, that respondents with higher incomes would have supported congestion fees, because they would tend to value the time savings more. Likewise, we expected that more educated respondents would be more likely to be able to assimilate the information provided during the survey and better understand the arguments in favor of user fees, and therefore would be more likely to support the policy than those less well-educated. In the event, we found no income effect at all and education was negatively associated with support. Perhaps more educated respondents were more skeptical of an untested economic theory or the competence of governments to implement these ambitious plans. The strongest result among the demographic variables was the very strong support for the policy among Hispanic respondents. Again, we have no explanation for this result.

Among the commuting behavior variables, only the carpool and transit use variables affected support, and only weakly. Certainly individuals with more days in carpools or in transit will benefit more from congestion fees and will be more likely to support them, but we found only borderline support for this hypothesis. This result may be a consequence of the small number of transit and carpool users in the sample; average transit and carpool use was only 0.12 and 0.56 days per week. One may need a larger sample of transit users or carpoolers to be able to discern an effect.

Neither trip length nor duration nor the number of commutes per week had any effect, but we had no *a priori* expectations about those variables. On the one hand, more rush hours should mean more time savings from congestion fees, but on the other hand require greater congestion fee payments. Similar considerations apply to the trip distance.

The variables of greatest interest are those that correspond to the individual costs and benefits of congestion pricing policy: minutes saved and estimated cost per hour saved. The cost per hour saved is calculated by taking the respondent's estimated congestion fee payments per week and dividing by the estimated time savings attributable to the fee policy, both quantities being determined by the CATI program. It is simply the unit price of time savings to the individual. Indeed, we find that an increase in the unit price causes support for the policy to decline.

We also find that support declines as the "minutes saved" variable increases, a result that at first glance appears counter-intuitive and requires comment. One might think that an increase in minutes saved ought to be perceived by the respondent as a good thing and hence something he should vote for. Because the unit price is included in the regression, however, what the coefficient on the minutes-saved variable really tells us is the following: How does the time savings affect support if the respondent's cost increases proportionately to the time savings? In effect, we are presenting the respondent with a fixed quantity of time, at a fixed price, and asking if he wants to buy. It is not at all surprising to see the level of support drop as the quantity increases. An individual may be willing to buy 5 pounds of potatoes for a dollar, or even ten pounds for two dollars, but he may not be at all eager to buy 500 pounds for $100.

There is no reason to expect this effect to be linear, and in fact we might expect the level of support to be mores sensitive to the minutes-saved variable when the quantity, and hence the payment required, is large. That is what we find. In Columns III and IV of Table II-6 we allow the effect of this variable to be different for savings below one hour per week and above one hour per week. As shown, increasing minutes saved if anything increases support up to savings of about an hour per week. Beyond that point support drops rapidly.

In the final specification we add as a variable the respondent's view as to whether congestion pricing would cause travel to move faster. This was by far the most potent variable increasing support, although other "belief" variables also were strongly associated with the policy. This leads to the tentative conclusion that an effective campaign to educate the public on the benefits of congestion pricing may produce dividends. In addition, support may increase as word spreads about the experience with pricing experiments such as SR91.

Table II-6
Determinants of Support For Congestion Fees

	I	II	III	IV
Demographic variables				
Gender	0	0	0	0
Age	--	--	--	--
High-school education or less	+	+	+	+
Household size	+?	+	+	0
Household income	0			
Ethnic identity (relative to whites)				
African American	0	0	0	0
Asian	+?	+?	+?	+?
Hispanic	++	++	++	++
Political party				
Democratic	0	+?	+?	0
Republican	0	0	0	0
Commuting behavior				
Commutes per week		-	-?	-?
Trip length	0	0	0	0
Percent congested			0	+?
Carpool days	0	+?	+?	0
Mass transit days	0	+?	+?	+?
Beliefs about effectiveness				++
Congestion fee attributes				
Total time saved	-	-		
Time saved, <60 min./day			0	+?
Time saved, >=60 min./day			-?	-?
Fees paid per hour saved	-	-	-	-

Key:

++	Coefficient is positive and significant at the 1 percent level
+	Coefficient is positive and significant at the 5 percent level
+?	Coefficient is positive and of borderline significance
0	Coefficient is not significant
-?	Coefficient is negative and of borderline significance
-	Coefficient is negative and significant at the 5 percent level
--	Coefficient is negative and significant at the 1 percent level

Congestion fees with tax reductions.

Table II-5 above suggests that respondents favor the tax reduction alternative by a plurality of 48 percent to 46 percent, but a closer look at the subsamples of individuals presented with the tax reduction alternative suggests that this percentage may be an overestimate. Although 38 percent of the entire sample supported the base policy, the support for it among those individuals in the tax reduction subsample is 41 percent. Furthermore, 46 percent of respondents support the base policy in the subsample where the total rebates are 50 percent of total revenues. Considering the strong influence of support for the base policy on support for the rebate policy, it is hardly a surprise that over 55 percent of the respondents in this group favored the rebate. A better estimate of the support for the various levels of the rebate is obtained when we use conditional probabilities to adjust the level of support to reflect the support for the base policy in the overall sample. These adjustments are made in Figure II-2 and in all estimates of the support level used in this report.

When we adjust for the excess of base support, as explained above, we find the support for the fee accompanied by various levels of tax reduction to be about 45 percent, as shown in Figure II-2. The levels of support in the three subsamples are 45 percent, 48 percent, and 43 percent, respectively. Since the standard errors in the proportions in these subsamples are about 3.5 percent, these differences are not statistically significant. However, the difference between the tax reduction policy and the base policy is significant. The rebates appear to enhance support for congestion fees by about 7 percentage points.

Table II-7 shows that support for the combined fee/tax reduction policy varies significantly from county to county. It is extremely popular in San Bernardino County, by better than a two to one margin, and not popular at all in Riverside, with the other three counties somewhere in between. We have no hypothesis to explain these regional differences.

Table II-7
Regional Support for the Congestion Fees with Tax Reductions
(percent)

	Support	Oppose	Don't know
Los Angeles	50	47	3
Orange	45	49	6
Riverside	40	52	8
San Bernardino	65	31	4
Ventura	45	49	6

The level of support is higher if the net fee is less than 0 (i.e., the respondent is told they will get a larger rebate than they pay in), but otherwise it is fairly constant, as shown in Table II-8. This suggests what is commonsensical, namely that it might be possible to enhance support if care is taken in the design of the rebates to minimize the number of people badly hurt by the imposition of the fees.

Table II-8
Effect of Net Fee on Support for Rebate Policy
(percent)

	Support	Oppose	Don't know
Net Fee <0	53	42	6
0<Net Fee <100	47	50	3
Net Fee >100	47	50	4

As noted earlier, the best predictor of support for the rebate policy is the support for the base policy. Even after we take into account the base support variable, though, we find that respondents with negative net fees are significantly more likely to support the rebate policy. When we regress the support on both the size of the rebate and the congestion fees, we find both to be approaching significance with the correct sign (See Appendix Table II-2). These variables were defined for the respondent, unfortunately, so that their collinearity is quite high, and that makes estimation less reliable. In these regressions the only other variable included is the base support variable, and we assume that the influence of the other covariates is expressed through this variable. The regional variables are included in this regression, and the coefficients affirm that San Bernardino is significantly different in its level of support.[1]

[1] Note that this issue is taken up in a slightly different way in the next chapter on pollution fees. There, attention is focused on the shifters--those who changed their vote from the base to the rebate policy.

Congestion fees with coupons

Unlike the cash rebate policy discussed above, the use of coupons did not in the aggregate improve support for congestion fees. Support for coupons is 36 percent, less than is found for the base policy in the entire sample. However, support was quite sensitive to the level of support. As shown in Figure II-2, support for the coupons increases substantially as the aggregate dollar value of the coupons increases from 25 percent of the fees to 82 percent of the fees.

The remarkable regional differences in support for the cash rebates are entirely absent here, and the support for the coupons is fairly constant among the regions. In all counties, though, the support is lower than the support for the rebate policy. These results are shown in Table II-9.

Table II-9
Regional Support for Coupon Policy
(percent)

	Support	Oppose	Don't know
Los Angeles	35	57	8
Oranges	31	63	6
Riverside	35	62	3
San Bernardino	39	58	3
Ventura	36	58	6

Regressing the support for the coupons on their dollar value and on the congestion fee yields results that are strikingly similar to the rebate result (Appendix Table A-II-2). Both the coupons and the congestion fees are almost significant, with the expected sign and of approximately the same magnitude.

Congestion fees on hot lanes

Respondents showed more support for congestion fees when they were told that they would apply only on the leftmost lane of the freeway. More than 45 percent said they would support congestion fees if an existing lane was designated a fee lane (with 48 percent opposed). Support increased to 54 percent when they were asked if they would support fees on a newly constructed lane. This was the only congestion fee policy examined which won the support of a majority of respondents.

We find another striking regional disparity in support for these hot lane policies. These policies are strongly disliked in Ventura County, even if the fast lane is to be new construction and does not decrease the number of existing free lanes. In the other four counties this policy enjoys a comfortable majority.

Table II-10 Regional Support for Hot Lanes (percent)			
	Support	Oppose	**Don't Know**
On existing lanes:			
Los Angeles	47	47	6
Orange	46	49	6
Riverside	43	57	0
San Bernardino	48	48	3
Ventura	36	58	6
On new lanes			
Los Angeles	54	40	6
Orange	57	38	5
Riverside	54	45	2
San Bernardino	55	42	3
Ventura	41	54	6

III. Pollution Fee Survey

Survey Description

The survey (see Figure III-1 for schematic) was designed similarly to the congestion fee survey, with the following differences.

Driving Information and Air Quality Effects. Respondents were asked about their driving habits and their vehicles as well as the degree to which air pollution bothers them and their families.

Features of the Basic Plan. The base plan was described to individuals using a set of questions structured as: "Would you be more or less likely to support the pollution fee if you knew that...." This structure was used instead of simply providing them a narrative because we felt the former approach would be more involving. These features include:

- the fee is based on the miles driven and the pollution per mile
- dirtier cars pay $0.05/mile, average cars pay $0.015/miles, and clean cars pay $0.01/mile.[2]
- the vehicle's pollution per mile rating would be updated during the Smog Check
- the fees would be phased in over a three year period

The sample was then split, with each half asked for the likelihood of their support if they knew that the fee would be figured by (a) having the odometer read and (b) having an electronic system at the gas pump that would read the pollution rate from a chip on the vehicle and charge on the basis of the gallons purchased.

[2] These figures appeared in the survey. In calculating the fee, the actual rate for dirty vehicles was $0.07/mile. These rates were derived from transportation and air quality modeling under the direction of the REACH Task Force.

The full sample was then informed about the possible responses people might make to the fee, using questions structured as: "People will .... Do you think most, some, or almost no people will do this." These questions also serve as indicators for people beliefs about the effectiveness of the plan. Respondents were told, for instance, that people would repair their cars, drive their cleaner cars more, drive less, take transit more, pay the fee.

Finally, respondents were informed about possible ways in which the money could be spent, again through questions meant to keep them involved in the phone survey. They were told that 16% of the funds would be spent on administration of the plan, and that the remaining funds could be spent on new transit options, rebates of taxes or fees, and low income vehicle repair programs

Base Plan Vote. The base plan carries the 5 cent/1.5 cent/1.0 cent per mile charges, as described above and the revenues are to be used "for regional government pollution reduction programs and on public transportation alternatives in your area." The benefits of the plan are described in terms of reductions in unhealthy air days from 120 per year to 60 per year. Such improvements are then linked to health and visibility improvements. The respondents are then told that if they continue driving as they do now they would pay a fee of $X per year. The fee is actually computed by multiplying the number of miles they say they drive per year times 1.5 cents if the vehicle is no older than a 1980 model year, or 7 cents/mile if the vehicle is older than 1980. They are then asked whether they would be better or worse off, whether they would vote for this plan on a ballot, whether they definitely or probably support (or oppose) the plan, and, if they oppose, why.

Split Sample. The sample is then split into two subsamples. One subsample is asked for their support of the base plan with a rebate in the form of reductions in various fees and taxes. The other subsample is asked for their support of the base plan with a rebate of coupons rather than cash, where the coupons can be spent on auto repair, transit, and the like.

The Cash Rebate Plan. The respondent is told that either 25%, 50%, or 84% of the revenues will be returned to the "people of Southern California" through cutting vehicle "registration and license fee and some local sales taxes." The implication of these phrases is that the revenues will not be returned to drivers in proportion to their pay-in. The CATI program assigns rebates of $23 for the 25% rebate, $46 for the 50% rebate, and $77 for the 84% rebate. Respondents are then told that they will, as before, pay X dollars per year as a fee, but that the rebate will save them Y dollars per year, so they would actually pay Z dollars per year. Finally, they are told that the tax/fee reduction plan would be implemented at the same time as the pollution fee. Then, they are asked for support (opposition) and the strength of such support (opposition). Then, they are asked for support/opposition to the same plan, except that they would get a tax credit on their state income tax.

The Coupon Plan. This plan, developed by COALESCE, is the same as the Cash Rebate Plan, except that instead of cash a percentage (25%, 50%, or 84%) of the revenues would be returned in "the form of coupons good for the repair of polluting vehicles, as well as for

the use of improved and convenient transportation alternatives, such as community shuttle vans and express buses in your area." The questions are in other respects identical to the cash rebate Plan. Finally, an additional set of questions asks whether upon knowing various features of the coupon plan, the respondent would be more or less likely to support the plan. These features include various transit options, plus redeeming the coupons for cash at a 50% discount, building better park and drive lots, trading coupons in the market, and using coupons for vehicle repairs.

B. Pollution Fee Parameters

The CATI program must calculate the pollution fees, the rebates, and the net fees. The pollution fee calculations are based on miles traveled and the age of the vehicle, while the rebates are determined by the percentage rebate chosen at random for the respondent. Descriptive statistics for these key variables are shown on Table III-1. The average fee was $225, with 2% of the sample given a fee greater than $1,000 and 21% of the sample given a fee of $100 or less. These estimates reflect the distribution of miles driven, which averaged slightly over 12,000 per year, and the distribution of model years, of which 8% of the vehicles driven by the respondents were produced before 1980. The rebates and coupons averaged around $50 in value. Thus for both the cash rebate and coupon plans, the net fee averaged about $180. About 13% of the subsamples received a refund. Note that the sample size is approximately half for the cash rebate and coupon plans.

C. Support for the Alternative Plans

For ease of comparison, the support and opposition to each of the policies examined are shown in Figure III-2. As shown the base support for pollution fees is 39 percent, compared to 53 percent opposed and 9% who did not express a preference. Linking the fees to other fee/tax reductions increases the support significantly, to 50 percent of respondents. The coupon proposal on average attracted somewhat more support than the base policy (particularly if the "don't knows" are not counted), but not as much support as the tax/fee rebate plan. However, there were significant differences in the levels of support for the different amounts of rebates/coupons distributed, as discussed further below.

Table III-1. Key Statistics for the Base Plan and Rebate Plan

	Base Plan Average Fee = $225 N=1574	Rebate Plan Average Fee = $180 N=767
Pollution Fee	Percent	Percent
Refund	NA	13
$0-100	21	22
101-200	35	33
201-300	29	18
301-400	5	6
401-500	5	3
501-1000	3	4
>1000	2	2

Miles Driven	Percent
<5000	21
5001-10000	28
10001-15000	28
15001-20000	14
20001-25000	4
25001-30000	5
>30000	0
Average Miles	*12,126*

Model Year	Percent
1990-1996	55
1980-1989	37
1970-1979	6
Pre-1970	2
Average Year	*1989*

figure III-2

Base survey

As shown in Table III-2, a solid majority (53 percent) opposes the base pollution fee policy, with only 39 percent in favor. If we consider the intensity of preferences, we see that a much higher fraction of the opposers are "definites," suggesting that this policy enjoys soft support and faces hard opposition.

Table III-2
Support for Base Pollution Fee Policy

Support		Oppose		Don't Know
39%		53%		9%
Definite	Probable	Probable	Definite	
15%	24%	16%	37%	9%

Although support for other policies is stronger, the respondent's attitude toward this base question is by far the best predictor of the response to those other policies. This point can be illustrated by the data in Table III-3, a cross-tabulation of support for the base policy and the combined pollution fee/tax reduction.

Table III-3
Importance of Base Policy

	Support pollution fees with tax reductions?		
Support base policy? ↓	No	Yes	Don't know
No	75%	20%	5%
Yes	9%	87%	4%
Don't know	11%	63%	26%
Average support for fees/tax reduction	44%	49%	7%

The rows of Table III-3 can be thought of as the conditional support for the fees with tax reductions given respondents' support or opposition to the base policy. Thus, among opponents of the base policy, 75 percent oppose the fees combined with tax reductions. An even higher percentage of base fee supporters -- 87 percent -- support fees with tax reductions. The fact that 20 percent of base fee opponents change their vote, compared to only 9 percent of supporters, is the reason that support for the fees with tax reductions is higher than support for the base policy.

Explaining base fee support. To aid in the design of a policy that will garner significant public support, the factors that influence the votes need to be understood. Attitudinal factors can be elicited directly, while other factors can be examined through statistical analyses, such as multivariate regressions. When the opposers were polled on their reason for opposition, the category with the highest response rate (22%) was "Just a tax increase," followed by "Doesn't trust or believe the government" (18%).

A large number of more concrete factors can be reasonably hypothesized to affect support for the base policy. To isolate the influences on support, we estimate a set of probit regression equations. The estimated dependent variable in this equation can be interpreted as the probability that an individual with the given characteristics will support the policy, and the coefficients on the independent variables indicate their influence on the probability of support. The results of these estimations are shown in Table III-4 and Table A-III-1 in the appendix.

Table III-4. Determinants of Support for the Base Plan

	I	II	III	IV
Pollution fee	--		--	
Miles driven		--		--
Old (pre-1980) vehicle		--		--
Age of respondent	--	--	--	--
Republican	--	--	--	--
Asian/Hispanic	++	++	+	+
Affected by air pollution	++	++	++	++
Yrs of schooling			++	++
Los Angeles resident			+	+?
People will respond	++	++	++	++
Household Income	0	0	0	0
Household Size	0	0	0	0
Number of Children	0	0	0	0
Own/Rent Home	0	0	0	0
Number of Vehicles	0	0	0	0
Respondent's Gender	0	0	0	0
Odometer versus Pump	0	0	0	0

Key:
- ++(--) Variable is positive (negative) and significant at the 1 percent level
- +(-) Variable is positive (negative) and significant at the 5 percent level
- +?(-?) Variable is positive (negative) and of borderline significance
- 0 Variable is not significant

We used two specifications (I and II): one in which the pollution fee paid is an independent variable, another where the factors used to calculate the fees are variables, i.e., the miles driven and whether the car is a pre-1980 model. Each of these factors in the specifications reveals that these factors influence support, e.g., the higher the fee paid, the lower the probability of support; or alternatively, the more miles driven and driving a pre-1980 vehicle, are associated with a lower probability of support. In addition, we found, after a reasonably thorough search, that younger respondents, Democrats and Independents, and Asians and Hispanics are more likely to support the base plan. Two other variables were always significant. If a respondent rated him- or herself or their family as highly bothered by air pollution, they were more likely to support the plan. In addition, if the respondent believed that many people would respond to the fees in the ways suggested to them in the survey, they were more likely to support the plan. This result leads to the tentative conclusion that an effective campaign to educate the public on the benefits of congestion pricing may produce dividends. Finally, two other variables appear to influence support, but need further discussion (see below). The first is the effect of region of residence on support, where respondents living in LA appear to have a higher propensity to support the base plan. The second is that respondents with *less* schooling are more likely to support the plan.

County Support. Table III-5 provides estimates of support for the base plan by county of residence. Except for Los Angeles, where support is significantly higher than for the other counties, there are small and insignificant differences in percentage support across the counties. This lack of variation implies that the factors explaining the probability of support will not include the county of residence, except possibly for Los Angeles. Regional variables, to the extent that they serve as proxies for regional differences in age, income, race, etc. might be expected to influence support of the plan. Such variables might also serve as proxies for factors that we cannot measure within the survey, such as highway and transit access, distance to place of work, and other characteristics.

Table III-5. Voting on Base Plan, By County (percentage)

Region	**Support**	**Oppose**	**Don't Know**
Los Angeles	43	50	7
Orange	33	58	9
Riverside	36	53	12
San Bernardino	32	59	10
Ventura	32	58	10

We found that respondents living in Los Angeles were significantly more likely to support the base plan than those living elsewhere when this factor alone was used to explain support. More revealing, even when this variable is used with the other explanatory variables to explain support, a significant relationship is found (at the 6% level) (as shown in Table III-4, specifications III and IV). This means that there are characteristics of Los Angeles not already captured by factors included in the survey that influence support. As

for the other counties, we infer from their similar degrees of support and lack of significance in the regression analysis that either: (a) there are no county-specific influences on support not otherwise captured in our analysis or (b) the county is too large and diverse a geographical unit to discern such influences.

Schooling. The survey presents a fairly complex program to individuals. For this reason we hypothesized that those with more education would understand and appreciate the usefulness of the pollution fee concept more than those with less education. In fact, we found that those with less schooling evidenced far greater support for the base plan than those with more schooling. In particular, the difference in attitude was distinct between the group with a high school education or less versus the more educated group. We thought that perhaps education was acting as a surrogate for income, but this was not found to be the case. It also could be a surrogate for miles driven, age, or sex. But these hypotheses were also found wanting. Finally, we thought it could be a surrogate for commuting behavior, hypothesizing that the noncommuters or transit users do mostly discretionary driving. In spite of the fact that those with at most a high school degree were far more likely than those with more education to take a bus to work (by 59% to 41%) and of those in the less educated group, a relatively large fraction did not commute, a variable representing the "discretionary driving" group was insignificant in explaining voting patterns. Further analysis of this finding therefore appears warranted.

Insignificant Factors. Note that we used all of the appropriate variables available to us in the survey to explain voting patterns, but that only those noted above were consistently significant. In particular, the respondent's household's income was NOT a significant factor in explaining support. If anything, the lowest income categories tend to be more supportive of the policy (although such support is not statistically significant). Other variables that were generally insignificant include: household size, number of children, whether the home is owned or not, the number of vehicles owned or leased by the household, and the sex of the respondent. Also, although in focus groups, a clear preference was expressed for the "pay at the pump" method of collecting pollution fees, support was not sensitive to whether the respondent received the odometer or the pay at the pump "treatment."

Note that we did not think it appropriate to use answers to the "informational" questions as explanatory (independent) variables. These questions, of the form "would you be more or less likely to support the policy if you knew that...", appear to be another way of expressing support or opposition to the plan, not an independent measure of factors that could explain such support or opposition.

Pollution fees with other fee/tax reductions.

Table III-2 above suggests that 50 percent of respondents favor this alternative, but a closer look at the subsamples of individuals presented with the cash rebate alternative suggests that this support can vary significantly, depending on the amount of the rebate. In particular, support appears to increase with the amount of the rebate, where support, as measured as a fraction of those providing an opinion, increases from 44% with a $23

rebate to 54% with a $77 rebate.[3] Not counting the "don't knows," 57% of those receiving the $77 rebate said they would support the rebate plan. While such an outcome might be unsurprising if a given set of respondents were asked their opinions in a *series* of questions involving higher and higher rebates, a much more powerful protocol was followed here where the subsample receiving the rebate question was further split randomly into three treatments, each receiving one of the rebate amounts. Thus, the increasing support is a result of independent trials and is a strong indication of the sensitivity of support to the rebate amounts or percentages.

The statistical significance of this relationship can be tested using probit regressions where the *net* pollution fee replaces the pollution fee variable in the basic regressions on Table III-4, or where the rebate amount (or percentage) is added to the alternative specification in Table III-4. The results (Table III-6 and Appendix Table A-III-2) reveal that these variables are highly significant in determining the probability of support for the cash rebate.

Note that some ambiguity is present in the effect of the rebate on voting patterns because respondents were presented with the rebate expressed in two ways -- as the percentage of the revenues returned to the "people of Southern California" and as the dollar amount to be returned to the respondent. Thus, in Figure III-2, note that the 25% rebate is also expressed as a $23 return to the individual, and so on. Because in our survey these two measures are simply alternative ways of expressing the same rebate we cannot discern their independent effects on voting patterns.

These analyses also reveal that the variables affecting support for the base plan also affect support for the rebate plan. Note, however, that the Los Angeles variable (LA) and the schooling variable (HIGHSC=1 if a person has no higher degree than a high school diploma) are no longer significant, although the schooling variable is significant at the 11% level. The result for county of residence is unsurprising in light of the crosstab (Table III-7) showing that support for the rebate is fairly similar across counties.[4]

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[3] These estimates do not exactly match the raw scores for voting on the fee/tax reductions because adjustments were necessary to correct for differences in the fraction of supporters of the base plan assigned the rebate "treatments" for the rebate plan. See chapter 2 for an explanation of the problem and adjustment procedure. Note that this problem is not present with the subsample assignments to the coupon plan; hence no corrections to the raw scores were made.

[4] This change may have occurred because the sample size has shrunk approximately in half compared with that for the base plan. A possible way to augment the sample size and increase the power of the analysis is to re-estimate these regressions with the full sample, setting the rebate amount to zero for all respondents who did not receive the cash rebate question. We find that the LA variable is still not significant, but that the other variables have increased in significance owing to the larger sample size.

Table III-6. Determinants of Support for the Rebate Plan

	I	II
Net fee	--	
Rebate amount		++
Miles driven		--
Old (pre-1980) vehicle		--
Age of respondent	-	-
Republican	--	--
Asian/Hispanic	+	+
Affected by air pollution	+	+
High School or less	+?	+?
Los Angeles resident	0	0
People will respond	++	++

Key:
++(--) Variable is positive (negative) and significant at the 1 percent level
+(-) Variable is positive (negative) and significant at the 5 percent level
+?(-?) Variable is positive (negative) and of borderline significance
0 Variable is not significant

Table III-7. Voting on Rebate Plan, By County (percentage)

Region	**Support**	**Oppose**	**Don't Know**
Los Angeles	51	43	6
Orange	47	48	4
Riverside	46	43	12
San Bernardino	50	42	8
Ventura	46	47	6

The fact that the same set of variables influences support for both the cash rebate and base plan while, at the same time, support for the rebate plan is significantly higher than for the base plan, suggests that we examine the characteristics of those who switched from opposition to the base plan to support of the cash rebate (and vice-versa). We were unable to explain why respondents switched from support of the base plan to opposition to the cash rebate. But, very few respondents are in this category. We found, however, that of those opposed to the base plan, the "switchers" (those who also support for rebate plan) are more likely to be female, favor both tax rebates and public spending on transportation, get larger rebates, travel fewer miles, and drive newer vehicles.

Finally, it is useful to consider a comparison of the strength of support among the subsample who received both the base plan and the cash rebate plan (Table III-8). Two-thirds of the subsample did not change their opinion. The largest gains were made in the definitely support category, which increased from 13% to 23% from the base to the rebate plan. The largest contributors to this increase came from the group who "probably supported" the base plan and those who "didn't know" whether they supported or opposed the base plan. Indeed, 63% of this "don't know" group registered support for the cash rebate while only 11% registered opposition (with the rest still saying they "didn't know." Finally, while only 7% of those who were definitely opposed to the base plan supported the rebate, 42% of those who probably opposed the base plan supported the rebate. Thus, we might consider that all but about one-third of the population is a reasonable target for building support for a rebate plan.

Table III-8. Strength of Support and Opposition to Base and Rebate Plans

	Rebate Plan					
Base Plan	**definitely support**	**probably support**	**probably oppose**	**definitely oppose**	**don't know**	**Total**
def sup (#)	*650525*	*92106*	*15136*	*4560*	*18377*	*780704*
row %	83.33	11.80	1.94	0.58	2.35	100.00
column %	49.83	6.10	2.05	0.25	4.35	13.49
cell %	11.24	1.59	0.26	0.08	0.32	13.49
prob sup	*387539*	*741292*	*136444*	*38501*	*71414*	*1375190*
	28.18	53.90	9.92	2.80	5.19	100.00
	29.69	49.11	18.49	2.13	16.90	23.76
	6.70	12.81	2.36	0.67	1.23	23.76
prob opp	*102238*	*337133*	*411446*	*84666*	*116461*	*1051944*
	9.72	32.05	39.11	8.05	11.07	100.00
	7.83	22.33	55.75	4.67	27.57	18.18
	1.77	5.83	7.11	1.46	2.01	18.18
def opp	*43888*	*95488*	*148537*	*1648257*	*63379*	*1999549*
	2.19	4.78	7.43	82.43	3.17	100.00
	3.36	6.33	20.13	90.98	15.00	34.55
	0.76	1.65	2.57	28.48	1.10	34.55
don't know	*121308*	*243478*	*26469*	*35707*	*152854*	*579816*
	20.92	41.99	4.57	6.16	26.36	100.00
	9.29	16.13	3.59	1.97	36.18	10.02
	2.10	4.21	0.46	0.62	2.64	10.02
Total	*1305498*	*1509497*	*738032*	*1811691*	*422485*	*5787203*
	22.56	26.08	12.75	31.31	7.30	100.00
	100.00	100.00	100.00	100.00	100.00	100.00
	22.56	26.08	12.75	31.31	7.30	100.00

Pollution Fees with Coupons Returned

Of the subsample who received both the base and the coupon plans, 42 percent of respondents favor the coupon alternative, while 40 percent favor the base plan. This is not a statistically significant difference. Nevertheless, support for the coupon plan appears to increase somewhat with the amount of coupons distributed. A crosstab of support/opposition to the coupon plan with the amount of the coupons rebated (Table III-9) reveals that a higher fraction of the subsample favor the plan when they receive either $46 or $77 worth of coupons than when they receive $23 worth (43-44 percent versus 40 percent, respectively).

Table III-9. Voting on Coupon Plan, in percent

Value of Coupons	Support	Oppose	Don't Know
$23	40	56	4
$46	44	47	9
$77	43	53	4

A more conclusive test of the coupon rebate effect can be made by running probit regressions with specifications similar to those used for the cash rebate plan. These results, summarized in Table III-10 (and Appendix Table A-III-3), show that the rebate is insignificant unless the sample receiving both the $46 and the $77 rebate is combined and compared to that receiving the $23 rebate.

Table III-10. Determinants of Support for the Coupon Plan

	I	II	III
Net fee	--		
Miles Driven		--	--
Old (pre-1980) vehicle		--	--
Coupon value		+?	
Coupon value either $46 or $77			+
Age of respondent	--	--	--
Republican	0	0	0
Asian/Hispanic	+?	+?	+?
Affected by air pollution	+	+	+
High School or less	+	+	+
Los Angeles resident	+?	+?	+?
People will respond	++	++	++

Key:

++(--) Variable is positive (negative) and significant at the 1 percent level
+(-) Variable is positive (negative) and significant at the 5 percent level
+?(-?) Variable is positive (negative) and of borderline significance
0 Variable is not significant

The probit regressions also reveal that, with the exception of political affiliation, the factors that were found to influence support of the cash rebate and the base plan also influence support for the coupon plan. As for the rebate plan, Los Angelenos are *not* more likely to support the coupon plan than those living in other counties, although this

factor is almost significant at the 10% level. However, as shown in Table III-11, *not* holding other things equal, this group is much more likely than respondents from other counties to support the plan, with San Bernadino residents much *less* likely to support it.

Table III-11. Voting on Coupon Plan, By County (percent)

Region	**Support**	**Oppose**	**Don't Know**
Los Angeles	46	48	6
Orange	40	56	4
Riverside	41	54	5
San Bernardino	31	63	6
Ventura	37	57	6

While the "switchers" commanded our attention in comparing responses to the base and rebate plans, the issue is less important here because the switching is more balanced. That is, about 15% of those opposed to the base plan supported the coupon plan, but 12% of those supporting the base plan opposed the coupon plan. At the same time, the phenomenon that those who did not vote on the base plan tended to support the cash rebate is evidenced for coupons, as well, albeit to a lesser degree. That is, whereas the "don't knows" for the base plan favored the rebate 6:1, this ratio falls to 2:1 for the coupon plan. Put another way, 46% of the "don't knows" for the base plan supported the coupon plan and 22% opposed it.

The survey permits some probing into why opposing respondents didn't like the coupon plan. The modal reason was "other" (30%), followed by "no reason." These responses suggest that some people did not understand the concept.

Implications of the surveys

The survey results clearly indicate that congestion pricing on freeways and pollution fees on motor vehicles in southern California can attract levels of public support that are at least within striking distance of a simple majority. We have found that this support can be significantly enhanced by returning at least some of the revenues in the form of tax reductions. Offering larger rebates and lower pollution fees can further enhance support. For congestion fees we have also found support to be enhanced for policies that put fees on only some freeway lanes, especially if the tolled lanes are new and do not reduce the number of existing free lanes. The results also indicate where (both geographically and demographically) support and opposition to these plans may be found to aid in targeting publicity and informational campaigns.

There are several "public support" issues that remain to be explored in furthering the design of viable congestion and pollution fee plans. First, we do not know whether

support is more sensitive to the percentage of revenues returned to the people or to the actual amount returned to the individual. Second, we do not know why those with less schooling and those who are Hispanic (and to a lesser extent Asian) appear to favor the plans disproportionately. Third, we do not have confidence that individuals voting on the coupon and rebate plans fully understood that in that alternative less money would be available for public investments in transportation or pollution control. Fourth, more study is needed of voting patterns for those who do most of their driving outside of rushhour. The survey provided only limited information on driving patterns. And fifth, in the pollution fee survey the weighting of survey results by population across the counties does not correct for the tilt in the sample towards older (>65) respondents. The sample fraction is 14 percent while the five-county fraction is 11.6%. As older respondents are more likely to oppose the pollution fee plans, correcting for this tilt should slightly increase the estimates of support.

Finally, we do not know the extent to which one overarching issue influenced results. This issue is the "counterfactual" to the pollution fee plan, that is, the plan that would be in effect if the pollution fee plan were *not* implemented. It is our contention that the pollution fee plan (with inspection stations to measure emission rates) is a *substitute* for an inspection and maintenance program, such as Smog Check I or II. Because Smog Check II was not yet implemented in Southern California, we could not test the effect on voting of specifying this counterfactual policy in the survey. Even if one does not agree with that the pollution fee plan is a substitute for Smog Check, it is still relevant to suggest to respondents that additional policy measures will be needed to reduce vehicular pollution if the pollution fee program is not put in place. Not suggesting a counterfactual policy is likely to bias voting on the pollution fee policy, but the direction of bias depends on the attractiveness of the counterfactual policy. For instance, if one believes that the pollution fee policy is more cost-effective (less costly) and flexible than the counterfactual policy, then the observed support will underestimate support for the pollution fee plan. We expect that this is the appropriate direction of bias for a Smog Check II counterfactual.

Appendix: Regression Results

This appendix reports on the results of probit regressions attempting to explain support for the various congestion and pricing policies discussed in the text. The numbers in the cells of the tables The columns refer to different model specifications, while the rows refer to variables included in each model. The numbers in parentheses are the standard errors of the coefficients.

Table A-II-1
Regression Results: Base Congestion Fee Policy

	I	II	III	IV
Hispanic	0.390 (0.114)	0.371** (0.106)	0.362** (0.106)	0.286** (0.111)
Black	-0.156 (0.175)	-0.187 (0.162)	-0.187 (0.162)	-0.187 (0.173)
Asian	0.345 (0.182)	0.240 (0.163)	0.241 (0.163)	0.271 (0.172)
Rating of congestion problem, 1-10	0.026 (0.017)	0.014 (0.018)	0.014 (0.018)	0.015 (0.019)
Democrat	0.097 (0.103)	0.139 (0.094)	0.136 (0.094)	0.105 (0.100)
Republican	-0.060 (0.106)	-0.019 (0.095)	-0.031 (0.095)	-0.087 (0.101)
Household income	-1.52E-03 (1.36E-03)			
Household size	0.041 (0.030)	0.054* (0.026)	0.054* (0.026)	0.032 (0.028)
Number of rush hours per week		-0.030* (0.015)	-0.026 (0.016)	-0.023 (0.016)
Percent of commute in congestion		0.172 (0.165)	0.181 (0.165)	0.172 (0.165)
Commuting distance	-1.16E-03 (1.24E-03)	-5.96E-04 (1.06E-03)	-4.91E-04 (1.06E-03)	-7.31E-04 (1.10E-03)
Respondent age	-1.01E-02 (3.77E-03)	-9.40E-03** (3.30E-03)	-9.39E-03** (3.30E-03)	-9.96E-03** (3.50E-03)
Education -- some college	-0.213* (0.103)	-0.214* (0.090)	-0.216* (0.091)	-0.210* (0.096)
Minutes saved by base plan per week	-8.11E-04* (3.95E-04)	-7.77E-04* (3.89E-04)		
Minutes saved, if minutes saved <60			3.02E-03 (2.59E-03)	4.83E-03* (2.74E-03)
Minutes saved, if minutes saved >60			-6.11E-04 (3.90E-04)	-6.18E-04 (3.93E-04)
Congestion fees paid per hour saved	-4.35E-03 (2.21E-03)	-4.98E-03* (2.22E-03)	-4.90E-03* (2.23E-03)	-4.92E-03* (2.40E-03)
Number of days per week in carpool	0.026 (0.030)	0.035 (0.027)	0.036 (0.027)	0.035 (0.029)
Number of days using transit	0.110 (0.083)	0.125 (0.071)	0.125 (0.070)	0.118 (0.083)
Belief that congestion fees will speed up traffic				0.615 (0.056)
Constant	0.172 (0.231)	0.174 (0.208)	0.073 (0.247)	-1.134** (0.285)
Mean Log Likelihood	-.635	-0.632	-0.631	-0.573
N	978	1157	1157	1123

Table AII-2. Congestion fees: Regression results, Rebate and Coupon Policies			
	Rebates	Rebates	Coupons
Net fee <0	0.278* (0.126)		
0<Net fee <100	0.166 (0.165)		
Orange County		0.152 (0.152)	-0.167 (0.155)
Riverside County		-0.131 (0.186)	-0.155 (0.206)
San Bernardino County		0.544** (0.185)	0.034 (0.172)
Ventura County		0.142 (0.194)	0.0108 (0.199)
Estimated rebate or tax reduction		0.000295 (0.000235)	
Value of coupons			0.000268 (0.000190)
Annual congestion fees		-0.000232 (0.0001555)	-0.000167 (0.000112)
Supports base policy?	1.123** (0.095)	1.142 (0.0966)	0.784 (0.0787)
Constant	-0.581** (0.098)	-0.551 (0.122)	-0.715 (0.114)
Mean log likelihood	-0.542	-0.545	-0.558
Sample Size	582	582	546

Table AIII--1. Pollution fees
Probit Regression Results for Voting on the Base Plan.

	I	II	III	IV
Pollution fee	-.0011 (.0002)		-.0011 (.0002)	
Miles driven (000)		-.0279 (.0052)		-.0260 (.0052)
Pre-1980 vehicle		-.6143 (.1446)		-.6642 (.1462)
Respondent age	-.0094 (.0025)	-.0099 (.0025)	-.0102 (.0025)	-.0104 (.0025)
Republican	-.3588 (.0777)	-.3570 (.0779)	-.3325 (.0783)	-.3320 (.0784)
Asian/Hispanic	.2882 (.0936)	.2815 (.0943)	.2337 (.0951)	.2333 (.0956)
Rating of air pollution effect	.0586 (.0146)	.0605 (.0146)	.0569 (.0146)	.0589 (.0147)
Response beliefs	.4000 (.0512)	.4035 (.0514)	.3847 (.0514)	.3884 (.0516)
Years of Schooling			-.0446 (.0149)	-.0443 (.0151)
Los Angeles resident			.1602 (.0795)	.1536 (.0801)
Mean Log Likelihood	-0.603	-0.600	-0.599	-0.595
Sample Size	1355	1355	1355	1355

Table A-III-2. Probit Regression Results for

Voting on the Rebate Plan.

(Standard error in parentheses)

	I	II
Net fee	-.0014 (.0003)	
Rebate amount		.0078 (.0024)
Miles driven(000)		-.0371 (.0071)
Pre-1980 vehicle		-.6009 (.2003)
Respondent age	-.0069 (.0034)	-.0080 (.0034)
Republican	-.3490 (.1075)	-.3389 (.1083)
Asian/Hispanic	.3375 (.1415)	.3067 (.1428)
Rating of air pollution effect	.0480 (.0199)	.0483 (.0201)
Response beliefs	.4272 (.0715)	.4428 (.0723)
High School or less	.1879 (.1182)	.1710 (.1198)
Los Angeles resident	-.0188 (.1145)	-.0637 (.1154)
Mean Log Likelihood	-0.614	-0.605
Sample Size	683	683

Table A-III-3. Probit Regression Results for

Voting on the Coupon Plan.

(Standard error in parentheses)

	I	II	III
Net fee	-.0013 (.0003)		
Miles Driven		-.0310 (.0074)	-.0304 (.0074)
Pre-1980 vehicle		-.6190 (.1966)	-.6202 (.1961)
Coupon Value		.0033 (.0023)	
Coupon Worth either $46 or $77			.2111 (.1073)
Respondent age	-.0107 (.0035)	-.0111 (.0036)	-.0110 (.0036)
Republican	-.0753 (.1070)	-.0786 (.1078)	-.0840 (.1079)
Asian/Hispanic	.2452 (.1312)	.2330 (.1324)	.2344 (.1324)
Rating of air pollution effect	.0487 (.0207)	.0499 (.0208)	.0494 (.0208)
Response beliefs	.4681 (.0708)	.4759 (.0715)	.4730 (.0714)
High School or less	.2769 (.1170)	.2795 (.1185)	.2783 (.1184)
Los Angeles resident	.1701 (.1088)	.1663 (.1098)	.1731 (.1097)
Mean Log Likelihood	-0.604	-0.599	-0.598
Sample Size	720	720	720