Online Appendix: Promotional Campaign Duration and Word-of-Mouth in Solar Panel Adoption

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Online Appendix A: Survey Instrument

The online survey codebook can be found at:

`http://bryanbollinger.com/index_files/codebook_solarize_survey.pdf`.

Online Appendix B: During Campaign Treatment Effects

Estimating During-Campaign Treatment Effects Using a Control Group In order to get estimates of the treatment effects for the campaigns, in this subsection we also include a control group in the analysis. Our preferred control group is the group of environmentally-oriented communities that have a clean energy task force, classified by the state as Connecticut Clean Energy Communities (CEC).[5] Summary statistics for key demographic and socioeconomic variables in these final datasets are also in Table OB.1 and indicate a good balance in observables across the treatment and control group.

[5] We remove any Solarize municipalities from the list of CEC communities used as a control group and we also explore matching approaches to develop further control groups as robustness checks.

Table OB.1 Balance of Covariates

	Classic		Express		Control	
VARIABLE	Mean	St. Dev.	Mean	St. Dev	Mean	St. Dev
Population density	820.7	955.5	578.3	746.5	781.4	878.0
Median income	97714**	27868	81568	17717	80245	24076
% White	0.905	0.083	0.887	0.113	0.908	0.096
% College degree	0.480	0.041	0.493	0.050	0.483	0.043
% Unemployed	0.083	0.022	0.070	0.022	0.082	0.025
% Democrat voters	0.309	0.070	0.330	0.090	0.316	0.073
#Occupied units	9394	9866	8622	9375	6073	5667
% Solar suitable homes	57.60***	4.92	66.88	17.64	72.34	11.49
# Solar suitable homes	5524	5848	4720	4534	4295	4060
Number of towns	11		5		40	

Note: Voting data are collected from the Office of the Secretary of State. Solar suitability from Google Project Sunroof and GeoStellar. All other data come from the 2009-2013 wave of the American Community Survey. Solar-suitable homes: # homes (2010) x percentage of homes suitable for solar. Asterisks next to mean values denote the significance levels from a t-test comparing the mean of each variable across the control group and the respective treatment group. $p < 0.1$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

To further assess the validity of the CEC communities as a control group, it is informative to compare the trends in adoptions between each of the two treatment groups and the control group prior to the campaigns. Figure OB.1 displays the cumulative solar adoptions for each of the two treatments, beginning two years before the campaigns and ending two years after, overlaid with the trend in the control towns during the same period. The shaded area in the graphs indicates the weeks in which there was an active campaign in at least some of the towns. The pre-treatment trends across the treated and control towns are very similar.

Figure OB.1 Cumulative Number of Contracts in Field Experiment

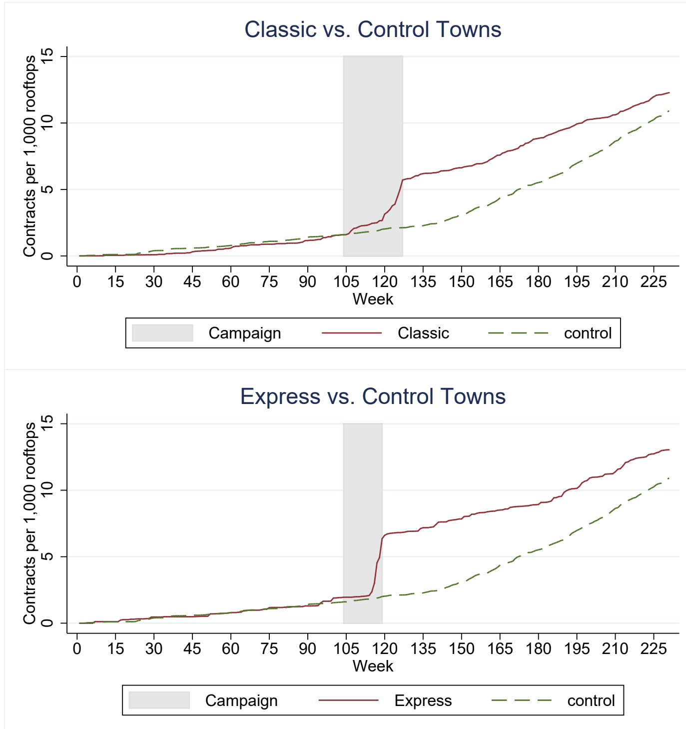

Figure OB.1 Note: Adoptions, including two years prior to the campaign start dates, 24-week period for Classic campaigns, 16 week period for Express campaigns, and two years post the campaign end dates.

A number of descriptive findings emerge from these simple trends. First, there is a clear overall increase in solar adoptions during the campaigns for both Classic and Express. The sharp increase of adoptions during the Classic campaigns is consistent with the findings in Gillingham and Bollinger (2021), but it is the comparison between the two types of camapigns we are focused on here. Second, this increase in adoptions appears to take place during the later stage of the campaign, which is to be expected given the durable, expensive nature of the product. In the Classic campaigns, we see low levels of adoption for most of the campaign, with an acceleration of the upward trend in adoption at the end of the campaign, consistent with WOM and peer recommendations. For the Express campaigns, there are virtually no installations for the first eleven weeks, just like with Classic, likely due to the time it takes WOM to operate. This also might be partly due to potential adopters in Express having a greater preference for waiting until the end of the campaign to see the final price.

Treatment Effects by Campaign Duration To estimate the treatment effects, we use a difference-in-differences regression approach, with and without town fixed effects, which helps address any randomization concerns due to the small number of towns. Let y_{it} denote the number of solar contracts signed in town i during week t per 1,000 owner-occupied houses in the town that are suitable for solar.[6] We define C_{it} and E_{it} as dummy variables, indicating the time during a Classic or Express campaign, respectively.

$$y_{it} = \alpha^c C_{it} + \alpha^e E_{it} + \mu_i + \delta_t + \epsilon_{it}. \tag{OB.1}$$

In this specification, μ_i are town-specific indicator variables, δ_t are week fixed effects, and ϵ_{it} is an idiosyncratic error term. The municipality fixed effects are useful in our setting to help control for any possible differences across the treated towns and control towns, while the time fixed effects are important for flexibly controlling for broader time trends that may influence the solar market.

[6] Recall that our measure of potential market size in a given town excludes from the total number of owner-occupied homes the fraction of homes which are determined as unprofitable for solar through irradiance data and building and roof shapes. In our robustness checks, we show that our main findings hold even when we do not adjust the number of owner-occupied homes for solar suitability.

Table OB.2 Average Treatment Effects of Classic and Express

VARIABLE	(1)	(2)	(3)	(4)
Classic	0.143	0.143		
	(0.056)**	(0.054)**		
	[0.016, 0.276]**	[0.016, 0.276]**		
Classic first 8 weeks			0.054	0.054
			(0.030)*	(0.028)*
			[-0.014, 0.130]	[-0.014, 0.130]
Classic middle 8 weeks			0.029	0.029
			(0.021)	(0.020)
			[-0.014, 0.079]	[-0.014, 0.079]
Classic last 8 weeks			0.357	0.357
			(0.127)***	(0.126)***
			[0.046, 0.739]**	[0.046, 0.739]**
Express	0.237	0.230		
	(0.154)	(0.154)		
	[-0.042, 0.614]	[-0.042, 0.614]**		
Express first 8 weeks			-0.016	-0.023
			(0.008)**	(0.008)***
			[-0.030, -0.001]**	[-0.030, -0.001]**
Express last 8 weeks			0.528	0.521
			(0.302)*	(0.302)*
			[0.019, 1.548]**	[0.019, 1.548]**
Town FE	no	yes	no	yes
Year-Week FE	yes	yes	yes	yes
R-squared	0.093	0.113	0.140	0.161
N	8,716	8,716	8,716	8,716

Note: Dependent variable is the weekly number of signed solar contracts per 1,000 owner-occupied solar-suitable homes. Unit of observation is town-week. Total effect in an average Classic and Express town is calculated as the sum of weekly effects over the duration of the respective campaign. Total Classic and Express effects are not statistically different in all specifications. Two-way clustered standard errors by town (62 clusters) and week (144 clusters) in parentheses. Wild cluster bootstrap (Cameron et al. 2008) 95% confidence intervals, reported in square brackets (1,000 draws). $p < 0.1$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

We estimate specification (OB.1) on all treated municipalities as well as the control municipalities for a measure of the average weekly treatment effect of each program, including two years of pre-campaign observations.[7] We do this twice, without and with town fixed effects. Table OB.2 presents the results in columns (1) and (2). Looking at column (1), Solarize Express appears to have a substantially larger average weekly treatment effect, although it is less precisely estimated since we cluster standard errors at the town level. This is what we would expect, given the increased resource intensity. To get the total effect of the campaigns, it is necessary to multiply the Classic coefficient by 24 and the Express coefficient by 16. There is no statistically significant difference across the campaigns in total adoptions (3.43 per 1,000 suitable homes for Classic and 3.79 for Express, in the specification with town fixed effects).

Given that there are a small number of clusters in the treatment groups of Classic and Express (16), the town-level clustered standard errors may still understate the uncertainty in the estimates. Previous studies have addressed such small-sample issues using a number of techniques. In particular, the Cameron et al. (2008) wild bootstrap method has found wide application in recent empirical studies (Giné and Yang 2009, Ben-David et al. 2013, Bloom et al. 2013). The results of our hypotheses tests are nearly the same using this approach. We report the 95th percent confidence intervals in Table OB.2 in brackets.

To get some sense of the dynamics within the campaign, we split the Classic campaigns into three eight-week periods and the Express campaign into two eight-week periods. Results are shown in columns (3) and (4) of Table OB.2, again first without and then with town fixed effects. In both campaigns, most of the effect is in the last eight weeks. Prior to that, Classic experiences a small positive effect of the campaigns, and Express actually experiences a small negative effect. Potential solar adopters might be reluctant to adopt solar in the early stages of the Express campaigns, especially if they believe that the best price tier may not be reached.[8] This could also serve to reduce WOM in the Express campaigns. Again, we find no significant difference across the campaigns in total adoptions over the entire length of the campaigns in these split specifications.

During Campaign Analysis without Control Towns To further examine whether the Classic and Express campaigns led to a different number of total adoptions during the campaigns, we

[7] See Table OB.5 for results with alternative control groups, which generally show quite similar results.

[8] Surasvadi et al. (2016) use a model of strategic forward-looking consumers to show that consumers will join the group buy only after a certain time threshold.

ran a simple regression of weekly installations on an Express dummy variable to capture any difference in effectiveness between the two campaigns.

$$y_{it} = \alpha E_i + \mu_i + \delta_t + \epsilon_{it}. \tag{OB.2}$$

in which E_i is a dummy variable indicating an Express campaign and y_{it} is the number of solar adoptions per 1,000 suitable non-adopting homes at time t. For the during-campaign analysis, we use weekly data during the campaign; using weekly data allows us to control for the slight staggering of the campaign end dates using weekly dummy variables, δ_t. The α coefficient captures the differential weekly effect of the Express treatment relative to the Classic treatment. We use the estimates to calculate the difference between the total predicted installations in an average Express town relative to an average Classic town. In the post-campaign analysis, we use monthly data due to the lower adoption rates, for a 24-month post-campaign period.

The results of estimating equation (OB.2) with the during campaign data without week fixed effects are shown in Table OB.3 in column (1). The intercept of 0.172 in column (1) can be interpreted as the weekly number of installations per 1,000 homes for a Classic campaign. The Express coefficient is the additional number of weekly installations per 1,000 homes for an Express campaign. The point estimate for Express is 61% the size of the intercept, indicating the weekly adoptions are 61% higher in Express, which is to be expected, since the campaigns are only two-thirds as long and the resource intensity is higher. The main object of interest is the total difference in adoptions across the campaigns. We find that Express campaigns are not significantly different than Classic campaigns in terms of total adoption over the campaigns, with a point estimate for the difference of just 0.3 installations per 1,000 suitable homes (1.6 installations for an average size town).

In column (2), we add week fixed effects, with the same results. In columns (3) and (4), we allow the campaigns to have different effects at different times of the campaigns. The first eight weeks of the Classic campaigns are before the Express campaigns begin. The middle eight weeks align with the first eight weeks of the Express campaigns. The last eight weeks for all campaigns occur approximately at the same time. We find the exact same difference in the expected total number of adoptions across campaign types, with similar lack of significance. Robustness checks are in Online Appendix C.

During Campaign Analysis with Different Control Towns

Table OB.3 Net Effect of Shortening the Campaign on Installations During the Campaign

VARIABLE	(1)	(2)	(3)	(4)
Express	0.105	0.105		
	(0.152)	(0.162)		
Classic middle 8 weeks			-0.036	-0.024
			(0.034)	(0.032)
Classic last 8 weeks			0.295**	-0.098
			(0.134)	(0.313)
Express first 8 weeks			-0.075***	-0.057
			(0.033)	(0.037)
Express last 8 weeks			0.457	0.164
			(0.311)	(0.155)
Constant	0.172***		0.085**	
	(0.057)		(0.032)	
Δ Total Effect	0.300	0.300	0.300	0.300
p-*value*				
Baseline regression	0.90	0.91	0.91	0.91
Wild cluster bootstrap	0.94	0.96	0.94	0.95
Year-Week FE	no	yes	no	yes
R-squared	0.006	0.224	0.104	0.234
N	344	344	344	344

Note: Dependent variable is the weekly number of signed solar contracts per 1,000 owner-occupied solar-suitable homes. Unit of observation is town-week. Sample includes only campaign observations from Classic and Express towns. Total effect in an average Classic and Express town is calculated as the sum of weekly effects over the duration of the respective campaign. Δ Total Effect equals the difference between the predicted total effect in an average Express town relative to an average Classic town. Two-way clustered standard errors by town (16 clusters) and week (27 clusters) in parentheses. p-values reported from testing the null hypothesis that Δ Total Effect = 0. "Wild cluster bootstrap" reports the same p-values using a wild cluster bootstrap (1,000 draws) technique. $p < 0.1$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Propensity score matching We employ a propensity score matching procedure to select towns closest to our treated communities in terms of cumulative pre-Solarize contracts (i.e., total number of PV contracts signed during the two-year pre-treatment period) and a set of demographic and socioeconomic characteristics. We obtain town-level data on population density, median household income, ethnic groups, education level, unemployment, and housing units from the 2009-2013 wave of the American Community Survey (ACS). We also draw town-level voting registration data for 2013 from the Office of CT's Secretary of the State (`http://portal.ct.gov/sots`). Our approach is straightforward. First, for each Solarize program (Classic and Express), we utilize a Probit model to estimate a propensity score, representing the probability of selecting into the program, as a function of the vector of covariates, listed in Table OB.4. We then match, with replacement, each of the treated towns to the two control towns with closest propensity scores. Using the new sample, we re-run our analysis. As shown in Table OB.5, this yields total treatment effects that are quite similar to our earlier results. Gillingham and Bollinger (2021) provide evidence for no spillovers across town borders, which would lead us to slightly underestimate the effects.

Table OB.4 Balance of Covariates with 2N Matching

	Classic		Control for Classic		Express		Control for Express	
VARIABLE	Mean	St. Dev.	Mean	St. Dev	Mean	St. Dev	Mean	St. Dev
Population density	820.7	955.5	1085.9	1184.8	578.3	746.5	1366.5	1506.3
Median income	97714	27868	89128	23851	81568	17717	92739	26555
% White	0.905	0.083	0.860	0.129	0.887	0.113	0.870	0.140
% college degree	0.480	0.041	0.492	0.060	0.493	0.050	0.513	0.062
% unemployed	0.083	0.022	0.084	0.018	0.070	0.022	0.088	0.028
% Democrat voters	0.309	0.070	0.304	0.048	0.330	0.090	0.306	0.087
# Occupied units	9394	9866	13899	15428	8622	9375	15985	17279
% Solar suitable homes	57.60	4.92	57.94	9.56	66.88	17.64	58.89	8.16
# Solar suitable homes	5524	5848	7932	8837	4720	4534	9971	11110
Number of towns	11		11		5		8	

Note: Matching weights are used to calculate the weighted mean and standard deviation of the control groups. A t-test comparing the weighted mean of each variable in the control group to the mean in the respective treatment group finds no statistically significant differences.

Table OB.5 Total Treatment Effect by Specification

VARIABLE	Matching	Current
Total Classic Adoptions (per 1,000 suitable homes)	3.33	3.07
Total Express Adoptions (per 1,000 suitable homes)	4.03	3.97

Note: Total treatment effect is calculated as a sum of the weekly marginal effects in each program. The column “Matching” refers to the specification using propensity score matching to select the control group. The column “Current” refers to the specification using current Solarize towns as a control group.

Current towns We use an alternative set of control towns which are currently part of the Solarize program. In the Spring of 2016, Solarize campaigns were run in seven towns in Connecticut: Barkhamsted, Fairfield, Harwinton, Hebron, New Haven, North Haven, and Wilton. Because Fairfield was already part of an earlier Solarize campaign from September 2012 until January 2013, we exclude it from the list of control towns, leaving us with six towns. Under this specification, the Express and Classic treatment effects are identified because of the staggered timing of the campaigns, with Express being shorter. Table OB.5 displays the total treatment effect in an average Classic and Express town, which are consistent with our earlier findings.

Online Appendix C: Robustness Checks

Post-campaign Analysis with Multiple WOM bins To motivate the median split, we first estimate a specification of the model that allows for flexibility in the functional form of the WOM effect by using multiple bins. There is a large jump in the point estimate of the effect of WOM when passing the 0.2 threshold, which is the median.

Table OC.1 Installation Growth Post-Solarize with Multiple WOM bins

VARIABLE	(1)	(2)	(3)	(4)
Express	-0.217	-0.222	-0.061	0.081
	(0.098)**	(0.155)	(0.257)	(0.270)
	[-0.46, 0.027]*	[-0.611, 0.187]	[-0.768, 0.565]	[-0.932, 1.16]
Express × year 2	0.089	0.089	-0.061	-0.032
	(0.139)	(0.138)	(0.111)	(0.102)
	[-0.25, 0.413]	[-0.253, 0.412]	[-0.289, 0.157]	[-0.282, 0.229]
Campaign installs	0.042	0.042	0.073	0.044
	(0.021)*	(0.020)*	(0.023)***	(0.023)*
	[-0.01, 0.115]	[-0.012, 0.116]	[-0.001, 0.159]*	[-0.032, 0.130]
# Active installer	0.045	0.045	0.020	0.047
	(0.018)**	(0.018)**	(0.021)	(0.035)
	[0.002, 0.1]**	[0.001, 0.099]**	[0.001, 0.04]**	[-0.061, 0.174]
Workshop		-0.002	-0.035	-0.097
		(0.026)	(0.053)	(0.104)
		[-0.079, 0.083]	[-0.19, 0.11]	[-0.550, 0.327]
Price per W			-0.085	-0.057
			(0.090)	(0.080)
			[-0.327, 0.142]	[-0.291, 0.130]
Leads			0.008	0.013
			(0.007)	(0.010)
			[-0.011, 0.029]	[-0.015, 0.043]
$0.1 < \text{WOM} < 0.2$				0.000
				(0.191)
				[-1.102, 1.268]
$0.2 < \text{WOM} < 0.3$				0.485
				(0.361)
				[-0.977, 2.041]
$\text{WOM} > 0.3$				0.662
				(0.267)**
				[-0.567, 2.095]
Year-Month FE	yes	yes	yes	yes

Post-campaign Analysis with Linear WOM Effect In addition to the median split, we demonstrate robustness of the effect of WOM using a specification with a linear WOM effect (Table OC.2). We now see an unexpected positive effect if Express in the post period, but this is a result of the assumed linearity.

Post-campaign Analysis excluding Campaign Leads To test to see if the post-campaign effect is due exclusively to the campaign leads adopting after the campaign concluded, we use the same analysis for as in Table 5, excluding those households who were leads generated during the campaigns. The effects of WOM remain positive and significant.

Post-campaign Analysis with alternative Definitions for WOM Table OC.4 shows the results of the main analysis using all survey responses, including non-adopting leads as well as solar adopters in the construction of the WOM variable. This is the one specification in which the WOM effect becomes insignificant using the median split, although we find a significant WOM effect in the linear specification with this alternative WOM variable.

Table OC.5 shows the results of the main analysis using an alternative WOM measure that includes the information received by town leaders in addition to friends or neighbors and other solar customers in the construction of the WOM variable.

No Scaling by Market Size Table OC.6 shows the results of the main analysis using log counts for the number of installing home as the DV and using the number of past installations and leads as the regressors, rather than scaling these by market size.

Table OC.6 Installation Growth Post-Solarize, Log Counts

VARIABLE	(1)	(2)	(3)	(4)
Express	-0.049	-0.165	0.124	0.288
	(0.158)	(0.276)	(0.304)	(0.238)
	[-0.495, 0.39]	[-0.92, 0.622]	[-0.808, 0.944]	[-0.487, 1.089]
Express × year 2	0.083	0.083	-0.065	-0.032
	(0.101)	(0.109)	(0.099)	(0.099)
	[-0.193, 0.354]	[-0.204, 0.357]	[-0.287, 0.157]	[-0.299, 0.24]
Campaign installs	0.018**	0.016**	0.021	0.017
	(0.007)	(0.007)	(0.014)	(0.010)
	[0, 0.036]*	[-0.005, 0.038]*	[-0.022, 0.065]	[-0.022, 0.051]
# Active installer	0.083**	0.085***	0.042	0.053*
	(0.030)	(0.028)	(0.032)	(0.025)
	[-0.005, 0.176]*	[-0.005, 0.168]*	[0.017, 0.066]***	[-0.037, 0.146]
Workshop		-0.034	-0.010	-0.094*
		(0.053)	(0.063)	(0.053)
		[-0.205, 0.123]	[-0.221, 0.197]	[-0.273, 0.083]
Price per W			-0.033	-0.019
			(0.041)	(0.036)
			[-0.127, 0.081]	[-0.1, 0.075]
Leads			-0.001	0.000
			(0.001)	(0.001)
			[-0.006, 0.004]	[-0.004, 0.005]
WOM > median WOM				0.627***
				(0.192)
				[-0.161, 1.365]*
Year-Month FE	yes	yes	yes	yes
Constant	yes	yes	yes	yes
R-squared	0.538	0.542	0.552	0.552
N	384	384	276	276

Note: The dependent variable is the monthly number of solar installations normalized by the potential market size (solar suitable households - cumulative installations) [x1000]. Solarize related variables: campaign installs, defined as total number

Table OC.2 Installation Growth Post-Solarize with Linear WOM Effect

VARIABLE	**(1)**	**(2)**	**(3)**	**(4)**
Express	-0.217	-0.222	-0.061	0.420
	(0.098)**	(0.155)	(0.258)	(0.110)***
	[-0.462, 0.029]*	[-0.63, 0.2]	[-0.903, 0.885]	[0.13, 0.732]**
Express $\times$ year 2	0.089	0.089	-0.061	-0.037
	(0.141)	(0.139)	(0.115)	(0.104)
	[-0.242, 0.411]	[-0.243, 0.413]	[-0.288, 0.16]	[-0.288, 0.214]
Campaign installs	0.042	0.042	0.073	0.045
	(0.021)*	(0.020)*	(0.023)***	(0.019)**
	[-0.019, 0.131]	[-0.018, 0.126]	[0, 0.174]*	[-0.017, 0.119]
# Active installer	0.045	0.045	0.02	0.017
	(0.018)**	(0.018)**	(0.021)	(0.021)
	[0.001, 0.103]**	[0.001, 0.1]**	[-0.039, 0.083]	[-0.068, 0.082]
Workshop		-0.002	-0.035	-0.033
		(0.026)	(0.053)	(0.037)
		[-0.086, 0.087]	[-0.262, 0.122]	[-0.156, 0.088]
Price per W			-0.085	-0.057
			(0.089)	(0.080)
			[-0.364, 0.126]	[-0.342, 0.102]
Leads			0.008	0.007
			(0.007)	(0.007)
			[-0.013, 0.029]	[-0.017, 0.037]
Word-of-Mouth				2.334
				(0.794)**
				[-0.114, 4.881]*
Year-Month FE	yes	yes	yes	yes
Constant	yes	yes	yes	yes
R-squared	0.193	0.193	0.497	0.550
N	384	384	276	276

Note: Dependent variable is the monthly number of solar installations normalized by the potential market size (solar suitable households - cumulative installations) [x1000]. Solarize related variables: campaign installs, defined as total number of

Table OC.3 Installation Growth Post-Solarize

VARIABLE	(1)	(2)	(3)	(4)
Express	-0.183	-0.177	0.029	0.063
	(0.094)*	(0.141)	(0.229)	(0.146)
	[-0.414, 0.055]	[-0.514, 0.193]	[-0.609, 0.588]	[-0.342, 0.449]
Express × year 2	0.057	0.057	-0.180	-0.123
	(0.139)	(0.141)	(0.133)	(0.131)
	[-0.283, 0.403]	[-0.282, 0.401]	[-0.52, 0.16]	[-0.421, 0.195]
Campaign installs	0.038	0.038	0.065	0.041
	(0.018)*	(0.018)*	(0.020)***	(0.018)**
	[-0.009, 0.099]*	[-0.01, 0.096]*	[0.01, 0.133]**	[-0.007, 0.098]*
# Active installer	0.044	0.045	0.017	0.044
	(0.017)**	(0.017)**	(0.018)	(0.026)
	[0.001, 0.096]**	[0, 0.096]*	[0, 0.033]**	[-0.036, 0.121]
Workshop		0.002	-0.031	-0.121
		(0.023)	(0.048)	(0.068)*
		[-0.074, 0.073]	[-0.173, 0.1]	[-0.322, 0.07]
Price per W			-0.114	-0.071
			(0.113)	(0.094)
			[-0.474, 0.195]	[-0.367, 0.15]
Leads			0.007	0.012
			(0.006)	(0.008)
			[-0.008, 0.024]	[-0.009, 0.037]
WOM > median WOM				0.600
				(0.244)**
				[-0.103, 1.435]*
Year-Month FE	yes	yes	yes	yes
Constant	yes	yes	yes	yes
R-squared	0.201	0.201	0.498	0.540
N	384	384	266	266

Note: The dependent variable is the monthly number of solar installations normalized by the potential market size (solar suitable households - cumulative installations) [x1000]. Solarize related variables: campaign installs, defined as total number

Table OC.4 Installation Growth Post-Solarize

VARIABLE	**(1)**	**(2)**	**(3)**	**(4)**
Express	-0.217	-0.222	-0.061	0.083
	(0.098)**	(0.155)	(0.257)	(0.151)
	[-0.46, 0.027]*	[-0.611, 0.187]	[-0.768, 0.566]	[-0.375, 0.493]
Express × year 2	0.089	0.089	-0.061	-0.051
	(0.139)	(0.139)	(0.111)	(0.104)
	[-0.25, 0.414]	[-0.253, 0.412]	[-0.288, 0.157]	[-0.249, 0.153]
Campaign installs	0.042	0.042	0.073	0.066
	(0.021)*	(0.020)*	(0.023)***	(0.022)***
	[-0.01, 0.115]	[-0.012, 0.117]	[0, 0.159]*	[-0.004, 0.145]*
# Active installer	0.045	0.045	0.020	0.021
	(0.018)**	(0.018)**	(0.021)	(0.019)
	[0.001, 0.1]**	[0.001, 0.099]**	[0.001, 0.04]**	[-0.043, 0.08]
Workshop		-0.002	-0.035	-0.004
		(0.026)	(0.053)	(0.033)
		[-0.078, 0.083]	[-0.191, 0.111]	[-0.138, 0.12]
Price per W			-0.085	-0.087
			(0.090)	(0.087)
			[-0.329, 0.142]	[-0.32, 0.142]
Leads			0.008	0.009
			(0.007)	(0.007)
			[-0.011, 0.029]	[-0.011, 0.029]
WOM > median WOM				0.219
				(0.178)
				[-0.372, 0.81]
Year-Month FE	yes	yes	yes	yes
Constant	yes	yes	yes	yes
R-squared	0.193	0.193	0.497	0.506
N	384	384	276	276

Note: The dependent variable is the monthly number of solar installations normalized by the potential market size (solar suitable households - cumulative installations) [x1000]. Solarize related variables: campaign installs, defined as total number

Table OC.5 Installation Growth Post-Solarize

VARIABLE	(1)	(2)	(3)	(4)
Express	-0.216	-0.222	-0.061	0.591
	(0.098)**	(0.155)	(0.257)	(0.219)**
	[-0.46, 0.027]*	[-0.611, 0.187]	[-0.768, 0.565]	[-0.118, 1.302]*
Express × year 2	0.089	0.089	-0.061	-0.046
	(0.139)	(0.138)	(0.111)	(0.102)
	[-0.25, 0.413]	[-0.253, 0.412]	[-0.289, 0.157]	[-0.277, 0.192]
Campaign installs	0.042	0.042	0.073	0.055
	(0.021)*	(0.020)*	(0.023)***	(0.021)**
	[-0.01, 0.115]	[-0.012, 0.116]	[-0.001, 0.159]*	[-0.006, 0.133]*
# Active installer	0.045	0.045	0.020	0.057
	(0.018)**	(0.018)**	(0.021)	(0.030)*
	[0.002, 0.1]**	[0.001, 0.099]**	[0.001, 0.04]**	[-0.027, 0.152]
Workshop		-0.002	-0.035	0.088
		(0.026)	(0.053)	(0.039)**
		[-0.079, 0.083]	[-0.19, 0.11]	[-0.049, 0.223]
Price per W			-0.085	-0.054
			(0.090)	(0.085)
			[-0.327, 0.142]	[-0.298, 0.122]
Leads			0.008	0.008
			(0.007)	(0.007)
			[-0.011, 0.029]	[-0.014, 0.029]
WOM > median WOM				0.678
				(0.233)**
				[-0.309, 1.524]*
Year-Month FE	yes	yes	yes	yes
Constant	yes	yes	yes	yes
R-squared	0.193	0.193	0.497	0.521
N	384	384	276	276

Note: The dependent variable is the monthly number of solar installations normalized by the potential market size (solar suitable households - cumulative installations) [x1000]. Solarize related variables: campaign installs, defined as total number

Table OC.7 Installation Growth Post-Solarize

VARIABLE	(1)	(2)	(3)	(4)
Express	-0.217**	-0.222	-0.084	-0.062
	(0.098)	(0.155)	(0.265)	(0.178)
	[-0.46, 0.027]*	[-0.61, 0.187]	[-0.77, 0.559]	[-0.548, 0.457]
Express × year 2	0.089	0.089	-0.020	0.095
	(0.139)	(0.139)	(0.091)	(0.109)
	[-0.255, 0.412]	[-0.254, 0.412]	[-0.067, 0.025]	[-0.208, 0.396]
Campaign installs	0.042*	0.042*	0.074***	0.048**
	(0.021)	(0.020)	(0.024)	(0.021)
	[-0.01, 0.115]	[-0.012, 0.116]	[-0.004, 0.16]*	[-0.015, 0.115]
# Active installer	0.045**	0.045**	0.020	0.047
	(0.018)	(0.018)	(0.020)	(0.030)
	[0.001, 0.1]**	[0.001, 0.099]**	[-0.034, 0.08]	[-0.046, 0.152]
Workshop		-0.002	-0.035	-0.132
		(0.026)	(0.053)	(0.077)
		[-0.079, 0.083]	[-0.189, 0.116]	[-0.372, 0.082]
Price per W			-0.090	-0.071
			(0.096)	(0.085)
			[-0.354, 0.145]	[-0.306, 0.108]
Leads			0.007	0.013
			(0.006)	(0.008)
			[-0.009, 0.022]	[-0.008, 0.036]
Leads × year 2			0.002	0.001
			(0.004)	(0.004)
			[-0.01, 0.014]	[-0.01, 0.011]
WOM > median WOM				0.560**
				(0.249)
				[-0.156, 1.328]*
(WOM > med. WOM) × yr. 2				0.161
				(0.126)
				[-0.166, 0.516]
Year-Month FE	yes	yes	yes	yes

Post-Campaign Analysis Allowing for Different Year Two Effect of WOM To allow for different effects of WOM over time, we estimate a specification in which we interact the WOM variable with a time dummy that indicates the distance (in years) from the campaign conclusion. We interact our previous set of instruments with a dummy variable indicating the second year post-campaign in order to create the additional instruments. Analogous tables to Tables 5 and 6 allowing for time-varying effects are shown in Tables OC.7 and OC.8. All of the findings hold, although the effects are smaller and lose significance in the second year post-campaign when applying the wild cluster bootstrap.

Table OC.8 WOM Effects

	OLS	IV
VARIABLE	**(1)**	**(2)**
Express	0.046	0.079
	(0.248)	(0.218)
	[-1.031, 0.991]	[-0.964, 1.162]
Campaign installs	0.046*	0.041
	(0.025)	(0.025)
	[-0.038, 0.139]	[-0.049, 0.147]
# Active installer	0.053	0.056*
	(0.032)	(0.030)
	[-0.057, 0.169]	[-0.053, 0.172]
Workshop	-0.106	-0.110
	(0.091)	(0.088)
	[-0.51, 0.22]	[-0.517, 0.233]
Price per W	-0.067	-0.064
	(0.094)	(0.086)
	[-0.377, 0.169]	[-0.362, 0.175]
Leads	0.014	0.015*
	(0.008)	(0.008)
	[-0.009, 0.041]	[-0.01, 0.042]
Leads × year 2	-0.000	-0.001
	(0.003)	(0.003)
	[-0.009, 0.01]	[-0.011, 0.009]
WOM > median WOM	0.555**	0.603**
	(0.235)	(0.237)
	[-0.141, 1.536]*	[-0.175, 1.468]*
(WOM > median WOM) × year 2	0.225	0.303**
	(0.168)	(0.141)
	[-0.223, 0.693]	[-0.192, 0.732]
Year-Month FE	yes	yes
Constant	yes	yes
R-squared	0.564	0.518

Post-campaign Analysis using All Owner-Occupied Homes As another robustness check, we use an alternative measure of market size, namely the entire set of owner-occupied homes instead of just the number of homes deemed suitable for solar due to available sunlight (Tables OC.9 and OC.10); all of the results are robust.

Installation Prices Post-Solarize We estimate equation (1) to see if there are any post-campaign differences in price across campaign types (Table OC.11). We see no significant differences.

Effects Using all Rounds of Solarize Classic To address the small sample size, we repeat the analyses for the WOM results, augmenting our main dataset with data from other rounds of the Solarize program. We have data for three other rounds of the Classic campaigns, one before this experiment and two after. We do not include the very first round of Classic campaigns due to missing data on the leads and workshops. The timeline for the four rounds of campaigns we use, rounds two to five, are shown in Online Appendix D in Table OC.12 – the Express experiment was run in round 3. We run the same analysis as before using this full set of 35 towns across the four rounds, employing month fixed effects and indicator variables for each round of Solarize implementation. The results are robust when including these other campaigns (controlling for price differences across campaigns).

Table OC.9 Installation Growth Post-Solarize. All Owner-Occupied Homes

VARIABLE	(1)	(2)	(3)	(4)
Express	-0.134	-0.134	-0.055	-0.024
	(0.061)**	(0.097)	(0.106)	(0.082)
	[-0.287, 0.021]*	[-0.369, 0.114]	[-0.357, 0.238]	[-0.257, 0.212]
Express × year 2	0.082	0.082	-0.005	0.008
	(0.078)	(0.078)	(0.061)	(0.062)
	[-0.111, 0.271]	[-0.112, 0.271]	[-0.158, 0.146]	[-0.144, 0.159]
Campaign installs	0.035	0.035	0.036	0.037
	(0.019)*	(0.018)*	(0.015)**	(0.015)**
	[-0.016, 0.098]	[-0.019, 0.097]	[-0.014, 0.083]	[-0.012, 0.082]
# Active installer	0.024	0.024	0.019	0.023
	(0.011)**	(0.011)**	(0.014)	(0.015)
	[-0.002, 0.061]*	[-0.003, 0.058]*	[0.007, 0.031]***	[-0.025, 0.073]
Workshop		0.000	-0.061	-0.079
		(0.015)	(0.036)	(0.040)*
		[-0.046, 0.046]	[-0.169, 0.041]	[-0.203, 0.036]
Price per W			-0.031	-0.027
			(0.046)	(0.044)
			[-0.149, 0.092]	[-0.145, 0.088]
Leads			0.010	0.009
			(0.005)**	(0.004)*
			[-0.002, 0.026]*	[-0.003, 0.023]
WOM > median WOM				0.213
				(0.091)**
				[-0.159, 0.536]
Year-Month FE	yes	yes	yes	yes
Constant	yes	yes	yes	yes
R-squared	0.163	0.163	0.515	0.531
N	384	384	276	276

Note: Dependent variable: solar installations normalized by number of households (2010) [x1000]. Solarize related variables: campaign installs, defined as total number of installations during Solarize normalized by number of house-

Table OC.10 WOM effects. All Owner-Occupied Homes

	OLS	IV
VARIABLE	**(1)**	**(2)**
Express	0.049	0.056
	(0.134)	(0.137)
	[-0.518, 0.67]	[-0.656, 0.73]
Campaign installs	0.032	0.032
	(0.019)	(0.018)*
	[-0.039, 0.104]	[-0.041, 0.108]
# Active installer	0.023	0.024
	(0.016)	(0.014)
	[-0.041, 0.086]	[-0.043, 0.082]
Price per W	-0.022	-0.022
	(0.051)	(0.048)
	[-0.176, 0.127]	[-0.179, 0.125]
Workshop	-0.048	-0.048
	(0.049)	(0.049)
	[-0.257, 0.161]	[-0.273, 0.184]
Leads	0.009	0.009
	(0.004)*	(0.004)**
	[-0.005, 0.023]	[-0.007, 0.024]
WOM $>$ median WOM	0.236	0.251
	(0.084)**	(0.055)***
	[-0.176, 0.719]	[-0.017, 0.533]*
Year-Month FE	yes	yes
Constant	yes	yes
R-squared	0.555	0.501
N	221	221
First stage F statistic		12.68
Hansen J-statistic (p-value)		0.32

Note: Dependent variable: solar installations normalized by number of households (2010) [x1000]. Campaign installs, defined as total number of installations during Solarize nor-

Table OC.11 Installation Prices Post-Solarize as DV

VARIABLE	(1)	(2)	(3)	(4)
Express	0.024	0.100	0.103	0.085
	(0.137)	(0.172)	(0.183)	(0.170)
Express= × year 2	0.063	0.064	0.067	0.057
	(0.204)	(0.203)	(0.203)	(0.200)
Campaign installs	-0.008	-0.008	0.007	0.014
	(0.012)	(0.012)	(0.021)	(0.022)
# Active installer	-0.018*	-0.016	-0.024	-0.032
	(0.010)	(0.009)	(0.017)	(0.022)
Workshop		0.022	0.041	0.070
		(0.016)	(0.026)	(0.046)
Leads			-0.005	-0.007
			(0.006)	(0.007)
WOM > median WOM				-0.193
				(0.178)
Year-Month FE	yes	yes	yes	yes
Constant	yes	yes	yes	yes
R-squared	0.188	0.190	0.194	0.201
N	276	276	276	276

Note: Dependent variable: Price per Watt. Solarize related variables: campaign installs, defined as total number of installations during Solarize normalized by number of households [x1000], Express: categorial variable for shorter version of Solarize, number of workshops and leads (normalized by number of households) collected during Solarize, and a categorial variable for WOM defined as the average number of WOM channels reported by solar adopters through which they heard about Solarize (from friends/neighbors or from another solar customer) being above the median of 0.2. The unit of observation is town-month. Main sample: Solarize Classic and Express campaigns observed for 24 month after the conclusion of the Solarize intervention. Year-Month FE is absorbed. Two-way clustered standard errors by town (16 clusters) and month (24 clusters) in parentheses. $p < 0.1$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table OC.12 Detailed Timeline of All Classic Campaigns

		Start Date	End Date
Round 2	Bridgeport	Mar 26, 2013	July 31, 2013
	Coventry	Mar 30, 2013	July 31, 2013
	Canton	Mar 19, 2013	July 31, 2013
	Mansfield	Mar 11, 2013	July 31, 2013
	Windham	Mar 11, 2013	July 31, 2013
Round 3	Easton	Sept 22, 2013	Feb 9, 2014
	Redding	Sept 22, 2013	Feb 9, 2014
	Trumbull	Sept 22, 2013	Feb 9, 2014
	Ashford	Sept 24, 2013	Feb 11, 2014
	Chaplin	Sept 24, 2013	Feb 11, 2014
	Hampton	Sept 24, 2013	Feb 11, 2014
	Pomfret	Sept 24, 2013	Feb 11, 2014
	Greenwich	Oct 2, 2013	Feb 18, 2014
	Newtown	Sept 24, 2013	Feb 28, 2014
	Manchester	Oct 3, 2013	Feb 28, 2014
	West Hartford	Sept 30, 2013	Feb 18, 2014
Round 4	Tolland	Apr 23, 2014	Sept 16, 2014
	Torrington	Apr 24, 2014	Sept 16, 2014
	Simsbury	Apr 29, 2014	Sept 23, 2014
	Bloomfield	May 6, 2014	Sept 30, 2014
	Farmington	May 14, 2014	Oct 7, 2014
	Haddam	May 15, 2014	Oct 7, 2014
	Killingworth	May 15, 2014	Oct 7, 2014
Round 5	Burlington	Nov 19, 2014	Apr 9, 2015
	East Granby	Dec 2, 2014	Apr 22, 2015
	Suffield	Dec 2, 2014	Apr 22, 2015
	Windsor	Dec 2, 2014	Apr 22, 2015
	Windsor Locks	Dec 2, 2014	Apr 22, 2015
	New Canaan	Dec 2, 2014	Apr 22, 2015
	New Hartford	Nov 17, 2014	Apr 7, 2015

Table OC.13 Solarize Installations & Number of leads for All Rounds of Classic

VARIABLE	Mean	Sd	Median	T-test
Leads / solar suitable homes [×1000]	55.52	27.37	53.37	0.27
Campaign installs / solar suitable homes [×1000]	11.62	8.34	10.22	0.29
# Municipalities			30	

Note: All Solarize Classic towns participating in Solarize CT, pooled rounds 2013-2015. Campaign installs is defined as total number of installations during Solarize / solar suitable homes [x1000]. Leads is total number of leads collected during Solarize / solar suitable homes [x1000]. Two-sample t-test for differences in mean to Express (Table 3). Unit of observation: town.

Table OC.14 Summary Statistics of Adopter Survey Responses: All Rounds of Classic

WOM Channels			
VARIABLE	Obs.	Mean	Std. Dev.
Friend/neighbor	640	0.145	0.353
Town leader	640	0.183	0.387
Solar customer	640	0.094	0.292
Newspaper	640	0.123	0.329
Social Media	640	0.034	0.182
Online media	640	0.091	0.287
Solarize event	640	0.322	0.468
Installer	640	0.042	0.201

Note: Each response variable for "WOM Channels" is a binary variable, which equals 1 if the respondent learned about the Solarize program through the respective information channel and 0 otherwise.

Table OC.15 Installation Growth Post-Solarize. All Classic Campaigns.

VARIABLE	(1)	(2)	(3)	(4)
Express	-0.285**	-0.342*	-0.166	-0.039
	(0.106)	(0.177)	(0.250)	(0.213)
	[-0.558, -0.018]**	[-0.785, 0.117]	[-0.825, 0.493]	[-0.606, 0.518]
Express × year 2	0.110	0.110	0.024	0.026
	(0.102)	(0.103)	(0.108)	(0.110)
	[-0.162, 0.376]	[-0.167, 0.381]	[-0.249, 0.313]	[-0.254, 0.311]
Campaign installs	0.018**	0.019**	0.033**	0.023
	(0.009)	(0.009)	(0.015)	(0.014)
	[-0.01, 0.046]	[-0.011, 0.046]	[-0.028, 0.083]	[-0.029, 0.072]
# Active installer	0.026**	0.025*	-0.024	-0.005
	(0.012)	(0.013)	(0.017)	(0.014)
	[-0.002, 0.058]*	[-0.005, 0.058]*	[-0.041, -0.008]***	[-0.04, 0.029]
Workshop		-0.018	-0.019	-0.013
		(0.029)	(0.047)	(0.037)
		[-0.089, 0.056]	[-0.139, 0.104]	[-0.117, 0.084]
Price per W			-0.129*	-0.104*
			(0.066)	(0.056)
			[-0.294, 0.032]*	[-0.236, 0.021]*
Leads			0.003	0.004
			(0.004)	(0.004)
			[-0.008, 0.017]	[-0.008, 0.019]
WOM > median WOM				0.367*
				(0.185)
				[-0.082, 0.873]*
Year 2	0.102	0.103	0.202**	0.209**
	(0.117)	(0.118)	(0.095)	(0.099)
	[-0.153, 0.364]	[-0.154, 0.364]	[-0.012, 0.406]*	[-0.014, 0.431]*
Year-Month FE	yes	yes	yes	yes
Solarizeround FE	yes	yes	yes	yes
Constant	yes	yes	yes	yes
R-squared	0.158	0.159	0.294	0.323

Online Appendix D: Campaign Costs

We first break down the total costs of the program into a fixed component, which is independent of campaign duration and number of participating towns, and a variable component which varies along either one or both of these dimensions. CGB and SmartPower staff time is allocated to drafting the initial request for proposals for solar installers and towns, as well as reaching out to communities to inform them about the program and encourage them to apply. The cost of this staff time is fixed, regardless of campaign length or number of participating municipalities. On the other hand, a number of program-related costs, associated with creating a campaign website for each town, supplying marketing materials to the communities, initial meetings with town leaders and volunteers, and organizing the kickoff event in each municipality, are independent of the campaign duration, but vary by the number of towns participating in the program. Lastly, travel expenses for SmartPower staff, related to organizing and participating in events throughout the program, are both participation- and duration-dependent. These duration-dependent costs are lower for shorter campaigns. Some of the towns participated in the campaign as a coalition. In particular, there were two coalitions among the Classic towns: Ashford-Chaplin-Hampton-Pomfret and Easton-Redding-Trumbull, and one coalition among the Express towns: Roxbury-Washington. We calculate costs on a per-campaign basis since costs are shared across towns in the coalitions, and then calculate the costs per installation as if each town had carried out a separate campaign.