Peer Effects in the Diffusion of Solar Photovoltaic Panels: Online Appendix

Bryan Bollinger and Kenneth Gillingham

April 30, 2012

1   Results using Installed Base in Counts and MW

We estimated the following model:

$$Y_{czt} = \alpha + \beta^{count} b_{zt}^{count} + \beta^{MW} b_{zt}^{MW} + \gamma' X_{zt} + \eta_{zq} + \xi_t + \epsilon_{zt}, \tag{1}$$

where b_{zt}^{count} and b_{zt}^{MW} are the installed base measured in total installations and total megawatts, respectively. The results are:

Table 1: Zip code model (obs=zip-day)

installed base (counts)	0.849
	(0.858)
installed base (MW)	0.143
	(0.143)
quarter-zip effects	Y
year-month indicators	Y
incentive steps	Y
R-squared	0.000
N	6,034,360

Robust standard errors in parentheses.

2 Contractor-Specific Regressions

We estimated the contractor-specific regressions using the following model:

$$Y_{czt} = \alpha + \beta^c b_{czt} + \beta b_{zt} + \gamma' X_{zt} + \eta_{zq} + \xi_t + \epsilon_{zt}, \tag{2}$$

where Y_{czt} is the faction of homes installing solar in day t using contractor c, and b_{czt} is the installed base by that contractor. The results for the five contractors with the most installations (SolarCity, REC Solar, Real Goods Solar, Akeena Solar, and Verengo Solar) are as follows:

Table 2: Contractor zip code model (obs=zip-day)

	SolarCity	REC	Real Goods	Akeena	Verengo
contractor installed base	7.69e-07	4.97e-07	-2.35e-07	1.73e-06	8.93e-12
	(1.15e-06)	(5.49e-07)	(3.42e-07)	(1.13e-06)	(6.39e-11)
installed base	2.53e-07	3.94e-08	6.51e-08	8.89e-08	-4.37e-12
	(8.79e-08)	(5.39e-08)	(4.51e-08)	(4.91e-08)	(1.15e-11)
month of year indicators	Y	Y	Y	Y	Y
day of week indicators	Y	Y	Y	Y	Y
day of month indicators	Y	Y	Y	Y	Y
incentive step indicators	Y	Y	Y	Y	Y
R-squared	0.000	0.000	0.000	0.000	0.000
N	6,032,221	6032218	6032199	6032214	6032225

Robust standard errors in parentheses.

3 Quasi-Experiment Zip Codes

These zip codes were used in the quasi-experimental analysis:

PG&E/SCE zip codes: 93117, 93203, 93212, 93215, 93221, 93222, 93225, 93230, 93245, 93250, 93252, 93254, 93256, 93271, 93272, 93274, 93291, 93306, 93307, 93308, 93427, 93436, 93440, 93441, 93454, 93455, 93460, 93518, 93560, 93561, 93603, 93647, 93664.

SCE/SDG&E zip codes: 90620, 90621, 90623, 90630, 90631, 90680, 90720, 90740, 90742, 90743, 91719, 91752, 91760, 92028, 92055, 92059, 92061, 92066, 92086, 92210, 92211, 92220,

92223, 92225, 92230, 92234, 92240, 92241, 92254, 92260, 92261, 92262, 92263, 92264, 92270,
92274, 92282, 92320, 92501, 92503, 92504, 92506, 92507, 92508, 92509, 92519, 92530, 92532,
92536, 92543, 92544, 92545, 92546, 92548, 92549, 92551, 92553, 92554, 92555, 92557, 92561,
92562, 92563, 92564, 92567, 92570, 92571, 92581, 92582, 92583, 92584, 92585, 92586, 92587,
92589, 92590, 92591, 92592, 92595, 92596, 92602, 92603, 92604, 92605, 92606, 92607, 92609,
92610, 92612, 92614, 92617, 92618, 92620, 92624, 92625, 92626, 92627, 92629, 92630, 92637,
92641, 92646, 92647, 92648, 92649, 92650, 92651, 92652, 92653, 92654, 92655, 92656, 92657,
92658, 92660, 92661, 92662, 92663, 92672, 92673, 92675, 92676, 92677, 92678, 92679, 92683,
92688, 92691, 92692, 92694, 92698, 92701, 92703, 92704, 92705, 92706, 92707, 92708, 92780,
92782, 92801, 92802, 92804, 92807, 92821, 92823, 92831, 92832, 92833, 92835, 92840, 92841,
92843, 92844, 92845, 92856, 92860, 92861, 92862, 92865, 92866, 92867, 92868, 92869, 92870.

4   GMM Estimation

Let Y_{zt} be the number of installations in zip code z at time t. Here we aggregate time
to the monthly level for computational reasons, so we consider month μ. Consider the
multiplicative model:

$$Y_{z\mu} = \exp(\gamma' X_{z\mu})\eta_z \epsilon_{z\mu}, \tag{3}$$

where the intercept and zip code installed base are covariates in $X_{z\mu}$ along with dummy
variables for the current incentives. In the absence of correlations between η_z and $\epsilon_{z\mu}$, η_z
and $\epsilon_{z\mu}^2$, and with no autocorrelation in $\epsilon_{z\mu}$, then:

$$\mathbb{E}\left[X_{z\mu-1}\left(\frac{Y_{z\mu}}{\mu_{z\mu}} - \frac{Y_{z\mu-1}}{\mu_{z\mu-1}} \right) \right] = 0, \tag{4}$$

where we define $\mu_{zt} = \exp(\gamma' X_{z\mu})$ (Woolridge 1997; Windmeijer 2000). We estimate this
equation using GMM estimation at the monthly level and find the installed base coeffi-
cient to be 2.31 with a standard error of 27.83.

References

Windmeijer, F. (2000), 'Moment conditions for fixed effects count data models with en-
dogenous regressors', *Economics Letters* **68**(1), 21–24.

Woolridge, J. M. (1997), 'Multiplicative panel data models without the strict exogeneity
assumption', *Econometric Theory* **13**(5), 667–678.