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Supplementary Materials for
Can the US Keep the PACE?
A Natural Experiment in Accelerating the Growth of Solar Electricity

Nadia Ameli, Mauro Pisu, Daniel M. Kammen

correspondence to: n.ameli@ucl.ac.uk

This PDF file includes:

Supplementary Text
Tables S1 to S4

21 **Materials and Methods**

22 A description of the PACE program

23 PACE has spread quickly in the United States since the first pilot program was launched
24 in 2008 in Berkeley. It has received initially strong federal support and since its
25 introduction thirty states have passed PACE-enabling legislation and nearly twenty more
26 state legislatures and local governments are currently considering authorizing or
27 implementing PACE programs (42). Despite this initial success, PACE has faced
28 regulatory opposition as the federal agencies involved in financing and regulating the
29 housing market, the Government Sponsored Enterprises (GSEs) Fannie Mae & Freddie
30 Mac, have opposed it's the senior lien status of PACE credits over existing mortgages
31 backed by the GSEs. Indeed, PACE's senior lien creates additional risks for mortgage
32 lenders and other mortgage holders (i.e., investors in mortgage backed securities) by
33 exposing them to defaults on PACE assessments without giving them control over the
34 loan underwriting process (43).

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36 The GES's reluctance to provide mortgages for properties benefitting from PACE has put
37 the program's future in doubt. Many states that financed PACE programs have suspended
38 or withdrawn them and overall the spread residential PACE programs have been
39 haphazard. Only few counties across the nation have continued to run this scheme. Up to
40 the beginning of 2016, 30 US state governments had enacted legislative changes to
41 enable PACE financing, but only in few states, such as California, Colorado, Florida,
42 New York, Missouri and Connecticut, have there been a significant number of projects
43 financed through this mechanism (42).

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45 Some attempts to revitalize PACE program have been put in place. Since 2012, HERO
46 program has been active in California communities; it was first used to finance
47 commercial projects, while recently it was expanded to the residential sector. The
48 program was launched by a private company, namely Renovate America, in Riverside
49 County reaching 186 cities in 2014. Moreover, in September 2013, to address the
50 FHFA's concerns over additional risks for lenders resulting from senior residential PACE
51 liens, California Governor Jerry Brown proposed a state-wide reserve fund of USD 10
52 million to insure FHFA against the risk of residential default or foreclosure on PACE
53 properties. It is worth noting that the wave of defaults that federal agencies feared never
54 materialized. Indeed, housing data from Sonoma County show that PACE homeowners'
55 default rates have been extremely low and are estimated at 0.85%, while the average
56 mortgage delinquency in Sonoma County is 2.19% (44).

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61 **Table S1. Descriptive statistics based on different bandwidths**

Variables	15 km (mean)	20 km (mean)	30 km (mean)	40 km (mean)
Ownership (% rate)				
Sonoma - treatment	45.54 (11.60)	48.23 (11.12)	48.61 (10.75)	48.14 (10.91)
Neighboring counties – control	45.46 (9.23)	45.43 (10.33)	50.57 (12.28)	50.59 (12.62)
Difference	0.08	2.8	1.96	2.45
Home value (dollars)				
Sonoma – treatment	434 180 (81 250)	410 154 (72 595)	389 038 (81 238)	385 316 (82 849)
Neighboring counties – control	457 873 (206 370)	450 430 (173 024)	441 255 (228 567)	458 688 (270 935)
Difference	23 693	40 276	52 217	73 372
HH income (dollars)				
Sonoma – treatment	66 071 (14 696)	63 775 (13 414)	61 657 (12 909)	61 657 (12 802)
Neighboring counties – control	66 886 (11 943)	67 723 (11 561)	69 681 (26 272)	69 992 (30 283)
Difference	815	3 948	8 024	8 335
Number of cities				
Sonoma – treatment group	13	24	34	36
Neighboring counties – control group	9	14	36	60

62 Note: The table reports descriptive statistics for the ownership rate (shorthand: ownership), home value (shorthand: home value) and
63 median household income (shorthand: HH income). The ownership rate is expressed as percentage value, while home value and
64 median household income are reported in dollars.

65 Source: US Census Bureau and US Gazetteer (2010)

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68 **Table S2. Residential installed solar photovoltaic power capacity in California,**
 69 **Sonoma and Sonoma's border Counties by year (Watt/population)**

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Year	Sonoma's border counties					Sonoma (mean)	California (mean)
	Solano (mean)	Mendocino (mean)	Napa (mean)	Lake (mean)	Marin (mean)		
2007	0.3101349	0.4032584	0.8259018	0.7455779	1.843059	0.9411484	0.7630199
2008	0.9506752	1.966739	5.272544	3.34792	4.938903	2.943326	1.701855
2009	1.11597	2.609227	7.451632	1.58555	4.596743	6.000862	2.59503
2010	1.76011	3.35274	7.449938	3.484645	3.706436	9.964075	3.491481
2011	2.286334	3.186623	5.545515	1.635271	5.30588	7.746592	3.813031
2012	2.986472	2.323395	5.114035	1.944967	4.906243	4.858843	4.929962

71 *Source: Authors calculation based on CSI database*

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75 **Table S3. Estimated effects of solar installations in cities up to 15 km, 20 km, 30 km**
 76 **and 40 km**

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VARIABLES	15 km		20 km		30 km		40 km	
	1	2	1	2	1	2	1	2
PACE policy	0.418*** (0.0952)	-0.0603 (0.149)	0.433*** (0.025)	-0.12 (0.0849)	0.633*** (0.127)	0.0221 (0.135)	0.622*** (0.171)	0.124 (0.164)
CSI	-0.854 (0.55)	-0.85 (0.544)	-0.401*** (0.0389)	-0.379*** (0.038)	0.00444 (0.227)	0.00752 (0.223)	0.203 (0.451)	0.2 (0.452)
Household wealth	0.429 (0.317)	0.429 (0.316)	0.639* (0.352)	0.639* (0.351)	0.971*** (0.318)	0.970*** (0.318)	0.699*** (0.204)	0.699*** (0.204)
PACE over time		0.125*** (0.0209)		0.144*** (0.02)		0.159*** (0.0265)		0.129*** (0.0333)
Time dummies	YES	YES	YES	YES	YES	YES	YES	YES
County dummies	YES	YES	YES	YES	YES	YES	YES	YES
Constant	9.918** (4.637)	9.756** (4.687)	5.444*** (0.169)	5.068*** (0.19)	-0.348 (1.962)	-0.537 (1.929)	-0.148 (4.191)	-0.235 (4.159)
Observations	126	126	216	216	390	390	546	546
R-squared	0.204	0.204	0.144	0.146	0.312	0.318	0.145	0.147

78 Notes: Estimates obtained through the Poisson pseudo-maximum-likelihood method
 79 Standard errors are clustered by counties and reported in parentheses; superscripts ***, ** and * indicate statistical significance at the
 80 1%, 5% and 10% level, respectively.

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84 **Table S4. Estimated effects on new solar installations in Sonoma and Sonoma's**
 85 **border counties**

Independent variable: new PV wattage per capita	
PACE 2008	0.448** (0.048)
PACE 2009-2010	0.817*** (0.197)
PACE 2011-2012	0.755** (0.213)
CSI	0.307 (0.423)
Household wealth	0.668*** (0.206)
Time dummies	YES
County dummies	YES
Constant	-1.149 (3.814)
Observations	744
R-squared	0.149

86 Notes: The new PV wattage is computed as the new yearly wattage per capita. Estimates obtained through the Poisson pseudo-
 87 maximum-likelihood method. Standard errors are clustered by counties and reported in parentheses. Coefficients of dependent
 88 variables, superscripts ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

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