

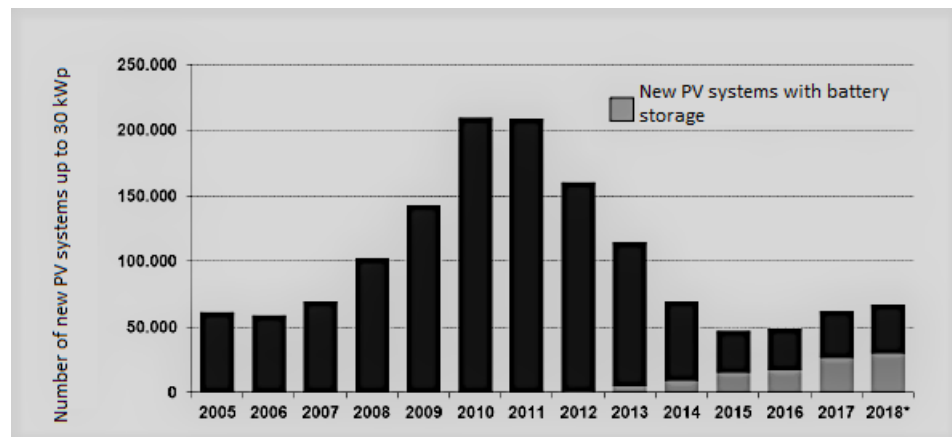
Appendix A

Table A1: Frequency in the GRECS Participation of Households and Number of Observations.

Number of responses	Frequency	Share	Cumulated	Number of observations
1	3,758	47.3%	47.3%	3,758
2	2,328	29.3%	76.6%	4,656
3	936	11.8%	88.4%	2,808
4	440	5.5%	93.9%	1,760
5	239	3.0%	96.9%	1,195
6	107	1.3%	98.2%	642
7	85	1.1%	99.3%	595
8	38	0.5%	99.8%	304
9	15	0.18%	99.98%	135
10	2	0.02%	100.0%	20
Total	7,948	100.0%	–	15,873

Source: GRECS (2022).

Figure A1: Distribution of Year of PV Installation for Households in Germany.



Source: BSW-Solar (2019).

Table A2: Comparison of the Estimation Sample with the Population of German households.

	2004			2015		
	Sample	Population	t-Statistic	Sample	Population	t-Statistic
Age < 25 years	2.8%	4.5%	-3.27***	0.0%	4.6%	–
Age 25-64 years	89.1%	67.5%	21.23***	56.7%	67.0%	-6.43***
Age > 64 years	8.2%	27.8%	-22.01***	42.7%	28.4%	8.94***
Female	27.9%	31.7%	-2.61***	35.4%	35.5%	-0.06
College	28.5%	11.0%	11.89***	29.0%	20.2%	5.94***
High income	11.4%	5.3%	5.65***	9.2%	11.4%	-2.26**
Household size=1	10.1%	37.2%	-27.66***	30.0%	41.4%	-7.73***
Household size=2	33.4%	34.1%	-0.45	52.8%	34.2%	11.52***
Household size=3	20.9%	13.8%	5.35***	8.7%	12.1%	-3.69***
Household size=4	25.5%	10.8%	10.32***	6.0%	9.0%	-3.86
Household size > 4	10.2%	4.1%	6.17***	2.5%	3.2%	-1.40
<i>PV</i>	1.1%	0.5%	1.56	4.2%	4.8%	-0.97

Note: Population data is drawn from the German TSOs (TSO 2017) and the German Federal Statistical Office (Destatis 2005, 2016). This data source asks the main earner to complete the questionnaire, whereas in the sample, the household member who usually makes the financial decisions for the household is asked. Furthermore, the variable High income is top-coded at €4,500, while in the sample the upper threshold is at €5,100. * p < 0.1; ** p < 0.05; *** p < 0.01.

Table A3: Summary Statistics for Solar and Non-Solar Households.

Variable	All	No PV	PV	t-Statistic
Age	52.63	52.63	52.61	-0.05
Female	0.305	0.309	0.231	-4.42***
College	0.317	0.317	0.316	-0.08
Household size=1	0.186	0.191	0.078	-7.64***
Household size=2	0.432	0.434	0.393	-2.17**
Household size=3	0.171	0.168	0.232	4.43***
Household size=4	0.156	0.154	0.218	4.66***
Household size>4	0.054	0.053	0.079	3.01***
Homeowner	0.722	0.713	0.915	11.90***
Income	2,841	2,822	3,254	9.29***
<i>eg</i>	3,651	3,629	4,108	7.51***
<i>p</i>	21.06	21.03	21.78	4.22***
<i>ap</i>	24.40	24.38	24.68	1.42
<i>z_p</i>	12.20	12.20	12.18	-0.198
<i>z_{PV}</i>	131.35	127.17	218.89	14.20***

Note: * p < 0.1; ** p < 0.05; *** p < 0.01.

Table A4: Placebo Test of the Amount of Electricity taken from the Public Grid on z_{PV} for Sub-Sample without Solar Households.

	Fixed Effects	
	Coeff.	Std. Err
$\ln(p)$	-0.035**	(0.017)
z_{PV}	-0.000	(0.000)
$\ln(\text{Income})$	0.018	(0.018)
Household size = 2	0.282***	(0.032)
Household size = 3	0.441***	(0.036)
Household size = 4	0.517***	(0.036)
Household size > 4	0.595***	(0.044)
College degree	0.021	(0.023)
Homeowner	0.173***	(0.043)
Age	0.004	(0.003)
Constant	7.477***	(0.218)
Year Dummies	Yes	
Number of observations	13,855	

Note: Clustered standard errors are in parentheses. * p < 0.1; ** p < 0.05; *** p < 0.01.

Table A5: First Stage Estimation Results.

	Standard 2SLS				Fixed Effects 2SLS			
	Price		PV		Price		PV	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
z_{PV}	-0.000	(0.000)	0.0001***	(0.000)	-0.000	(0.000)	0.0001**	(0.000)
z_p	0.279***	(0.032)	-0.088**	(0.044)	0.202***	(0.064)	0.093*	(0.052)
ln(Income)	-0.002	(0.005)	0.011**	(0.005)	0.012	(0.017)	-0.008	(0.012)
Household size = 2	-0.022***	(0.006)	0.007	(0.006)	-0.042**	(0.018)	0.003	(0.005)
Household = 3	-0.022***	(0.008)	0.025**	(0.010)	-0.052***	(0.019)	-0.003	(0.008)
Household size = 4	-0.023***	(0.008)	0.016	(0.011)	-0.035	(0.024)	-0.001	(0.014)
Household size > 4	-0.021**	(0.009)	0.029*	(0.016)	-0.027	(0.031)	0.019	(0.038)
College degree	0.008**	(0.004)	-0.001	(0.006)	0.021	(0.019)	-0.038*	(0.022)
Homeowner	-0.006	(0.005)	0.033***	(0.005)	-0.034	(0.021)	0.000	(0.017)
Age	-0.001***	(0.000)	-0.000	(0.000)	0.001	(0.001)	0.000**	(0.000)
Female	-0.003	(0.004)	-0.013**	(0.006)	–	–	–	–
Constant	2.159***	(0.084)	0.111	(0.113)	2.179***	(0.212)	-0.165	(0.153)
Year Dummies	Yes		Yes		Yes		Yes	
Number of observations	12,524		12,524		12,524		12,524	
Kleibergen-Paap F-statistic	16.81				6.12			

Note: Standard errors clustered at the household level are in parentheses. * p < 0.1; ** p < 0.05; *** p < 0.01.

Table A6: Fixed-Effects Estimation Results for the Determinants of Price Knowledge and Supplier Change.

	Price Knowledge		Supplier Change	
	Coeff.	Std. Err.	Coeff.	Std. Err.
$\ln(p)$	0.906***	(0.061)	0.068	(0.042)
PV	0.053	(0.082)	0.023	(0.017)
$\ln(\text{Income})$	-0.019	(0.078)	-0.070	(0.183)
Household size = 2	-0.133	(0.082)	-0.109	(0.067)
Household size = 3	-0.148	(0.091)	-0.128*	(0.078)
Household size = 4	-0.215**	(0.099)	-0.138	(0.084)
Household size > 4	-0.382***	(0.123)	-0.134*	(0.078)
College degree	0.069	(0.117)	0.195	(0.224)
Homeowner	0.148	(0.124)	0.103	(0.282)
Age	0.002	(0.011)	0.089	(0.139)
Constant	-2.171**	(0.954)	-4.679	(8.189)
Year Dummies	Yes		Yes	
Number of observations	6,945		5,358	

Note: Standard errors clustered at the household level are in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table A7: Fixed-Effects Estimation Results for Static Specification [6] when Estimated with the Sub-Sample employed for Dynamic Specification [7].

	Without Interaction Terms		With Interaction Terms	
	Fixed Effects		Fixed Effects	
	Coeff.	Std. Err.	Coeff.	Std. Err.
$\ln(p)$	-0.027	(0.032)	-0.020	(0.034)
PV	-0.071	(0.045)	0.219	(0.248)
$PV \times \ln(p)$	—	—	-0.095	(0.086)
$\ln(\text{Income})$	0.067**	(0.030)	0.067**	(0.030)
Household size = 2	0.318***	(0.066)	0.318***	(0.065)
Household size = 3	0.508***	(0.074)	0.508***	(0.074)
Household size = 4	0.576***	(0.077)	0.576***	(0.077)
Household size > 4	0.654***	(0.088)	0.654***	(0.088)
College degree	0.065*	(0.035)	0.066*	(0.035)
Homeowner	0.078*	(0.047)	0.079*	(0.047)
Age	0.008*	(0.005)	0.008*	(0.005)
Constant	6.568***	(0.410)	6.548***	(0.411)
Year Dummies	Yes		Yes	
Number of observations	4,655		4,655	

Note: Standard errors clustered at the household level are in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table A8: GMM System Estimation Results for Dynamic Specification [7] using the Sub-Sample covering the years 2004-2011.

	Without Interaction Terms		With Interaction Terms	
	Coeff.	Std. Err.	Coeff.	Std. Err.
$\ln(e g_{t-1})$	0.615***	(0.091)	0.640***	(0.092)
$\ln(\widehat{p})$	-0.376**	(0.161)	-0.317*	(0.172)
\widehat{PV}	0.021	(0.054)	-0.463	(1.669)
$\widehat{PV} \times \ln(\widehat{p})$	–	–	0.157	(0.559)
$\ln(\text{Income})$	0.024*	(0.014)	0.022	(0.014)
Household size = 2	0.188***	(0.045)	0.180***	(0.045)
Household size = 3	0.291***	(0.067)	0.277***	(0.068)
Household size = 4	0.318***	(0.077)	0.301***	(0.078)
Household size > 4	0.388***	(0.088)	0.367***	(0.089)
College degree	-0.011	(0.010)	-0.010	(0.009)
Homeowner	0.048***	(0.017)	0.045***	(0.016)
Age	0.001	(0.001)	0.001	(0.001)
Female	-0.000	(0.009)	-0.000	(0.009)
Constant	3.796***	(0.816)	–	–
Year Dummies	Yes		Yes	
Number of observations	2,949		2,949	
Number of instruments	43		50	
Arellano-Bond test for AR(1)	p=0.000		p=0.000	
Arellano-Bond test for AR(2)	p=0.721		p=0.770	
Hansen test of overid. restrictions	p=0.731		p= 0.543	
Long-run price elasticity	-0.977**	(0.455)	–	–

Note: Standard errors clustered at the household level are in parentheses. * p < 0.1; ** p < 0.05; *** p < 0.01.

Table A9: GMM System Estimation Results for Dynamic Specification [7] With Varying Effects for Years since Panel Adoption.

	Varying PV Effect	
	Coeff.	Std. Err.
$\ln(eg_{t-1})$	0.620***	(0.076)
$\ln(p)$	-0.282**	(0.123)
PV panel 0 – 1 years	0.002	(0.022)
PV panel 2 – 3 years	0.026	(0.020)
PV panel 4 – 5 years	0.004	(0.032)
PV panel 6 – 7 years	-0.029	(0.048)
PV panel 8 – 9 years	-0.029	(0.071)
PV panel 10 – 11 years	-0.011	(0.123)
$\ln(\text{Income})$	0.024**	(0.010)
Household size = 2	0.181***	(0.035)
Household size = 3	0.280***	(0.054)
Household size = 4	0.309***	(0.060)
Household size > 4	0.379***	(0.072)
College degree	-0.013*	(0.007)
Homeowner	0.048***	(0.015)
Age	0.001**	(0.001)
Female	0.000	(0.007)
Year Dummies		Yes
Number of observations		4,655
Number of instruments		71
Arellano-Bond test for AR(1)		p=0.000
Arellano-Bond test for AR(2)		p=0.916
Hansen test of overid. restrictions		p=0.605
Long-run price elasticity	-0.742**	(0.307)

Note: Standard errors clustered at the household level are in parentheses. * p < 0.1; ** p < 0.05; *** p < 0.01.

Table A10: GMM System Estimation Results for Dynamic Specification [7] using Average Electricity Prices ap .

	Without Interaction Terms		With Interaction Terms	
	Coeff.	Std. Err.	Coeff.	Std. Err.
$\ln(eg_{t-1})$	0.622***	(0.069)	0.613***	(0.066)
$\ln(\widehat{ap})$	-0.433***	(0.163)	-0.332**	(0.161)
\widehat{PV}	-0.002	(0.042)	2.196	(2.375)
$\widehat{PV} \times \ln(\widehat{ap})$	–	–	-0.688	(0.741)
$\ln(\text{Income})$	0.015	(0.009)	0.018*	(0.009)
Household size = 2	0.163***	(0.032)	0.172***	(0.031)
Household size = 3	0.247***	(0.048)	0.261***	(0.046)
Household size = 4	0.275***	(0.055)	0.289***	(0.052)
Household size > 4	0.339***	(0.064)	0.356***	(0.061)
College degree	-0.012	(0.007)	-0.010	(0.007)
Homeowner	0.043***	(0.014)	0.045***	(0.013)
Age	0.001**	(0.001)	0.001**	(0.000)
Female	-0.000	(0.007)	0.001	(0.007)
Constant	4.081***	(0.807)	–	–
Year Dummies	Yes		Yes	
Number of observations	4,655		4,655	
Number of instruments	50		57	
Arellano-Bond test for AR(1)	p=0.000		p=0.000	
Arellano-Bond test for AR(2)	p=0.532		p=0.535	
Hansen test of overid. restrictions	p=0.566		p=0.419	
Long-run price elasticity	-1.146***	(0.434)	–	–

Note: Standard errors clustered at the household level are in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table A11: Robustness Checks for Dynamic Model [7] based on the Blundell-Bond GMM System Estimator using Various Ways to Instrument the Lagged Consumption Variable.

Instruments	First-differences not collapsed		First-differences collapsed		Orthogonal-deviations not collapsed	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
$\ln(eg_{t-1})$	0.610***	(0.069)	0.603***	(0.082)	0.693***	(0.076)
$\ln(\overline{p})$	-0.168**	(0.081)	-0.202	(0.135)	-0.116	(0.107)
\overline{PV}	0.037	(0.038)	0.000	(0.050)	0.012	(0.074)
$\ln(\text{Income})$	0.020*	(0.010)	0.023**	(0.011)	0.015	(0.011)
Household size = 2	0.188***	(0.033)	0.193***	(0.039)	0.159***	(0.035)
Household size = 3	0.282***	(0.049)	0.296***	(0.058)	0.234***	(0.054)
Household size = 4	0.321***	(0.055)	0.331***	(0.066)	0.260***	(0.060)
Household size > 4	0.387***	(0.066)	0.389***	(0.077)	0.314***	(0.074)
College degree	-0.018**	(0.008)	-0.015*	(0.008)	-0.013**	(0.006)
Homeowner	0.049***	(0.013)	0.050***	(0.015)	0.036***	(0.014)
Age	0.001**	(0.001)	0.001**	(0.001)	0.001*	(0.000)
Female	-0.008	(0.007)	-0.006	(0.007)	-0.004	(0.006)
Constant	3.221***	(0.561)	3.359***	(0.756)	2.487***	(0.719)
Year Dummies	Yes		Yes		Yes	
Number of observations	4,655		4,655		4,655	
Number of instruments	167		57		128	
Arellano-Bond test for AR(1)	p=0.000		p=0.000		p=0.000	
Arellano-Bond test for AR(2)	p=0.703		p=0.698		p=0.632	
Hansen test of overid. restrictions	p=0.209		p=0.044		p=0.211	
Long-run price elasticity	-0.432**	(0.211)	-0.509	(0.334)	-0.377	(0.318)

Note: Standard errors clustered at the household level are in parentheses. * p < 0.1; ** p < 0.05; *** p < 0.01.

Table A12: GMM System Estimation Results for Dynamic Specification (7) based on a Sample that is Matched by Propensity Score Matching.

	Propensity Score Matching			
	Without Interaction Terms		With Interaction Terms	
	Coeff.	Std. Err.	Coeff.	Std. Err.
$\ln(eg_{t-1})$	0.614***	(0.084)	0.607***	(0.080)
$\widehat{\ln(p)}$	-0.315*	(0.185)	-0.251	(0.182)
\widehat{PV}	-0.088	(0.059)	-1.077	(1.768)
$\widehat{PV} \times \widehat{\ln(p)}$	–	–	0.343	(0.602)
ln(Income)	0.012	(0.013)	0.014	(0.012)
Household size = 2	0.196***	(0.042)	0.202***	(0.042)
Household size = 3	0.306***	(0.065)	0.315***	(0.064)
Household size = 4	0.335***	(0.071)	0.345***	(0.070)
Household size > 4	0.403***	(0.084)	0.409***	(0.080)
College degree	-0.018	(0.011)	-0.019	(0.012)
Homeowner	0.055***	(0.018)	0.055***	(0.017)
Age	0.001*	(0.001)	0.001*	(0.001)
Female	-0.010	(0.011)	-0.010	(0.011)
Constant	3.708***	(0.878)	–	–
Year Dummies	Yes		Yes	
Number of observations	4,488		4,488	
Number of instruments	50		55	
Arellano-Bond test for AR(1)	p=0.000		p=0.000	
Arellano-Bond test for AR(2)	p=0.575		p=0.549	
Hansen test of overid. restrictions	p=0.737		p= 0.730	
Long-run price elasticity	-0.815*	(0.487)	–	–

Note: Standard errors clustered at the household level are in parentheses. * p < 0.1; ** p < 0.05; *** p < 0.01.

Figure A2: Check for Common Support Assumption for Propensity Score Matching Results.

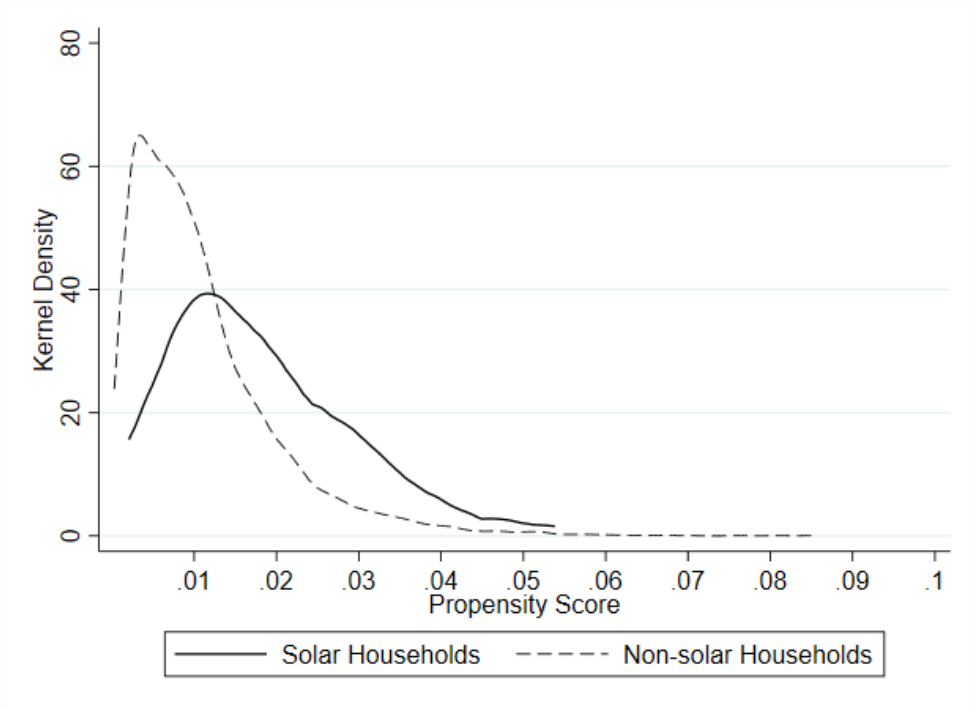


Table A13: Balancing Check for the Propensity Score Matching.

Variable		Means		%reduct.		t-test		Variance Ratio
		Solar	Non-solar	%bias	bias	t	p> t	V(T)/V(C)
\bar{p}	Unmatched	18.96	21.68	-66.1	–	-5.11	0.000	0.52*
	Matched	18.96	18.92	1.0	98.5	0.06	0.950	0.56*
\overline{Income}	Unmatched	3,209	2,797	37.0	–	3.10	0.002	0.79
	Matched	3,209	3,184	2.3	93.8	0.15	0.883	0.86
$\overline{Householdsize = 2}$	Unmatched	0.38	0.44	-13.0	–	-1.15	0.251	0.99
	Matched	0.38	0.39	-2.7	79.4	-0.17	0.865	1.01
$\overline{Householdsize = 3}$	Unmatched	0.20	0.16	9.1	–	0.84	0.399	1.22
	Matched	0.20	0.20	-0.9	90.4	-0.05	0.958	1.03
$\overline{Householdsize = 4}$	Unmatched	0.22	0.15	19.3	–	1.85	0.065	1.36
	Matched	0.22	0.21	1.0	94.6	0.06	0.951	0.99
$\overline{Householdsize > 4}$	Unmatched	0.12	0.05	26.2	–	2.89	0.004	2.17*
	Matched	0.12	0.11	4.6	82.5	0.25	0.804	1.05
$\overline{College}$	Unmatched	0.36	0.32	8.5	–	0.76	0.446	1.07
	Matched	0.36	0.35	0.6	92.9	0.04	0.970	1.00
$\overline{Homeowner}$	Unmatched	0.88	0.69	46.9	–	3.59	0.000	0.49*
	Matched	0.88	0.88	0.7	98.6	0.05	0.960	0.97
\overline{Age}	Unmatched	49.92	52.7	-21.9	–	-1.86	0.063	0.83
	Matched	49.92	50.1	-1.5	93.3	-0.09	0.925	0.88
\overline{Female}	Unmatched	0.23	0.33	-21.7	–	-1.83	0.068	–
	Matched	0.23	0.23	-0.7	96.6	-0.05	0.961	–

Note: %bias refers to the standardized percentage bias, which is the difference of the sample means of solar and non-solar households in percent for the matched and unmatched sub-samples as a percentage of the average standard deviation over both household groups (Rosenbaum and Rubin 1985). The achieved percentage bias reduction in absolute values is denoted by |bias|. * indicates if variance ratio lies outside the interval [0.64; 1.56].

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