ONLINE APPENDIX

The Electric Gini: Income Redistribution through Energy Prices

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A. First-Best: Individualized Prices and Access Fees

Consider an economy with n households, distinguished according to their income levels. Let w^i denote the income level of a household of i, $i = 1,...,n$. Household i derives utility $u\left(e^i, x^i\right)$ from consumption of x^i units of a numeraire good and e^i units of electricity, where $u_x > 0,\ u_e > 0,\ u_{xx} < 0,\ u_{ee} < 0,\ u_{xe} \geq 0,\ u_{xx}u_{ee} \geq u_{xe}^2$. The household's budget constraint is $x^i + p^i e^i = \hat{w}^i \equiv w^i - t^i$, where p^i is the price faced this household per unit of electricity and t^i is a fixed fee the household pays to have access to the electricity system. We allow the electricity and access fee to be personalized in order to study departures from the first-best when the regulator faces constraints that make it impossible to personalize the access fee and the electricity price.

Taking the access fee and the price of electricity as given, household i chooses the amount of electricity to consume in order to maximize $u\left(e^i, \hat{w}^i - p^i e^i\right)$. Assuming an interior solution, the first-order condition yields

$$\frac{u_e^i}{u_x^i} = p^i, \qquad i = 1,...,n, \tag{A1}$$

where $u_x^i \equiv \partial u\left(e^i, x^i\right)/\partial x^i$ and $u_e^i \equiv \partial u\left(e^i, x^i\right)/\partial e^i$. Let $e^i\left(p^i, \hat{w}^i\right)$ and $x^i\left(p^i, \hat{w}^i\right) = \hat{w}^i - p^i e^i\left(p^i, \hat{w}^i\right)$ denote the quantities demanded of electricity and numeraire good, respectively. Household i's indirect utility function is

$$v\left(p^i, \hat{w}^i\right) = u\left(x^i\left(p^i, \hat{w}^i\right), e^i\left(p^i, \hat{w}^i\right)\right), \qquad i = 1,...,n. \tag{A2}$$

The electricity supplier can produce E units of output at the total cost $F + cE$, where $F > 0$ is the fixed cost and $c > 0$ is the per unit cost. In any equilibrium, $E = \sum_{i=1}^{n} e^i\left(p^i, \hat{w}^i\right)$, since the quantity supplied must be equal to the quantity demanded.

Electricity supply is regulated. The regulator chooses $\left\{p^1,...,p^n,t^1,...,t^n\right\}$ to maximize $\sum_{i=1}^{n} v\left(p^i, w^i - t^i\right)$ subject to the following feasibility constraint:

$$\sum_{i=1}^{n}\left[t^i + \left(p^i - c\right)e^i\left(p^i, w^i - t^i\right)\right] = F \tag{A3}$$

Letting λ denote the multiplier associated with constraint (A3), the first-order conditions are equation (A3) and the following, for $j = 1,...,n$:

$$-v_p^j = \lambda\left(e^j + \left(p^j - c\right)e_p^j\right) \quad \text{(with respect to } p^j\text{) and} \tag{A4}$$

$$v_{\hat{w}}^j = \lambda\left(1 - \left(p^j - c\right)e_{\hat{w}}^j\right) \quad \text{(with respect to } t^j\text{),} \tag{A5}$$

where $v_p^j \equiv \partial v\left(p^j, \hat{w}^j\right) / \partial p^j$, $v_{\hat{w}}^j \equiv \partial v\left(p^j, \hat{w}^j\right) / \partial \hat{w}^j$, $e_p^j \equiv \partial e^j\left(p^j, \hat{w}^j\right) / \partial p^j$ and $e_{\hat{w}}^j \equiv \partial e^j\left(p^j, \hat{w}^j\right) / \partial \hat{w}^j$.

Combining equations (A4) and (A5) in order to eliminate the multiplier yields, for $j = 1,...,n$

$$-\frac{v_p^j}{v_{\hat{w}}^j} = \frac{e^j + \left(p^j - c\right)e_p^j}{1 - \left(p^j - c\right)e_{\hat{w}}^j} > 0 \tag{A6}$$

Roy's identity ($-v_p^j / v_{\hat{w}}^j = e^j$) means that the left side of equation (A6) equals e^j, $\forall j$. That in turn means that

$$\left(p^j - c\right)\left[e^j e_{\hat{w}}^j + e_p^j\right] = 0. \tag{A7}$$

By the Slutsky equation, the term in square brackets in (A7) is the derivative of the Hicksian electricity demand function, which is strictly negative for any well-behaved preferences: $h_p^j \equiv \partial h^j\left(p^j, u^j\right) / \partial p^j < 0$. So

$$\left(p^j - c\right)h_p^j = 0 \Rightarrow p^j - c = 0. \tag{A8}$$

Every household is charged the same price, $p^j = c$.

Since $v_w^j = u_x^j$, $\forall j$, equations (A5) and (A8) imply

$$u_x^j = u_x^i, \qquad \forall i, j = 1,...,n, \ i \neq j. \tag{A9}$$

Since $p^j = c$, $\forall j$, equations (A1) imply

$$u_e^j = u_e^i, \qquad \forall i, j = 1,...,n, \ i \neq j. \tag{A10}$$

Equations (A9) and (A10) hold simultaneously if and only if, for $\forall i, j = 1,...,n, \ i \neq j$:

$$e^i = e^j \,, \tag{A11}$$

$$x^i = x^j \,. \tag{A12}$$

Now, note that equations (A11) and (A12) imply

$$\hat{w}^i \equiv w^i - t^i = w^j - t^j \equiv \hat{w}^j \,, \quad \forall i,\, j = 1,...,n,\ i \neq j \,. \tag{A13}$$

If $w^i = w^j$, $\forall i,\, j = 1,...,n,\ i \neq j$, then equations (A13) imply $t^i = t^j = t$. In this case, $t = F/n$ according to (A3).

B. Uniform Access Fees and Individualized Prices

Consider the case where the regulator can set individual prices, p^i, but cannot set individualized access fees: $t^i = t$ for all i. The regulator chooses $\{p^i,\ldots,p^n,t\}$ to maximize $\sum_i v(p^i, w^i - t)$ subject to

$$nt + \sum_i (p^i - c) e^i (p^i, w^i - t) = F \,. \tag{B1}$$

Letting λ denote the multiplier associated with constraint (B1), and assuming an interior solution ($t > 0$ and $p^j > 0$), the first-order conditions are (A4) and

$$\sum_i v^i_{\hat{w}} = \lambda \left(n - \sum_i \left(p^i - c \right) e^i_{\hat{w}} \right). \tag{B2}$$

Since $\lambda > 0$ and $\sum_i v^i_{\hat{w}} > 0$, $n - \sum_i \left(p^i - c \right) e^i_{\hat{w}} > 0$. Combining conditions (A4) and (B2) yields

$$\sum_i v^i_{\hat{w}} = -\left(\frac{v^j_p}{e^j + \left(p^i - c \right) e^j_p} \right) \left(n - \sum_i \left(p^i - c \right) e^i_{\hat{w}} \right), \qquad \forall j \,. \tag{B3}$$

Using Roy's identity, $-v^j_p = e^j v^j_{\hat{w}}$, and cross-multiplying by $\left(e^j + \left(p^j - c \right) e^j_p \right) / e^j$, equations (B3) then imply

$$L^j \equiv \frac{p^j - c}{p^j} = -\frac{1}{\varepsilon^j_p} \left[1 - \frac{v^j_{\hat{w}} \left(n - \sum_i \left(p_i - c \right) e^i_{\hat{w}} \right)}{\sum_i v^i_{\hat{w}}} \right], \qquad \forall j \tag{B4}$$

which is equation (12) in the main body of the paper.

C. Solar Roofs and Other Electricity Endowments

To capture non-income heterogeneity, we assume household *i* is endowed with $\tilde{e}^i$ units of electricity. Household *i*'s budget constraint is then $x^i + p^i\left(e^i - \tilde{e}^i\right) = w^i - t$. Define $\tilde{w}^i$ as the household's exogenous income, including the value of its electricity endowment and net of access fees: $\tilde{w}^i \equiv w^i + p^i\tilde{e}^i - t$. Household *i*''s electricity demand is $e^i\left(p^i, \tilde{w}^i\right)$ and indirect utility is $v^i\left(p^i, \tilde{w}^i\right)$. The regulator chooses $\{p^1,\ldots,p^n,t\}$ to maximize $\sum_i v^i\left(p^i, \tilde{w}^i\right)$, subject to

$$nt + \sum_i (p^i - c)e^i\left(p^i, \tilde{w}^i\right) = F \,. \tag{C1}$$

Letting λ denote the Lagrange multiplier associated with constraint (C1), the first-order conditions of the regulators problems are

$$v_p^j + v_{\tilde{w}}^j\tilde{e}^j + \lambda\left[e^j + \left(p^j - c\right)\left(e_p^j + e_{\tilde{w}}^j\tilde{e}^j\right)\right] = 0 \quad \forall j \qquad \text{(with respect to } p^j\text{) and} \tag{C2}$$

$$-\sum_i v_{\tilde{w}}^i + \lambda\left[n - \sum_i\left(p^i - c\right)e_{\tilde{w}}^i\right] = 0 \qquad \text{(with respect to } t\text{).} \tag{C3}$$

Applying Roy's identity ($-v_p^j = v_{\tilde{w}}^j e^j$), equation (C2) becomes

$$v_{\tilde{w}}^j\left(e^j - \tilde{e}^j\right) = \lambda\left[e^j + \left(p^j - c\right)\left(e_p^j + e_{\tilde{w}}^j\tilde{e}^j\right)\right] \quad \forall j \,. \tag{C4}$$

Combining equations (C3) and (C4) yields

$$\sum v_w^i = \frac{v_{\tilde{w}}^j\left(e^j - \tilde{e}^j\right)}{\left(e^j + \left(p^j - c\right)\left(e_p^j + e_{\tilde{w}}^j\tilde{e}^j\right)\right)}\left[n - \sum_i\left(p^i - c\right)e_{\tilde{w}}^i\right], \qquad \forall j \,, \tag{C5}$$

which can be rewritten as

$$L^j \equiv \frac{p^j - c}{p^j} = \frac{-1}{\left(\varepsilon_p^j + \frac{\tilde{e}^j}{e^j}p^j e_{\tilde{w}}^j\right)}\left[1 - \left(\frac{v_{\tilde{w}}^j}{\sum_i v_{\tilde{w}}^i}\right)\left(\frac{e^j - \tilde{e}^j}{e^j}\right)\left(n - \sum_i\left(p^i - c\right)e_{\tilde{w}}^i\right)\right], \qquad \forall j \,. \tag{C6}$$

This is equation (14) in the main paper. L^j is the Lerner index of monopoly power with respect to household *j*, and ε_p^j is household *j*'s price elasticity of electricity demand: $\left(\partial e^j/\partial p^j\right)\left(p/e\right)<0$.

The Slutsky equation in this context says that compensated electricity demand, $h_p^j = e_p^j + e_{\tilde{w}}^j e^j < 0$. Multiplying the right side of that that expression by p^j/e^j yields the expression $\varepsilon_p^j + p^j e_{\tilde{w}}^j$. We know that is negative, from Slutsky, so multiplying the second term by $\tilde{e}^j/e^j < 1$ to get the denominator in (C6) tells us that denominator is negative, since $\tilde{e}^j < e^j$ by assumption.

D. Increasing Block Pricing

To simplify, we assume that the access fee is t=0, and that an exogenous rule determines the number of households facing each of two price tiers: n_L low-using customers face price p_L for each kWh of electricity up to threshold quantity *q*, and n_H high-using customers face price p_H for each kWh above *q*. The budget constraint for the low types is

$$x^i + p_L\left(e^i - \tilde{e}^i\right) = w^i \quad , \tag{D1}$$

and the budget constraint for the high types is

$$x^i + p_L q + p_H\left(e^i - \tilde{e}^i - q\right) = w^i \quad . \tag{D2}$$

As before, define $\tilde{w}_L^i \equiv w^i + p_L\tilde{e}$ and $\tilde{w}_H^i \equiv w^i + p_H\tilde{e} + \left(p_H - p_L\right)q$. The higher-users' problem is equivalent to paying a fixed fee $p_L q$ and per-kWh price $p_H\left(e^i - \tilde{e}^i - q\right)$.

The regulator chooses the two prices and the threshold, $\left\{p_L, p_H, q\right\}$, to maximize

$$\sum_{i\in L} v^i\left(p_L, \tilde{w}_L^i\right) + \sum_{i\in H} v^i\left(p_H, \tilde{w}_H^i\right) \quad , \tag{D3}$$

subject to the zero profit constraint that

$$\left(p_L - c\right)\left[n_H q + \sum_{i\in L} e^i\left(p_L, \tilde{w}_L^i\right)\right] + \left(p_H - c\right)\left[\sum_{i\in H} e^i\left(p_H, \tilde{w}_H^i\right)\right] = F \quad . \tag{D4}$$

Letting λ be the constraint on (D4), and using Roy's identity to rewrite v_p^i as $-e^i v_{\tilde{w}}^i$, the three first-order conditions are

$$-\sum_{i\in H} v_{\tilde{w}}^i \left(e^i - \tilde{e}^i - q\right) + \lambda \sum_{i\in H}\left(e^i + \left(p_H - c\right)\left(e_p^i + e_{\tilde{w}}^i\left(\tilde{e}^i - q\right)\right)\right) = 0 \qquad \text{(with respect to } p_H\text{)}, \tag{D5}$$

$$-\sum_{i\in L} v_{\tilde{w}}^i \left(e^i - \tilde{e}^i\right) - q\sum_{i\in H} v_{\tilde{w}}^i + \lambda\left[n_H q + \sum_{i\in L}\left(e^i + \left(p_L - c\right)\left(e_p^i + e_{\tilde{w}}^i \tilde{e}^i\right)\right) - \left(p_H - c\right) q \sum_{i\in H} e_{\tilde{w}}^i\right] = 0 \tag{D6}$$

(with respect to p_L), and

$$\left(p_H - p_L\right)\sum_{i\in H} v_{\tilde{w}}^i + \lambda\left[n_H\left(p_L - c\right) + \left(p_H - c\right)\left(p_H - p_L\right)\sum_{i\in H} e_{\tilde{w}}^i\right] = 0 \qquad \text{(with respect to } q\text{)}. \tag{D7}$$

Consider equation (D7). The first term is positive, so the bracketed term that multiplies λ must be negative. So either $p_L < c$ or $\left(p_H - c\right)\left(p_H - p_L\right) < 0$. Since $p_H > p_L$ by assumption, and since equation (D4) must hold, it must be the case that that $p_H > c > p_L$. That is intuitive. Customers using less than *q* will pay below marginal cost, $p_L < c$, and customers using more than *q* will pay above marginal cost $p_H > c$ for all electricity above *q*.

Combining equations (D5) and (D7) yields

$$\frac{-\left(p_L - c\right)}{p_L} = \left(\frac{p_H - p_L}{p_L}\right)\times \left[\frac{\left(p_H - c\right)\sum_{i\in H} e_{\tilde{w}}^i \sum_{i\in H} v_{\tilde{w}}^i\left(e^i - \tilde{e}^i - q\right) + \sum_{i\in H} v_{\tilde{w}}^i\left(\sum_{i\in H} e_{\tilde{w}}^i + \left(p_H - c\right)\sum_{i\in H}\left(e_p^i + e_{\tilde{w}}^i\left(\tilde{e}^i + q\right)\right)\right)}{n_H \sum_{i\in H} v_{\tilde{w}}^i\left(e^i - \tilde{e}^i - q\right)}\right] = 0. \tag{D8}$$

Intuitively, the rate at which low-demand customers are subsidized is proportional to the size of the gap between the high and low prices. Lowering p_L requires raising p_H.

Combining equations (D5) and (D6) yields

$$\frac{\sum_{i\in H} v_{\tilde{w}}^{i}\left(e^{i}-\tilde{e}^{i}-q\right)}{\sum_{i\in L} v_{\tilde{w}}^{i}\left(e^{i}-\tilde{e}^{i}\right)+q\sum_{i\in H} v_{\tilde{w}}^{i}}=\frac{E^{H}+\left(p_{H}-c\right)\sum_{i\in H}\left(e_{p}^{i}+e_{\tilde{w}}^{i}\left(\tilde{e}^{i}+q\right)\right)}{E^{L}+\left(p_{L}-c\right)\sum_{i\in L}\left(e_{p}^{i}+e_{\tilde{w}}^{i}\tilde{e}^{i}\right)+n_{H}q-\left(p_{H}-c\right)q\sum_{i\in H} e_{\tilde{w}}^{i}}, \tag{D9}$$

where $E^{H}=\sum_{i\in H} e^{i}$ and $E^{L}=\sum_{i\in L} e^{i}$. The left side of (D9) is the rate at which p_L can be lowered and p_H can be raised, holding total *utility* constant. It is the marginal social rate of substitution between the high and low electricity prices. The right side of (D9) is the rate at which p_L can be lowered and p_H raised, holding total *revenue* constant. It is the marginal social rate of transformation between high and low electricity prices.

E. Appendix Tables

Appendix Table E1: Sample creation

Step	Data process	Utilities	Rates
1	Import data from Utility_Rate_Database	3,227	50,506
2	Keep only residential rates	2,650	10,658
3	Drop net metering and "buy-all-sell-all" rates	2,537	8,891
4	Drop time-of-use rates	2,525	7,638
5	Drop special rates such as: 3-phase wiring, negative rates, demand-side management, unbundled, wholesale, swimming pool, employee, peak and off-peak, water heating, commercial, home business, agribusiness, senior citizen, dual fuel, heat-pump, multi-family, master-metered, medical, means-tested, public housing, government, irrigation, high-demand, vacation home, all-electric, renewable, photovoltaic, storage, conservation, interruptible, prepaid, energy star, mobile home park, electric vehicle	2,298	4,436
6	Keep only most recent rates (exclude updated rates updated)	2,298	3,083
7	Keep only utilities in EIA form 861, 2015	1,337	1,910
8	Average across subregions. Examples: urban/rural, PG&E regions, Alaska villages.	1,337	1.337
9	Match zip codes served with county data from American Community Survey	1,.328	1,328
10	Drop if missing covariates—final sample	1,308	1,308

Appendix Table E2: Winter Electric Gini and Local Population Characteristics

Dep var: Winter Electric Gini			**Regressions**			
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Household income	0.347			0.163	0.184	0.361
Gini 2015	(0.161)			(0.132)	(0.172)	(0.172)
Share below		-0.105				
poverty line		(0.044)				
Average income			0.008	0.001	0.001	0.002
($10,000)			(0.002)	(0.002)	(0.002)	(0.002)
State tax/transfer				-0.375	-0.330	-0.833
effect on Gini				(0.835)	(0.767)	(0.552)
Democratic vote				0.037	0.042	-0.030
share				(0.032)	(0.033)	(0.022)
Fraction of sales				-0.030	-0.029	-0.051
residential				(0.016)	(0.015)	(0.016)
Res. customers				0.001	0.000	-0.001
(mill.)				(0.004)	(0.004)	(0.003)
Average electricity				0.269	0.274	0.218
price ($/kWh)				(0.061)	(0.078)	(0.077)
Investor owned				0.011	0.014	0.011
utility				(0.016)	(0.018)	(0.011)
Cooperative				-0.009	-0.009	-0.004
				(0.015)	(0.014)	(0.013)
Has a means					-0.008	-0.008
tested rate					(0.012)	(0.008)
Noncompliance					0.000	0.000
with NAAQS					(0.000)	(0.000)
Correlation					-0.044	0.008
(income, elect)					(0.044)	(0.035)
Share electricity						0.014
from gas						(0.013)
Share electricity						0.036
from nuclear						(0.014)
Share electricity						0.045
from hydro						(0.021)
Share electricity						0.594
from petroleum						(0.195)
NERC region dummies (10)						yes
Constant	0.152	0.327	0.248	0.162	0.169	
	(0.071)	(0.010)	(0.017)	(0.105)	(0.113)	
N	1,308	1,308	1,308	1,308	1,308	1,308
R2	0.03	0.02	0.10	0.27	0.28	0.47

Notes: See Table 3 for means and standard deviations of all variables. All regressions weighted by the number of ratepayers. Standard errors (in parentheses) clustered by state.

Appendix Table E3: Unweighted Summer Gini and Local Population Characteristics

Dep var: Summer Electric Gini			**Regressions**			
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Household income	0.172			0.183	0.157	0.053
Gini 2015	(0.065)			(0.052)	(0.044)	(0.040)
Share below		-0.010				
poverty line		(0.021)				
Average income			0.005	0.002	-0.000	0.000
($10,000)			(0.002)	(0.001)	(0.001)	(0.001)
State tax/transfer				-0.896	-0.838	-1.149
effect on Gini				(0.411)	(0.281)	(0.254)
Democratic vote				0.014	0.010	0.012
share				(0.011)	(0.011)	(0.011)
Fraction of sales				-0.023	-0.023	-0.023
residential				(0.006)	(0.006)	(0.005)
Res. customers				0.008	0.006	0.003
(mill.)				(0.006)	(0.006)	(0.006)
Average electricity				0.173	0.146	0.106
price ($/kWh)				(0.048)	(0.036)	(0.042)
Investor owned				0.002	0.002	0.004
utility				(0.004)	(0.003)	(0.004)
Cooperative				-0.029	-0.028	-0.027
				(0.003)	(0.003)	(0.003)
Has a means					0.003	0.003
tested rate					(0.004)	(0.003)
Noncompliance					0.001	0.001
with NAAQS					(0.000)	(0.000)
Correlation					0.001	-0.029
(income, elect)					(0.019)	(0.023)
Share electricity						0.028
from gas						(0.010)
Share electricity						0.015
from nuclear						(0.011)
Share electricity						-0.016
from hydro						(0.010)
Share electricity						0.140
from petroleum						(0.141)
NERC region dummies (10)						yes
Constant	0.224	0.302	0.267	0.147	0.176	
	(0.028)	(0.005)	(0.009)	(0.046)	(0.029)	
N	1,308	1,308	1,308	1,308	1,308	1,308
R2	0.02	0.00	0.05	0.39	0.41	0.45

Notes: See Table 3 for means and standard deviations of all variables. Standard errors (in parentheses) clustered by state.

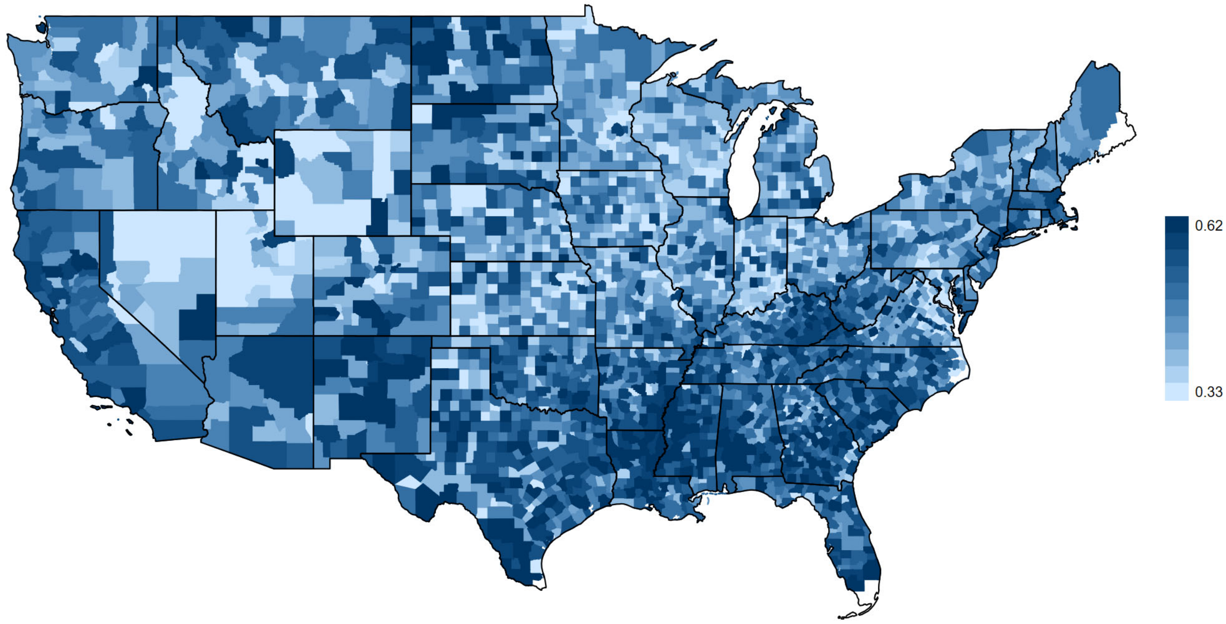
Appendix Table E4: Unweighted Winter Electric Gini and Local Population Characteristics

Dep var: Winter Electric Gini	**Regressions**					
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Household income Gini 2015	0.135			0.109	0.085	0.001
	(0.074)			(0.059)	(0.049)	(0.048)
Share below poverty line		-0.011				
		(0.021)				
Average income (\$10,000)			0.005	0.001	-0.001	-0.000
			(0.002)	(0.001)	(0.001)	(0.001)
State tax/transfer effect on Gini				-0.550	-0.522	-1.078
				(0.506)	(0.407)	(0.340)
Democratic vote share				0.037	0.034	0.024
				(0.018)	(0.017)	(0.018)
Fraction of sales residential				-0.021	-0.021	-0.020
				(0.007)	(0.007)	(0.006)
Res. customers (mill.)				0.001	-0.001	-0.003
				(0.004)	(0.004)	(0.004)
Average electricity price (\$/kWh)				0.176	0.148	0.101
				(0.065)	(0.050)	(0.056)
Investor-owned utility				0.002	0.000	0.001
				(0.006)	(0.006)	(0.006)
Cooperative utility				-0.026	-0.025	-0.026
				(0.004)	(0.004)	(0.004)
Has a means-tested rate					0.005	0.003
					(0.006)	(0.005)
Noncompliance with NAAQS					0.001	0.000
					(0.000)	(0.000)
Correlation (income, elect)					0.015	0.004
					(0.016)	(0.023)
Share electricity from gas						0.025
						(0.011)
Share electricity from nuclear						0.010
						(0.014)
Share electricity from hydro						-0.004
						(0.012)
Share electricity from petroleum						0.272
						(0.162)
NERC region dummies (10)						yes
Constant	0.235	0.297	0.264	0.190	0.210	
	(0.032)	(0.006)	(0.011)	(0.056)	(0.036)	
N	1,308	1,308	1,308	1,308	1,308	1,308
R2	0.01	0.00	0.04	0.30	0.32	0.36

Notes: See Table 3 for means and standard deviations of all variables. Standard errors (in parentheses) clustered by state.

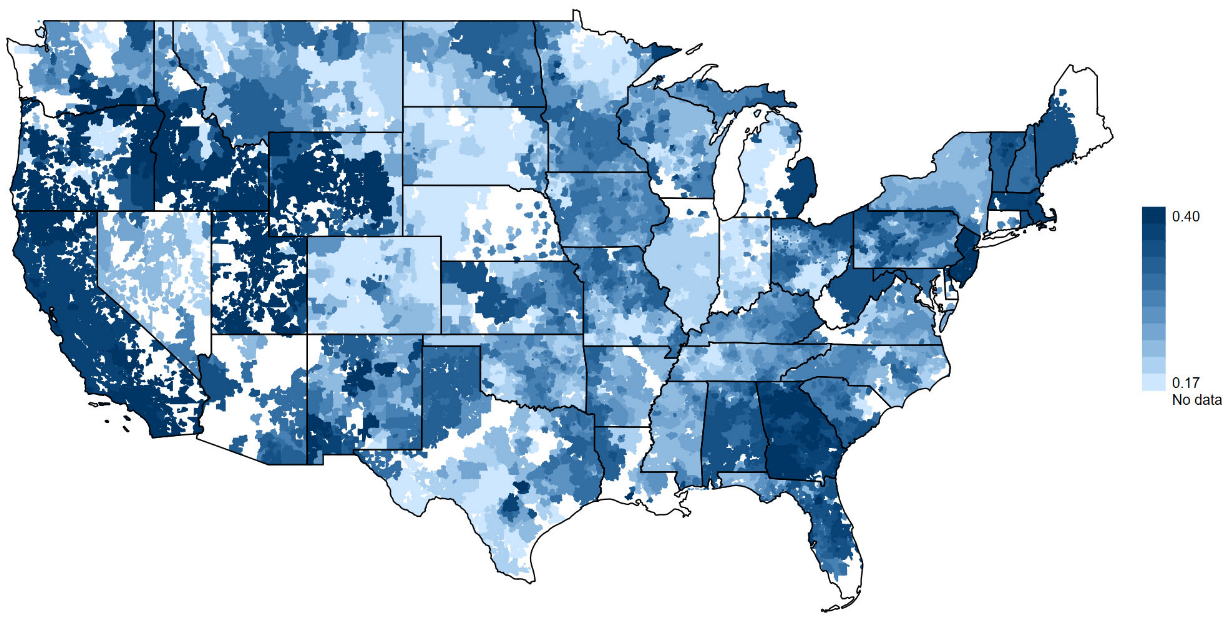
F. Appendix Figures

Appendix Figure F1: Gini Coefficients for 2015 Household Incomes, by US County.



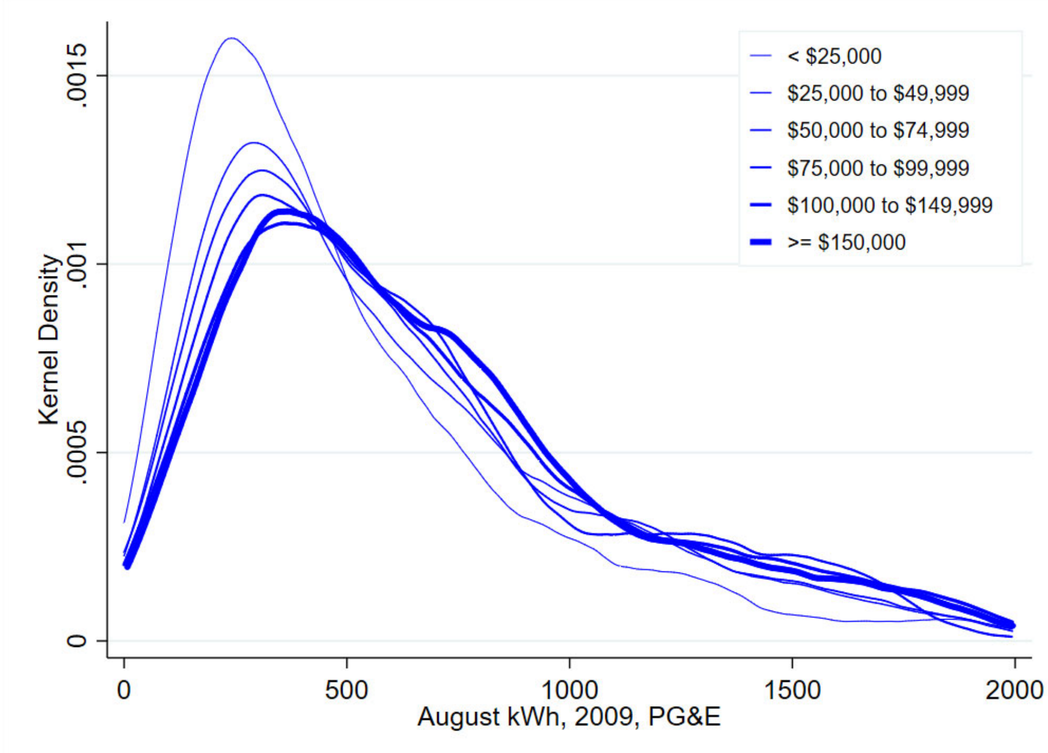
Source: American Community Survey, 2015.

Appendix Figure F2: Electric Ginis, by Utility Service Area



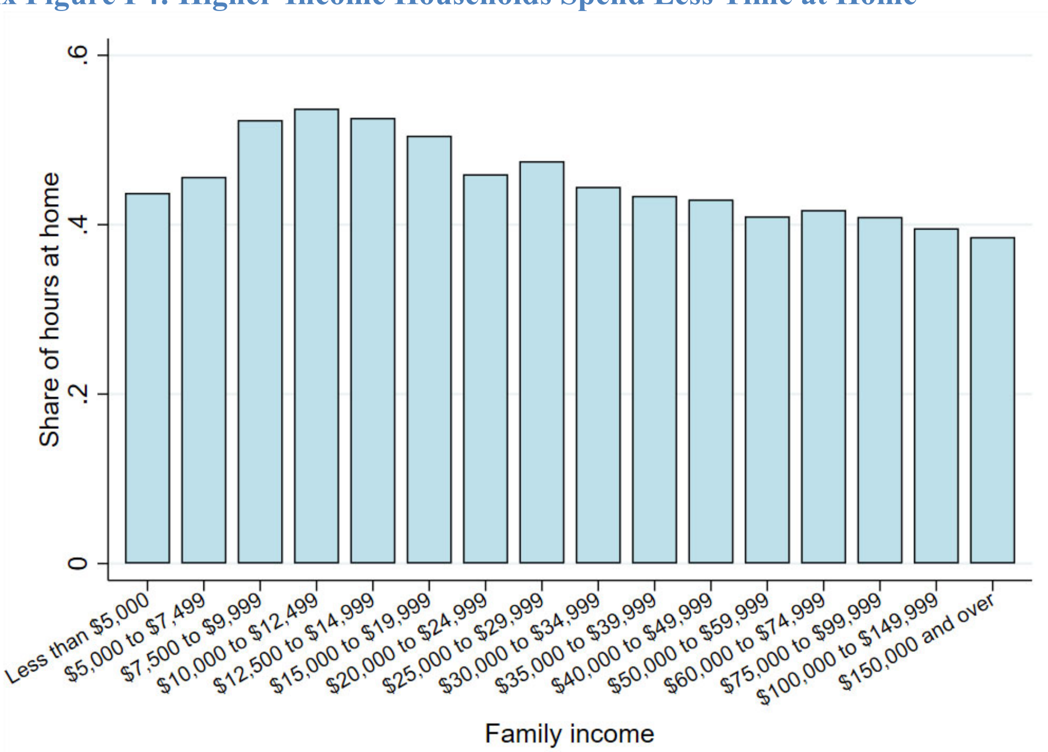
Source: Authors' calculations from Utility Rate Database, summer electricity prices.

Appendix Figure F3: Distributions of PG&E August Electricity Use by Household Income



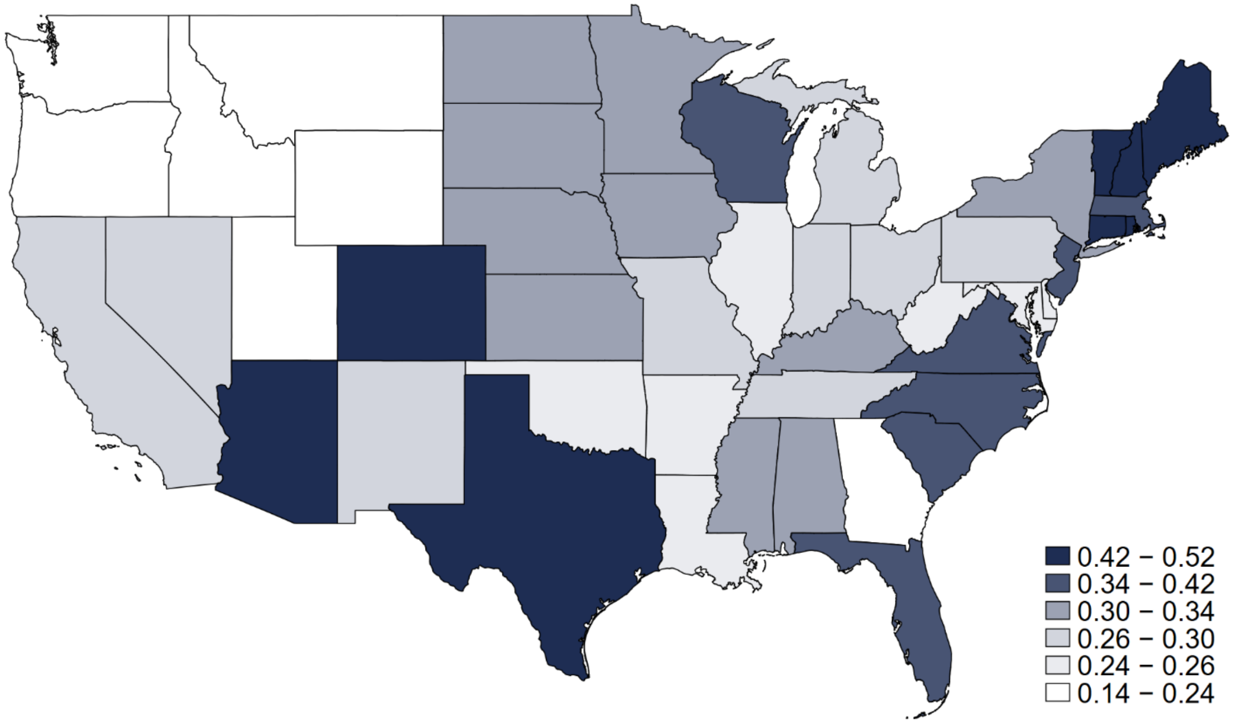
Source: Calculations from 2009 Residential Appliance Saturation Survey (Levinson, 2016).

Appendix Figure F4: Higher-Income Households Spend Less Time at Home



Source: Calculations from 2017 American Time Use Survey. (Bureau of Labor Statistics, 2017)

Appendix Figure F5: Correlation between Income and Electricity Use



Source: Calculations from 2009 Residential Energy Consumption Survey (Levinson, 2016).

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Bureau of Labor Statistics. 2017. "American Time Use Survey – 2017 Microdata Files." United States Department of Labor. https://www.bls.gov/tus/ accessed February 2019.

Levinson, Arik. 2016. Replication data for: How Much Energy Do Building Energy Codes Save? Evidence from California Houses. Nashville, TN: American Economic Association [publisher], 2016. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2019-10-12. https://doi.org/10.3886/E113037V1