

Income-targeted Marketing as a Supply-side Barrier to Low-income Solar Adoption

Eric O'Shaughnessy, Galen Barbose, Ryan Wiser, Sydney Forrester

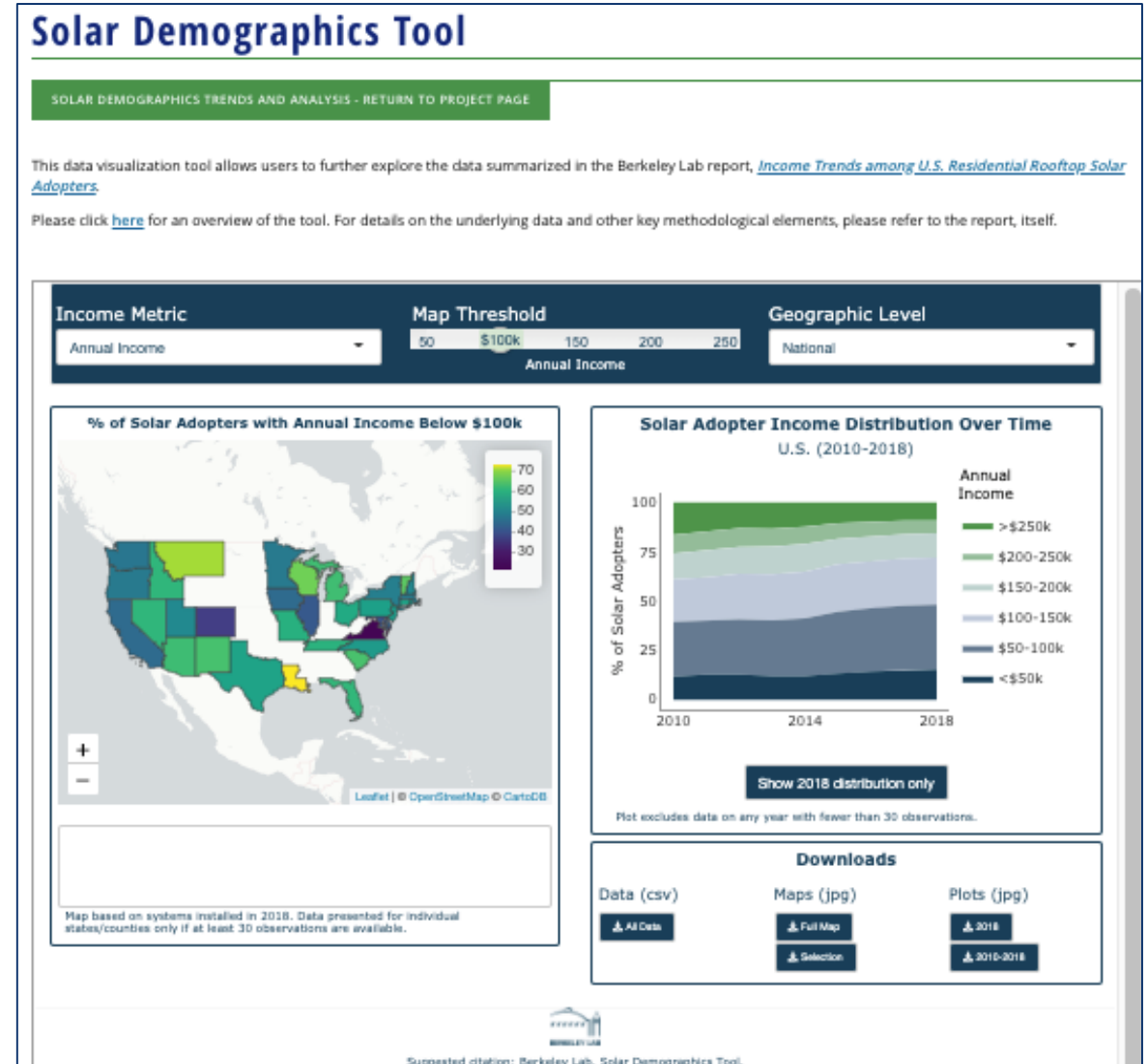
Presentation based on paper published in *iScience* of the same title

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LBL Solar Demographics Tracking

- This presentation is part of a broader Lawrence Berkeley National Laboratory effort to collect and analyze rooftop solar adopter demographic data.
- Additional resources, including an interactive tool and data, are available at: <https://emp.lbl.gov/projects/solar-demographics-trends-and-analysis>



Summary

- Low- and moderate-income (LMI) households are significantly less likely to adopt solar photovoltaics (PV) than higher-income households.
- PV adoption inequity is often attributed to demand-side barriers, but supply-side factors could also play a role.
- We analyze a quote data set to explore the marketing patterns of PV installers with respect to area income levels.

Key findings:

Households in LMI areas tend to receive fewer quotes than households in more affluent areas.

LMI households are less likely to close deals, in part because they receive fewer quotes.

Background

- Over 2 million households have adopted rooftop solar in the United States
- These households come from a variety of demographic backgrounds, but generally skew toward higher income levels
- Adoption inequity is common in other industries, particularly for emerging technologies, but policy could help accelerate a transition toward more equitable adoption

Solar-Adopter Incomes Skew High

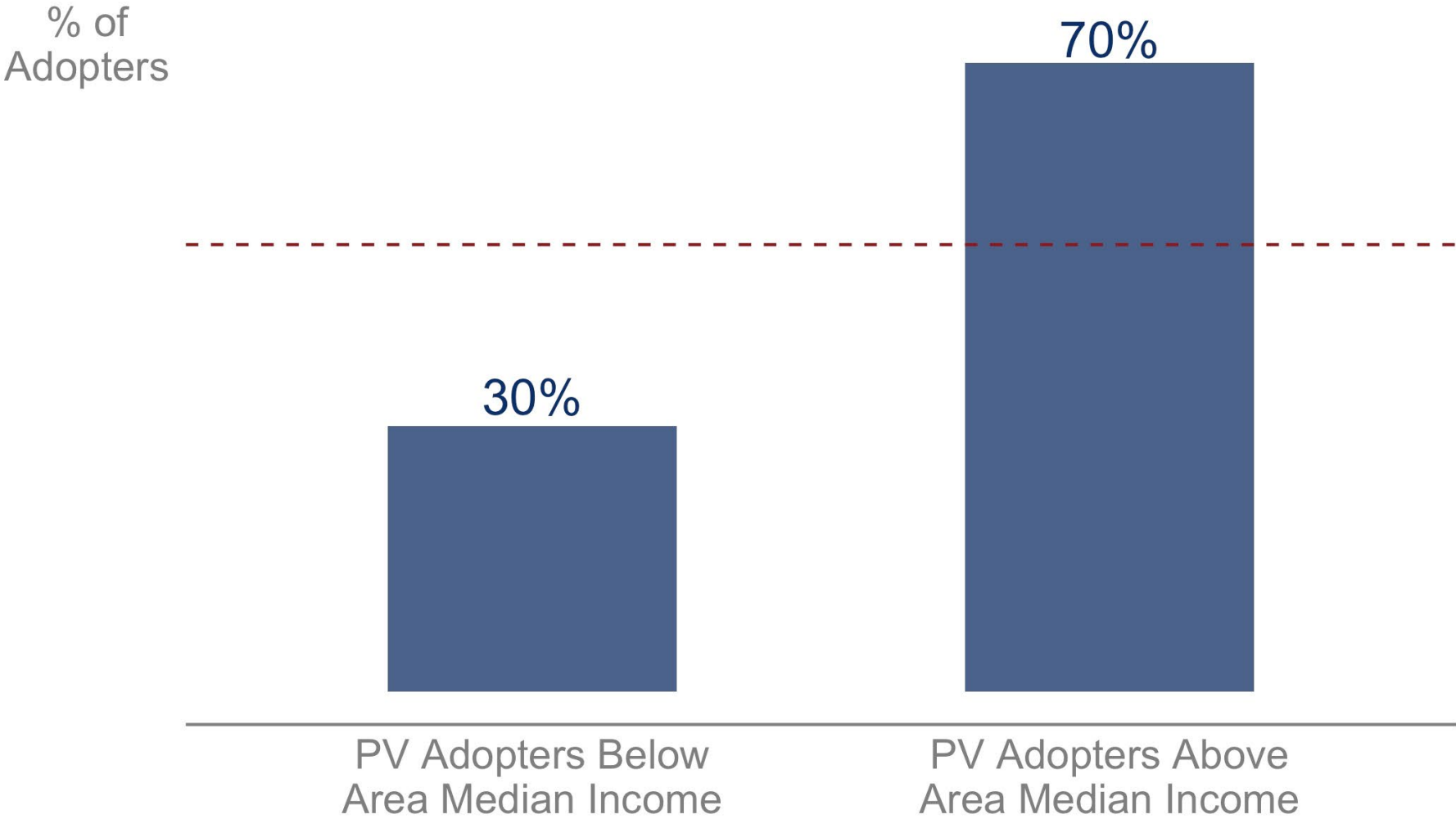


Figure based on data from Barbose et al. (2021)

Solar Adoption is Becoming More Equitable Over Time

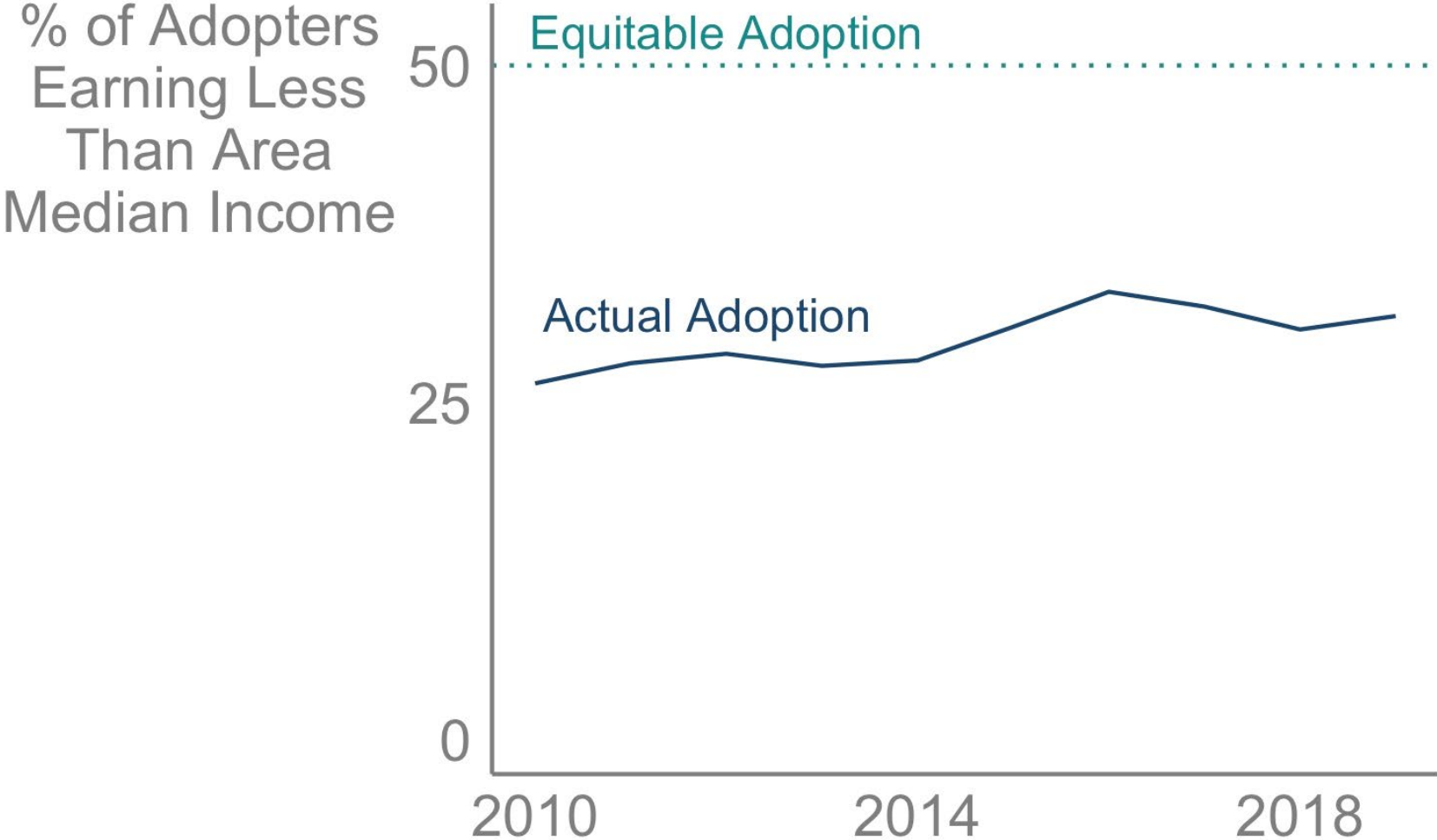


Figure based on data from Barbose et al. (2021)

What Explains Solar-Adopter Income Patterns?

Structural inequality

Income inequality, income segregation

Demand-side barriers

e.g., cash constraints, home ownership,
language barriers

Technology diffusion

A temporary phase of inequitable
adoption is common for emerging
technologies

Supply-side barriers?

Focus of this study: Supply-side barriers

Structural inequality

Income inequality, income segregation

Demand-side barriers

e.g., cash constraints, home ownership,
language barriers

Technology diffusion

A temporary phase of inequitable adoption is common for emerging technologies

Supply-side barriers

Income-targeted marketing

Potential Drivers of Income-Targeted Marketing

Business Siting

Installers tend to locate in affluent areas

LMI = Lower Margins

Installers may perceive that LMI customers equate to lower margins

LMI = Lower Close Rates

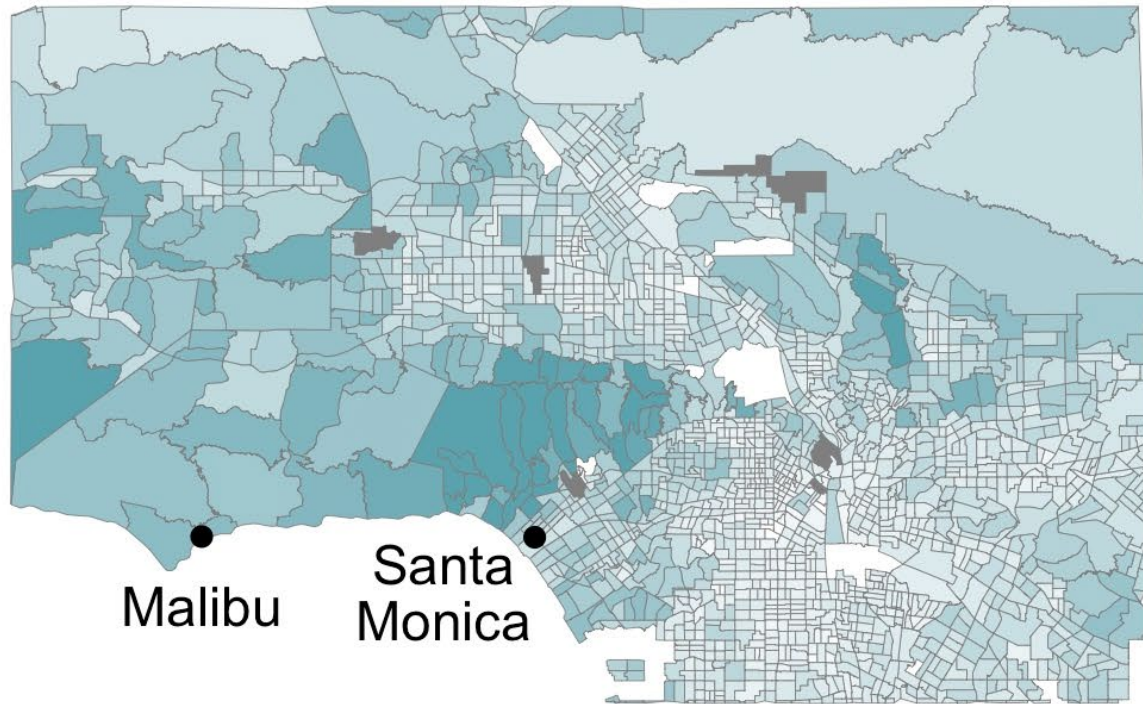
Installers may perceive that LMI customers are less likely to close deals

LMI = Cancellation Risk

Installers may perceive that LMI customers are more likely to cancel

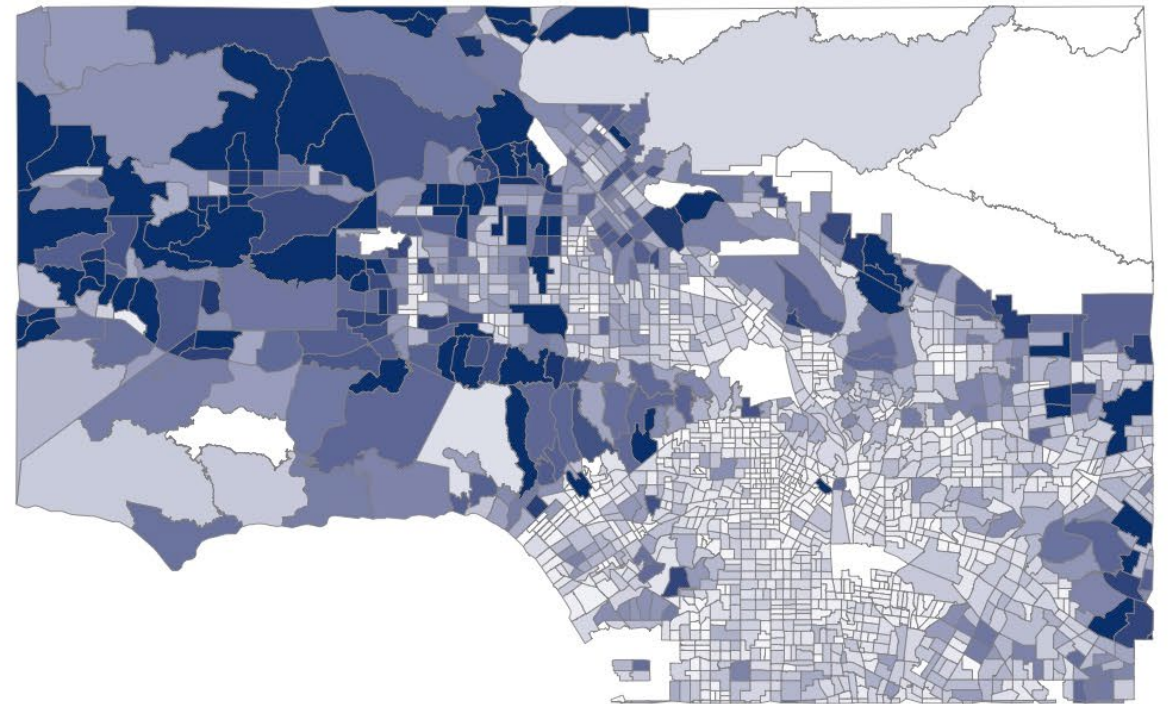
How?

Median Household Income



<10k \$100k >\$200k

PV Adoption Per 1,000 Households



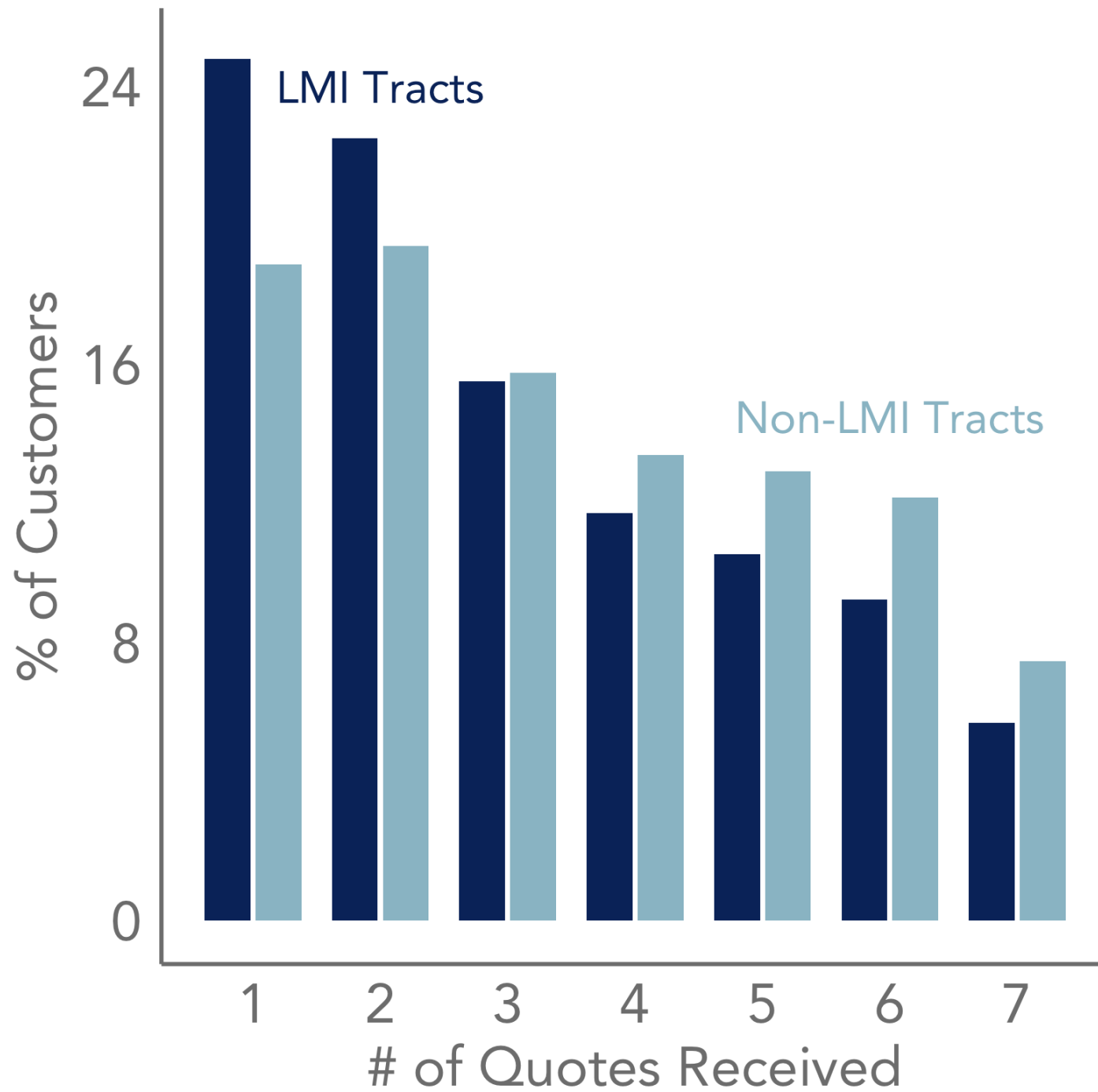
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The Study

- Quote data from EnergySage (663,740 quotes submitted to 192,970 customers)
- Installers don't know customer's income but can infer it based on the customer's address (at least in income-segregated areas)
- We use the Census Tract to proxy the installer's perception of the customer's income, then study installer quote behavior according to Tract income levels

Quote
Dev.





Regression Results

	(1) No controls	(2) Controls (except notified installers)	(3) Controls with notified installers
LMI tract	-0.34*	-0.27*	-0.20*
Area income delta		0.001	-0.0005
Interaction: LMI x delta		0.05*	0.03*
Notified installers			0.14*

Customers in LMI tracts receive about

0.34

fewer quotes than customers in other tracts, on average

Customers in LMI tracts receive about
0.27

fewer quotes than customers in other tracts, on average, when controlling for other factors.

Customers in LMI tracts receive about 0.05 additional quotes for each \$10,000 increase in the median incomes of surrounding tracts.

Customers in LMI tracts receive about

0.2

fewer quotes than customers in other tracts, on average when controlling for the number of notified installers

Drivers of Income-Targeted Marketing

Business Siting

Installers tend to locate in affluent areas

LMI = Lower Margins

Installers may perceive that LMI customers equate to lower margins

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Business Siting

Installers tend to locate in affluent areas

% of
Installers

3

2

1

0

100

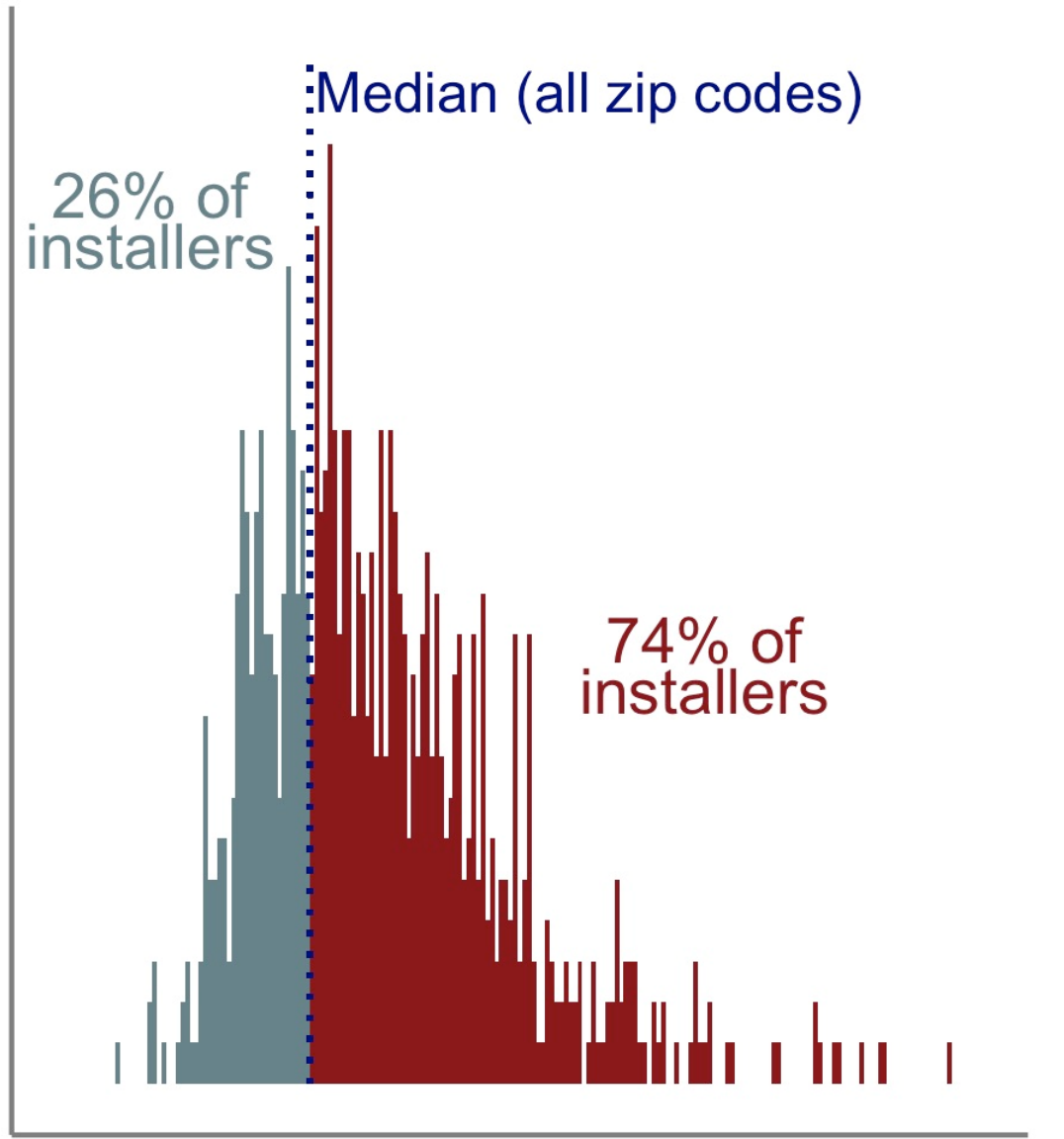
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Median Income of Headquarter
Zip Code

26% of
installers

Median (all zip codes)

74% of
installers



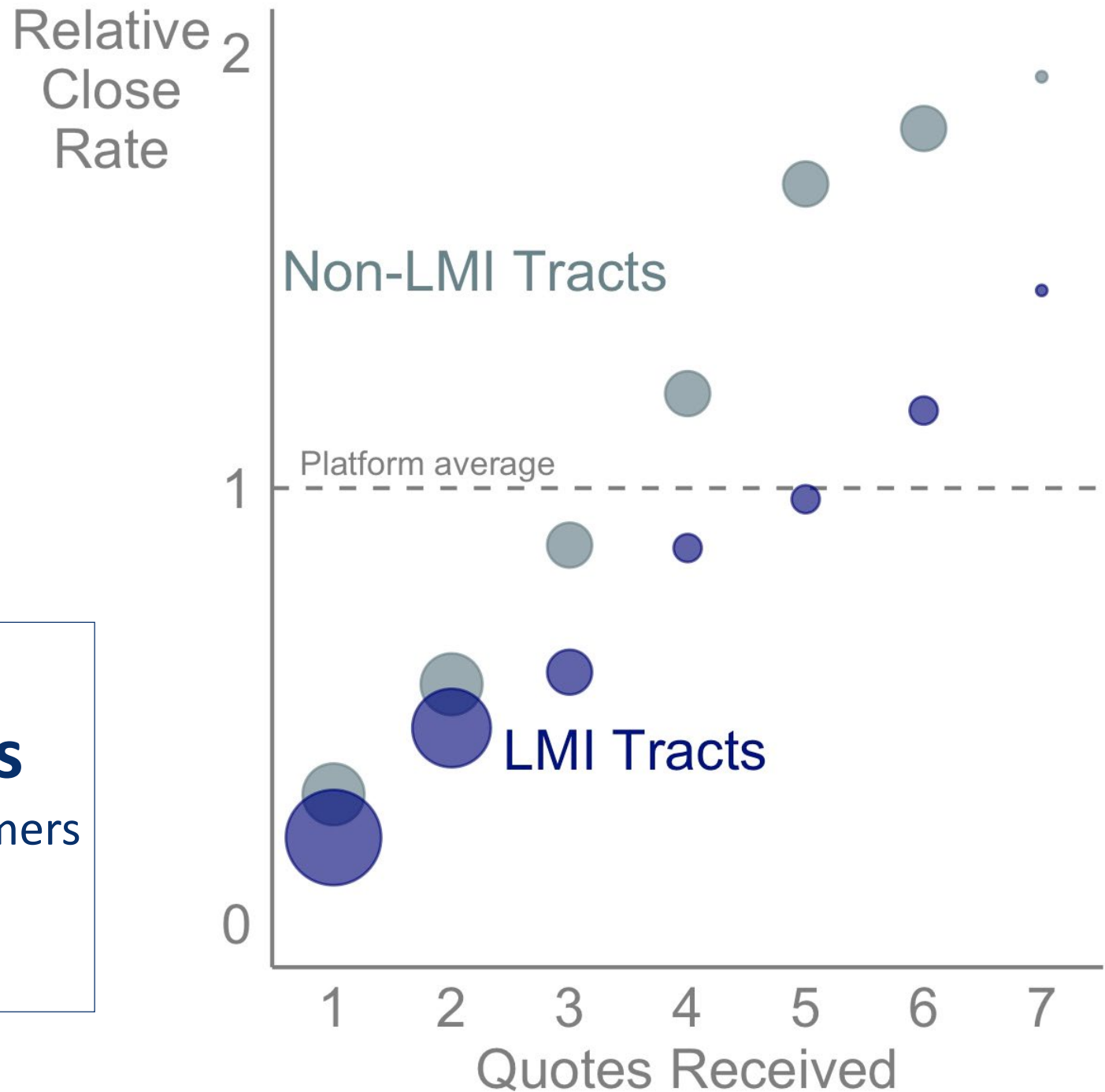
LMI = Lower Margins

Installers may perceive that LMI customers equate to lower margins

Previous work supports this hypothesis (e.g., Gillingham et al. 2016), but *accepted* prices do not vary significantly by income level in the quote data.

LMI = Lower Close Rates

Installers may perceive that LMI customers are less likely to close deals



We can't study this with the quote data, but previous work by Liao (2020) shows that cancel rates are higher in LMI areas.

LMI = Cancellation Risk

Installers may perceive that LMI customers are more likely to cancel

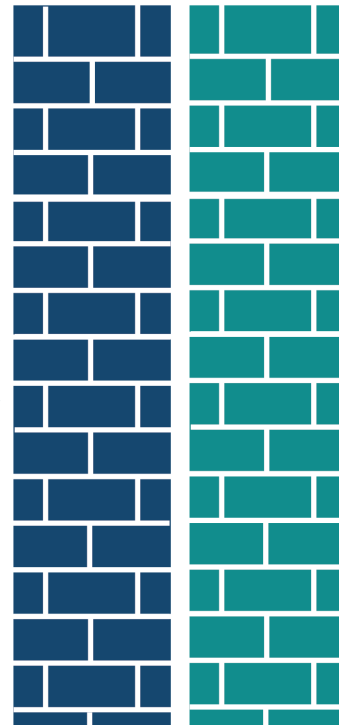
A Bigger Picture

1. LMI households are less likely to pursue PV adoption in the first place



A Bigger Picture

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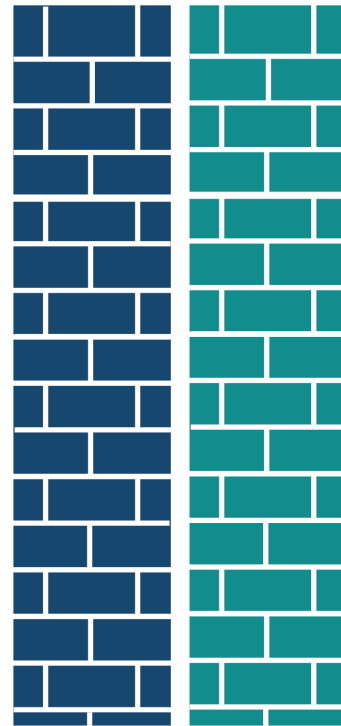


2. Installers are less likely to pursue LMI customers



A Bigger Picture

1. LMI households are less likely to pursue PV adoption in the first place



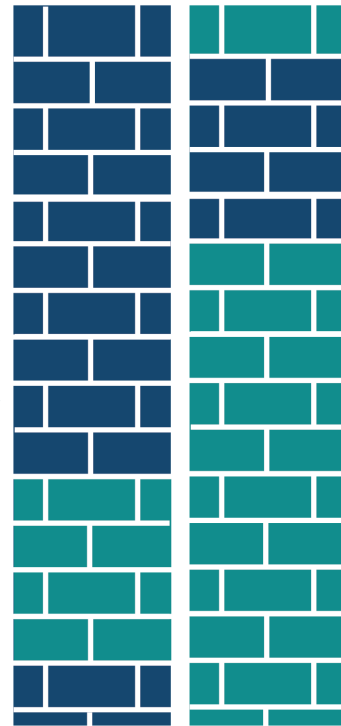
2. Installers are less likely to pursue LMI customers



3. LMI customers are less likely to close

A Bigger Picture

1. LMI households are less likely to pursue PV adoption in the first place



2. Installers are less likely to pursue LMI customers



3. LMI customers are less likely to close

References

- Barbose et al. 2021. *Residential Solar-Adopter Income and Demographic Trends: 2021 Update*. Lawrence Berkeley National Laboratory.
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