



# R-PACE: Policy Developments and Empirical Program Impacts

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Presented at 2018 ACEEE Energy Efficiency Finance Forum



# Agenda

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- Brief timeline and recent policy developments
- Scale of R-PACE and program impact questions
- R-PACE impacts on solar PV deployment
- R-PACE impacts on energy usage
- R-PACE impacts on mortgage and property tax payments
- Other potential empirical work



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# TIMELINE AND POLICY DEVELOPMENTS



# R-PACE timeline

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- 2008-09: early local programs launch
- 2010: FHFA guidance
- 2013: privately-administered regional programs begin to attain scale in CA
- 2014: private programs go statewide in CA; R-PACE launches in FL
- 2016: R-PACE launches in MO
- 2016-current: legislative and regulatory developments on consumer protection

# Recent legislation and regulation

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## 2016: California AB 2693

- Enhances and standardizes required consumer disclosures

## 2017

### □ California SB 242

- Mandates customer confirmation of terms by phone
- Bars “kickbacks” to contractors

### □ California AB 1284

- Requires that underwriting consider ability to pay
- Establishes minimum training requirements
- Charges CA Department of Business Oversight (DBO) with regulating R-PACE programs

## 2018

- Draft California DBO regulations (to go into effect 1/19)
- S.2155 (Federal) passed the Senate – similar in substance to CA protections



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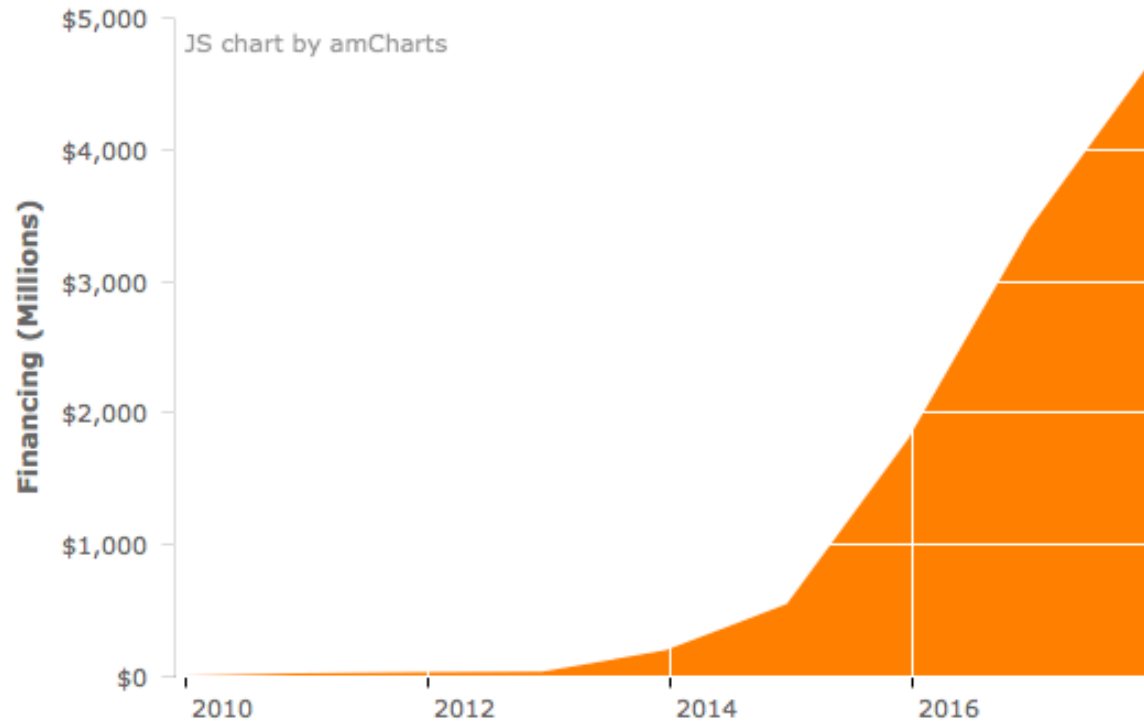
# SCALE OF R-PACE AND IMPACT QUESTIONS



# R-PACE has achieved remarkable scale

## Cumulative R-PACE Financing

2010-2017



Source: [PACENation](#)

# R-PACE has achieved remarkable scale

**Table 1. Programmatic Efficiency Lending Volumes in 2014**

Program Type	Total Loan Volume (\$M)	Residential Sector (\$M)	Number of Residential Loans
On-bill	\$179	\$76	9,486
Utility loan (not on-bill)	\$202	\$196	16,607
PACE	\$267	\$248	12,061
State Energy Office RLF	\$74	\$17	1,595
ESPC	\$4,101	-	-
<b>Total</b>	<b>\$4,823M</b>	<b>\$537M</b>	<b>39,749</b>

Source: Deason et al., [“Energy Efficiency Program Financing: Where it comes from, where it goes, and how it gets there.”](#)



# R-PACE impacts – getting beyond dollars

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- Does R-PACE finance measures that would not have otherwise been deployed?
- How has R-PACE affected participants' energy usage?
- How has R-PACE affected participants' mortgage and property tax payments?

With support from the Department of Energy, Berkeley Lab is studying these questions.



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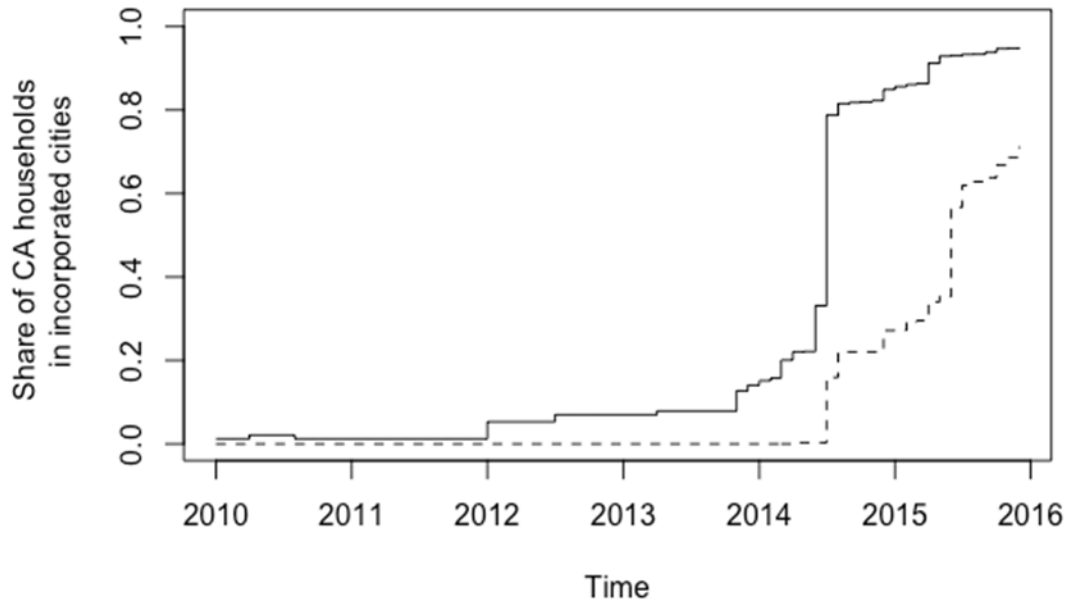
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# R-PACE IMPACTS ON SOLAR PV DEPLOYMENT



# Approach

- Fixed effects panel regression analysis, exploiting city-level differences in program start dates to estimate the impact of R-PACE on deployment of residential solar PV in California cities.

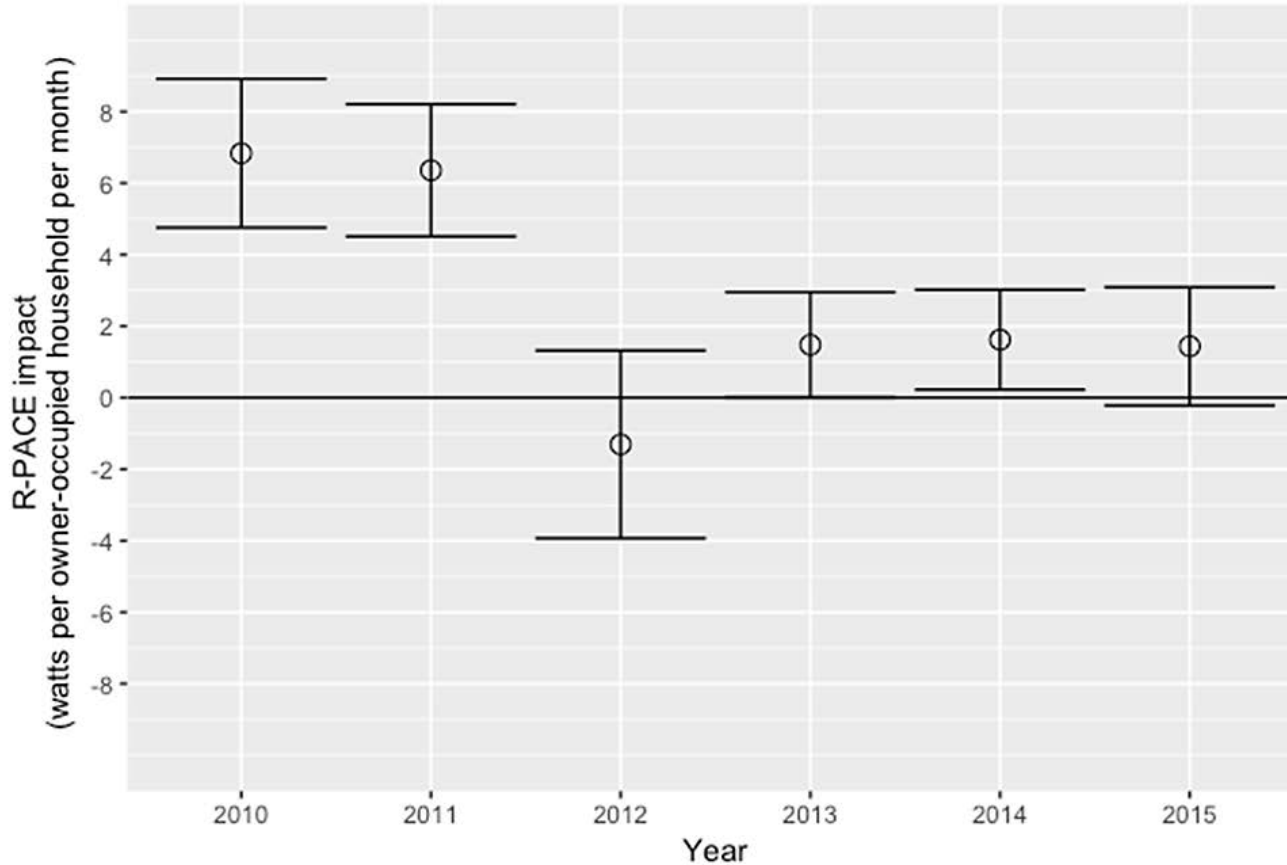


**Growth in the share of California households in incorporated cities with an R-PACE program, 2010-2015.** Solid line indicates share of households served by at least one program; dashed line indicates share of households served by multiple programs.

Source: Deason and Murphy, [“Assessing the PACE of California residential solar deployment”](#)

# Findings

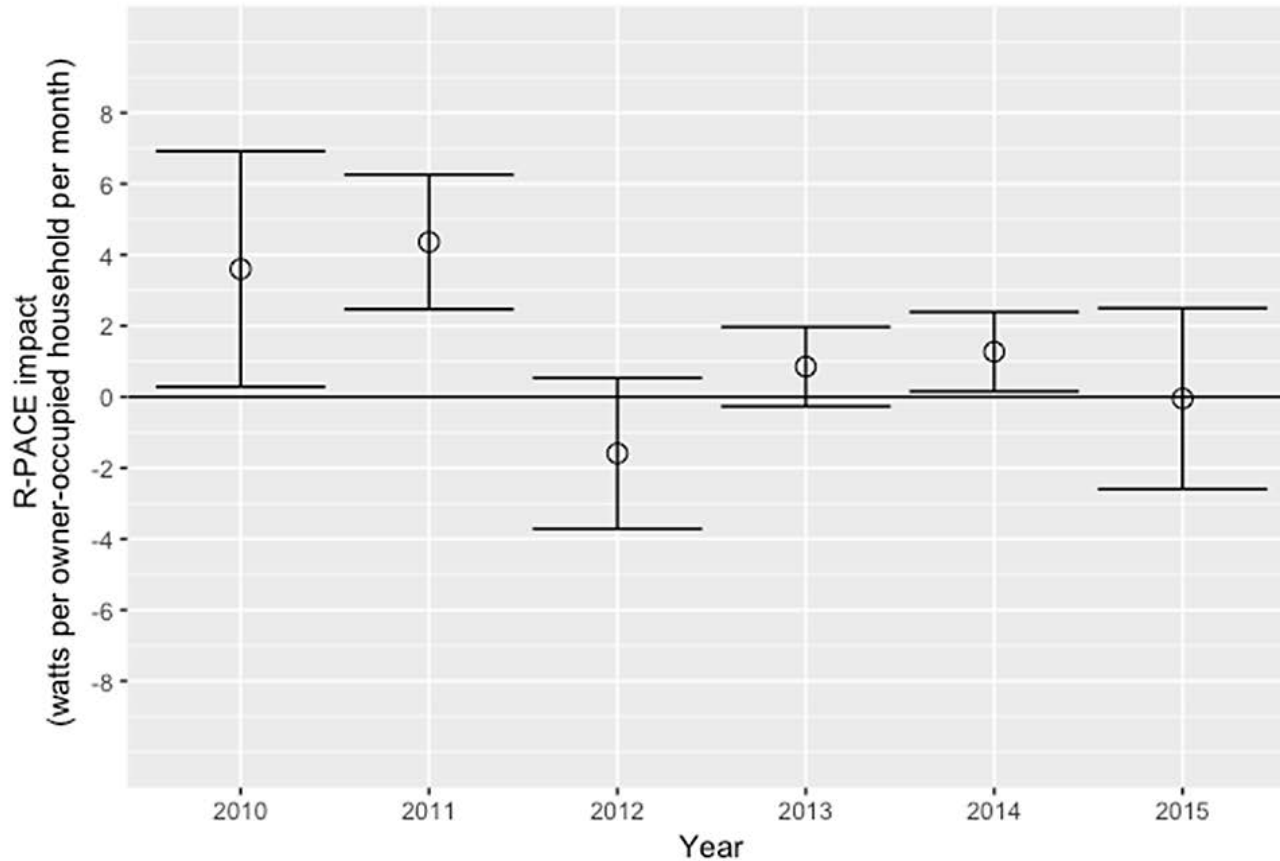
R-PACE programs appear to be driving PV deployment even in later years of our dataset (2010-2015), though effects are largest in early years.



Source: Deason and Murphy, [“Assessing the PACE of California residential solar deployment”](#)

# Findings

R-PACE programs appear to be driving PV deployment even in later years of our dataset (2010-2015), though effects are largest in early years.



Source: Deason and Murphy, "[Assessing the PACE of California residential solar deployment](#)"

# Findings

Impacts averaged across dataset (2010-2015):

Sample	Impact of R-PACE where present (watts per owner-occupied household driven by R-PACE)	Impact of R-PACE where present (% of capacity driven by R-PACE)	Estimate of total systems installed due to R-PACE
Large cities with annual demographic data	1.1	12%	12,000
All cities, no annual demographic data	0.6	7%	9,500

Share of PACE-financed PV associated with program presence:  
~100% large cities; ~55% all cities (with large confidence intervals)



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In Progress

# R-PACE IMPACTS ON ENERGY USAGE



# Energy usage approach

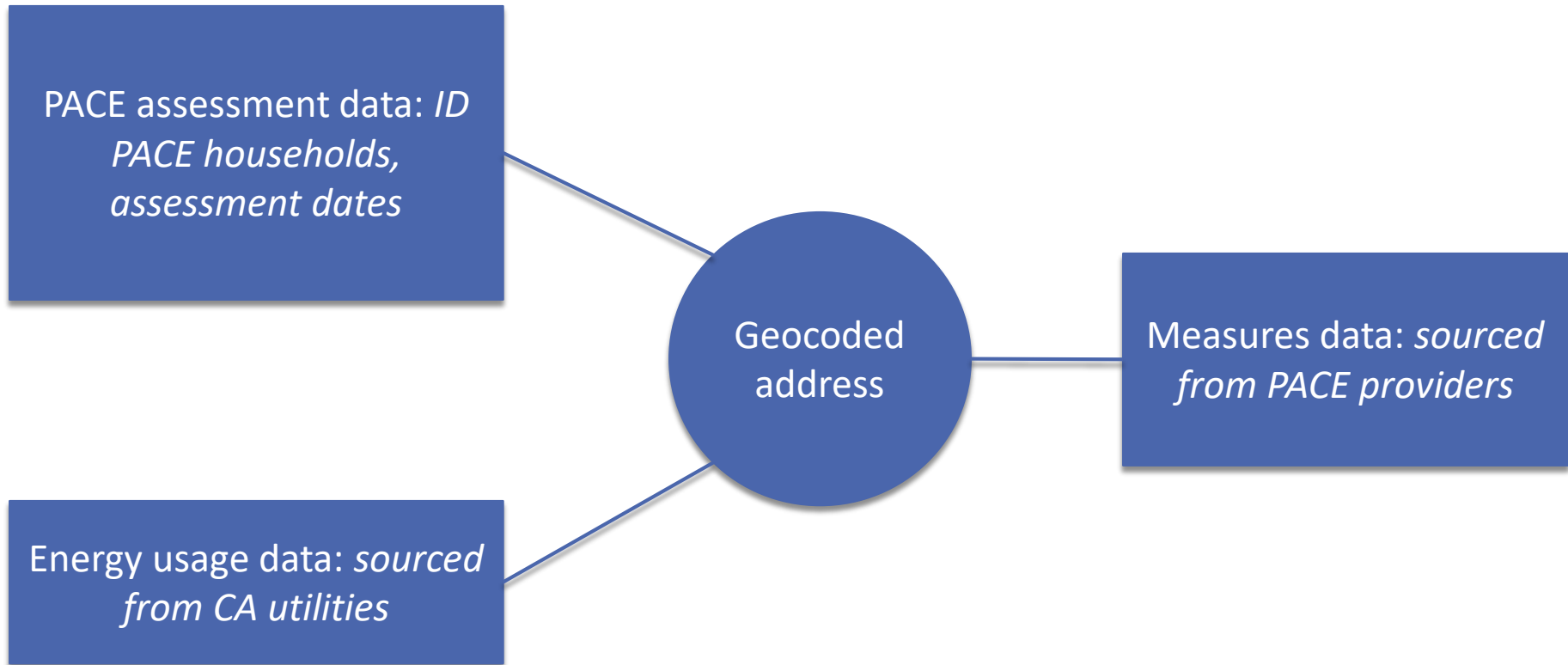
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- **Method:** Analyze household-level metered energy usage data for R-PACE customers to estimate impact of R-PACE projects. Analysis will ultimately cover ~ 50,000 households that participated in R-PACE programs.
  - ▣ Household level weather-normalized pre/post usage comparison (CalTrack/ASHRAE 14/IPMVP Option C)
  - ▣ Econometric methods similar to PV deployment study
- We are building a **household-level dataset**



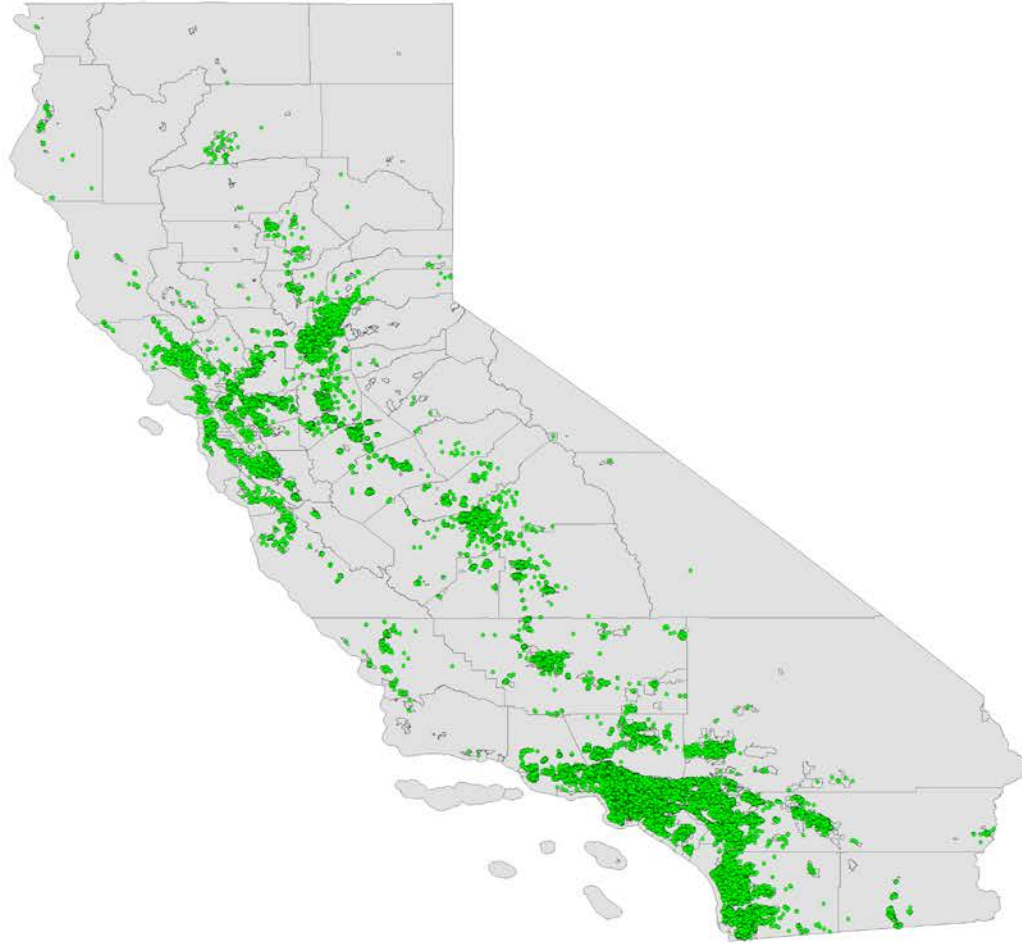
# R-PACE energy usage joined dataset structure

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# Locations of R-PACE households

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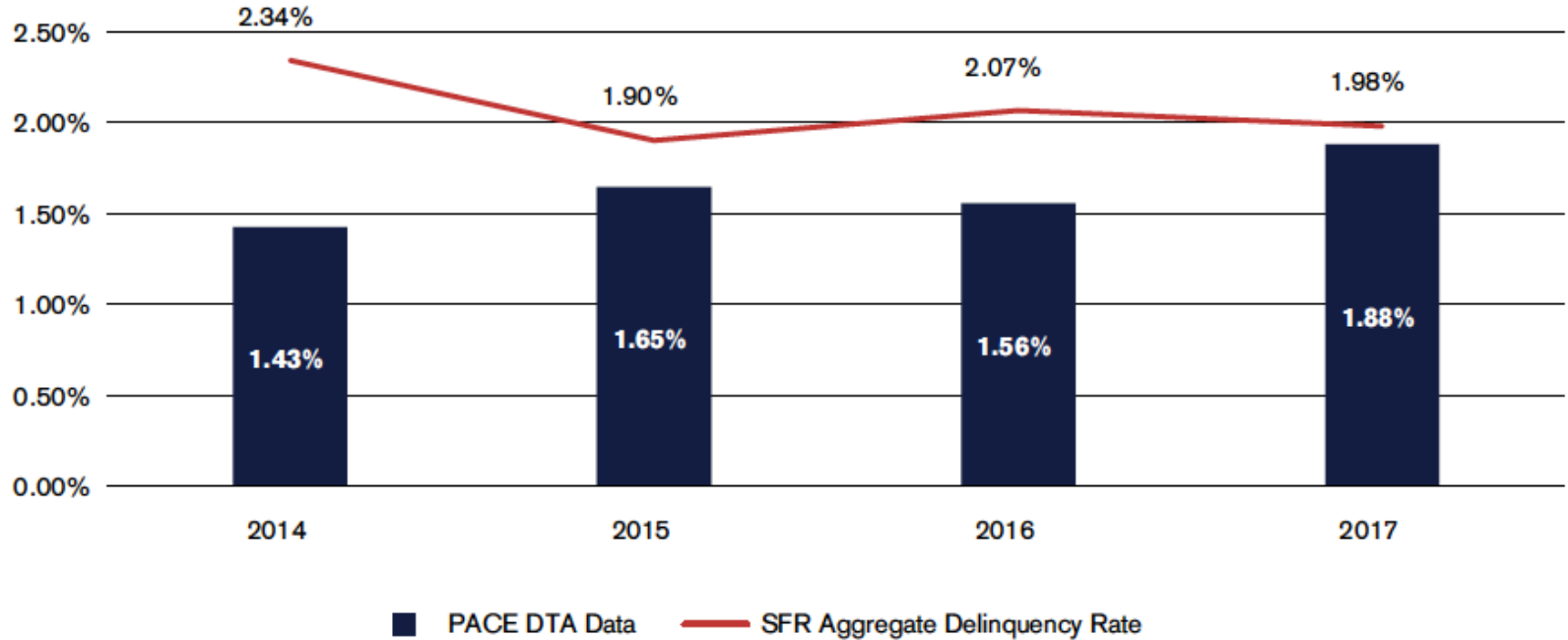
In Progress

# **R-PACE IMPACTS ON MORTGAGE AND PROPERTY TAX PAYMENTS**



# DBRS study on R-PACE property tax delinquency

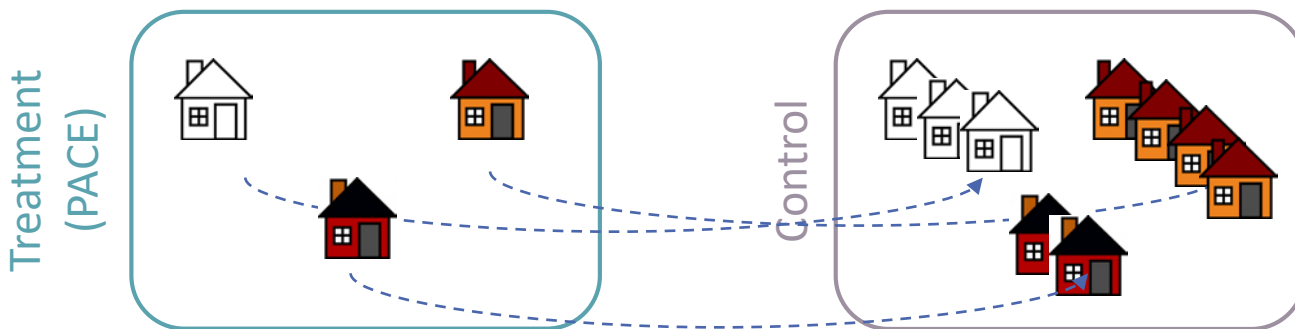
Exhibit 10: Aggregate SFR vs. PACE Delinquency as of Second Installment Due Date



R-PACE property tax delinquency rates are slightly lower than the average delinquency rates for single-family homes in the 10 CA counties with the most R-PACE assessments

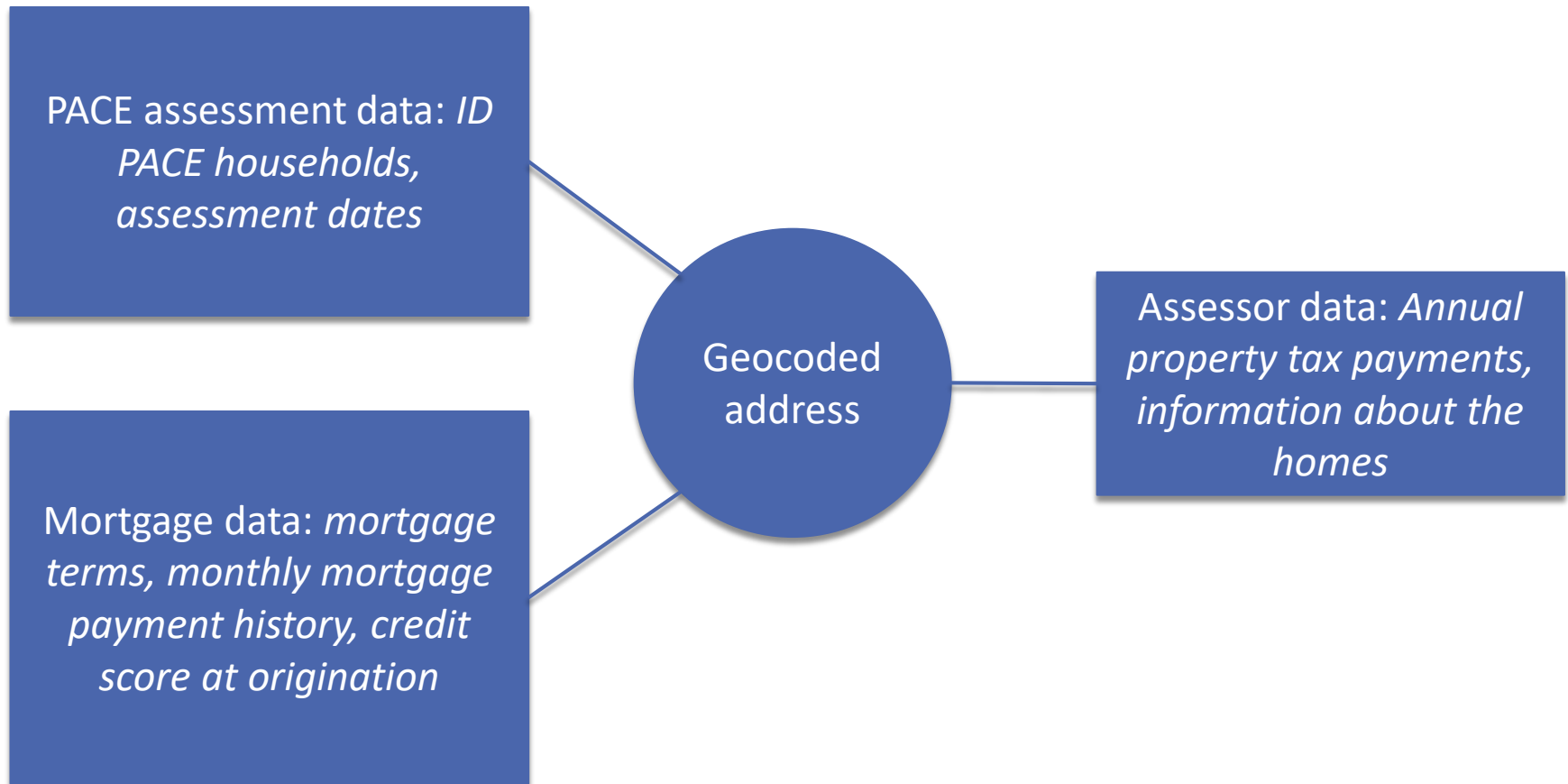
# Berkeley Lab study: Questions and approach

- How does participation in a residential PACE program affect a household's mortgage repayment performance?
  - ▣ Overall
  - ▣ For subsets of particular interest (e.g., households in low-income areas), to the extent that our data will allow
- How does participation in a residential PACE program affect a household's property tax payment performance?



# R-PACE mortgage joined dataset structure

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# OTHER EMPIRICAL TOPICS



# Potential future empirical work

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- R-PACE and the consumer experience
  - ▣ Complaints about financing product relative to other consumer financing products
  - ▣ Complaints about R-PACE contractors relative to other contractors
- R-PACE and home values
- Continual updating and refinement on all fronts





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