

# Property Assessed Clean Energy (PACE) Financing and Consumer Financial Outcomes

Data Point

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# Executive Summary

This report focuses on Property Assessed Clean Energy (PACE) financing, a type of loan used to fund home improvements. PACE loans are voluntary transactions secured by the borrower's home, but they are repaid through the borrower's property tax bill. This report studies the effect of PACE loans on consumer financial outcomes using new data on both originated PACE loans and applications for PACE financing, combined with de-identified credit report information on over 200,000 consumers who applied for PACE loans over a six-year period. These data allow us to plausibly estimate the causal effect of PACE loans on consumer credit outcomes, by comparing changes over time between consumers who had a PACE loan originated to those who applied and were approved for a PACE loan but opted not to go forward with the loan. We focus particularly on primary mortgage delinquency as a main outcome. A large majority of PACE borrowers have a primary mortgage at the time of the PACE origination. For consumers with a mortgage, difficulty in paying the cost of a PACE loan will generally manifest in the data as a mortgage delinquency.<sup>1</sup>

In this report, we find:

- **PACE loans cause an increase in negative credit outcomes, particularly mortgage delinquency.**
  - We find that, compared to PACE applicants who did not ultimately obtain a loan, getting a PACE loan increases mortgage delinquency rates by 2.5 percentage points over a two year period following the PACE origination. For reference, the average rate of mortgage delinquency for PACE borrowers in our data over the two-year period prior to getting a PACE loan was 7.1 percent. This means that on average, getting a PACE loan increases the risk of a mortgage delinquency by about 35 percent over two years, relative to what would have happened without the PACE loan.
  - The effect of PACE loans on primary mortgage delinquency was larger for consumers with lower credit scores. This is a point of concern given that some industry stakeholders have held PACE out as a solution for consumers with less than ideal credit history.<sup>2</sup>
  - Consumers without a pre-existing mortgage seem to use credit cards more in response to acquiring a PACE loan. PACE loans cause substantial increases in credit card balances for consumers who did not have a pre-existing mortgage, equal to

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<sup>1</sup> PACE payments are made with property tax payments, and many consumers pay their property taxes through their monthly mortgage payment. Even for those who do not, mortgage servicing companies generally pay a delinquent property tax bill on behalf of the consumer and then collect the shortage from the consumer to protect the creditor's security interest.

<sup>2</sup> See, e.g. Olivia White, Comments of Renew Financial Group LLC to Consumer Financial Protection Bureau, Advanced Notice of Proposed Rulemaking Regarding Residential Property Assessed Clean Energy Financing, (May 2019). Available at [https://downloads.regulations.gov/CFPB-2019-0011-0093/attachment\\_2.pdf](https://downloads.regulations.gov/CFPB-2019-0011-0093/attachment_2.pdf).

around 15 percent of the average pre-PACE balance for those consumers. All else equal we might expect some of these consumers' overall spending, and thus their credit card balances, to decrease following a PACE loan origination. PACE loans are commonly used to fund home improvement projects with potential energy or water savings. This suggests that some PACE consumers may have responded to difficulty paying their PACE loan by accumulating credit card debt.

- **PACE borrowers typically have access to conventional credit.** More than 70 percent of the PACE borrowers in our data had pre-existing mortgages when they got a PACE loan. Almost all had a credit score, with a majority having scores in the prime or near-prime range. About 11 percent had super-prime credit scores.
- **PACE borrowers were relatively more likely to live in Black or Hispanic neighborhoods compared to the State average.** PACE borrowers reside in census tracts with higher percentages of Black and Hispanic residents than the average for their States. However, the effect of PACE loans on primary mortgage delinquency was similar across census tract characteristics.
- **PACE loans are relatively expensive.**
  - PACE loans increase consumers' property tax bills by about \$2,700 per year on average, an average increase of about 88 percent.
  - PACE loans have interest rates that are substantially higher than normal rates for mortgages or home equity loans (although much lower than credit card rates), and they have high fees relative to the size of the loans. More than a third have estimated annual percentage rates (APRs) or fees high enough to meet the definition of a "high-cost mortgage" under Regulation Z.
  - PACE loans with the lowest interest rates had less effect on primary mortgage delinquency.
- **The data show some evidence of problematic sales practices for PACE loans.** A little more than 13 percent of PACE borrowers received multiple PACE loans, with many of these loans originated simultaneously or within a few months of each other.
- **State regulation of PACE loans in California improved PACE outcomes.**
  - Starting in 2018, State laws in California required new consumer protections for PACE loans. We find that PACE loans made in California after these laws went into effect increased mortgage delinquency less than PACE loans made before the laws went into effect.
  - More broadly, we find that PACE loans where the PACE company collected consumers' reported income as part of the application process (mostly but not entirely in California after 2018) increased mortgage delinquency less than loans where the PACE company did not collect reported income.

- The California reforms as a whole substantially reduced the volume of PACE lending, compared to the trend in Florida, the other main State with active PACE lending.

# 1. Introduction

Homeowners often have a range of financing options when considering home improvement projects. Homeowners have access to one of the most valuable assets most consumers own—the equity in their homes—which can be used to secure a loan. While home equity financing options can provide a way for consumers to access credit, they can also be risky. If a borrower is unable to repay a home equity loan, they can accrue delinquency charges and potentially lose the home and any existing equity through foreclosure.

This report focuses on PACE financing, a type of loan used to fund certain home improvements.<sup>3</sup> This report provides analysis of certain features of PACE financing and of the consequences for consumers of entering into PACE loans. PACE loans are used to pay for home improvements and are secured by the borrower’s home, but they are repaid through the consumer’s property tax bill. PACE programs are authorized by State laws and are generally limited to projects meeting certain specified public purposes. Originally eligible projects were limited to renewable energy and energy efficiency upgrades, such as solar panels or energy-efficient windows. States now authorize PACE for additional project types such as disaster hardening measures.

Despite the connection to local governments, which authorize PACE financing, are parties to the financing agreements, and collect payments through the property tax system, PACE financing programs are generally administered by private companies. These companies oversee originations, make decisions about whether to extend the loans, and may securitize assets related to the obligations to sell on the secondary market. The loans are often marketed by home improvement contractors who sell home improvement services door-to-door and offer PACE loans as a financing option on behalf of the private PACE companies.<sup>4</sup>

PACE financing has been a source of some controversy in recent years in the States where it operates. Stories in the media and from consumer advocates report that some consumers are deceived by PACE companies or their associated contractors, or have their property taxes increased beyond what is affordable.<sup>5</sup> Because PACE payments are generally paid as part of the consumer’s property tax payment, failure to pay the additional PACE amount generally means an overall failure to

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<sup>3</sup> For clarity throughout this report we refer to PACE financing transactions as “PACE loans.” In addition, although PACE loans are also available for commercial properties in some States, this report focuses solely on residential PACE loans.

<sup>4</sup> The private companies that operate PACE financing programs are sometimes referred to as “PACE Administrators,” reflecting their role administering the PACE program on behalf of local governments. For clarity in this report we refer to these firms as “PACE companies”

<sup>5</sup> See, e.g., Jeremy Kohler & Haru Coryne, State-Supported “Clean Energy” Loans Are Putting Borrowers at Risk of Losing Their Homes, Propublica (Apr. 23, 2021), <https://www.propublica.org/article/missouri-pace-loans>; National Consumer Law Center, Residential (PACE) Loans: The Perils of Easy Money for Clean Energy Improvements (Sept. 2017), [https://www.nclc.org/images/pdf/energy\\_utility\\_telecom/pace/ib-pace-stories.pdf](https://www.nclc.org/images/pdf/energy_utility_telecom/pace/ib-pace-stories.pdf); see also Office of the District Attorney, County of Riverside, News Release, District Attorneys Announce \$4 Million Consumer Protection Settlement (Aug. 9, 2019), <https://rivcoda.org/community-info/news-media-archives/district-attorneys-announce-4-million-consumer-protection-settlement>; Kristin Grind, America’s Fastest-Growing Loan Category Has Eerie Echoes of Subprime Crisis, Wall Street Journal (Jan. 10, 2017), <https://www.wsj.com/articles/americas-fastest-growing-loan-category-has-eerie-echoes-of-subprime-crisis-1484060984>

pay the tax bill. This can potentially result in penalties that may include late fees, tax sales, and foreclosure, depending on State law. Some local officials, consumer advocates, and consumer advocacy groups have echoed these concerns in discussions with CFPB staff and in comments they submitted in response to the CFPB's 2019 Advance Notice of Proposed Rulemaking on PACE financing (PACE ANPR).<sup>6</sup> At the same time, some PACE industry participants have asserted that PACE loans are generally safe for consumers, serve important public purposes, and have a very low default rate.<sup>7</sup>

There have been various initiatives over the years to address the impacts of PACE financing on consumers. California passed a series of laws that went into effect in 2018, that among other things required income-based underwriting of all PACE loans. In May of 2018, as part of the Economic Growth, Regulatory Relief, and Consumer Protection Act (EGRRCPA), Congress directed the CFPB to promulgate regulations that carry out the purposes of the ability-to-repay (ATR) provisions in the Truth in Lending Act (TILA) with respect to PACE financing, and to apply the TILA's general civil liability provision for violations. EGRRCPA section 307 requires these rules to account for the unique nature of PACE financing. In 2021 the trade association for PACE companies announced a set of consumer protection policy principles for residential PACE.<sup>8</sup>

There is relatively little publicly available analysis of PACE financing and its effects on consumers. This report studies the effect of PACE on consumer financial outcomes using new data on both originated PACE loans and applications for PACE financing, combined with de-identified credit report information on over 200,000 consumers who applied for PACE loans over a six year period between July 2014 and June 2020.

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<sup>6</sup> See Advance Notice of Proposed Rulemaking on Residential Property Assessed Clean Energy Financing, 84 FR 8479 (May 7, 2019).

<sup>7</sup> See, e.g. Comments of Renew Financial Group LLC to Consumer Financial Protection Bureau, Advanced Notice of Proposed Rulemaking Regarding Residential Property Assessed Clean Energy Financing, (May 2019). Available at [https://downloads.regulations.gov/CFPB-2019-0011-0093/attachment\\_2.pdf](https://downloads.regulations.gov/CFPB-2019-0011-0093/attachment_2.pdf).

<sup>8</sup> See PACE Nation, Residential Property Assessed Clean Energy (R-PACE) State and Local Consumer Protection Policy Principles, (October 2021). Available at: <https://www.pacenation.org/wp-content/uploads/2021/11/PACENation-R-PACE-Consumer-Protection-Policy-Principles-ADOPTED-October-21.2021.pdf>



# 2. Data

This section describes the data used in this report. Our primary data include detailed de-identified records of PACE transactions obtained from four PACE companies, linked to de-identified credit record data from one of the three nationwide consumer reporting agencies. Using these data, we can track outcomes for consumers before and after they applied for or received PACE loans.

## 2.1 PACE financing transaction data

Our data on PACE financing transactions come from four private firms that provide PACE financing in California and Florida. In October 2020, the CFPB sent a voluntary data request to all entities that were at the time engaged in PACE financing. The request sought information on PACE applications and originated PACE loans between July 2014 and June 2020.<sup>9</sup> In 2022, the CFPB received data from all four of the private entities that were active in the PACE market at the time of submission: FortiFi Financial, Home Run Financing, Renew Financial and Ygrene Energy Fund. The entities submitted their data directly to a nationwide consumer reporting agency, acting as the CFPB's contractor, for matching. The consumer reporting agency pooled the data from the four PACE companies before providing the combined data to the CFPB in August 2022. These combined PACE data are what is used in this report. The data include key dates, the basic underwriting information used for each application, the outcome of each application, information on the home improvement project type, and detailed information on the terms of each originated loan, such as balance and interest rate.

The combined data include 369,234 PACE loan applications submitted in Florida and California from July 2014 to June 2020.<sup>10</sup> Of these applications, 221,003 were from California, and 148,231 were from Florida. A total of 127,900 applications resulted in an originated PACE loan, including 77,534 in California and 50,365 in Florida.<sup>11</sup> Based on available public data, these appear to be all the PACE loans originated during this timeframe by the four companies that participated in the data collection.<sup>12</sup>

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<sup>9</sup> The full text of the data request is included in this report as Appendix C. Note that not all fields requested were included in the final dataset. The PACE companies declined to submit some fields due to privacy concerns; other fields were included by some companies and not others, and were suppressed by the CFPB's contractor to reduce the risk of re-identifying the companies. The fields listed in the request that are not in our data are: assessor's parcel number, county FIPS code, and sponsor. As discussed below, census tract codes (which include the county code) were provided by the CFPB's contractor based on geocoding the address associated with each application.

<sup>10</sup> Residential PACE lending was also active in Missouri during this period, although few loans were made overall compared to California and Florida. In addition, a small pilot program was launched in Ohio in 2015. The PACE company that operated in Missouri during our sample period filed for bankruptcy while the CFPB's data request was outstanding and did not participate in the data collection. Other PACE companies have entered the residential PACE market in Missouri since June 2020, but the voluntary data collection did not request information on loans during this period.

<sup>11</sup> The data include 14 PACE applications, including one that resulted in an originated PACE loan, with invalid addresses that could not be geocoded by the CFPB's contractor and assigned to a State.

<sup>12</sup> To verify this, we compared the counts of originations in our data to public data from the California Alternative Energy and Advanced Trans-

In our main analysis, we compare differences in outcomes between two groups: 1) “Application-Only” consumers whose applications were approved but not originated; and 2) “Originated” consumers whose applications turned into PACE loans. We define an additional group—“Denied” consumers—who applied but were not approved for PACE, but most of our analyses in this report do not utilize these PACE applications.

A key part of our analysis involves the timing of consumers’ interactions with PACE companies. In a typical PACE transaction, the consumer applies for the loan through a home improvement contractor at the point of sale for a home improvement project. The PACE application is often approved or denied by the PACE company quickly, sometimes on the same day. After the PACE application is approved, the consumer may be able to opt not to proceed with the PACE transaction, in which case the consumer would need to either pay the contractor in cash, find another financing option, or opt not to go forward with the project. The contractor is not paid until after the project is complete. After the loan agreement is signed, an assessment is placed on the consumers’ property, and then payments become due on a future property tax bill.<sup>13</sup>

For purposes of our analysis, we combine the various date variables in the PACE transaction data to create one “PACE Experience Date” to denote the date on which each consumer’s involvement with a potential PACE loan began. This can be interpreted as the origination date for Originated consumers, or an estimate of when the origination date would have been for Application-Only consumers. Appendix A provides detail on the procedure for assigning PACE Experience Dates.

Another relevant date is the date when the first property tax payment that includes the PACE assessment (or would have included the PACE assessment, for Application-Only consumers) becomes due. The first due date for PACE payments can vary substantially depending on the State and when the PACE loan was originated within a calendar year. In California, the property tax year runs July 1 to June 30, and PACE assessments that are added to the tax rolls in one tax year are due for the first time in December of the next tax year. In Florida, the tax year runs January to December, but again assessments must be placed by June 30 to be due on the current calendar year’s tax bill, which is due in November but not delinquent until April of the following year.<sup>14</sup> For example, the first payment on a PACE loan originated in June 2017 would be delinquent if unpaid in December 2017 in California and April 2018 in Florida. However, a PACE loan originated in July 2017 would not be delinquent until December 2018 in California and April 2019 in Florida. Based on these rules, we calculate the first date when PACE payments would be late,

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portation Financing Authority (CAEATFA). *See* CAEATFA, PACE Loss Reserve Program Enrollment Activity, available at <https://www.treasurer.ca.gov/caeatfa/pace/activity.pdf>. The counts are essentially identical for the four PACE companies that submitted data.

<sup>13</sup>This description of the typical PACE process is based on comments received in response to the PACE ANPR. *See, e.g.*, Comments of Renew Financial Group LLC to Consumer Financial Protection Bureau, Advanced Notice of Proposed Rulemaking Regarding Residential Property Assessed Clean Energy Financing, (May 2019). Available at [https://downloads.regulations.gov/CFPB-2019-0011-0093/attachment\\_2.pdf](https://downloads.regulations.gov/CFPB-2019-0011-0093/attachment_2.pdf); Comments of Ygrene Energy Fund Re: RE: Advance Notice of Proposed Rulemaking on Residential Property Assessed Clean Energy Financing (RIN 3170-AA84), (May 2019). Available at [https://downloads.regulations.gov/CFPB-2019-0011-0075/attachment\\_1.pdf](https://downloads.regulations.gov/CFPB-2019-0011-0075/attachment_1.pdf).

<sup>14</sup>More precisely, according to public comments the CFPB received in response to the PACE ANPR, the first semi-annual tax bill in California and the annual bill in Florida are issued in November of the tax year, but payments are late in California if they are not received by December 10, while in Florida they are not late until April 1 of the following calendar year.

**TABLE 1:** PERCENT OF PACE APPLICATIONS WITH INCOME INFORMATION REPORTED, BY STATE AND TIME PERIOD

Time	State	Originated	Application-Only	Denied
Pre-April 2018	California	23.91	16.70	44.26
Pre-April 2018	Florida	10.42	4.67	24.07
Post-April 2018	California	98.66	71.64	57.87
Post-April 2018	Florida	26.27	16.06	55.89

given the PACE Experience Date referred to above. We refer to this as the First PACE Due Date.

For a minority of the data, the underwriting information for each application includes household income. PACE companies were required by State law to collect and verify income in California beginning in April 2018 (see Section 5). However, at least some of the PACE companies who contributed data appear to have collected income information for some applications received before 2018 or in Florida; a third of PACE applications in Florida after April 2018 included income information. Table 1 gives the share of applications with income data by State, time period, and application outcome.

For additional technical details about how the PACE transaction data were prepared, see Appendix A.

## 2.2 Matched de-identified credit record data

The CFPB contracted with one of the three nationwide consumer reporting agencies to link the PACE transaction data provided by the PACE companies to detailed, de-identified credit record data. The four PACE companies each provided the CFPB’s contractor with the names and addresses associated with each PACE application. The contractor used this name and address information to link to its internal consumer identifiers, and in turn to snapshots of each consumers’ credit record over time. The contractor destroyed the identifying information after the matched de-identified data were delivered to the CFPB, and retained no copy of it. No personally identifiable information was shared with CFPB staff at any time. The contractor specifically provided annual credit record snapshots from June 2014 through June 2018 and semi-annual snapshots from December 2018 through June 2022.

Each credit record snapshot includes everything on consumers’ credit records as of the end of that month, with three main types of records: tradelines, or accounts; hard inquiries, or applications for credit; and public records, such as bankruptcy filings. The consumer reporting agency also provided a commercially available credit score for each consumer at each snapshot date, and the census tract code associated with the address used for matching. The bulk of our analysis focuses

on the tradeline records, which include account type, balances, limits, original principal amounts, and delinquency status for each credit account on each consumer’s credit report, as well as items such as collections tradelines.

Of the 369,234 PACE applications in the original PACE transaction data, 285,679 had a match to the credit record data, including 100,455 applications associated with an originated loan. Based on the consumer reporting agency’s internal identifiers, these applications were only associated with 207,443 unique consumers, 87,001 of whom had at least one originated loan—some consumers had multiple applications and even multiple PACE loans during the period 2014–2020. Because the consumer reporting agency provided census tract information based on the address used for matching, we have the census tract of residence even for PACE applications that did not match to the credit record data. We do observe some differences in census tract demographics across matched and unmatched PACE records, but adjusting for these differences does not materially change our results. For more on this see Appendix B.

For much of our analysis of the impacts of PACE on consumer outcomes, we construct a panel of credit outcomes in order to follow these outcomes over time before and after consumers applied for or received a PACE loan. For many outcomes, including delinquency, we can analyze credit accounts at a monthly frequency, despite the annual/semi-annual nature of the underlying credit record data.<sup>15</sup> For other outcomes, such as balances, credit limits, payments, and credit scores, we observe only what is in the credit record snapshots annually or semi-annually and cannot reconstruct what happened in between.<sup>16</sup>

## 2.3 Other data sources

We link the PACE transaction data to census tract-level information from the American Community Survey using the census tracts provided by the consumer reporting agency based on the address of residence at the time of each PACE application. The census tract characteristics we focus on include: percent white, percent Black, percent Asian, percent Hispanic, percent that speaks English less than very well, percent with less than a High School diploma, and median household income.

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<sup>15</sup> For delinquency outcomes, the tradeline data contain a “payment grid” field that reports the sequence of delinquency statuses for a given account up to 72 months in the past, allowing us to fill in delinquency status in between credit record snapshots. For outcomes to do with specific events, such as inquiries, bankruptcy filings, new accounts and closed accounts, we observe the exact dates these events occurred, and again can build a monthly sequence of these outcomes in between the credit record snapshots.

<sup>16</sup> Credit card balances and mortgage payments are the monthly amount the consumer owes. However, we can only observe these outcomes on an annual or semi-annual cadence.

# 3. Characteristics of PACE: Terms, customers, industry practices

We begin our analysis by documenting the basic descriptive facts regarding PACE loans. We start by describing the terms of the loans themselves, then discuss the characteristics of the consumers who acquire PACE loans, based on the linked credit record data, and then discuss what the data indicate about PACE industry practices.

Some key results of this section are as follows:

- PACE loans made between July 2014 and June 2020 had original balances averaging around \$25,000, payable over an average term of just under 20 years, resulting in the consumers' property taxes increasing by about \$2,700 per year on average.
- A little more than 13 percent of PACE borrowers received multiple PACE loans during this period, with many of these loans originated simultaneously or within a few months of each other.
- PACE loans had relatively high costs compared to primary mortgages, and had particularly high fees relative to the loan amounts. Many have fees above the levels used in the regulatory threshold for a high-cost mortgage.
- Although industry stakeholders have suggested PACE fills a niche for consumers without other access to credit or to affordable credit, most PACE borrowers had other credit at the time they acquired their PACE loan. More than 71 percent of PACE borrowers had a pre-existing mortgage and almost 90 percent had a credit card.
- PACE interest rates are mainly correlated with project type and State, rather than loan terms or consumer credit risk, even though high credit score applicants were more likely to be approved for a PACE loan.

## 3.1 Terms and Features of PACE Loans

Table 2 reports summary statistics on the basic terms of the PACE loans in our data.<sup>17</sup> The average PACE loan had an original balance of about \$25,000, with an average term of about 20

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<sup>17</sup>The Table considers all PACE loans, including those that did not have a match to the credit record data. The average characteristics for matched loans are similar.

**TABLE 2: CHARACTERISTICS OF ORIGINATED PACE LOANS**

	Mean	Min	P25	P50	P75	Max	N
Original Balance	25,001.1	797.4	13,319.6	20,629.7	31,060.8	454,366.8	127,900
Interest Rate	7.6	0.7	7.2	8.0	8.3	9.8	127,900
Term (Years)	18.8	5.0	15.0	20.0	20.0	30.0	127,900
Fees	1,301.9	0.0	732.0	1,084.0	1,609.0	30,517.6	127,900
APR	8.5	2.0	8.2	8.7	9.0	15.0	127,900
PACE Payment	2,706.7	82.7	1,502.7	2,214.8	3,276.2	105,258.1	127,900
Income	101,428.0	1.0	54,000.0	80,000.0	120,000.0	750,000.0	40,064

years.<sup>18</sup> PACE loans had relatively high interest rates compared to primary mortgages. The average PACE loan had an interest rate of about 7.6 percent. For reference, the average prime offer rate (APOR) for primary mortgage loans was around 3.5 percent for most of the period between July 2014 and June 2020, varying somewhat over time and by loan term. Interest rates for PACE loans were tightly bunched, with half of all PACE loans having rates between 7.2 and 8.3 percent. Estimated APRs tended to be a full percentage point above the nominal interest rate, as fees averaging about \$1,300 per loan increase the total effective cost of the loans substantially. Given the terms, original balance and interest rates of the loans, we can calculate the annual payment amount that is added to consumers' property tax bills by the PACE loan. That average payment amount was about \$2,700 annually, equivalent to an extra \$225 per month, with about a quarter of PACE loan payments exceeding \$3,200 annually. For reference, given the assessed value of the PACE borrower's homes and typical property tax rates in California and Florida, the likely annual pre-PACE property tax amounts for these consumers was about \$3,600 on average. This means that on average a consumer's total property taxes likely increased by almost 88 percent as a result of the PACE loan payment.<sup>19</sup> More than a quarter of PACE borrowers' property tax payments likely increased by double or more.<sup>20</sup>

Much of our analysis of the impact of PACE loans focuses on comparisons among consumers who applied for PACE loans, comparing applications that resulted in an originated PACE loan to applications that were approved by the PACE company but did not result in a loan. Table 3 reports application characteristics for Originated consumers, Application-Only consumers, and Denied consumers. We do see some differences in characteristics between approved applications that were originated and those that were not. Application-Only consumers initially requested larger PACE loans, and were more likely to be considering projects that included solar panels. Still, the average credit score and average income (where available) of Originated

<sup>18</sup> See Appendix Figure A1 for more detail on the distribution of PACE loan term lengths.

<sup>19</sup> Typical property tax rates as a percent of a house's market value are estimated to be 0.76 percent in California and 0.89 percent in Florida, based on data from the 2019 American Community Survey. See Appendix Table A2 for more details.

<sup>20</sup> For consumers who pay their property taxes through an existing escrow, the effect on the monthly payment could be even higher when the escrow payment initially increases to include the PACE loan payment. This may happen if the servicer requires an escrow cushion or there is a delay in incorporating the PACE loan into the escrow account, resulting in an escrow deficiency or shortage.

**TABLE 3: CHARACTERISTICS OF PACE APPLICATIONS BY APPLICATION OUTCOME**

	Originated	Application-Only	Denied
Average Amount Requested	\$22,537	\$27,421	\$28,110
Prior Mortgage Delinquency	0.32%	0.69%	4.49%
Prior Tax Delinquency	0.19%	1.38%	4.49%
Prior Bankruptcy	0.4%	0.12%	4.49%
Average Credit Score	673	680	650
Average Income	\$101,428	\$104,911	\$89,024
Share Solar	24.02%	30.67%	36.2%
Share Windows	13.03%	12.49%	12.77%
Share HVAC	24.17%	16.88%	20.35%
Share Disaster	25.84%	28.75%	15.96%
Share Roofing	14.6%	14.67%	15.17%
Share Other	18.4%	16.32%	16.49%

and Application-Only consumers were similar. More broadly, Application-Only consumers look much more like Originated consumers than they do like Denied consumers.

There are some important differences in the profile of PACE loans across the two main States where PACE financing was active during our sample period, California and Florida. Table 4 breaks out characteristics of PACE applications and loans by the consumer’s State of residence. The share of applications approved in California was lower than the share in Florida, reflecting a decrease in approvals following a set of California laws that went into effect in 2018—see Section 5 for more on this. During the full sample period, PACE loans in California were notably larger than loans made in Florida, with an average original balance of over \$27,700 in California, compared to around \$20,800 in Florida. The types of projects funded by PACE loans also differed substantially across States. The most common type of project in California was solar panels, with over a third of PACE loans used for this purpose. In contrast, a large majority of Florida loans, almost 63 percent, were for disaster-related improvements, with less than 7 percent involving solar panels.

As noted above, the PACE loans in our data were relatively expensive relative to primary mortgages. Another way to examine PACE pricing is to compare it to thresholds in Federal mortgage regulations that designate certain loans as high-cost mortgages. Pursuant to the Home Ownership and Equity Protection Act (HOEPA) as implemented in Regulation Z, certain closed-end loans secured by the consumer’s principal dwelling are “high-cost mortgages” if they meet any of three coverage tests. These tests are based on the transaction’s APR, the amount of points and fees paid in connection with the transaction, and the prepayment penalties charged.<sup>21</sup> The first coverage

<sup>21</sup> 12 CFR 1026.32(a)(1)

**TABLE 4: CHARACTERISTICS OF PACE APPLICATIONS BY STATE**

	California	Florida
Share Approved	55.66%	65.67%
Share Funded	35.08%	33.98%
Average Amount Requested	\$26,721	\$19,644
Average Balance	\$27,732	\$20,797
Average Interest Rate	7.79%	7.32%
Average Term	19.17	18.79
Share Solar	35.83%	6.91%
Share Windows	19.22%	4.07%
Share HVAC	25.62%	22.07%
Share Disaster	0.29%	62.82%
Share Roofing	19.54%	7.45%
Share Other	26.71%	6.39%
N	77534	50365

test is generally met if the difference between the APR and APOR for a comparable transaction (the APR-APOR spread) exceeds 6.5 percent as of the date the interest rate for the transaction is set for first-lien mortgages or 8.5 percentage points for subordinate-lien transactions.<sup>22</sup> The second coverage test is met if the total points and fees exceed certain thresholds that depend on the loan amount.<sup>23</sup> Regulation Z also defines a “Higher-Priced Mortgage Loan” as a loan with APR-APOR spreads of 1.5 percent or more for certain first-lien mortgage loans.<sup>24</sup> Table 5 shows the share of loans that we estimate would be above the 6.5 percent APR-APOR spread and points-and-fees thresholds under HOEPA and the share with APR-APOR spreads above 1.5 percent.<sup>25</sup> The Table also gives these percentages separately by State. According to our estimates, very few PACE loans would be above the HOEPA cost thresholds based on APR alone—only about four percent of PACE loans have APR-APOR spreads above 6.5 percent. Over a third of PACE loans have fees that would exceed the points-and-fees limits under HOEPA.<sup>26</sup> However, this differs substantially across States, with over half of California PACE loans exceeding the fee thresholds, but only about eight percent of Florida PACE loans. More than 96 percent of PACE loans across both

<sup>22</sup> 12 CFR 1026.32(a)(1)(i).

<sup>23</sup> 12 CFR 1026.32(a)(1)(ii). Points and fees are defined in 12 CFR 1026.32(b).

<sup>24</sup> 12 CFR 1026.35(a)(1). The APR-APOR spread threshold for Higher-Priced Mortgage Loan can be higher for loans with higher balances than the PACE loans in our data and for loans secured by a subordinate lien.

<sup>25</sup> For loans with original balances in the range typical for PACE loans, the HOEPA thresholds are also nearly identical in most cases to the spread and fee limits for the General Qualified Mortgage (QM) standard under Regulation Z. The share of PACE loans reported in the Table as being above the HOEPA high cost loan thresholds is thus also approximately the share that would fail the spread or fee requirements to be General QMs, based on the original balances of those loans.

<sup>26</sup> For purposes of comparing fees to the HOEPA thresholds, we deduct \$200 from the value reported in the data, as the voluntary data request to the PACE companies did not ask the companies to itemize fees by type. Certain fees may not count towards the HOEPA points and fees thresholds (such as county recording fees). A review of some PACE contracts shows that fees that might be excluded from the calculation are typically between \$100 and \$200.



**TABLE 5: PERCENT OF PACE LOANS EXCEEDING REGULATORY PRICING THRESHOLDS**

Percent of PACE Loans With...	All	California	Florida
Fees Over HOEPA Fee Threshold	35.22	53.84	8.02
APR-APOR Spread Over 6.5 Percent	4.09	4.78	3.07
Either Fees Over HOEPA Fee Threshold or APR-APOR Spread Above 6.5 Percent	37.65	56.41	10.23
APR-APOR Spread Over 1.5 Percent	96.69	96.92	96.35
<i>N</i>	121521	72153	49368

States have estimated APR-APOR spreads high enough to be considered Higher-Priced Mortgage Loans.

## 3.2 Characteristics of PACE borrowers

The linked credit record data allow us to document the credit characteristics of PACE borrowers in some detail. Table 6 documents the credit profiles of Originated, Application-Only, and Denied PACE consumers. All statistics in the Table are calculated as of the most recent credit record snapshot prior to the consumer’s PACE Experience Date. Almost all matched PACE consumers had enough information in their credit records to receive a credit score, with Originated PACE borrowers having an average of 7.4 unique credit accounts. The average of the most recent credit score from the credit record match was similar to what we see in the PACE transaction data, around the upper end of the sub-prime range.<sup>27</sup> PACE consumers had an average age of 55, similar to the general population of consumers in California and Florida with credit records and a mortgage.<sup>28</sup> Figure 1 provides additional detail on the distribution of credit score and age for Originated and Application-Only consumers.

A large majority of Originated PACE borrowers, almost 71 percent, had a primary mortgage at the time they acquired a PACE loan, with an average mortgage size of about \$265,000 and a monthly mortgage payment of \$1,877.<sup>29</sup>

Most PACE borrowers had other credit accounts besides a mortgage. About half had an auto loan and 89 percent had at least one credit card. Just over 19 percent had student loans. On av-

<sup>27</sup> Credit scores may differ between the two data sources because both their timing and source can be different. The score from the credit record data may be up to 11 months older than the score from the PACE transaction data. In addition, we do not observe which credit scoring model was used in the PACE transaction data, nor do we observe the consumer reporting agency whose records the score was based on. Both of these may differ from the credit score we received from the CFPB’s contractor.

<sup>28</sup> For a point of reference, in the CFPB’s Consumer Credit Panel, a broad sample of credit records from the same consumer reporting agency that provided the data for this report, the average age of consumers residing in Florida or California with a mortgage in June 2022 was just over 54.

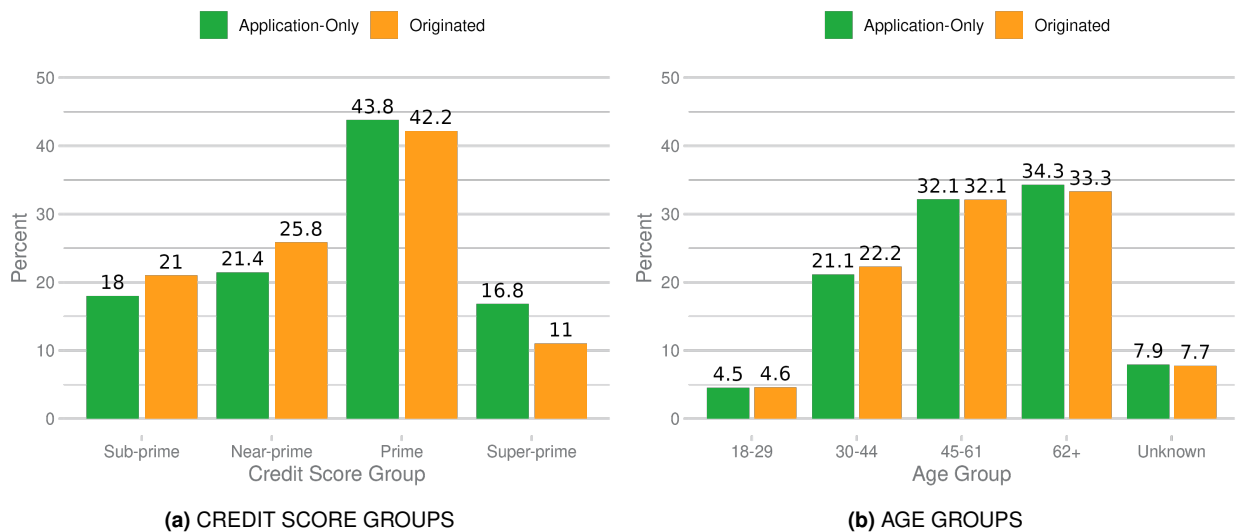
<sup>29</sup> The primary mortgage payment amount as reported in the credit record data will typically include property taxes and insurance when consumers escrow those payments through their mortgage servicer. However, we do not observe in the data whether any particular mortgage account has an escrow.

**TABLE 6: CREDIT CHARACTERISTICS OF PACE BORROWERS AND APPLICANTS AS OF THE MOST RECENT CREDIT RECORD ARCHIVE PRIOR TO PACE ORIGINATION**

	Originated	Application-Only	Denied
Average Number of Credit Accounts	7.4	7.6	6.2
Share Scored	98.9%	98.9%	98.4%
Average Credit Score	669	685	656
Average Age in 2022	55.1	55.7	56.2
Share with a Mortgage	70.8%	67.2%	58.3%
Average Mortgage Balance	\$264,947	\$246,979	\$286,278
Average Monthly Mortgage Payment	\$1,877	\$1,817	\$1,894
Share with an Auto loan	53.9%	50.2%	45.4%
Share with a Credit Card	89%	89.5%	81.3%
Average Total Credit Card Limit	\$28,620	\$32,865	\$23,237
Average Credit Card Balance	\$9,205	\$8,338	\$6,463
Share with a Student loan	19.1%	17%	15.6%
Share with Any Collection	25.6%	24.6%	31.9%
Share with a Medical Collection	13.3%	13.6%	16.6%
N	87,001	46,906	73,537

Statistics are as of the most recent June or December credit record archive prior to the origination date or application date for each consumer. Number of credit accounts includes mortgages, credit cards, auto loans, student loans, and home equity loans. Mortgage balance and monthly payment are conditional on having a mortgage; credit card measures are unconditional.

**FIGURE 1: DISTRIBUTION OF ORIGINATED AND APPLICATION-ONLY CONSUMERS ACROSS CREDIT SCORE AND AGE GROUPS**



erage, Originated PACE borrowers had almost \$29,000 in combined credit limits across all card accounts, with an average combined balance of about \$9,200. Many PACE borrowers had collections items on their credit reports, including about 13 percent who had medical collections.<sup>30</sup>

Application-Only consumers largely had credit profiles similar to those of Originated consumers. A somewhat smaller share of Application-Only consumers had a mortgage or auto loan before their PACE Experience Date. On average they had somewhat more credit card credit available as well, with higher average limits and lower average balances. Consumers in the Denied category had significantly different credit profiles, being much less likely to have a mortgage and other types of credit, and more likely to have collections tradelines on their credit records.

For some Originated consumers, we can characterize the total indebtedness resulting from acquiring the PACE loan. As noted in Section 2, we do not have income data for a majority of the sample, so these statistics may not be representative of PACE borrowers as a whole. Nonetheless, where income is reported, we can estimate a debt-to-income (DTI) ratio. For this analysis, we total the payments due across all credit accounts in the credit record data, add the annual PACE amount divided by 12, and then divide the result by monthly income.<sup>31</sup> Figure 2 shows the distribution of estimated DTI for Originated PACE borrowers. The most common DTI values were between 25 and 35 percent, with another cluster of DTI ratios between 5 and 10 percent. A substantial minority of PACE borrowers (29 percent) with reported income had estimated DTI ratios in excess of 40 percent, levels at which mortgage lenders generally will not be willing to make a loan.

For the nearly three quarters of PACE borrowers with a primary mortgage at their PACE Experience Date, the PACE loan payments will tend to be linked to the amount of the consumers' monthly mortgage payments. For consumers whose mortgage servicers escrow property tax payments on their behalf, this link is easy to see—the PACE payments increase the consumers' property tax bill, and servicers will increase required escrow payments to cover the higher tax payment. Even when consumers do not have an escrow account, required mortgage payments may ultimately increase if the consumer has difficulty paying the PACE loan. Mortgage servicers will generally cover a missed tax payment to protect the security interest in the property, and will then recover the amounts advanced by establishing an escrow account for the consumer. Failure to make full mortgage payments, including the increased escrow payment, can result in delinquency and ultimately foreclosure.

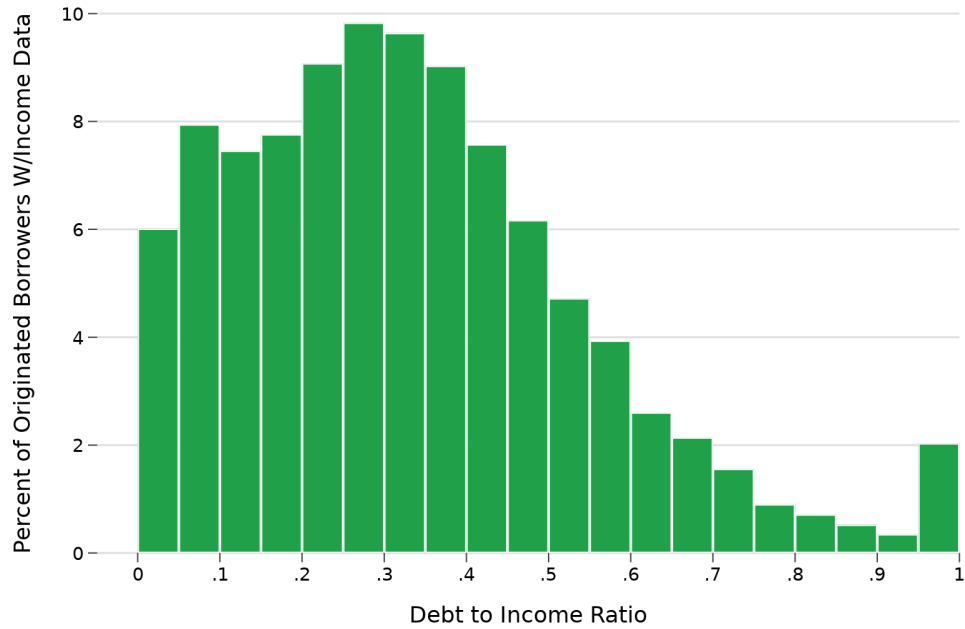
We do not observe in the credit record data whether consumers with a mortgage have an escrow

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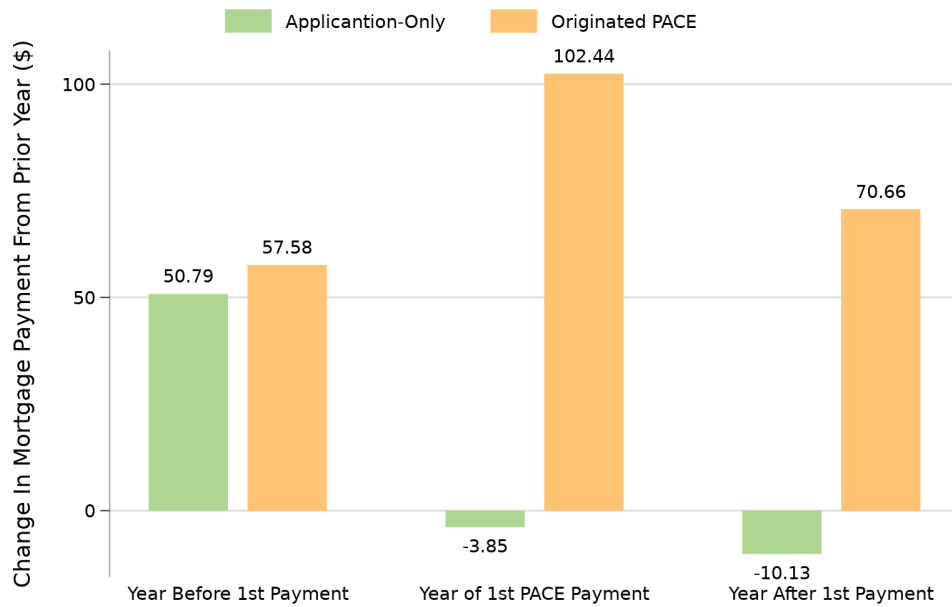
<sup>30</sup>This is somewhat lower than the average for all consumers with a credit report during this period, which declined from almost 20 percent in 2017 to about 14 percent in 2022. See Lucas Nathe & Ryan Sandler, Paid and Low-Balance Medical Collections on Consumer Credit Reports, Consumer Credit Trends Report (July 2022). Available at <https://www.consumerfinance.gov/data-research/research-reports/paid-and-low-balance-medical-collections-on-consumer-credit-reports/>

<sup>31</sup>This calculation is only intended to be illustrative of the overall indebtedness of PACE borrowers. There may be additional considerations if a PACE company were to calculate DTI for purposes of underwriting, such as how to handle the less-than-monthly frequency of the PACE payment.

**FIGURE 2:** ESTIMATED DEBT TO INCOME RATIOS OF ORIGINATED PACE BORROWERS AT THE TIME OF ORIGINATION.



**FIGURE 3:** AVERAGE CHANGES IN MORTGAGE PAYMENTS FOR PACE APPLICANTS AND ORIGINATED BORROWERS



account, but we can observe changes in mortgage payments over time. Figure 3 shows the average year-over-year change in mortgage payments for Originated and Application-Only consumers

around their PACE Experience Date.<sup>32</sup> Average primary mortgage payments for Originated and Application-Only consumers increased in the year before their First PACE Due Date, compared to two years prior to their First PACE Due Date. Application-Only consumers saw their mortgage payments stay roughly constant or decline slightly in the year of their First PACE Due Date. Originated borrowers, on the other hand, saw average increases of over \$100 in their monthly mortgage payments in the year following their First PACE Due Date relative to the prior year, and an average increase of over \$71 per month in the year after. The continued or delayed increase in mortgage payments is to be expected, since mortgage servicers may not increase required escrow payments to collect for the PACE loan until an annual escrow account analysis, which could be up to a year after the first PACE payment becomes due as part of the consumer's property tax bill. For additional detail on primary mortgage payments, in Figure A2 in the Appendix we show the full distribution of mortgage payment changes for Originated and Application-Only consumers in each year around their First PACE Due Date. In brief, the distributions are very similar across the two groups the year before the First PACE Due Date, then diverge in the year of the First PACE Due Date.

Although the PACE transaction data and linked credit record data have limited information on the demographics of the consumers who applied for PACE loans, we can characterize the census tracts (roughly equivalent to neighborhoods) that PACE applicants resided in. Table 7 summarizes the demographics of PACE applicants' census tracts, based on data from the American Community Survey. The first column reports the averages for all PACE applications in our data, including those that did not have a credit record match. The next three columns show averages for consumers with a credit record match, with separate columns for all PACE consumers, Originated PACE consumers, and Application-Only PACE consumers. Finally, the last column of the Table shows average characteristics of all census tracts in California or Florida for comparison. The top panel shows characteristics for consumers in both States, the middle panel shows characteristics for consumers in California, and the bottom panel shows characteristics for consumers in Florida.

Broadly, we see little difference between the average census tract characteristics of the different subsets of PACE applicants, with similar characteristics across applicants with and without a credit record match and across Originated and Application-Only records. We do see significant differences in tract level demographics between census tracts of PACE applicants and the States as a whole. The average share of Black and Hispanic residents in census tracts where PACE applicants reside was significantly higher than the average for all census tracts in California and Florida. At the same time, PACE applicants were more likely to reside in census tracts with higher median income, higher education, and lower shares that speak English less than very well. These characteristics are consistent with the fact that PACE borrowers must be homeowners, which will tend to be correlated with higher socioeconomic status. PACE loans were primarily made in non-rural areas. PACE applicants lived in census tracts with smaller rural populations

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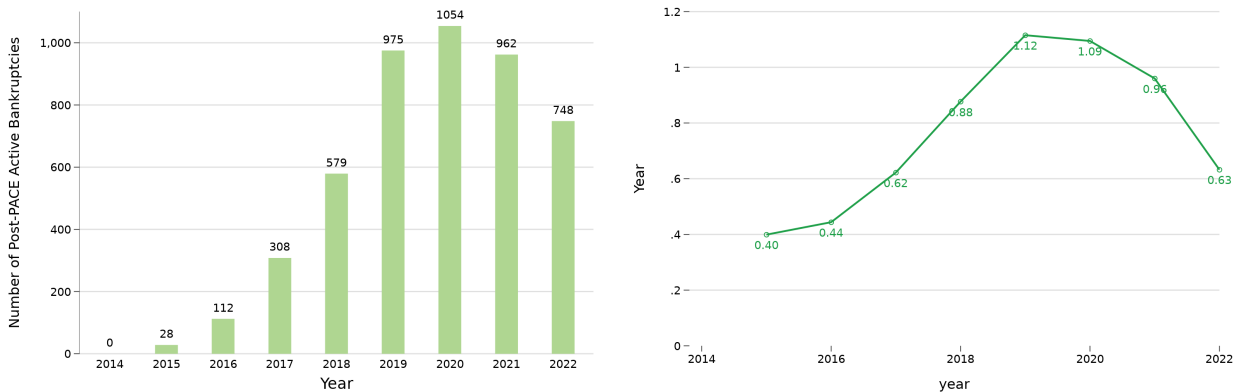
<sup>32</sup>The analysis in this Figure is limited to consumers who had a mortgage immediately prior to their PACE Experience date. Average changes in each period also exclude consumers who did not have a mortgage in the current or prior period. That is, the Figure reflects changes in payment amount between years on existing accounts, not changes from new mortgages being opened or existing mortgages being paid off.

**TABLE 7: CENSUS TRACT DEMOGRAPHIC CHARACTERISTICS OF PACE APPLICANTS**

	<i>All States</i>				
	All Apps	Credit Record Match			All Tracts
		All Apps	Originated	App Only	
Percent White	58.9	59.7	60.4	61.2	65.2
Percent Black	14.9	14.3	13.9	15.3	9.3
Percent Asian	7.7	7.9	8.1	6.9	9.8
Percent Hispanic	42.0	40.5	38.7	40.8	32.9
Median Household Income	72506.8	73499.7	74614.8	73182.2	66102.7
Percent < HS	17.2	16.5	15.5	15.5	17.5
Percent English < VW	4.6	4.6	4.7	4.5	5.4
Percent Rural	3.9	4.0	3.8	3.3	6.2
<i>California</i>					
	All Apps	Credit Record Match			All Tracts
		All Apps	Originated	App Only	
Percent White	57.2	58.1	59.0	58.9	60.1
Percent Black	8.6	8.1	7.9	8.2	6.0
Percent Asian	11.0	11.3	11.6	11.3	13.6
Percent Hispanic	43.3	41.5	38.7	40.3	37.8
Median Household Income	76104.2	77593.7	79128.5	76510.0	71881.4
Percent < HS	19.6	18.5	17.1	18.2	19.4
Percent English < VW	4.9	5.0	5.2	5.1	6.6
Percent Rural	5.3	5.3	5.1	5.1	4.9
<i>Florida</i>					
	All Apps	Credit Record Match			All Tracts
		All Apps	Originated	App Only	
Percent White	61.5	62.2	62.5	63.5	75.1
Percent Black	24.5	23.9	23.2	22.2	15.8
Percent Asian	2.5	2.5	2.5	2.6	2.5
Percent Hispanic	40.0	39.0	38.7	41.2	23.4
Median Household Income	66965.9	67087.1	67498.4	69981.0	54882.8
Percent < HS	13.6	13.3	13.1	12.9	13.8
Percent English < VW	4.0	4.0	3.8	4.0	2.9
Percent Rural	1.8	2.0	1.8	1.6	8.6

Unit of observation is a PACE application in the first column, a consumer who applied for PACE in the second, third and fourth columns, and a census tract in California and Florida (weighted by population) in the last column.

**FIGURE 4: NUMBER AND SHARE OF PACE BORROWERS IN ACTIVE BANKRUPTCY OVER TIME**



than their States as a whole; moreover California and Florida overall have smaller rural population shares than the national average.<sup>33</sup>

Bankruptcy is a fairly rare occurrence among PACE borrowers (as it is in the U.S. population as a whole). Figure 4 shows the number and share of PACE borrowers who both had an outstanding PACE loan and were in active bankruptcy in each year between 2014 and 2022 according to the credit record data.<sup>34</sup> The number of PACE borrowers in bankruptcy peaked in 2019, with less than 1,000 Originated borrowers in active bankruptcy, representing about 1.1 percent of all borrowers with outstanding PACE loans at the time.<sup>35</sup>

### 3.3 PACE industry practices

We now examine what the data can tell us about the lending practices of PACE companies. As discussed above, PACE loans are relatively expensive compared to typical primary mortgages. PACE pricing from July 2014 to June 2020 tended to be tightly bunched, with about half of all PACE loans having estimated APRs between 8.3 and 9 percent. Most of the variation in pricing seems to be across States and project types. Table 8 shows the estimated average APR for PACE loans in California and Florida, broken out by the type of home improvement project the loan

<sup>33</sup>Rural percentage is based on the 2010 Decennial Census, in which about 19 percent of the U.S. population as a whole lived in areas that are “rural” as defined by the Census Bureau. California and Florida had the smallest and 6th smallest rural population shares, respectively, of all U.S. States in 2010.

<sup>34</sup>We define “active bankruptcy” as having filed for bankruptcy under Chapter 7 or Chapter 13 of the U.S. bankruptcy code, but not yet having received either a discharge or a dismissal in their case. In the Figure, a consumer is considered in active bankruptcy in a given year if they were in active bankruptcy at any time during that calendar year; this could potentially represent multiple bankruptcy filings.

<sup>35</sup>The rate of bankruptcies among Application-Only borrowers is somewhat higher than among Originated borrowers (not shown). Using the CFPB’s Consumer Credit Panel, we estimate that the share of consumers with a credit record in active bankruptcy using the same methodology as we use above declined from about 1 percent in 2014 to about 0.2 percent in 2022, consistent with a general secular decline in bankruptcy filing. See, e.g., <https://www.uscourts.gov/news/2022/02/04/bankruptcy-filings-drop-24-percent>.

**TABLE 8: AVERAGE ESTIMATED APR OF ORIGINATED PACE LOANS BY STATE AND PROJECT TYPE**

Project Type	California	Florida
Solar	8.478	6.249
Windows	8.766	8.105
HVAC	8.820	8.847
Disaster	8.776	8.329
Roofing	8.737	8.241
Other	8.876	8.703
Total	8.681	8.289

funded.<sup>36</sup> Estimated APRs were almost 0.4 percentage points higher for PACE loans in California than for PACE loans in Florida.<sup>37</sup> This is evident in most project types but especially for projects with solar panels in Florida, which had APRs more than two percentage points lower on average than solar projects in California. Although these are raw averages, these differences across State and project type persist if we conduct a regression analysis to control for other factors such as origination year, credit score, or loan amount.<sup>38</sup> It is not clear what drives variation in the pricing of PACE loans, but it does not appear to be a function of traditional measures of credit risk.

Next, we explore which factors are associated with PACE applications being approved. Although PACE companies do not formally underwrite based on credit history, most PACE applications in the data from the PACE companies include a commercially available credit score (separate from the linked credit record data). Figure 5 shows the share of PACE applications that were approved by the PACE company for consumers in each of four credit score tiers.<sup>39</sup> Approval rates rise steadily with credit score tiers, with applications from consumers with super-prime credit scores more than 20 percentage points more likely to be approved than applications from consumers with deep sub-prime credit scores. Because of missing data in rejected applications, it is difficult to conduct a regression analysis for the outcome of approval that controls for other factors beyond credit score and is generally applicable across PACE applications. However, the general pattern in approval rates across credit score tiers also holds in a regression analysis that controls for other loan characteristics, including time and State.

Finally, we examine how often consumers receive multiple PACE loans. Consumers who are sat-

<sup>36</sup>This Table uses all PACE loans, including those with no match to the credit record data; the results using matched PACE loans are nearly identical.

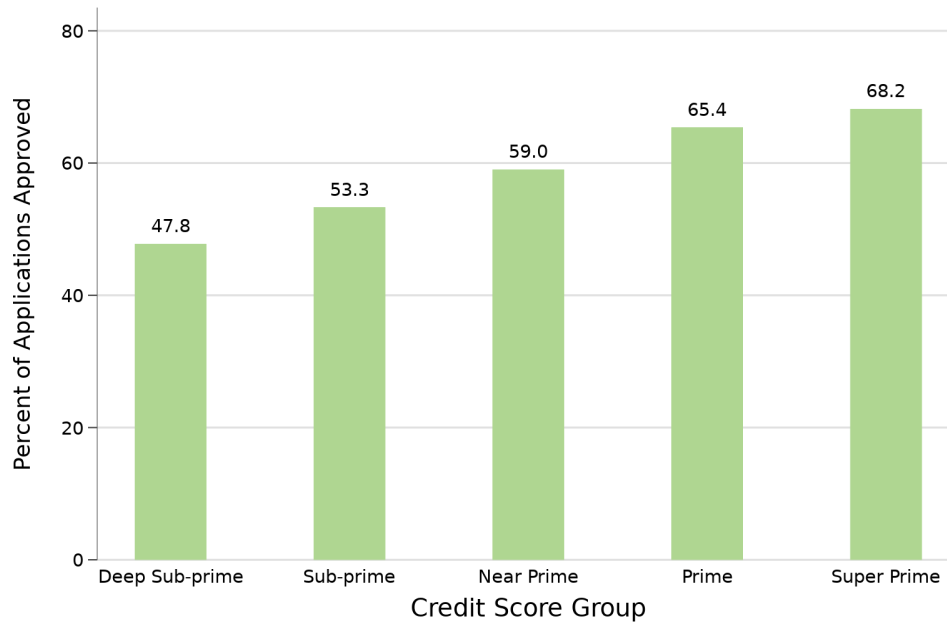
<sup>37</sup>Note that this is not due to differences in upfront fees, which are included in our calculation of estimated APR—the raw interest rates are higher in California by a similar margin on average.

<sup>38</sup>In that regression analysis (not shown), factors such as credit score are correlated with estimated APR in expected ways, but the associations are so small in magnitude as to be negligible. For instance, consumers with deep sub-prime credit scores had statistically significantly higher APRs on average compared to consumers with super-prime credit scores, but the difference is less than five basis points on average.

<sup>39</sup>Again, this Figure uses all PACE applications, including those unmatched to the credit record data, but the statistics are similar when limited to matched applications. For how the Bureau typically defines credit score tiers, see, *e.g.* <https://www.consumerfinance.gov/data-research/consumer-credit-trends/credit-cards/borrower-risk-profiles/>.



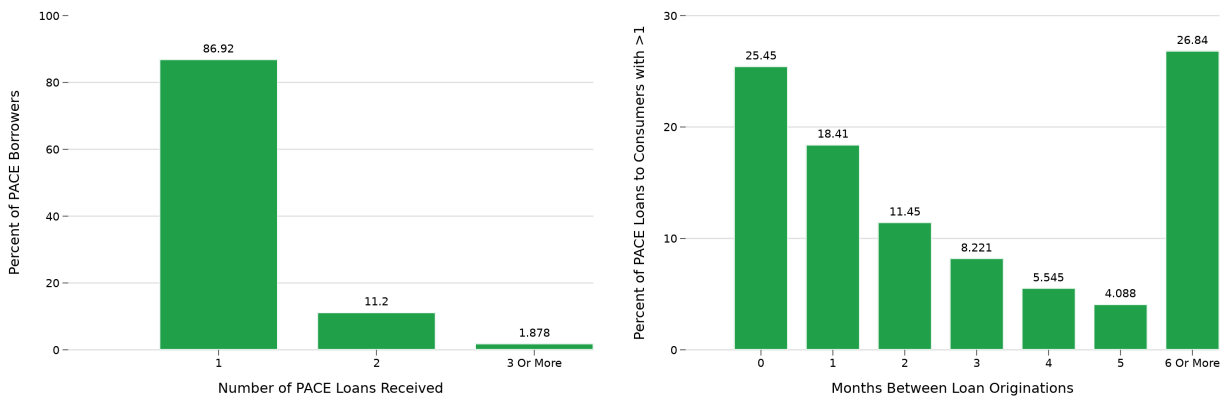
**FIGURE 5:** SHARE OF PACE APPLICATIONS APPROVED BY CREDIT SCORE TIER OF APPLICANT



ified with their PACE loan product might seek out multiple loans over time as they either engage in further home improvement projects, or move and make energy efficiency improvements on their new homes. Consumers who own multiple homes may also acquire PACE loans on separate properties. However, multiple PACE loans in a short period of time on the same property may indicate problematic sales practices, such as loan splitting—separating what is essentially one obligation into pieces to make the overall balance look smaller and thus meet lending standards more easily. We would expect that loans made close together in time are more likely to be problematic. Because the data used in this report do not identify the PACE company that made each loan, when we see multiple PACE loans to the same consumer, we cannot tell whether a single PACE company knowingly made multiple loans to the same consumer (whether close in time or not), or whether the home improvement contractor who marketed the loans instead connected the consumer with multiple PACE companies without the companies’ knowledge.

Figure 6 reports the frequency of multiple PACE loans to the same consumer and the spacing of those loans in time. As shown in the left panel of the Figure, the vast majority of consumers in our data, almost 87 percent, received exactly one PACE loan. About 11 percent received two PACE loans, and less than two percent received three or more loans. The right panel shows that about a quarter of consumers with multiple PACE loans had both loans originated in the same month. Another quarter had at least six months between originations, which could be more consistent with distinct home improvement projects. The remaining half of consumers with multiple loans are more ambiguous, with between one and five months elapsing between originations.

**FIGURE 6: FREQUENCY AND TIMING OF MULTIPLE PACE LOANS MADE TO THE SAME CONSUMER**



## 4. Impact of PACE loans on borrower credit outcomes

Although PACE loans can allow consumers to finance important home improvements, they have the potential to create or contribute to financial hardship. In the previous section, we showed that PACE assessments can more than double some consumers' property tax bills. Some consumers may not be able to pay the extra amount, such that the PACE payment can lead to negative financial consequences. In this section, we estimate the causal effect of acquiring a PACE loan on consumer financial outcomes, using Application-Only consumers as a control group to approximate what would have happened to Originated consumers if they had not received the PACE loan.

We focus primarily on mortgage delinquencies of 60 days or longer. This outcome captures consumers' ability to repay the PACE loan payment most directly relative to other potential outcomes, including property tax delinquency. Most PACE borrowers have a primary mortgage, and for consumers with a primary mortgage, failure to pay property taxes will result in a mortgage delinquency, as mortgage servicers will generally ensure payment of property taxes at the borrower's expense regardless of whether the borrower normally pays property taxes through an escrow account. We focus on 60-day delinquencies specifically because they are both a serious negative outcome, but are also relatively common among PACE consumers pre-PACE, providing enough statistical precision to study smaller subgroups.<sup>40</sup> We also examine effects on rarer but more serious delinquency outcomes such as foreclosure and bankruptcy filings. In addition, we study other financial outcomes such as credit card balances, since consumers frequently prioritize paying their mortgage and property taxes over other financial obligations, and may do so in response to property taxes straining their budgets.<sup>41</sup> These other financial outcomes are particularly relevant for consumers without a primary mortgage, who may reasonably prioritize property tax payments over payments on their credit accounts. We also test which particular groups of consumers experience difficulty making their PACE payments.

The key results of this section are:

- We find clear evidence that PACE loans increase primary mortgage delinquency for Originated consumers with a pre-existing mortgage. The probability of a primary mortgage delinquency increases by 2.5 percentage points over a two-year period, compared to the

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<sup>40</sup>The focus on delinquencies of 60 days or longer is consistent with the CFPB's previous analysis of early delinquency. See, e.g., Bureau of Consumer Financial Protection, *Ability-to-Repay and Qualified Mortgage Rule Assessment Report*, (Jan. 2019), [https://files.consumerfinance.gov/f/documents/cfpb\\_ability-to-repay-qualified-mortgage\\_assessment-report.pdf](https://files.consumerfinance.gov/f/documents/cfpb_ability-to-repay-qualified-mortgage_assessment-report.pdf). However, we obtain substantially similar results using 30-day delinquencies, shown in the Appendix.

<sup>41</sup>See, e.g., Jacob Conway & Matthew Plosser, *When Debts Compete Which Wins?* Liberty Street Economics (Mar. 2017), available at <https://libertystreeteconomics.newyorkfed.org/2017/03/when-debts-compete-which-wins/>. Note that such payment hierarchies tend to shift over time.

trend of Application-Only consumers. For comparison, the two-year primary mortgage delinquency rate for Originated borrowers was about 7.1 percent pre-PACE. This means that for the average consumer who receives a PACE loan, their probability of delinquency increases 35 percent relative to the estimated counterfactual with no PACE loan.

- PACE loans increase primary mortgage delinquency the most for consumers who had low credit scores pre-PACE. Lower priced PACE loans had a smaller effect, but otherwise we do not find significant heterogeneity across other dimensions considered.
- PACE loans have some impact on credit card balances, but this effect is concentrated in PACE borrowers without a pre-existing mortgage.

## 4.1 Methodology

Consumers may experience negative financial outcomes for any number of reasons unrelated to acquiring a PACE loan. To disentangle the impact of a PACE loan on borrowers, we estimate a difference-in-differences regression model. Difference-in-differences is a quasi-experimental design that compares the changes in a treated group before and after treatment to the corresponding change in a control group. In this context, Originated consumers are the treated group, while Application-Only consumers are the control group. In simple terms, the difference-in-differences model follows the Originated and Application-only groups over time and looks at how each group's outcomes change after their PACE loans are (or would have been) originated.

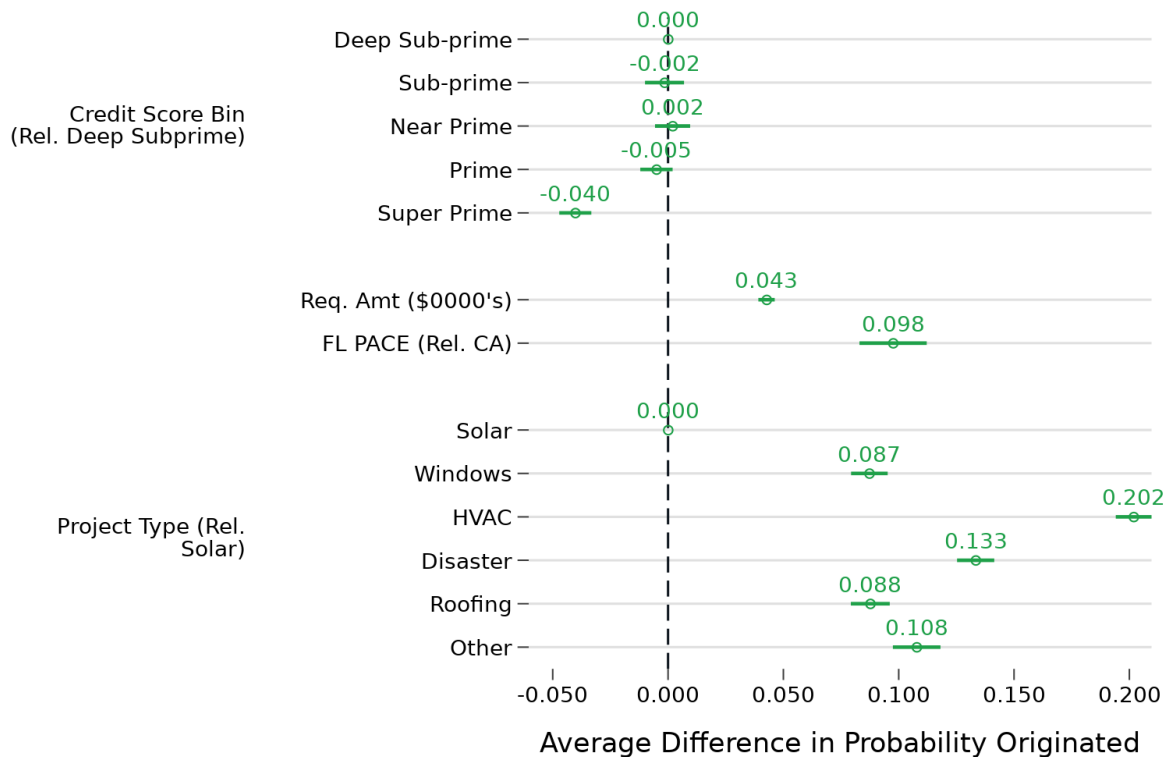
### 4.1.1 Assumptions

The key assumption in a difference-in-differences analysis is that any factors unrelated to PACE will be changing at the same rate for both the treated group (Originated consumers) and the control group (Application-Only consumers). The technical term for this is “parallel trends.” Put another way, our estimates may show that average outcomes for Originated consumers diverged from Application-Only consumers around the time of their PACE experience. This will represent the causal effect of PACE lending on outcomes, unless there is some other factor that was not just different between the two groups, but changing at a different rate over time.

Because there are some differences between Originated consumers and Application-Only consumers in the characteristics we observe, it is important to consider the ways in which this could influence our analysis and undermine the parallel trends assumption.

We start by examining what factors lead some approved PACE applicants to originate a loan, and others not. We estimate a regression analysis using approved PACE applications to predict the association between several loan characteristics and whether each application was originated. We focus on credit score tier, project type, requested project amount, and State, but also control

**FIGURE 7: FACTORS ASSOCIATED WITH THE SHARE OF APPROVED PACE APPLICATIONS THAT RESULT IN AN ORIGINATED PACE LOAN**



Note: Points represent coefficients calculated from a regression of the probability that an approved PACE application is originated on application characteristics. The unit of observation is a PACE application, including applications that did not have a credit record match. Horizontal lines indicate 95 percent confidence intervals based on heteroskedasticity-robust standard errors. In addition to the coefficients listed, the regression includes fixed effects for month-of-year and State-by-application year.

for the month and year each application was received. The results of this analysis are shown in Figure 7. Each point shows the average difference in the share of approved applications that were originated associated with each variable. For the categorical variables, this should be interpreted as relative to the first category in each group (deep sub-prime credit scores, solar project type). The horizontal bars indicate the 95 percent confidence interval for each estimate.

Credit score tier is largely uncorrelated with the probability of origination. However, borrowers with super-prime credit scores are about four percentage points less likely to originate a PACE loan if they have an approved application. Applications involving solar panels were significantly less likely to result in an originated loan than other project types, while HVAC projects were significantly more likely than other project types to be originated.

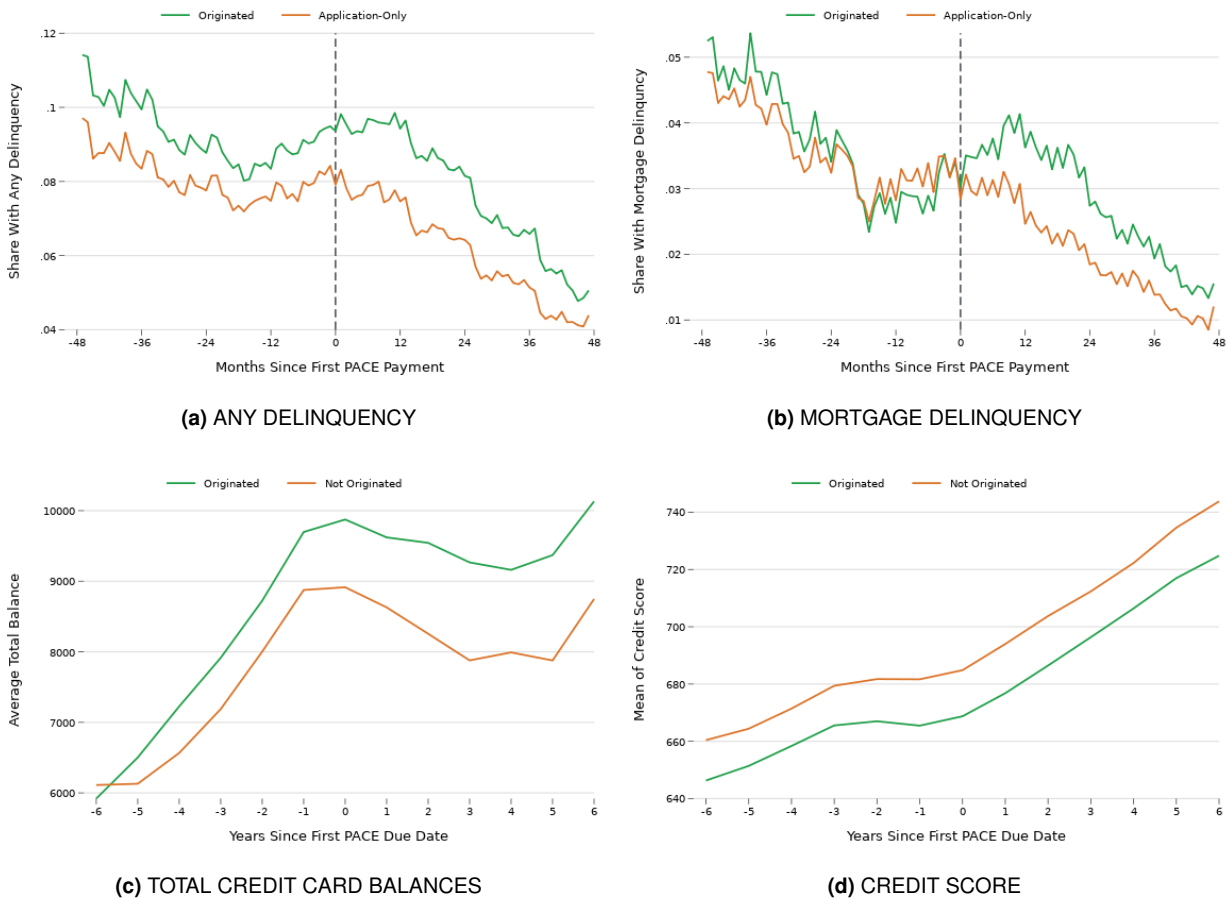
Together, the results on project type and credit score tier suggest that consumers were somewhat more likely to originate a PACE loan, conditional on approval, when they had fewer other financing options on the margin. Super-prime borrowers are likely to have access to other sources of credit, particularly home equity lines of credit. There are other, typically unsecured, options for

solar financing available (again, particularly for higher credit score borrowers).

If Application-Only consumers had more financing options and as a result had a systematically different trend in their outcomes, we might expect them to have better outcomes than Originated consumers for reasons unrelated to the PACE loans. If this is the case our difference-in-differences estimates would erroneously find that Originated consumers had worse outcomes as a result of PACE loans, relative to the true effect. However, as we show in Section 4.2.2, we continue to find effects on mortgage delinquency if we only compare within credit score tier, and we find larger effects in lower credit score tiers. Similarly, we find essentially identical effects when we limit our analysis to consumers with the same project type. Another way to test this is to use Denied consumers as part of the control group, or as the entire control group. If an estimate using Application-Only consumers makes Originated consumers look worse off than they actually are, we would expect the opposite from using Denied consumers. By definition, Denied consumers failed to meet the eligibility criteria for acquiring a PACE loan, eligibility criteria which were at times very limited. As a result, Denied consumers presumably were on a trend to have poor outcomes going forward. In the appendix we present the difference-in-differences results using Denied consumers as a control group (Appendix Tables A5 and A6). In fact, we find that the effect of PACE loans on most outcomes is worse using Denied consumers in the control group compared to our preferred version using Application-Only consumers.

Finally, as a more direct test of the parallel trends assumption, we can examine in the raw data how consumers' financial outcomes evolved around the time of their PACE experience. Figure 8 plots the averages of some key outcomes for both Originated PACE borrowers and Application-Only consumers over time, with time denominated relative to the First PACE Due Date. Panel (a) plots the share of consumers with any delinquency on a credit account in each month leading up to and following their First PACE Due Date. Overall delinquency rates generally declined over time, with Originated consumers and Application-Only consumers generally moving in sync prior to their PACE experience, and possibly an increase in delinquency for Originated borrowers post-PACE. Panel (b) focuses on average mortgage delinquency rates, and again we see a broad decline over time, with Originated consumers and Application-Only consumers moving in tandem, but in a preview of our difference-in-differences results, we see a notable increase for Originated borrowers after the First PACE Due Date. Pre-PACE, monthly mortgage delinquency rates for Originated and Application-Only consumers were never more than 0.5 percentage points apart, and often much closer. After the First PACE Due Date, Originated consumers have monthly mortgage delinquency rates around one percentage point higher. Panels (c) and (d) show the average credit card balances and average credit score of PACE consumers, measured annually as these outcomes are not observed between credit record snapshots. Both credit card balances and credit scores rise over time, with similar trends for Originated borrowers and Application-Only consumers, although possibly credit card balances diverge somewhat post-PACE.

**FIGURE 8: AVERAGE CREDIT OUTCOMES FOR ORIGINATED AND APPLICATION-ONLY CONSUMERS AROUND THE TIME OF THEIR FIRST PACE DUE DATE**



The tests discussed above give some assurance that our assumption of parallel trends between Originated and Application-Only consumers is a reasonable assumption. However, we acknowledge that Application-Only consumers are not a perfect control group, and thus it is possible that the true effect of PACE loans may differ somewhat from the difference-in-differences estimates we present in this report.

### 4.1.2 Empirical specification

In the difference-in-differences analysis we take two approaches for dealing with time:

1. **“Static” model.** In this version, we aggregate the outcomes over time into two two-year periods for each consumer. Period 1 is the two years immediately before their PACE Experience Date, and period 2 is one to three years after. The year immediately following the PACE Experience Date is not included, as this will typically be the period between when the loan was originated and when the first payment was due. For the binary outcomes such

as delinquency, we measure whether the outcome occurred at any point during each two-year period. For continuous variables like credit card balances, we take the average across each annual or semi-annual credit record archive that falls in the two-year period. The static model omits consumers for whom we cannot track outcomes for both of the full two-year periods before and after the PACE Experience Date. These omitted consumers appear in the dynamic model described below. For details on how many consumers are excluded due to insufficient data, see Appendix A. The static model is estimated with a regression analysis that controls for census tract and loan characteristics.<sup>42</sup>

2. **“Dynamic” model.** In this version we keep the data at the most disaggregated level available for the particular outcome (either monthly, or annual/semi-annual). The before/after split occurs at the First PACE Due Date. This version allows us to track how outcomes evolve over time and allows us to include all consumers, regardless of their PACE Experience Date. Note that binary outcomes such as delinquency will be less common in higher-frequency data (a consumer is more likely to be delinquent at some point in a two-year period than to be delinquent in any specific month), so effect sizes may be smaller in this sample for those outcomes. The dynamic model is also estimated with a regression analysis, controlling for consumer characteristics that do not evolve over time.<sup>43</sup>

Each model has its own advantages. The static model provides the cleanest comparison, with equal-length before and after periods for each consumer, but requires us to drop a portion of the sample. The dynamic model uses more of the data, but it provides less of a clean comparison.

## 4.2 Effect of PACE on credit delinquency

In this section, we present the results of the difference-in-differences analysis for delinquency outcomes, using both the static and dynamic models described above.

<sup>42</sup> Specifically, we estimate

$$y_{it} = \beta_1 \text{Originated}_i + \beta_2 \text{After}_t + \beta_3 \text{Originated}_i * \text{After}_t + \gamma X_{it} + \epsilon_{it},$$

where  $t$  indexes time (either before or after the PACE Experience Date),  $i$  indexes consumers,  $\text{After}_t$  is an indicator equal to one if  $t$  is a post-PACE observation,  $\text{Originated}_i$  is an indicator equal to one if the consumer is Originated and zero if they are Application-Only, and  $X_{it}$  is a vector of controls. In all regressions  $X_{it}$  includes census tract characteristics, year of origination, original balance or requested amount, State of residence, year of origination, and pre-PACE credit score. The coefficient  $\beta_3$  on the interaction between  $\text{After}$  and  $\text{Originated}$  captures the difference-in-differences effect of PACE on the outcome  $y$ , and is what we present in the tables and figures in this report.

<sup>43</sup> Specifically, we estimate

$$y_{it} = \beta_1 \text{After}_t + \beta_2 \text{Originated}_i * \text{After}_t + \alpha_i + \delta_t + \epsilon_{it},$$

Where  $t$  indexes time (months or credit record snapshots),  $i$  indexes consumers,  $\text{After}_t$  is an indicator equal to one if  $t$  is a post-First PACE Due Date observation,  $\text{Originated}_i$  is an indicator equal to one if the consumer is Originated and zero if they are Application-Only, and  $\alpha_i$  and  $\delta_t$  are time and consumer fixed effects, respectively. Because consumer fixed effects will subsume all characteristics that are constant within a consumer over time, we are implicitly controlling for all the characteristics in the static regressions and more besides, including the base level of the  $\text{Originated}$  indicator. The coefficient  $\beta_2$  on the interaction between  $\text{After}$  and  $\text{Originated}$  captures the difference-in-differences effect of PACE on the outcome  $y$ , and is what we present in the tables in this report. We also include a control for whether  $t$  is between the PACE Experience Date and the PACE Due Date. It is possible that consumers may anticipate and change their behavior before payments are due, so this control allows us to more precisely estimate the impact of the payments actually being due. We use the Stata package `reghdfe` for estimation, see Sergio Correia, Linear Models with High-Dimensional Fixed Effects: An Efficient and Feasible Estimator, Working Paper (2017). <http://scorreia.com/research/hdfe.pdf>



**TABLE 9: DIFFERENCE-IN-DIFFERENCES ESTIMATES OF THE EFFECT OF PACE LOANS ON 60 DAY DELINQUENCY OUTCOMES FOR ORIGINATED CONSUMERS**

Effect of PACE Loan On:	Static Model	Dynamic Model
Any Credit Delinquency	0.0156*** (0.00326)	0.00263*** (0.000600)
Pre-PACE Average Outcome	0.213	0.050
Sample Size	199,807	13,384,460
Mortgage Delinquency	0.0251*** (0.00234)	0.00361*** (0.000453)
Pre-PACE Average Outcome	0.072	0.017
Sample Size	156,360	10,452,637
Credit Card Delinquency	0.0103*** (0.00307)	0.000473 (0.000411)
Pre-PACE Average Outcome	0.146	0.025
Sample Size	186,598	12,482,884

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Main statistics in each row report the difference-in-differences estimate of the effect of having an originated PACE loan on the outcome in question, using Application-Only consumers as a control group. That is, these are coefficient estimates on the interaction between an indicator for being an Originated consumer and the current time being in the post-PACE period. Each statistic is from a separate regression. Regressions in the “Static Model” column use two observations per consumer covering the two years prior to their PACE Experience Date and 1–3 years after. These regressions control for census tract characteristics, state of residence, pre-PACE credit score and original balance or requested amount. Regressions in the “Dynamic Model” column have one observation per consumer per month and include time period fixed effects, year of PACE experience fixed effects, consumer fixed effects and an indicator for the current month being between the consumer’s PACE experience date and their First PACE Due Date. Pre-PACE Average Outcome is the average of the outcome variable for Originated borrowers for the two years prior to their PACE Experience Date, in the Static Model column, and the average for months prior to their First PACE Due Date, in the Dynamic Model column. Standard errors clustered by consumer reported in parentheses.

#### 4.2.1 Average effect of PACE on all PACE borrowers

Table 9 displays the impact of receiving a PACE loan on a subset of delinquency outcomes.<sup>44</sup> For each delinquency outcome, the sample is limited to consumers who had at least one account of the relevant type as of the credit record snapshot immediately prior to their PACE Experience Date. The Table also lists the average of the outcome variable for Originated borrowers in the pre-PACE period in each analysis to give a sense of the relative frequency of these delinquencies. “Any delinquency” is the most common; about 21 percent of Originated borrowers had some kind of delinquency in the two years before their PACE Experience Date in the static model and about 9 percent of pre-PACE consumer-months had a delinquency in the dynamic model. Because these are binary outcomes, both the means and effect sizes are smaller in the dynamic model. Mortgage delinquency is the rarest delinquency listed.

<sup>44</sup> For the impact of PACE on student loan and auto loan delinquency, please refer to Appendix B.

We find that PACE loans cause Originated borrowers to have a significantly higher probability of experiencing any delinquency or mortgage delinquency in both the static and dynamic models. Originating a PACE loan increases the probability of mortgage delinquency by 2.5 percentage points in the two years after PACE experience date. In the dynamic model, the results are smaller; the probability of mortgage delinquency increases by 0.36 percentage points in any given month post-PACE. We only find a significant increase in credit card delinquency in the static model.

Table 10 shows differences-in-differences estimates for the effect of PACE loans on four rarer, but more serious, delinquency outcomes: 90-day delinquency on any credit account, 90-day delinquency on a primary mortgage, foreclosure on a mortgage,<sup>45</sup> and filing for bankruptcy. We caution that foreclosure may not be measured reliably. Mortgage servicers sometimes cease furnishing information on mortgage accounts that have become sufficiently delinquent that the servicer no longer expects payment, as would be the case for accounts that end in foreclosure. This means we will likely be missing foreclosures for both Originated and Application-Only consumers before and after their PACE Experience Dates. We find that PACE loans increase the probability of all of the serious outcomes considered in the table. In the static model, PACE loans increase both foreclosures and bankruptcy filings by about 0.5 percentage points for Originated borrowers over a two-year period after their PACE Experience Date. These effects are small in absolute magnitude, given the overall rarity of foreclosures and bankruptcy filings in the data, but are quite large relative to the pre-PACE averages of those outcomes. Only about 1 percent of Originated borrowers had a bankruptcy filing in the two years prior to their PACE Experience Date, and less than one percent had a foreclosure, meaning that those consumers' PACE loans increased the risk of bankruptcy and foreclosure by more than half.

We can also examine how the effect of PACE on 60-day primary mortgage delinquency evolves over time by generalizing the dynamic version of the difference-in-differences model. Rather than simply comparing outcomes before and after PACE payments become due, we can trace out the differences in each month relative to the First PACE Due Date. This is known as an event study analysis.<sup>46</sup> An event study of this nature effectively measures the difference between the lines for Originated and Application-Only consumers in Figure 8, but controlling for other characteristics.

<sup>45</sup> The code used in the credit record data to indicate a foreclosure can represent either a foreclosure start or a completed foreclosure, and does not distinguish whether the foreclosure was completed.

<sup>46</sup> Formally, we estimate

$$y_{ipt} = \sum_{d=-D}^D \beta_d \tau_d^t * Originated_i + \sum_{d=-D}^D \delta_d \tau_d^t + \gamma_t + \theta_i + \alpha_p + \varepsilon_{it},$$

where  $i$  indexes consumers,  $t$  indexes calendar time,  $p$  indexes the year of origination or application,  $d$  is the number of time periods after the consumer's First PACE Due Date (before for negative values) and  $\tau_d^t$  is an indicator equal to one if the current period  $t$  is  $d$  periods after the First PACE Due Date. The coefficients  $\delta_d$  capture the equivalent of the effect of *After <sub>$t$</sub>*  in the dynamic difference-in-differences, while the coefficients  $\beta_d$  capture the treatment effect of a PACE loan. The  $\beta_d$  coefficients and associated confidence intervals are what we plot in our event study figures. We note that event studies typically are not able to estimate event-time fixed effects (the  $\delta_d$  coefficients) separately from the treatment effects, as this requires the control group (Application-Only consumers in our context) to have a defined event time, something not usually available. The regressions include consumer, time and origination/application year fixed effects, which will subsume constant individual characteristics such as PACE loan features and census tract characteristics, but also control for an indicator for being after the PACE Experience Date and before the First PACE Due Date. In practice, we aggregate event-time  $d$  in units of three months (quarters) to obtain more precise estimates, and accumulate lags and leads beyond three years, such that the coefficients on  $\beta_{-36}$  and  $\beta_{36}$  should be interpreted as the effect of a PACE loan 36 months or more before and after the PACE due date.

**TABLE 10: DIFFERENCE-IN-DIFFERENCES ESTIMATES OF THE EFFECT OF PACE LOANS ON SEVERE DELINQUENCY OUTCOMES FOR ORIGINATED CONSUMERS**

Effect of PACE Loan On:	Static Model	Dynamic Model
Any Account 90DPD	0.0157*** (0.00326)	0.00263*** (0.000600)
Pre-PACE Average Outcome	0.2128	0.0502
Sample Size	199,807	13,384,460
Mortgage 90DPD	0.0190*** (0.00202)	0.00294*** (0.000392)
Pre-PACE Average Outcome	0.0481	0.0122
Sample Size	156,360	10,452,637
Foreclosure	0.00509*** (0.000872)	0.000409*** (0.000106)
Pre-PACE Average Outcome	0.0078	0.0011
Sample Size	156,360	10,452,637
Filed Bankruptcy	0.00537*** (0.000887)	0.000147*** (0.0000266)
Pre-PACE Average Outcome	0.0100	0.0005
Sample Size	202,187	13,556,038

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Main statistics in each row report the difference-in-differences estimate of the effect of having an originated PACE loan on the outcome in question, using Application-Only consumers as a control group. That is, these are coefficient estimates on the interaction between an indicator for being an Originated consumer and the current time being in the post-PACE period. Each statistic is from a separate regression. Regressions in the “Static Model” column use two observations per consumer covering the two years prior to their PACE Experience Date and 1–3 years after. These regressions control for census tract characteristics, state of residence, pre-PACE credit score and original balance or requested amount. Regressions in the “Dynamic Model” column have one observation per consumer per month and include time period fixed effects, year of PACE experience fixed effects, consumer fixed effects and an indicator for the current month being between the consumer’s PACE experience date and their First PACE Due Date. Pre-PACE Average Outcome is the average of the outcome variable for Originated borrowers for the two years prior to their PACE Experience Date, in the Static Model column, and the average for months prior to their First PACE Due Date, in the Dynamic Model column. Standard errors clustered by consumer reported in parentheses.

This type of analysis serves two purposes: First, it provides another test of the underlying assumption of the difference-in-differences model that absent the PACE origination, Originated consumers would have had similar outcomes to the Application-Only consumers. If the two groups were trending the same before the first PACE payment, controlling for characteristics, it stands to reason they would have continued trending together afterward, but for the PACE loans made to Originated consumers. The event study also allows us to detect whether the effect of PACE changes over time—the difference-in-differences estimate tells us an average effect, but it could be that the effect starts out small and grows over time, starts large and then diminishes, or stays constant.

Figure 9 displays the results of the event study analysis for the outcome of mortgage delinquency. Once again, we limit the sample to consumers who had a mortgage before their PACE Experience Date. Each point can be interpreted as the change in difference between Originated and Application-Only consumers' primary mortgage delinquency rate, all relative to the difference 21 months before each consumer's First PACE Due Date.<sup>47</sup> Estimates around zero indicate that the two groups have the same trend. In Figure 9, we see no trend between two and three years prior to the First PACE due date, indicating that the two groups' mortgage delinquency rates were evolving similarly over time. Consistent with the raw averages in Figure 8(b), we see a slight decline in mortgage delinquency rates for Originated borrowers relative to Application-Only consumers 21 months prior to the First PACE Due Date that persists until the First PACE Due Date. This may be due to the consumer receiving energy or water savings from the home improvement project, without yet having the burden of paying the payments for the PACE loan. It is also possible that we see mortgage delinquency responding before the First PACE Due Date in part because we cannot precisely determine when consumers would first begin responding to their increased tax payments. In particular, PACE borrowers in Florida receive their tax bills months before the payments would be considered late, and mortgage servicers may start adjusting escrow payments in response to this. The lack of a pre-PACE trend in delinquency suggests that our use of Application-Only consumers as a control group is a valid way to capture the counterfactual. After PACE payments become due, we see mortgage delinquency rates continue to rise and remain elevated over the pre-PACE level for at least 3 years, suggesting that the effect of PACE on mortgage-holders is persistent.

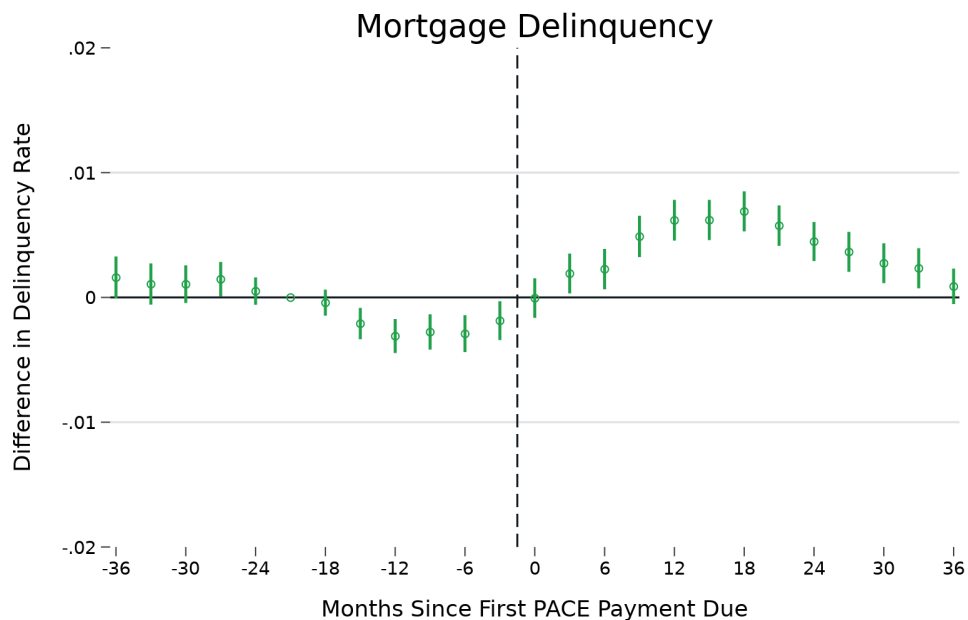
## 4.2.2 Effect of PACE on mortgage delinquency for vulnerable sub-populations

In the subsection above, we estimated the average impact of PACE on mortgage delinquency for Originated consumers. Given that we find that obtaining a PACE loan causes a moderate increase in delinquency, we now test for differential effects across different subgroups of consumers. In doing so, we attempt to characterize the subset of borrowers who experience mortgage delinquency

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<sup>47</sup>We use 21 months as the baseline for these comparisons because this will be prior to the PACE Experience Date for all consumers—the largest possible gap (for consumers in Florida with a July PACE Experience Date) is 21 months.

**FIGURE 9:** PRIMARY MORTGAGE DELINQUENCY RATES FOR ORIGINATED CONSUMERS RELATIVE TO APPLICATION-ONLY CONSUMERS, OVER TIME RELATIVE TO FIRST PACE DUE DATE (OUTCOME IS DELINQUENCY IN A GIVEN MONTH)

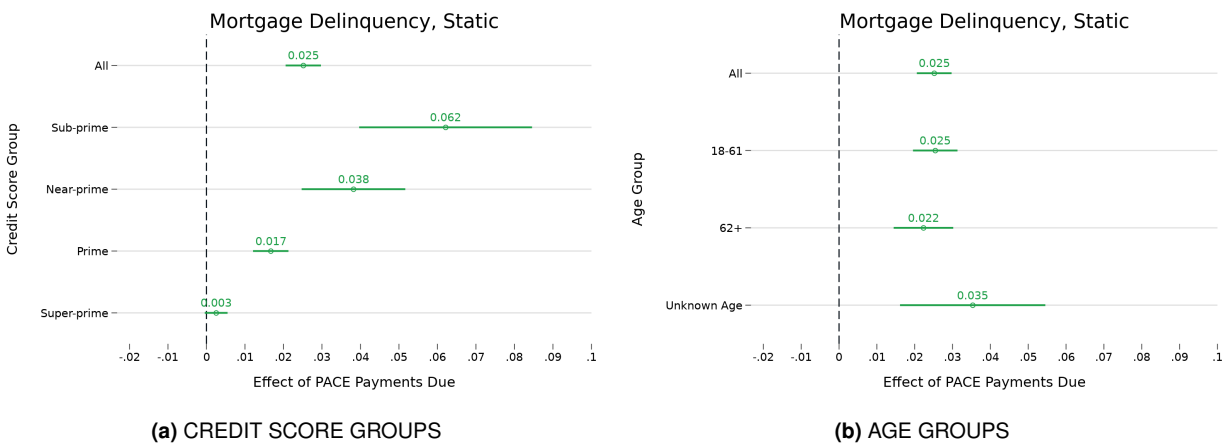


as a result of PACE. To do this, we estimate separate difference-in-differences regressions for each of a variety of subgroups, limiting our sample in each case to Originated and Application-Only consumers who belong to that subgroup. Throughout this subsample analysis we restrict attention to the static model, which compares outcomes over two-year windows, but we find similar results using the month-by-month dynamic model. As in our overall difference-in-differences results, in all cases we restrict our sample to consumers who had a mortgage prior to their PACE Experience Date.

We begin by splitting our sample by categories of the limited demographic characteristics we observe in the credit record data: credit score and age. Figure 10 shows difference-in-differences coefficients broken out by credit score groups in panel (a) and by age groups in panel (b). In the Figure, as well as all the subsample analyses presented in this section, the points show our estimated difference-in-differences effect of PACE loans on mortgage delinquency for each group, and the horizontal lines show the 95 percent confidence interval for those estimates. Where the confidence intervals overlap between subgroups, it can roughly be said that our estimates are not precise enough to say there is a difference between groups. Beginning with differences by credit score group, we find a strong relationship between credit score and the impact of PACE loans on mortgage delinquency.<sup>48</sup> Consumers in the sub-prime credit score group see an increase in mortgage delinquency almost two and a half times the average effect, and more than 20 times the

<sup>48</sup>The sub-prime category includes what is typically classified as Deep Sub-prime, with scores below 500; there are very few PACE consumers with pre-PACE scores in this range, yielding very imprecise estimates if broken out on their own.

**FIGURE 10:** EFFECT OF PACE LOANS ON 60-DAY MORTGAGE DELINQUENCY FOR SUB-POPULATIONS SPLIT BY BORROWER CHARACTERISTICS (OUTCOME IS DELINQUENCY OVER A TWO-YEAR PERIOD)



Note: Points are coefficients from an event study regression analysis with the probability of a 60-day or longer mortgage delinquency as the outcome variable. Displayed coefficients are the interactions between event-time indicators and an indicator for being an Originated consumer. Unit of observation is a consumer-month. Regression controls for an indicator for being between the PACE Experience Date and First PACE Due Date, event-time base-level fixed effects, year of origination fixed effects, and consumer fixed effects. Vertical lines are 95 percent confidence intervals based on standard errors clustered by consumer.

effect on consumers in the super-prime credit score tier. It appears that consumers in lower credit score tiers are most negatively affected by PACE, a point of concern given that some industry stakeholders have held PACE out as a solution for consumers with less than ideal credit history.<sup>49</sup>

In light of concerns from media stories and consumer advocates about PACE being particularly problematic for older consumers, we also estimated our difference-in-differences model separately by age group. However, we do not find any relationship between age and the effect of PACE on mortgage delinquency. Our regression estimates are almost identical to each other and to the average effect, and are well within a 95 percent confidence interval of each other. It is possible that older Americans who do not have a credit record either have worse outcomes from PACE or are relatively more likely to get a PACE loan, but if so we cannot observe that in our data.

Although we do not observe other individual-level demographics, we can split our sample by the demographics of the census tracts where consumers reside. In Section 3 we show that PACE consumers reside in census tracts with higher shares of Black and Hispanic residents compared to State averages. It is possible that PACE has larger effects on consumers in those areas as well. Figure 11 shows splits by census tract median household income, census tract education and English language proficiency, and whether the census tract is Majority White, Hispanic, or neither.<sup>50</sup>

<sup>49</sup> See, e.g. Olivia White, Comments of Renew Financial Group LLC to Consumer Financial Protection Bureau, Advanced Notice of Proposed Rulemaking Regarding Residential Property Assessed Clean Energy Financing, (May 2019). Available at [https://downloads.regulations.gov/CFPB-2019-0011-0093/attachment\\_2.pdf](https://downloads.regulations.gov/CFPB-2019-0011-0093/attachment_2.pdf).

<sup>50</sup> The thresholds for the income, language, and education categories were chosen to roughly represent quartiles of California and Florida census tracts, with about one quarter of census tracts in those two States falling into each grouping, according to American Community Survey data.

Largely, we do not find a correlation between the effect of PACE and census tract demographics. Our estimate for the effect of PACE on mortgage delinquency for consumers residing in census tracts with particularly high median income, over \$90,000, is smaller than for other census tract income groups, but not precise enough that we can be sure this is not merely chance. We don't find strong evidence that consumers in census tracts with a high percentage of the population who speak English less than very well, or with lower educational attainment, have different effects of PACE from the average. We find largely similar effects of PACE for all categories of census tract race and ethnicity. Although our central estimate finds that PACE loans increase mortgage delinquency less for consumers in majority white census tracts than in other census tracts, we cannot reject that this is due to chance. Because this analysis is based on neighborhood-level characteristics, none of this means that individual consumers who are Hispanic, low income or lower education are affected by PACE similarly to other consumers. However, it does suggest that if PACE-affiliated contractors targeted neighborhoods based on their demographic characteristics, it did not result in consistently worse mortgage delinquency outcomes as a result of originated PACE loans, compared to the effect of PACE loans made in other neighborhoods.

Finally, we can split the sample by the characteristics of the PACE loans. Figure 12 shows the results of our difference-in-differences model with the sample split by loan characteristics.<sup>51</sup> Beginning with panel (a), we find that the effect of PACE on mortgage delinquency was significantly smaller for PACE loans in the lowest quartile of APR (rates below about 8.2 percent). There is little additional improvement between PACE loans in the second quartile and PACE loans with higher rates. Another measure of pricing is the spread between the APR and the APOR. Panel (b) shows the results of a split by estimated APR-APOR categories.<sup>52</sup> Although most PACE loans had estimated APR-APOR spreads in excess of 3.5 percentage points, loans below this threshold had a smaller effect on mortgage delinquency, and loans with spreads below 2.25 percentage points had almost no effect on mortgage delinquency.

As discussed above in Section 3, a significant portion of the APR for PACE loans comes from fixed fees that are a substantial percentage of the overall loan amount. Panel (c) shows the results of a difference-in-differences analysis splitting the sample by whether the fees were above or below the HOEPA points-and-fees limits. In general, we see no variation in the effect of PACE on mortgage delinquency across high- and low-fee PACE loans. The variation we see across loan pricing seems to come from the interest rate instead.

Finally, in panel (d) we examine whether the effects of PACE vary depending on the type of project being funded. Particularly because many PACE projects are purported to deliver energy savings, it is possible that some types of projects have offsetting benefits that soften the financial impact of PACE payments. However, our estimates by project type are not precise enough to identify any such variation. Our central estimates suggest that window-related projects have

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<sup>51</sup> For splits by APR, APR-APOR spread and fees, we include all Application-Only consumers in the control group for each subsample, as we do not observe an interest rate or fee amount for consumers who did not have a PACE loan originated.

<sup>52</sup> The categories were chosen to align with some of the APR-APOR spread limits that are part of the General QM definition under Regulation Z.

**FIGURE 11:** EFFECT OF PACE LOANS ON MORTGAGE DELINQUENCY FOR SUB-POPULATIONS SPLIT BY CATEGORIES OF CENSUS TRACT CHARACTERISTICS (OUTCOME IS DELINQUENCY OVER A TWO-YEAR PERIOD)



better outcomes, but this could easily be the product of random chance, rather than a real association.

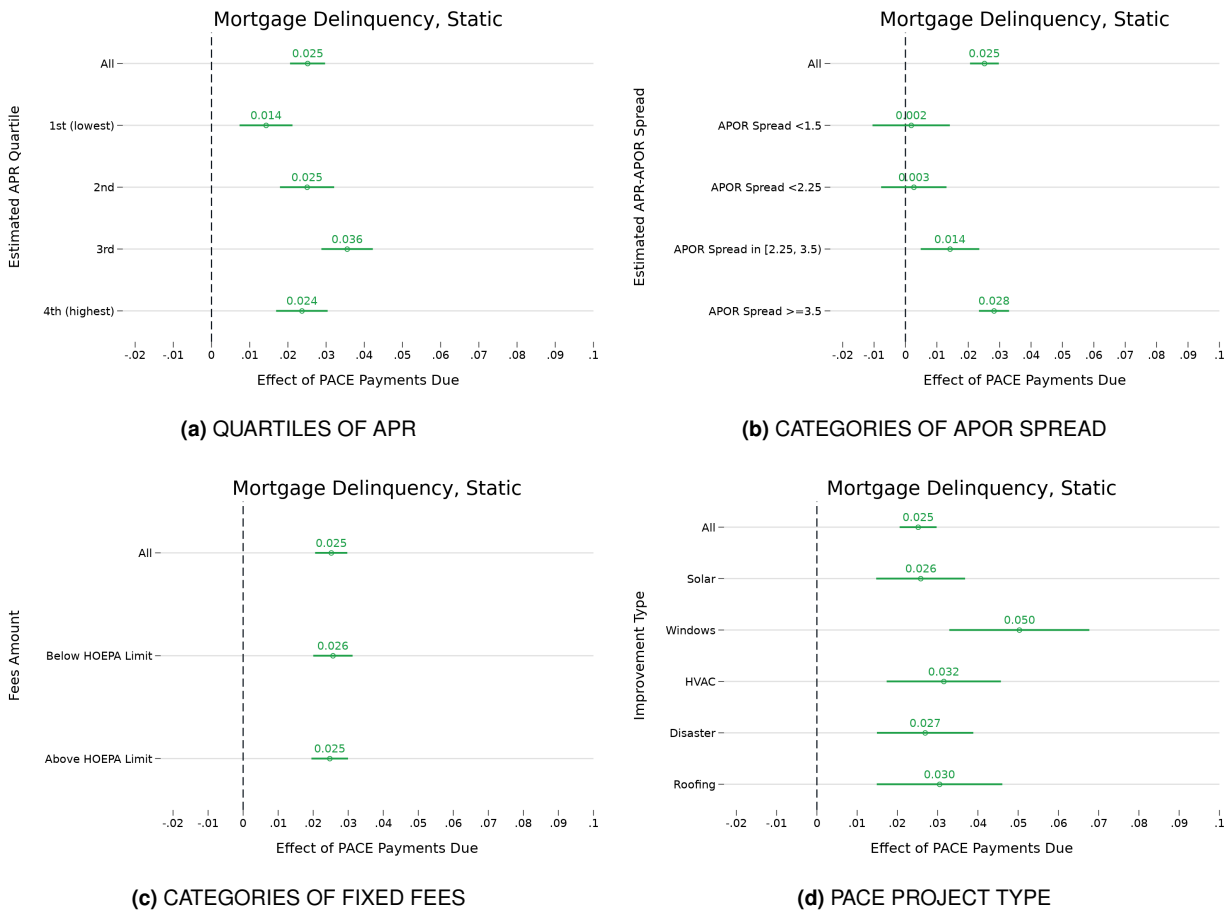
### 4.3 Effect of PACE on other credit outcomes

We focus above on the effect of PACE loans on mortgage delinquency because payment on the PACE loan itself through the consumer’s property tax bill is intrinsically linked to mortgage payments. However, PACE loans may impact other credit outcomes if consumers adjust their borrowing and spending behavior to prioritize their payments for mortgages and property taxes. Acquiring new debt in order to make a PACE-increased property tax bill may not be ideal for consumers, but is likely preferable to risking the loss of their home, whether through foreclosure or a tax sale.

Table 11 shows difference-in-differences regression results for several contemporaneous credit health measures: total credit card limits, total credit card balances, credit score, and average



**FIGURE 12:** EFFECT OF PACE LOANS ON MORTGAGE DELINQUENCY FOR SUB-POPULATIONS SPLIT BY CATEGORIES OF PACE LOAN CHARACTERISTICS (OUTCOME IS DELINQUENCY OVER A TWO-YEAR PERIOD)



monthly mortgage payments.<sup>53</sup> We only observe these variables at the time of each credit record snapshot, so the static version of the model uses the average of 2–4 annual or semi-annual observations before and after each consumers’ PACE Experience Date, while in the dynamic, period-by-period version of the model, the unit of observation is an annual or semi-annual credit record snapshot per consumer, rather than a consumer-month.

We find that PACE loans caused Originated consumers to have credit card limits that are about \$500 lower on average than they might have had otherwise.<sup>54</sup> Because this is relative to the trend established by Application-Only consumers, this difference could come from slower average growth in limits, or from accounts that were closed or had limits cut.

<sup>53</sup> The sample used for the mortgage payment regression is limited to those consumers who had a mortgage loan in the time period prior to their PACE Experience Date.

<sup>54</sup> Because these outcomes are dollar averages, rather than probabilities as with our delinquency analysis, we do not necessarily expect different results between the static and dynamic versions. While probabilistic events are inherently less likely in a short period compared to a long period, there is no reason to expect average limits or balances to be different when measured over a long period of time rather than a single point in time. The differences we observe come down to the different samples (since the static version includes only consumers with a full two years before and three years after their PACE Experience Date) and the different time ranges.

At the same time, in Table 11, we see that PACE loans moderately increased credit card usage for Originated borrowers, with effects around \$200 in monthly balances in the static estimate, although the dynamic version is imprecise. This suggests that some PACE consumers may have responded to difficulty paying their PACE loan by accumulating credit card debt. The effect is relatively small—the average effect is less than four percent of the average pre-PACE credit card balance for Originated borrowers. On the other hand, all else equal we might expect Originated consumers’ overall spending, and thus credit card balances, to decrease following a PACE loan origination, due to potential energy or water savings stemming from the home improvement project.

As an overall measure of credit health, we can study the effect of PACE on consumer credit scores. PACE loans do lower consumers’ credit scores, consistent with the effects we observe on mortgage delinquency and credit card balances, but the overall effect is small, on the order of a point or two. Consumers who received a PACE loan, on average, experience a small decrease in their credit scores. In the static model, we find that scores decrease by 1.65 points from an average pre-PACE credit score of 668. Finally, consistent with the descriptive evidence in Section 3, mortgage payments increase on average for Originated borrowers. Monthly mortgage payments increase by about \$170 from an average of \$1,623 pre-PACE; in the dynamic model we find a smaller impact with a smaller average monthly payment.

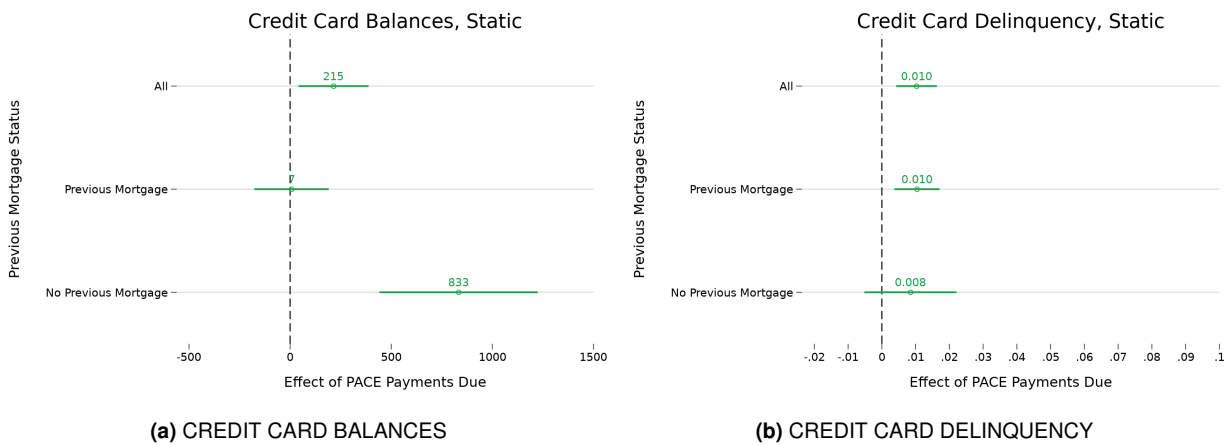
Credit card outcomes may be particularly relevant for the 29 percent of PACE consumers who did not have a mortgage prior to their PACE experience. Since these consumers are solely responsible for making payments for their property taxes and we do not observe these payments, we might expect to see effects on other credit outcomes such as credit card usage or delinquency. Figure 13 shows the results of separate difference-in-differences analyses for credit card outcomes by pre-PACE mortgage-holding status, using the static (two-year window) model. Panel (a) shows results for average credit card balances. We find the average effect of PACE on credit card balances of a \$215 increase is composed of essentially no effect for PACE borrowers who had a mortgage pre-PACE, and a significantly larger increase of over \$800 for borrowers who did not have a mortgage, roughly 15 percent of the average pre-PACE balances for Originated borrowers without a pre-existing mortgage.<sup>55</sup> Thus, it does appear that consumers without a mortgage are responding to the cost of PACE by relying on credit cards. Panel (b) shows results for the probability of credit card delinquency. Although our central estimate for consumers without a pre-existing mortgage is slightly smaller than that for consumers with a pre-existing mortgage, we cannot reject that this is just chance, and both estimates are fairly small, less than a 1 percentage point increase.

Consumers might also respond to the increased burdens of a PACE loan by seeking additional credit through new credit accounts, and thus avoid mortgage or other delinquency by relying on

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<sup>55</sup> Originated borrowers without a pre-existing mortgage had average monthly credit card balances of \$5,588 in the two years prior to their PACE Experience Date

**FIGURE 13:** EFFECT OF PACE LOANS ON CREDIT CARD OUTCOMES FOR SUB-POPULATIONS SPLIT BY PRE-PACE MORTGAGE STATUS (OUTCOME IS BALANCE OR DELINQUENCY OVER A TWO-YEAR PERIOD)



those sources of credit. The credit record data allows us to observe applications for new credit. Any application that leads the potential creditor to pull the consumer’s credit report results in a “hard inquiry” that appears on the credit report and which we see in the data.<sup>56</sup> New mortgage loans or closed mortgage accounts could also potentially indicate distress. Consumers faced with an unaffordable increase in property tax payments due to a PACE loan might feel compelled to acquire a mortgage where their home previously had none, to refinance an existing mortgage, or even to sell their house and move. We cannot easily distinguish between these cases, but we can study them collectively by estimating the effect of PACE loans on opening a new mortgage, and on closing an existing mortgage. Table 12 reports estimates of difference-in-differences models for the outcomes of the count of new credit inquiries, the probability of a new mortgage inquiry, the probability of opening a new mortgage account, and the probability of closing an existing mortgage account. All of these outcomes are observed monthly, although they are aggregated over a two-year period for the static version of the model.

Ultimately we do not find strong evidence that consumers are generally seeking new credit. If anything we see a small decrease in the overall number of credit inquiries, although the magnitude of this effect is very small relative to the average rate of hard inquiries. We do see suggestive evidence that some Originated consumers may be selling their homes and moving in response to a PACE loan. The probability of closing a mortgage loan increases, but there is not a corresponding increase in opening new mortgages. Indeed, we see a moderate decrease in new mortgage openings in the static version of the model, although the dynamic model shows a much smaller and less precise estimate.

<sup>56</sup>Note however that we likely do not observe all inquiries for most credit types. Although mortgage lenders almost always request credit reports from all three nationwide consumer reporting agencies, lenders for other types of credit such as credit cards and auto loans generally only request reports from one or two. Because our credit record data is from only one consumer reporting agency, we will not observe inquiries that were not sent to that company.

**TABLE 11: DIFFERENCE-IN-DIFFERENCES ESTIMATES OF THE EFFECT OF PACE LOANS ON OVERALL CREDIT HEALTH OUTCOMES FOR ORIGINATED CONSUMERS**

Effect of PACE Loan On:	Static Model	Dynamic Model
Total Credit Card Limits	-494.1** (157.1)	-580.5*** (149.7)
Pre-PACE Average Outcome	27,309	25,103
Sample Size	247,808	1,739,841
Total Credit Card Balances	214.9* (88.43)	129.8 (70.84)
Pre-PACE Average Outcome	8,812	8,208
Sample Size	247,808	1,739,841
Credit Score	-1.648*** (0.337)	-1.274*** (0.295)
Pre-PACE Average Outcome	668	662
Sample Size	246,892	1,704,923
Monthly Mortgage Payment	169.3*** (7.058)	120.9*** (6.819)
Pre-PACE Average Outcome	1,623	1,500
Sample Size	182,828	1,271,762

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Main statistics in each row report the difference-in-differences estimate of the effect of having an originated PACE loan on the outcome in question, using Application-Only consumers as a control group. That is, these are coefficient estimates on the interaction between an indicator for being an Originated consumer and the current time being in the post-PACE period. Each statistic is from a separate regression. Regressions in the “Static Model” column use two observations per consumer covering the two years prior to their PACE Experience Date and 1–3 years after. These regressions control for census tract characteristics, state of residence, pre-PACE credit score and original balance or requested amount. Regressions in the “Dynamic Model” column have one observation per consumer per annual or semi-annual credit record archive and include time period fixed effects, year of PACE experience fixed effects, consumer fixed effects and an indicator for the current month being between the consumer’s PACE experience date and their First PACE Due Date. Pre-PACE Average Outcome is the average of the outcome variable for Originated borrowers for the two years prior to their PACE Experience Date, in the Static Model column, and the average for months prior to their First PACE Due Date, in the Dynamic Model column. Standard errors clustered by consumer reported in parentheses.

**TABLE 12: DIFFERENCE-IN-DIFFERENCES ESTIMATES OF THE EFFECT OF PACE LOANS ON OUTCOMES RELATED TO SEEKING NEW CREDIT FOR ORIGINATED CONSUMERS**

Effect of PACE Loan On:	Static Model	Dynamic Model
Number of New Credit Inquiries	-0.0216* (0.0108)	-0.000983*** (0.000294)
Pre-PACE Average Outcome	0.845	0.033
Sample Size	202,187	13,556,038
Any Mortgage Inquiry	0.00334 (0.00205)	0.0000158 (0.0000822)
Pre-PACE Average Outcome	0.075	0.004
Sample Size	202,187	13,556,038
Any New Mortgage	-0.0211*** (0.00359)	-0.000124 (0.000121)
Pre-PACE Average Outcome	0.322	0.012
Sample Size	202,187	13,556,038
Any Closed Mortgage	0.0135*** (0.00360)	0.00116*** (0.000122)
Pre-PACE Average Outcome	0.2094	0.0090
Sample Size	202,187	13,556,038

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Main statistics in each row report the difference-in-differences estimate of the effect of having an originated PACE loan on the outcome in question, using Application-Only consumers as a control group. That is, these are coefficient estimates on the interaction between an indicator for being an Originated consumer and the current time being in the post-PACE period. Each statistic is from a separate regression. Regressions in the “Static Model” column use two observations per consumer covering the two years prior to their PACE Experience Date and 1–3 years after. These regressions control for census tract characteristics, state of residence, pre-PACE credit score and original balance or requested amount. Regressions in the “Dynamic Model” column have one observation per consumer per month and include time period fixed effects, year of PACE experience fixed effects, consumer fixed effects and an indicator for the current month being between the consumer’s PACE experience date and their First PACE Due Date. Pre-PACE Average Outcome is the average of the outcome variable for Originated borrowers for the two years prior to their PACE Experience Date, in the Static Model column, and the average for months prior to their First PACE Due Date, in the Dynamic Model column. Standard errors clustered by consumer reported in parentheses.

# 5. Regulating PACE: Case study of California

For most of the loans in our sample, PACE companies generally did not consider consumers' ability to repay the obligation. The estimates in Section 4 demonstrate that PACE loans made between July 2014 and June 2020 had negative impacts on consumers' credit outcomes, causing a significant increase in primary mortgage delinquency rates. Since PACE loans are often paid through a consumers' primary mortgage (either through a preexisting escrow account or repaid after the mortgage servicer advances funds to cure a tax delinquency), this in turn suggests that a subset of PACE consumers had difficulty affording the cost of the PACE obligation. In this section, we examine whether determining eligibility for PACE loans based on income improves consumer outcomes.

To answer this question, we consider the case of California after the passage of several bills that went into effect in 2018 and included a number of consumer protection provisions for PACE loans (2018 California PACE Reforms). Following these reforms, California law required consideration of income, among other factors, for PACE loans made in California, but there was no similar change in Florida law at the same time. This difference between States allows us to examine how the 2018 California PACE Reforms changed the effect of PACE on consumer outcomes.

Our main results are as follows:

- PACE loans increase primary mortgage delinquency in rates in both California and Florida, but the effect for California PACE borrowers was smaller after the 2018 California PACE Reforms went into effect, compared to before the Reforms. PACE loans in Florida cause less of an increase in primary mortgage delinquency rates overall as compared to PACE loans in California, although we also find that this decreased after 2018, suggesting changes in the impact of PACE over time.
- We do not have sufficient income information for consumers who received PACE loans to definitively say whether making eligibility determinations based on income reduces the negative impact of PACE. The data weakly suggest that consumers with lower debt-to-income ratios when they get a PACE loan may experience a smaller increase in mortgage delinquency compared to consumers with high debt-to-income ratios. More generally, PACE loans for which income information was collected by the PACE company seem to perform better than loans without.
- The 2018 California PACE Reforms caused a significant reduction in the volume of PACE transactions in California. This comes from both a reduction in applications for new PACE loans and a—possibly temporary—reduced approval rate for applications.

## 5.1 PACE reforms in California

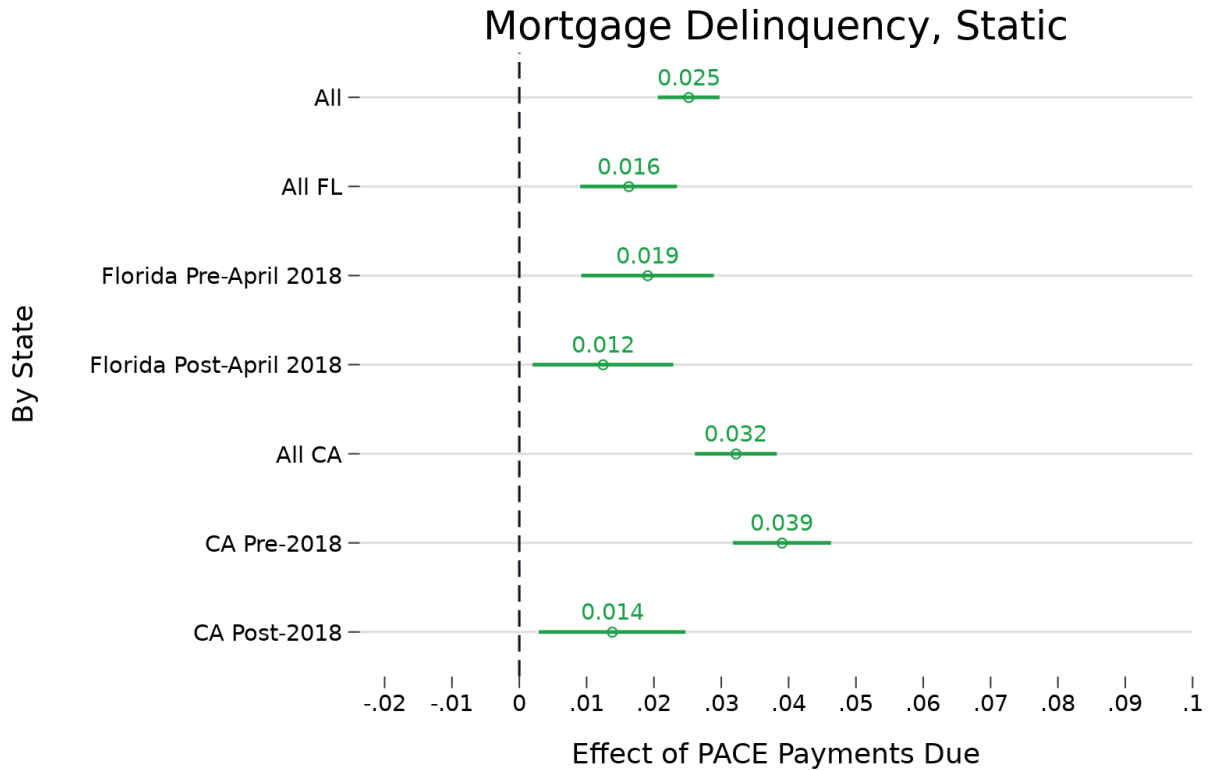
Since authorizing PACE in 2008, the California legislature has amended its PACE provisions several times. California AB 1284 was enacted in 2017, and required PACE program administrators to make a reasonable, good faith determination that the property owner has a reasonable ability to pay the PACE assessment, with that requirement going into effect in April 2018. The same bill also required PACE companies to be licensed by the Department of Business Oversight (now the Department of Financial Protection and Innovation) and provided for agency oversight of contractors soliciting property owners, as well as required background checks and training. SB 242, enacted in 2017, required PACE program administrators to orally confirm the key terms and conditions of the assessment contract with a property owner, in the property owner's preferred language, and required that agreements be translated into the property owner's preferred language. AB 2063, enacted in 2018, amended the ability to pay provisions to require that a determination be made before execution of the PACE assessment. We refer to these laws collectively as the 2018 California PACE Reforms.

## 5.2 Impact of the 2018 California PACE Reforms on PACE consumer outcomes

We first examine how the effect of PACE loans on mortgage delinquency changed after April 2018. As in our analysis in Section 4.2.2, we estimate our difference-in-differences model for the effect of PACE loans on mortgage delinquency, comparing Originated PACE borrowers to Application-Only consumers before and after PACE payments likely became due. We separately estimate the model on four distinct subsamples split by time and location: consumers whose PACE experience was before and after the 2018 California PACE Reforms and who resided in California, and consumers in the same time periods but who resided in Florida. We also estimate versions using all California consumers and all Florida consumers. For this analysis we again focus on the static model, comparing a two-year period before each consumer's PACE Experience date to a two year period after, but we find similar results looking at outcomes month-by-month in the dynamic model.

Figure 14 shows the result of this split, with a point in each row showing the effect of having a PACE loan originated on the probability of experiencing a 60-day mortgage delinquency for the labeled group, and bars showing a 95 percent confidence interval around that estimate. Prior to the 2018 California PACE Reforms, PACE loans increased the probability of a mortgage delinquency for California borrowers by 3.9 percentage points. After the effective date, PACE loans only increased mortgage delinquency for California PACE borrowers by 1.4 percentage points, a 64 percent reduction. We find that, on average, PACE loans caused a smaller impact on Florida borrowers compared to California borrowers. This effect also decreased after 2018, although not

**FIGURE 14:** THE EFFECT OF PACE LOANS ON MORTGAGE DELINQUENCY OVER A TWO YEAR PERIOD FOLLOWING ORIGINATION, BY STATE AND TIME



to the same extent as in California.

We can also examine directly whether standard income measures of ability to pay are correlated with outcomes for PACE borrowers. As discussed in Section 3, for any consumer with income reported, we can calculate a DTI ratio. We split the sample by whether consumers' DTI was above or below 43 percent, a threshold commonly used in the mortgage space.<sup>57</sup> We note again that this test is likely to be noisy, as we only have the income data necessary to calculate DTI for about a quarter of our sample.<sup>58</sup> In addition, the vast majority of consumers with income reported in our data resided in California after April 2018, such that consumers with higher DTI might have had their PACE application denied due to the income evaluation required by the California's ATP law.

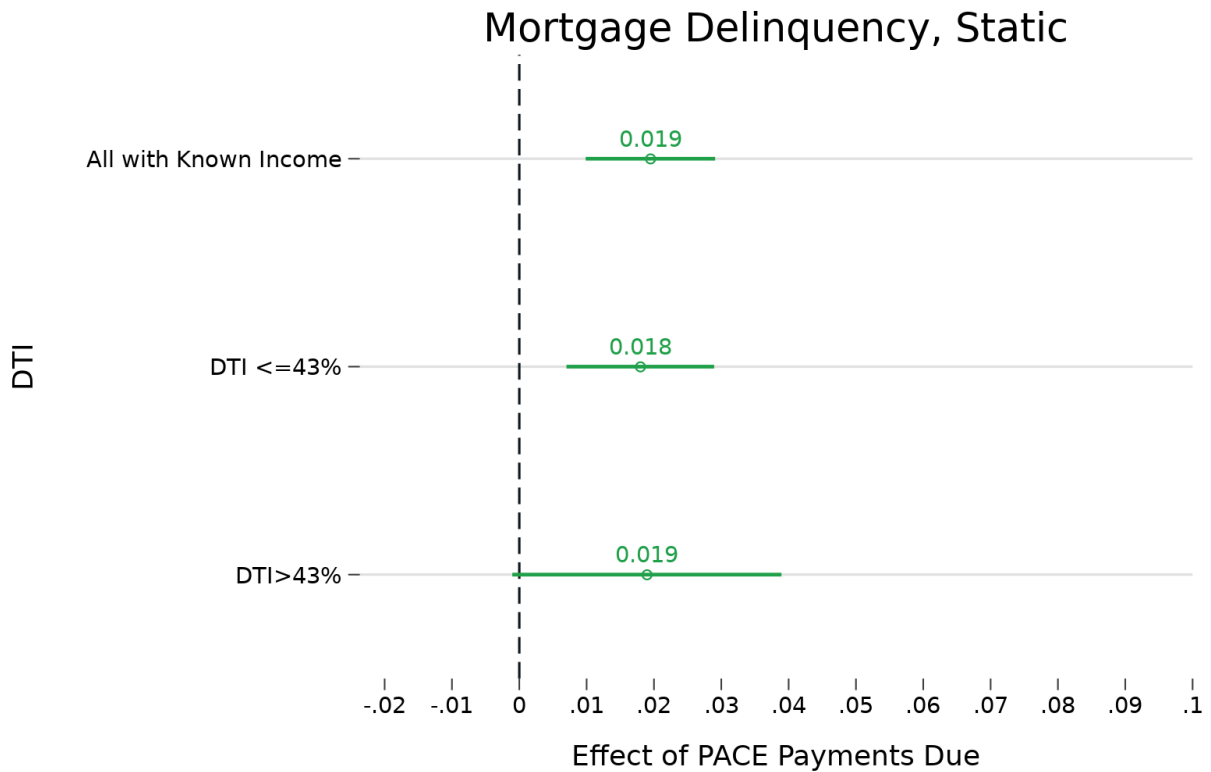
The results of the split by DTI are shown in Figure 15. Having an originated PACE loan increases primary mortgage delinquency by 1.9 percentage points for consumers with DTI above 43 per-

<sup>57</sup> Under an earlier version of the CFPB's Regulation Z, mortgages could qualify for the General QM standard if they had DTI below 43 percent and met other criteria. In 2020, the relevant regulations were revised and specific DTI thresholds do not currently have a formal role in the regulatory definition of a General QM loan. *See, e.g.* 85 FR 86308 (Dec. 29, 2020).

<sup>58</sup> The 2018 California PACE Reforms' income assessment is based around a different ability to pay measure, residual income. Although residual income is reported in the PACE data, it is available for even fewer consumers than overall income, so we cannot split the sample by this measure.



**FIGURE 15:** THE EFFECT OF PACE LOANS ON MORTGAGE DELINQUENCY OVER A TWO YEAR PERIOD FOLLOWING ORIGINATION, BY INCOME MEASURES

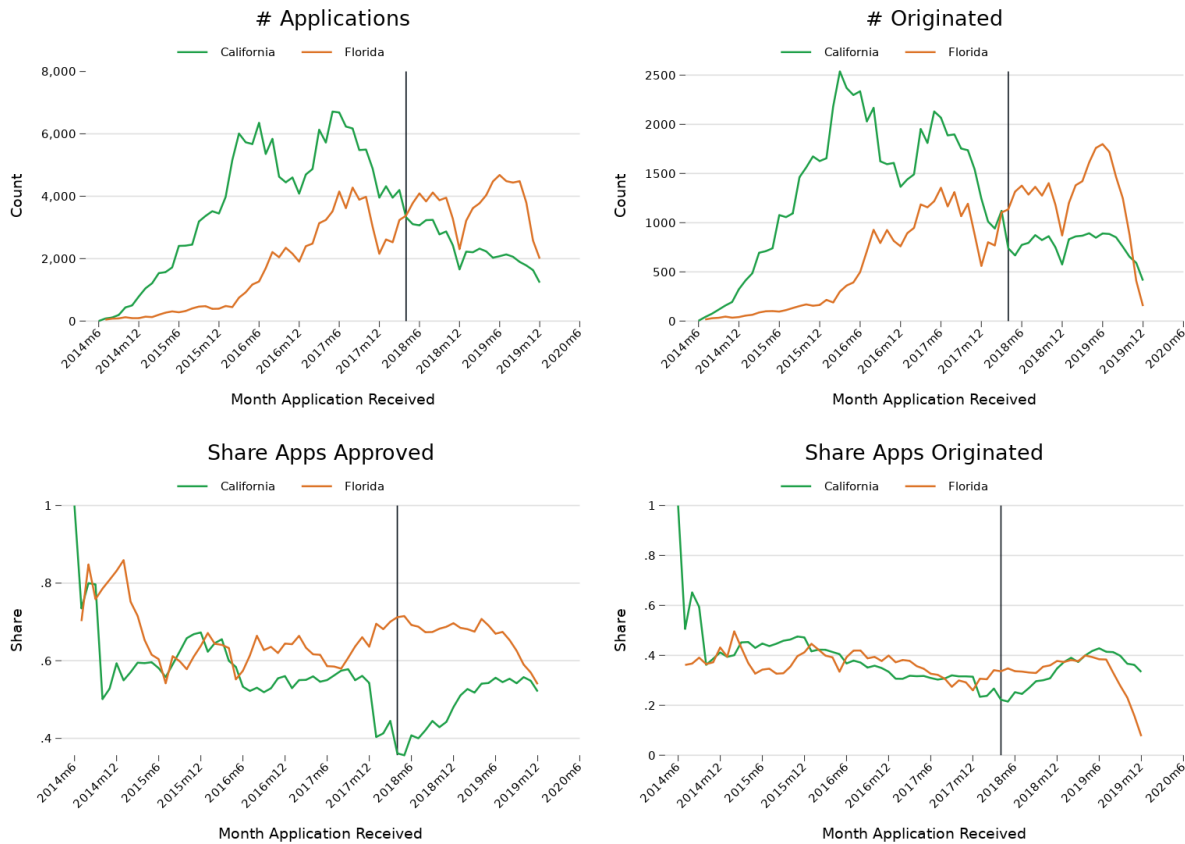


cent, just slightly more than for consumers with DTI below 43 percent for whom we estimate PACE loans increase primary mortgage delinquency by 1.8 percentage points. The 95 percent confidence interval for consumers above 43 percent DTI includes the estimate for consumers with lower DTI. As such, this evidence is weakly suggestive at best that determining eligibility based on DTI would improve outcomes. Perhaps more relevant is that the average effect of PACE on primary mortgage delinquency over a two-year period for consumers with reported income is an increase of 1.9 percentage points, somewhat lower than the average for all Originated consumers, although again this is not statistically precise.

### 5.3 Impact of the 2018 California PACE Reforms on the PACE industry

Turning from direct impacts on consumers, we next examine how the 2018 California PACE Reforms impacted the supply of PACE loans overall. In response to the CFPB’s PACE ANPR, industry participants noted a significant drop in PACE lending volume in California following

**FIGURE 16:** TRENDS IN PACE LENDING ACTIVITY IN CALIFORNIA AND FLORIDA, 2014–2019



the 2018 California PACE Reforms.<sup>59</sup> For this section, we consider all PACE applications, regardless of whether they had a match to the credit record data, and explore how the volume of PACE applications, the approval rate of those applications, and the number of PACE loan originations changed around the effective date of the 2018 California PACE Reforms. We also examine changes in the average terms of originated PACE loans.

Figure 16 plots the number of PACE applications, the number of PACE originations, and the share of applications that were approved and originated in each month covered by the data, with separate lines for California and Florida. The top left panel shows trends in the number of PACE applications received by the four PACE companies that contributed to the CFPB’s voluntary data collection. In both California and Florida, the number of PACE applications per month rose rapidly over a one- to two-year period before leveling off at around 5,000 applications per month in California (before 2018) and around 3,000 applications per month in Florida. Around that average level, there was notable seasonal variation in the number of applications per month, with

<sup>59</sup> See, e.g., Comments of Ygrene Energy Fund Re: RE: Advance Notice of Proposed Rulemaking on Residential Property Assessed Clean Energy Financing (RIN 3170-AA84), (May 2019). Available at [https://downloads.regulations.gov/CFPB-2019-00111-0075/attachment\\_1.pdf](https://downloads.regulations.gov/CFPB-2019-00111-0075/attachment_1.pdf)

significantly more PACE applications in the summer and fewer in the winter. There was a sharp drop in the volume of applications in California following the 2018 California PACE Reforms—applications in both California and Florida fell over the winter of 2017/2018, consistent with the usual seasonal pattern, but while applications recovered in Florida in the spring of 2018, in California the number of applications continued to decline. In 2019, the last full year, there were about 45,500 applications in Florida and 23,800 in California. There was a similar pattern for the number of originations (top right panel), albeit at lower levels overall, since not all applications result in an originated PACE loan.

The decline in PACE applications is more consistent with the new laws resulting in shifting business practices, for example by possibly disincentivizing contractors from marketing PACE, than with a filtering-out of consumers who cannot afford to repay a PACE loan. We do see some decline in approval rates in the raw trends. The bottom two panels of Figure 16 show the share of PACE applications that were approved by the PACE company, and the share that were ultimately originated. There does seem to be a short-term decline in the share of applications that were approved and originated in California around the time the 2018 California PACE Reforms took effect, which was not matched by a similar decline in Florida, although approval rates rose again in 2019 to near the 2017 levels.<sup>60</sup>

We can examine these changes in application volumes and approval rates more formally through a difference-in-differences regression analysis. The concept here is similar to the analysis in Section 4, but instead of analyzing outcomes at the consumer-time level, we now consider a State-month as a unit of observation. As in Figure 16, we are examining how the volume of PACE lending changed in California after the 2018 California PACE Reforms, using the trend in Florida to approximate the trend that would have occurred in California but-for the Reforms. As in Section 4, we are assuming that California and Florida experienced the same trends prior to the 2018 California PACE Reforms, and would have continued to experience the same trends absent the law. Given that Figure 16 shows that the trends were quite similar before 2018, this seems like a reasonable assumption. Also as in Section 4, in order to claim we are measuring a causal effect of the 2018 California PACE Reforms on the PACE industry we do not need the levels of PACE lending to be the same across the two States, only the trends. We limit attention to the period beginning January 2017, as the volume of PACE applications in Florida was still growing rapidly until that time.<sup>61</sup>

Table 13 shows the results of this difference-in-differences analysis. The effect of the 2018 California PACE Reforms is given by the statistics in the third row of the Table, which represents the change in California after the law, relative to the change in Florida over the same period. We estimate that the 2018 California PACE Reforms reduced the number of PACE applications by about 3,500 per month, and reduced the share of applications that were approved by about 7 percentage

<sup>60</sup>The decline in the share of applications that were originated is entirely due to the change in the share of applications that were approved—the share of approved applications that were originated did not change meaningfully in either State (not shown).

<sup>61</sup>We obtain nearly identical results if we include 2016, or even all months back to July 2014.

points. Originations also fell by about 1,000 loans per month in California after the 2018 California PACE Reforms took effect, although the share of applications that were ultimately originated largely did not change—the estimate for share originated is not precise enough to rule out either a moderate increase or a small decrease.

Table 14 repeats this exercise but with the average loan terms of originated PACE loans as the outcomes, instead of counts and shares of application outcomes. Estimated APRs for PACE loans increased by about 24 basis points following the 2018 California PACE Reforms, primarily due to an average increase of about \$150 in up-front fees. In contrast, interest rates largely did not change in California relative to the trends in Florida. The average loan balance in California also increased by almost \$1,300 after the 2018 California PACE reforms.

**TABLE 13:** DIFFERENCE-IN-DIFFERENCES EFFECT OF 2018 CALIFORNIA PACE REFORMS ON THE VOLUME OF PACE LENDING IN CALIFORNIA

	Number of Applications	Success Rate	Originations	Share Originated
California	2084.2*** (159.5)	-0.108*** (0.0234)	561.4*** (62.74)	-0.0252** (0.0115)
Post-Reforms	-207.2 (345.6)	-0.0202 (0.0845)	-364.5 (382.2)	-0.153 (0.128)
California x Post	-3447.7*** (230.6)	-0.0715** (0.0321)	-1040.0*** (89.95)	0.0372 (0.0250)
<i>N</i>	72	72	72	72
Average Outcome	3549.7	0.578	1140.5	0.324

Note: Unit of Observation is a State-month, covering January 2017 to December 2019. Outcome variable is indicated in the first row of the table. All columns control for calendar-month fixed effects, which will also account for seasonality in PACE lending.

**TABLE 14:** DIFFERENCE-IN-DIFFERENCES EFFECT OF 2018 CALIFORNIA PACE REFORMS ON THE AVERAGE TERMS OF PACE LENDING IN CALIFORNIA

	Estimated APR	Interest Rate	Fees	Original Loan Balance
California	-0.245*** (0.0653)	0.0484 (0.0585)	566.4*** (21.32)	9375.1*** (290.4)
Post-Reforms	-1.361** (0.627)	-0.716*** (0.142)	212.9 (187.9)	2287.4*** (797.5)
California x Post	0.246** (0.101)	0.0371 (0.0699)	153.5** (60.03)	1299.1** (480.9)
<i>N</i>	72	72	72	72
Average Outcome	8.243	7.478	757.6	25543.0

Note: Unit of Observation is a State-month, covering January 2017 to December 2019. Outcome variable is indicated in the first row of the table. All columns control for calendar-month fixed effects, which will also account for seasonality in PACE lending.

# 6. Conclusion

The analysis in this report indicates that some consumers who receive PACE loans have difficulty paying them back, evidenced by increases in mortgage delinquency, as well as increases in credit card balances for consumers who did not previously have a mortgage. Although the impact of PACE loans, among those who receive them, is similar across demographic groups, it is a point of concern that PACE loans are disproportionately made to consumers living in census tracts with larger shares of Black and Hispanic residents.

It is likely that a contributing factor behind these results is that the PACE companies did not evaluate whether the consumer had the ability to repay before making most of the loans in our data. We find that PACE outcomes improved significantly in California after that State began requiring PACE companies to consider ability to pay before making a loan.

Our analysis has some important limitations. Our estimates of the effect of PACE on consumer outcomes rely on the assumption that Application-Only consumers make up a good comparison group for Originated PACE borrowers. Although we discuss a number of tests of this assumption in Section 4 and in Appendix B, it is possible that the outcomes of these two groups could have diverged for reasons unrelated to the PACE loans received by Originated borrowers. In addition, much of our analysis relies on matched credit record data and is necessarily limited to consumers with a credit record. As discussed in the Appendix, we can adjust our results for differences in demographics between consumers with a credit record match and those without, and doing so yields substantially similar results. However, it is possible that the effect of PACE is better or worse for consumers who are credit invisible or otherwise could not be matched for our data.

# Appendix A: Data processing details

## A.1 PACE financing transaction data

Because the PACE companies originally provided application information in separate tables from information on originated assessments, the data do not have a formal flag for being originated. We code applications as originated if they have a non-zero and non-missing original balance.

The following process was used to determine the PACE Experience Date: For those applications that eventually become originated, we use the date the loan was funded. If funding date is not available, we use the date the lien was recorded. If both those dates are missing, we use the date the inspection for the project was completed. For some Originated consumers and all Application-Only and Denied consumers, we are missing all three of these dates. In these cases we use the date the application was received plus 87 days, the average number of days between the application received date and the funding date for consumers whose loans were funded.

Where consumers have multiple PACE applications, we condense the data to have one observation per consumer. For consumers with both originated applications and non-originated applications, we exclude the non-originated applications, and similarly for Application-Only consumers who also had denied applications, we keep only approved applications. Where a consumer still has multiple applications after these exclusions, for applications or originations that were within one year of each other, we aggregate variables such as balance and interest rate, and use the first PACE Experience Date. We exclude from our analysis applications that were more than a year after the earliest PACE Experience Date for a consumer.

For the Static difference-in-differences model, we drop consumers who do not have sufficient data before and after their PACE Experience Date. The sample begins with 207,444 consumers. By keeping only Originated and Application-Only consumers, the sample drops to 133,907 consumers. Each consumer needs to have at least two years of data before their PACE Experience Date, and three years after their PACE Experience Date. In practice, this means consumers must have PACE Experience Dates between January 2016 and June 2019 to be included in the sample used for the Static model. This leaves us with 102,756 consumers. The final monthly sample thus includes  $102,756 * 2 = 205,512$  consumers-two-year period observations. For outcomes that we only observe during credit record archives, we can expand the sample slightly to include consumers with PACE Experience Dates between August 2015 and December 2019, because the months we are missing due to the beginning or end of the data are also months in between semi-annual credit archives, which we would not observe regardless of the length of the sample

period. For these outcomes, the limitation on PACE Experience Date leaves us with 125,985 consumers. The final sample thus includes  $125,985 * 2 = 251,970$  observations. The Static samples we use are frequently smaller due to missing data for one or more control variables, as well as conditioning on having a particular type of credit pre-PACE.

## A.2 Credit report data

### A.2.1 Geographic differences between matched and unmatched PACE transactions

The CFPB contracted with one of the three nationwide consumer reporting agencies to link the PACE transaction data provided by the PACE companies to detailed, de-identified credit record data. The consumer reporting agency was not able to provide a match for every application: 83,555 (22 percent) of the 369,234 total applications could not be matched to a credit record.. The matches may be missing non-randomly, which could introduce bias into our results. To test this, we check the balance of census tract characteristics between the two groups using a series of t-tests. We find that, on average, there are the differences in census tract characteristics between match and unmatched applications along a few dimensions: Percent Asian (matched group is higher), percent Hispanic (unmatched group is higher), median income (matched group is higher), percent with education less than high school (unmatched group is higher), and percent who speak English less than very well (matched group is higher). Given these differences, to check the robustness of our results, we weighted the matched individuals such that they have the average census tract characteristics of the matched and unmatched individuals grouped together.

Table A1 shows the results of the weighted analysis, split by the static and dynamic specification. None of the estimates from the baseline specification change sign when weighted. In the body of the report, we focus on the outcomes of mortgage delinquency, credit card balances, credit card limits, and credit score. The impact of PACE on mortgage delinquencies, credit card payments, and credit score is slightly bigger in weighted versions. For credit limit, the weighted version is less precise and the impact of PACE is closer to 0. However, in all versions, receiving a PACE loan has a negative impact on credit limit.

**TABLE A1: DIFFERENCE IN DIFFERENCES WEIGHTED REGRESSION**

Effect of PACE Loan On:	Static Specifications		Dynamic Specifications	
	Baseline	Weighted	Baseline	Weighted
Mortgage Delinquency	0.0251*** (0.00234)	0.0304*** (0.00339)	0.00361*** (0.000453)	0.00349*** (0.000712)
Mortgage Inquiry	0.00334 (0.00205)	0.00579** (0.00261)	0.0000158 (0.0000822)	0.0000650 (0.000119)
Mortgage Closed	0.0135*** (0.00360)	0.0125*** (0.00404)	0.00116*** (0.000122)	0.00116*** (0.000139)
Mortgage Opened	-0.0211*** (0.00359)	-0.0225*** (0.00400)	-0.000124 (0.000121)	-0.000189 (0.000137)
Mortgage Payments	164.6*** (7.048)	184.3*** (9.220)	116.4*** (6.832)	131.1*** (8.700)
Credit Card Delinquency	0.0103*** (0.00307)	0.0142*** (0.00403)	0.000473 (0.000411)	0.000528 (0.000565)
Credit Card Inquiry	-0.00188 (0.00214)	-0.00237 (0.00266)	-0.0000950 (0.0000775)	-0.000107 (0.000103)
Credit Card Opened	-0.00149 (0.00387)	-0.00805* (0.00457)	-0.000256 (0.000381)	-0.000650 (0.000473)
Credit Card Limit	-498.3*** (157.1)	-356.9** (177.4)	-580.5*** (149.7)	-330.2 (212.0)
Credit Card Balance	215.6** (88.43)	361.4*** (101.9)	129.8* (70.84)	210.4*** (77.70)
Credit Score	-1.678*** (0.337)	-2.303*** (0.418)	-1.274*** (0.295)	-1.532*** (0.363)
Any Delinquency	0.0156*** (0.00326)	0.0216*** (0.00424)	0.00263*** (0.000600)	0.00241*** (0.000860)
Number of Inquiries	-0.0216** (0.0108)	-0.0385** (0.0165)	-0.000983*** (0.000294)	-0.00144*** (0.000434)
Student Loan Delinquency	0.00598 (0.00616)	0.0155* (0.00814)	-0.00123 (0.000923)	-0.000546 (0.00117)
Auto Loan Delinquency	0.0135*** (0.00277)	0.0153*** (0.00377)	0.000808*** (0.000288)	0.000625 (0.000432)
Auto Delinquency	0.0135*** (0.00277)	0.0153*** (0.00377)	0.000808*** (0.000288)	0.000625 (0.000432)

Standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$   
PACE FINANCING AND CONSUMER FINANCIAL OUTCOMES



# Appendix B: Additional results

**TABLE A2: PACE PAYMENT AMOUNTS RELATIVE TO OTHER PROPERTY TAXES**

	All					
	Mean	Min	25th Percentile	Median	75th Percentile	Max
Home Value	449,221	233	264,450	375,060	530,200	32,400,000
Likely Annual Property Tax Amount	3,591	2	2,193	3,057	4,186	246,240
Annual PACE Amount	2,707	83	1,503	2,215	3,276	105,258
PACE Amount as % of Taxes	87.9	1.3	49.7	75.7	111.1	245958.9
	California					
	Mean	Min	25th Percentile	Median	75th Percentile	Max
Home Value	521,376	233	311,300	447,800	609,816	32,400,000
Likely Annual Property Tax Amount	3,962	2	2,366	3,403	4,635	246,240
Annual PACE Amount	3,065	83	1,696	2,491	3,721	105,258
PACE Amount as % of Taxes	94.3	1.7	49.0	78.1	121.9	245958.9
	Florida					
	Mean	Min	25th Percentile	Median	75th Percentile	Max
Home Value	340,394	30,000	227,550	299,000	397,600	6,589,216
Likely Annual Property Tax Amount	3,030	267	2,025	2,661	3,539	58,644
Annual PACE Amount	2,155	213	1,269	1,868	2,666	54,970
PACE Amount as % of Taxes	78.4	1.3	50.8	73.3	99.9	801.0

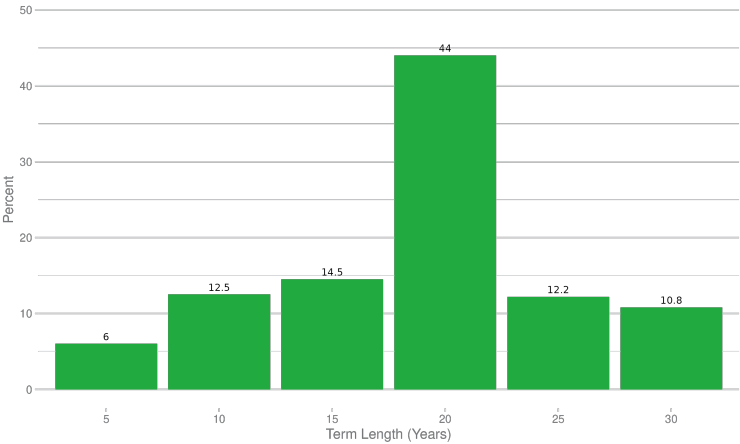
**TABLE A3:** DIFFERENCE-IN-DIFFERENCES ESTIMATES OF THE EFFECT OF PACE LOANS ON DELINQUENCY OUTCOMES FOR ORIGINATED CONSUMERS

Effect of PACE Loan On:	Static Model	Dynamic Model
Any Credit Delinquency	0.0104** (0.00363)	0.00272** (0.000901)
Pre-PACE Average Outcome	0.36	0.10
Sample Size	199,807	13,384,460
Mortgage Delinquency	0.0353*** (0.00307)	0.00615*** (0.000726)
Pre-PACE Average Outcome	0.15	0.04
Sample Size	156,360	10,452,637
Credit Card Delinquency	0.00782** (0.00362)	-0.000296 (0.000624)
Pre-PACE Average Outcome	0.26	0.05
Sample Size	186,598	12,482,884

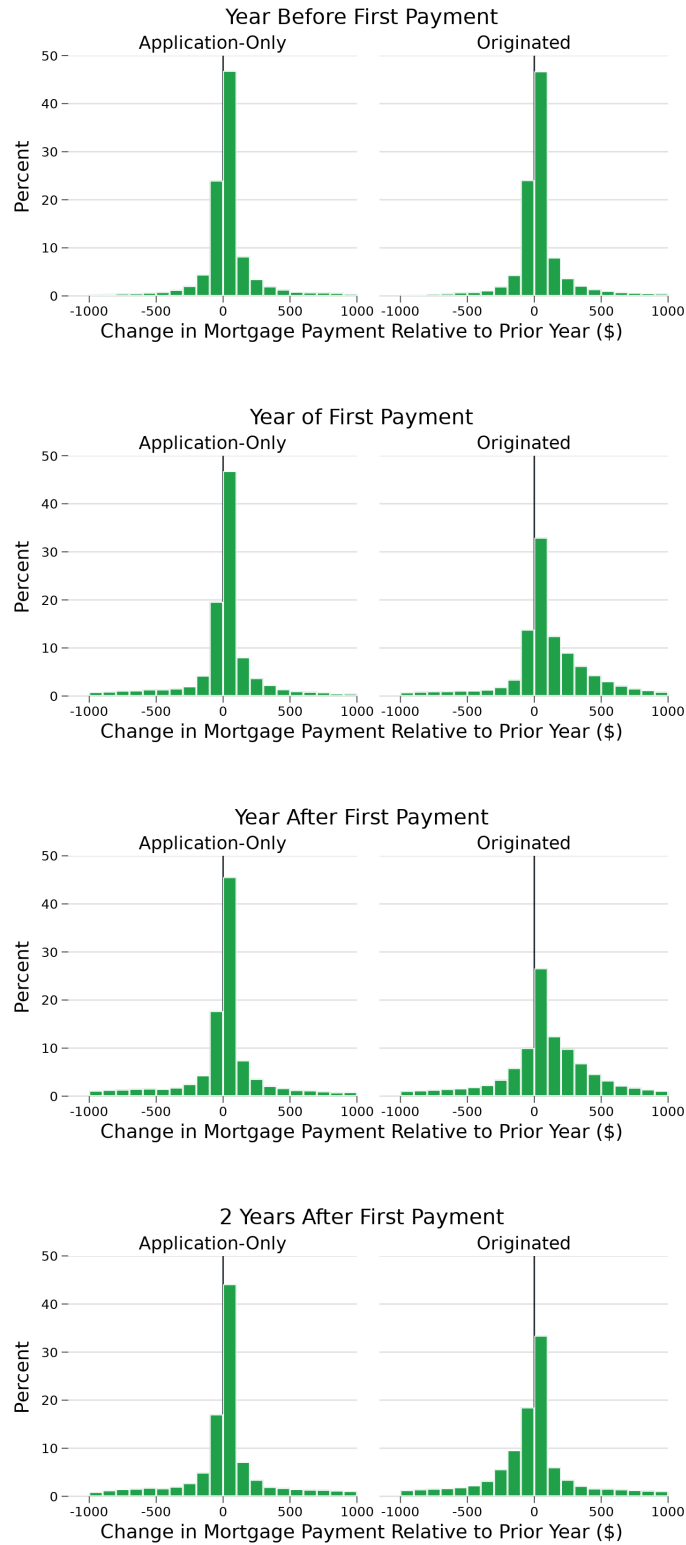
\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Main statistics in each row report the difference-in-differences estimate of the effect of having an originated PACE loan on the outcome in question, using Application-Only consumers as a control group. That is, these are coefficient estimates on the interaction between an indicator for being an Originated consumer and the current time being in the post-PACE period. Each statistic is from a separate regression. Regressions in the “Static Model” column use two observations per consumer covering the two years prior to their PACE Experience Date and 1–3 years after. These regressions control for census tract characteristics, state of residence, pre-PACE credit score and original balance or requested amount. Regressions in the “Dynamic Model” column have one observation per consumer per month and include time period fixed effects, year of PACE experience fixed effects, consumer fixed effects and an indicator for the current month being between the consumer’s PACE experience date and their First PACE Due Date. Pre-PACE Average Outcome is the average of the outcome variable for Originated borrowers for the two years prior to their PACE Experience Date, in the Static Model column, and the average for months prior to their First PACE Due Date, in the Dynamic Model column. Standard errors clustered by consumer reported in parentheses.

**FIGURE A1:** DISTRIBUTION OF TERM LENGTH FOR PACE LOANS ORIGINATED BETWEEN JUNE 2014 AND JUNE 2020.



**FIGURE A2:** DISTRIBUTION OF YEAR-OVER-YEAR CHANGES IN MONTHLY MORTGAGE PAYMENTS, FOR ORIGINATED AND APPLICATION-ONLY PACE BORROWERS WITH A PRE-PACE PRIMARY MORTGAGE, BY YEAR RELATIVE TO PACE EXPERIENCE DATE



## B.1 Stacked difference-in-differences

The consumers in the PACE data receive the “treatment”—PACE payments due—at different times. A recent econometrics literature shows that when treatment times are staggered in this manner, commonly used difference-in-differences approaches can be biased. In short, if the impact of PACE payments being due varies over time or across consumers, the results of a basic difference-in-differences may not be valid.<sup>62</sup> An approach to ameliorate this concern is stacked difference-in-differences.<sup>63</sup> With this approach, we create a stacked dataset, adapting the dynamic data such that only observations where the consumer has not yet been treated are included. In each time period, we keep all consumers who are treated in that period or later. Then we stack these year or month data, creating a much larger dataset than the original dynamic data. We then estimate the same regression equation as in the Dynamic model on these stacked data, weighting the duplicated observations so as not to double count. The results are in Table A4. Of the main outcomes using the dynamic model that we discuss in the main body of the report (Any Delinquency, Mortgage Delinquency, Credit Card Limit, Credit Score, Mortgage Payments, Number of Inquiries, Mortgage Opened, Mortgage Closed), all have similar coefficients and remain statistically significant in the stacked regression.

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<sup>62</sup> It is not clear that the concerns of the econometric literature actually apply in our context, given the structure of our data. Most commonly in staggered difference-in-differences designs, the time of treatment is undefined for the control group. As a consequence, in common settings the equivalent of our “Static” model is not possible, while estimates from the equivalent of our “Dynamic” model are composed of the estimates of several two-by-two difference-in-differences comparisons. These include comparisons between newly treated individuals and previously treated individuals, which can be problematic if the effect of treatment is variable over time or across individuals. *See* Andrew Goodman-Bacon, *Difference-in-Differences with Variation in Treatment Timing*, *Journal of Econometrics*, 225(3) (2021). However, because we observe a counterfactual treatment time for our Application-Only control group, and can control for a “before” and “after” effect for all consumers, even our dynamic difference-in-differences should only be making comparisons between treated and control observations, avoiding the problems identified in the literature.

<sup>63</sup> *See* Andrew C. Baker, David F. Larcker & Charles C.Y. Wang, *How much should we trust staggered difference-in-differences estimates?* *Journal of Financial Economics*, 144(2) (2022), Doruk Cengiz Arindrajit Dube, Attila Lindner and Ben Zipperer, *The Effect of Minimum Wages on Low-Wage Jobs*, *Quarterly Journal of Economics*, (2019).

**TABLE A4: DIFFERENCE IN DIFFERENCES STACKED REGRESSION**

Effect of PACE Loan on	Dynamic Specification	Stacked Specification
Mortgage Delinquency	0.00361*** (0.000453)	0.00486*** (0.000541)
Mortgage Inquiry	0.0000158 (0.0000822)	0.00000706 (0.0000993)
Mortgage Closed	0.00116*** (0.000122)	0.000725*** (0.000157)
Mortgage Opened	-0.000124 (0.000121)	-0.000520*** (0.000153)
Mortgage Payments	120.9*** (6.819)	123.7*** (6.454)
Credit Card Delinquency	0.000473 (0.000411)	0.00276*** (0.000571)
Credit Card Inquiry	-0.0000950 (0.0000775)	-0.000205** (0.0000994)
Credit Card Opened	-0.000256 (0.000381)	-0.00115** (0.000473)
Credit Card Limit	-580.5*** (149.7)	-879.6*** (129.6)
Credit Card Balance	129.8* (70.84)	186.6*** (67.32)
Credit Score	-1.274*** (0.295)	-1.482*** (0.300)
Any Delinquency	0.00263*** (0.000600)	0.00557*** (0.000761)
Number of Inquiries	-0.000983*** (0.000294)	-0.000784** (0.000357)
Student Loan Delinquency	-0.00123 (0.000923)	-0.00109 (0.00113)
Auto Delinquency	0.000808*** (0.000288)	0.00130*** (0.000388)

Standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## B.2 Robustness to changes in sample definition

We conducted three additional robustness checks, displayed in Table A5 (Static model) and A6 (Dynamic model). The first column of each table repeats our main specification from Section 4 for comparison.

In our main specifications, we limit the samples to include only Originated consumers and Application-Only consumers. The second column of each table expands the sample to include Denied consumers in the control group. The third column excludes Application-Only consumers, keeping only Denied consumers for the control group. There are some consumers who have multiple applications. Because we have condensed the data for these consumers to only have one PACE Experience Date, it is possible that these additional PACE events are not being measured correctly, leading to bias in our estimates. We drop consumers with multiple applications in the fourth columns of the Tables.

For the most part, including Denied consumers in our control group increases the magnitude of our estimates, and as such using only Denied consumers increases them further still. An exception is that, the impact of PACE on credit card limit changes from negative to positive. This may imply that credit card limits are trending down for consumers whose PACE applications were denied, relative to Originated consumers.

When we drop consumers with multiple applications, we find that, in many cases, our results slightly attenuate or lose precision. The impact of PACE on mortgage delinquency, any delinquency, and credit score, are similar across these samples and maintains significance.



**TABLE A5: STATIC DIFFERENCE IN DIFFERENCES ROBUSTNESS CHECKS**

Effect of PACE Loan On:	Baseline	Include Denied	Denied Only	Drop Mult. Apps
Mortgage Delinquency	0.0251*** (0.00234)	0.0391*** (0.00222)	0.0632*** (0.00360)	0.0201*** (0.00253)
Mortgage Inquiry	0.00334 (0.00205)	0.00245 (0.00177)	0.00114 (0.00230)	0.000202 (0.00238)
Mortgage Closed	0.0135*** (0.00360)	0.0195*** (0.00305)	0.0283*** (0.00383)	0.0148*** (0.00434)
Mortgage Opened	-0.0211*** (0.00359)	-0.0277*** (0.00304)	-0.0374*** (0.00373)	-0.0200*** (0.00433)
Mortgage Payments	164.6*** (7.048)	184.2*** (6.168)	219.2*** (8.513)	146.7*** (7.945)
Credit Card Delinquency	0.0103*** (0.00307)	0.0112*** (0.00277)	0.0127*** (0.00397)	0.00974*** (0.00348)
Credit Card Inquiry	-0.00188 (0.00214)	-0.00272 (0.00186)	-0.00396 (0.00250)	-0.00222 (0.00249)
Credit Card Opened	-0.00149 (0.00387)	-0.0146*** (0.00336)	-0.0338*** (0.00453)	0.00262 (0.00463)
Mortgage Payments	164.6*** (7.048)	184.2*** (6.168)	219.2*** (8.513)	146.7*** (7.945)
Credit Card Limit	-498.3*** (157.1)	248.5* (134.6)	1366.9*** (162.2)	-720.7*** (196.4)
Credit Card Balance	215.6** (88.43)	232.4*** (74.30)	255.1*** (89.86)	41.98 (108.4)
Credit Score	-1.678*** (0.337)	-2.006*** (0.296)	-2.489*** (0.410)	-1.029*** (0.388)
Any Delinquency	0.0156*** (0.00326)	0.0255*** (0.00290)	0.0403*** (0.00406)	0.0117*** (0.00372)
Any Inquiry	-0.0216** (0.0108)	-0.0128 (0.00967)	0.000219 (0.0134)	-0.0210* (0.0119)
Student Loan Delinquency	0.00598 (0.00616)	0.00759 (0.00552)	0.00997 (0.00818)	-0.00400 (0.00704)
Auto Delinquency	0.0135*** (0.00277)	0.0105*** (0.00255)	0.00577 (0.00393)	0.0100*** (0.00306)

Standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

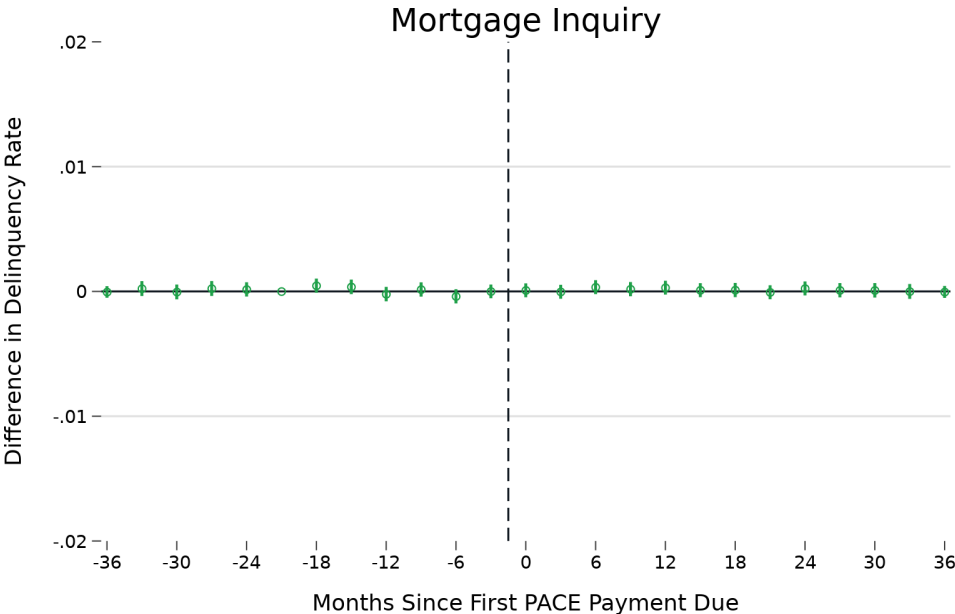
**TABLE A6: DYNAMIC DIFFERENCE IN DIFFERENCES ROBUSTNESS CHECKS**

Effect of PACE Loan On:	Baseline	Include Denied	Denied Only	Drop Mult. Apps
Mortgage Delinquency	0.00361*** (0.000453)	0.0128*** (0.000424)	0.0194*** (0.000563)	0.00369*** (0.000475)
Mortgage Inquiry	0.0000158 (0.0000822)	-0.0000128 (0.0000668)	-0.0000298 (0.0000763)	-0.0000494 (0.0000930)
Mortgage Closed	0.00116*** (0.000122)	0.00149*** (0.0000958)	0.00170*** (0.000106)	0.00113*** (0.000148)
Mortgage Opened	-0.000124 (0.000121)	-0.000534*** (0.0000947)	-0.000798*** (0.000104)	-0.000129 (0.000145)
Mortgage Payments	116.4*** (6.832)	158.0*** (5.459)	187.7*** (6.287)	100.7*** (7.765)
Credit Card Delinquency	0.000473 (0.000411)	0.00249*** (0.000346)	0.00388*** (0.000407)	0.000965** (0.000460)
Credit Card Inquiry	-0.0000950 (0.0000775)	-0.000120* (0.0000639)	-0.000139* (0.0000745)	-0.000114 (0.0000891)
Credit Card Opened	-0.000256 (0.000381)	-0.00395*** (0.000297)	-0.00630*** (0.000335)	0.0000697 (0.000444)
Mortgage Payments	116.4*** (6.832)	158.0*** (5.459)	187.7*** (6.287)	100.7*** (7.765)
Credit Card Limit	-580.5*** (149.7)	1081.1*** (116.5)	2151.6*** (124.3)	-866.2*** (183.6)
Credit Card Balance	129.8* (70.84)	268.7*** (56.94)	359.5*** (60.14)	29.20 (89.29)
Credit Score	-1.274*** (0.295)	-1.719*** (0.233)	-1.995*** (0.265)	-1.242*** (0.340)
Any Delinquency	0.00263*** (0.000600)	0.0133*** (0.000520)	0.0203*** (0.000629)	0.00316*** (0.000661)
Any Inquiry	-0.000983*** (0.000294)	0.000560** (0.000247)	0.00155*** (0.000290)	-0.000996*** (0.000326)
Student Loan Delinquency	-0.00123 (0.000923)	0.00228*** (0.000772)	0.00466*** (0.000926)	-0.00159 (0.00105)
Auto Delinquency	0.000808*** (0.000288)	0.00109*** (0.000258)	0.00129*** (0.000329)	0.000799*** (0.000307)

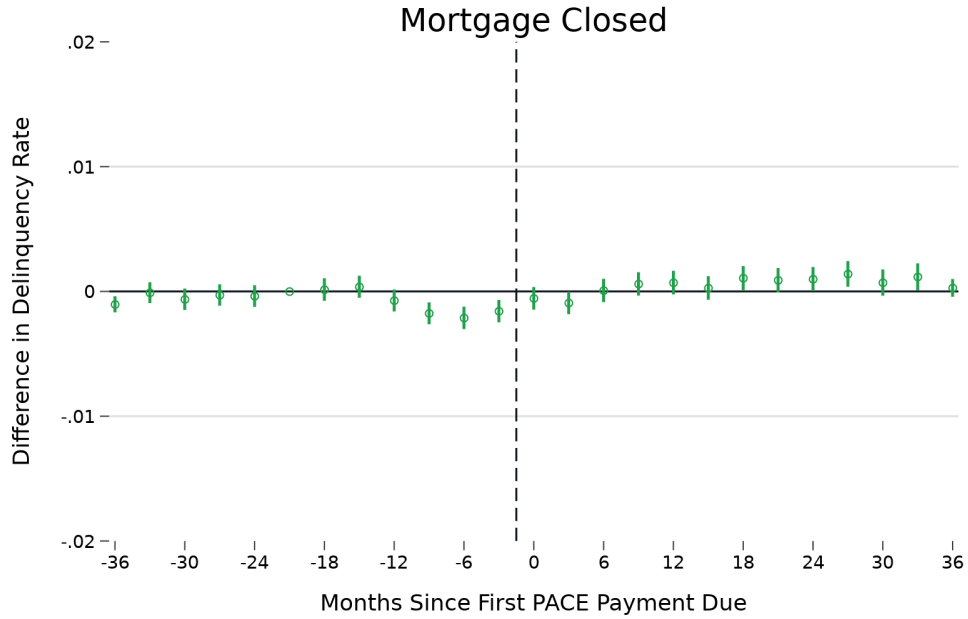
Standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

# B.3 Event study evidence on impact of PACE on credit outcomes other than mortgage delinquency

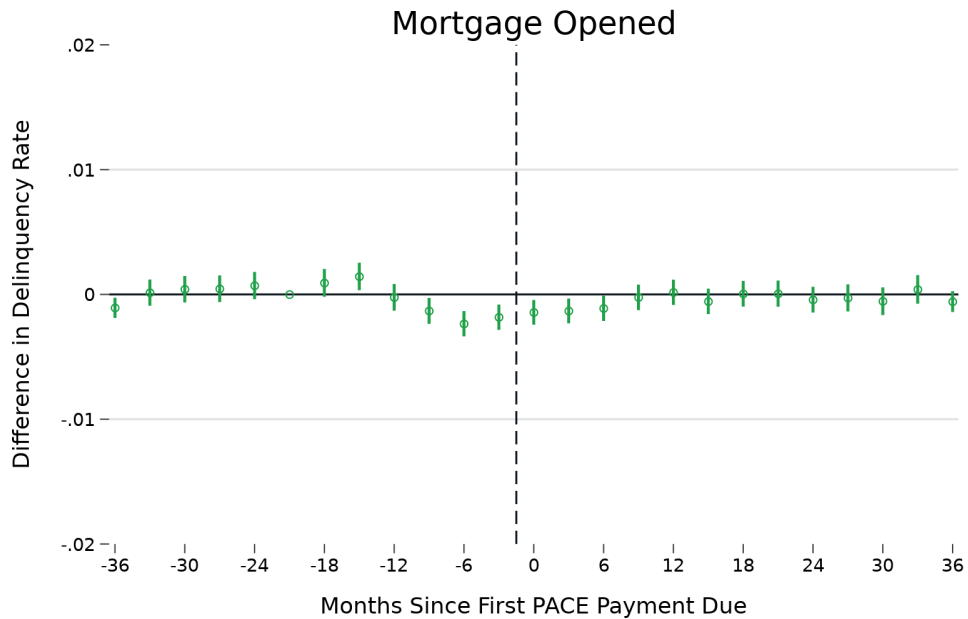
**FIGURE A3:** EFFECT OF PACE LOANS ON PROBABILITY OF AT LEAST ONE MORTGAGE INQUIRY, OVER TIME RELATIVE TO FIRST PACE DUE DATE (OUTCOME IS AN INQUIRY IN A GIVEN MONTH)



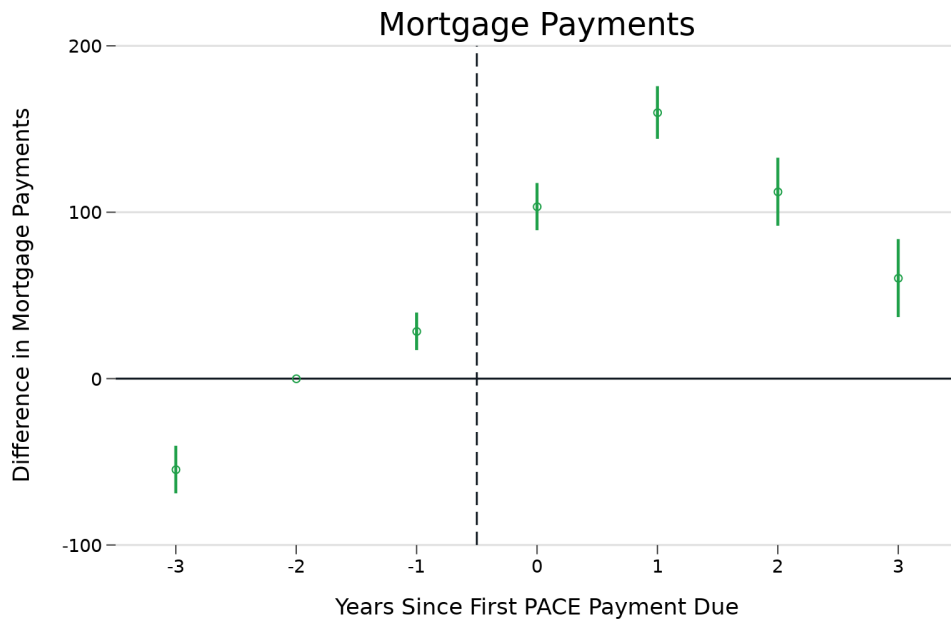
**FIGURE A4:** EFFECT OF PACE LOANS ON PROBABILITY OF AT LEAST ONE MORTGAGE CLOSING, OVER TIME RELATIVE TO FIRST PACE DUE DATE (OUTCOME IS CLOSING A MORTGAGE IN A GIVEN MONTH)



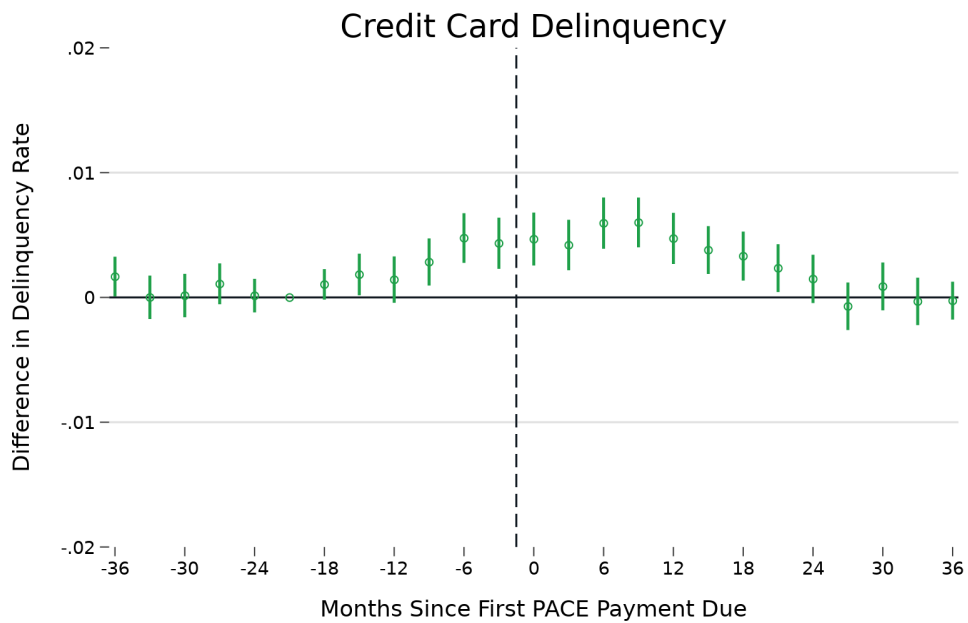
**FIGURE A5:** EFFECT OF PACE LOANS ON PROBABILITY OF OPENING A NEW MORTGAGE, OVER TIME RELATIVE TO FIRST PACE DUE DATE (OUTCOME IS OPENING A MORTGAGE IN A GIVEN MONTH)



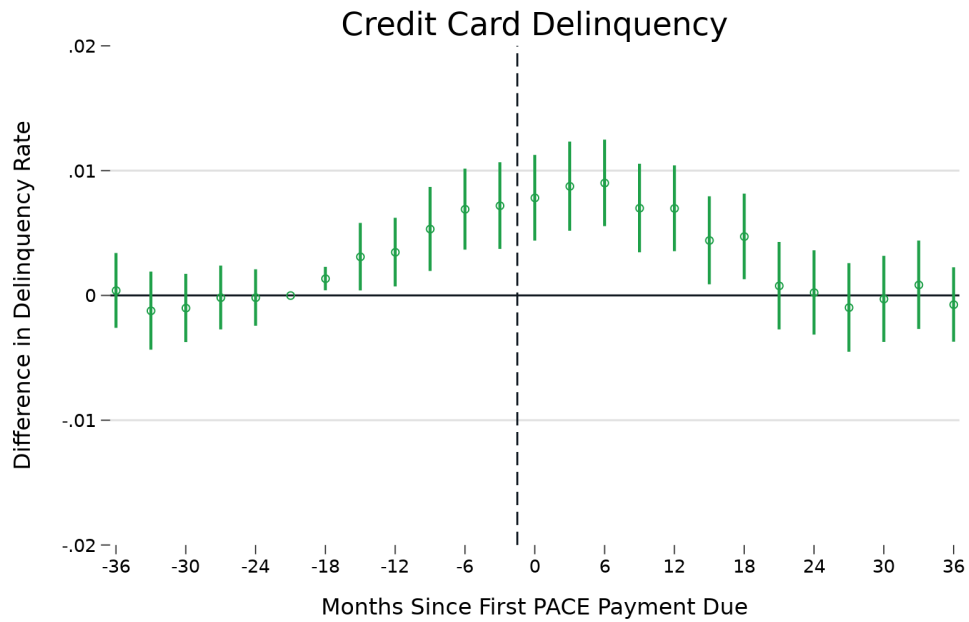
**FIGURE A6:** EFFECT OF PACE LOANS ON MONTHLY MORTGAGE PAYMENT AMOUNT, OVER TIME RELATIVE TO FIRST PACE DUE DATE (OUTCOME IS AVERAGE MONTHLY PAYMENT IN A GIVEN YEAR)



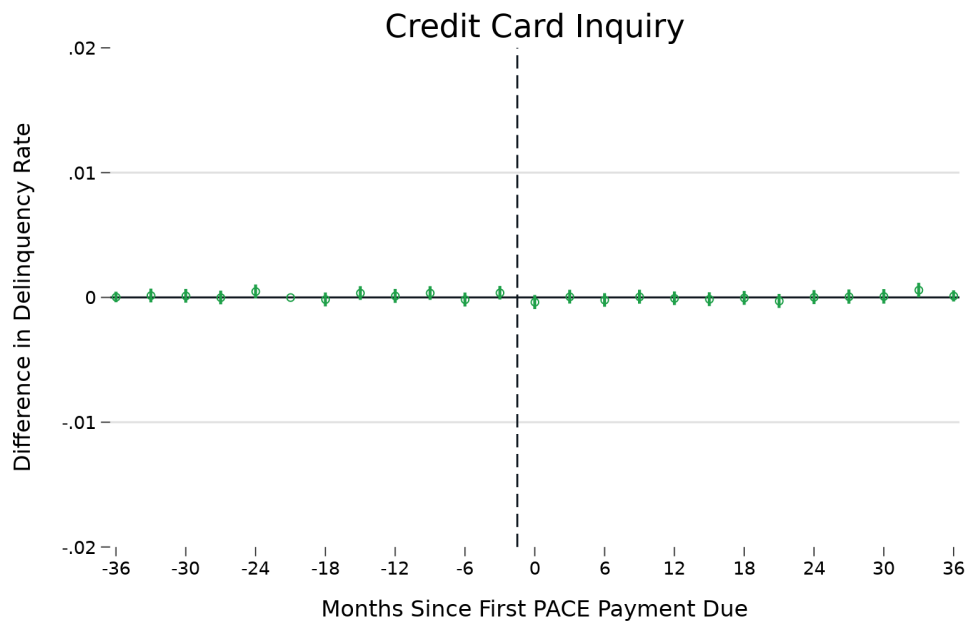
**FIGURE A7:** EFFECT OF PACE LOANS ON 60-DAY CREDIT CARD DELINQUENCY, OVER TIME RELATIVE TO FIRST PACE DUE DATE (OUTCOME IS DELINQUENCY IN A GIVEN MONTH)



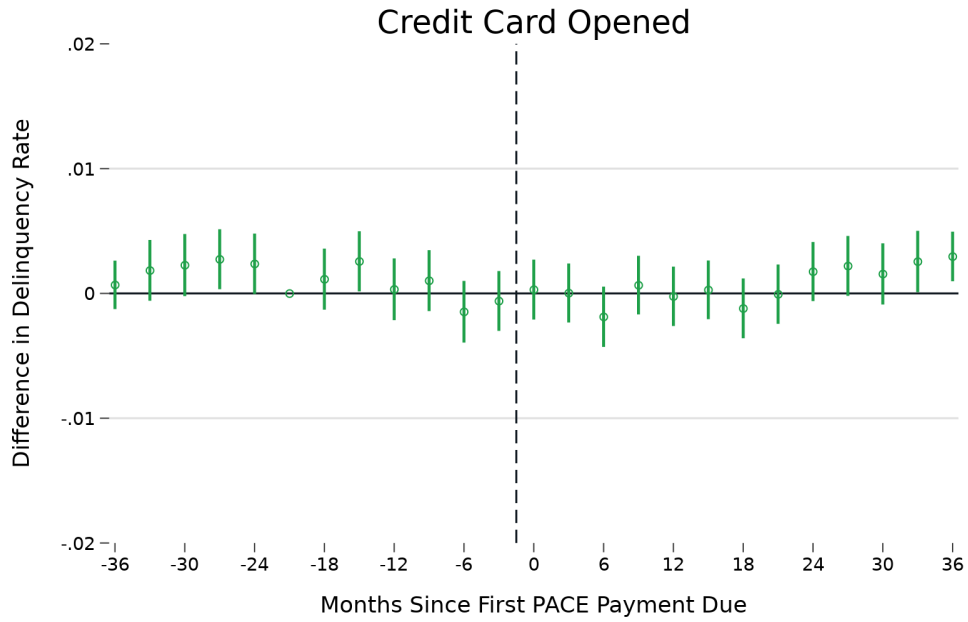
**FIGURE A8:** EFFECT OF PACE LOANS ON 30-DAY CREDIT CARD DELINQUENCY, OVER TIME RELATIVE TO FIRST PACE DUE DATE (OUTCOME IS DELINQUENCY IN A GIVEN MONTH)



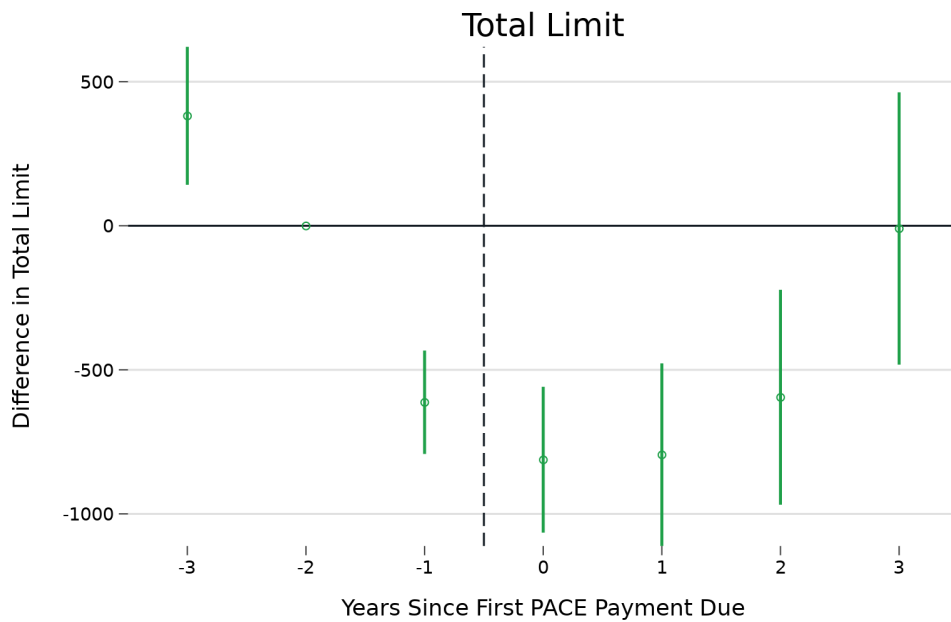
**FIGURE A9:** EFFECT OF PACE LOANS ON PROBABILITY OF ANY NEW CREDIT CARD INQUIRY, OVER TIME RELATIVE TO FIRST PACE DUE DATE (OUTCOME IS INQUIRY IN A GIVEN MONTH)



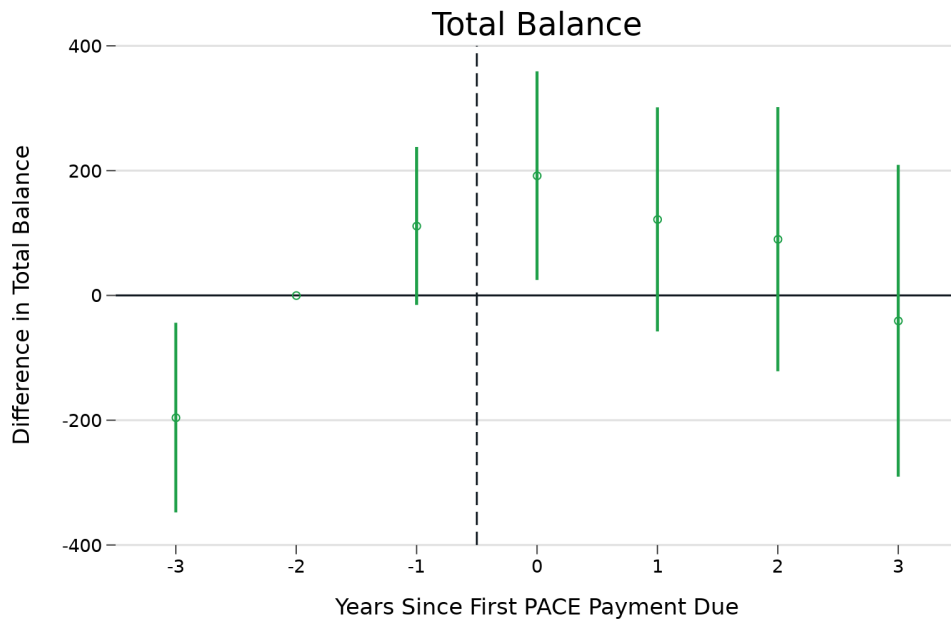
**FIGURE A10:** EFFECT OF PACE LOANS ON PROBABILITY OF OPENING A NEW CREDIT CARD ACCOUNT, OVER TIME RELATIVE TO FIRST PACE DUE DATE (OUTCOME IS OPENING A NEW CREDIT CARD IN A GIVEN MONTH)



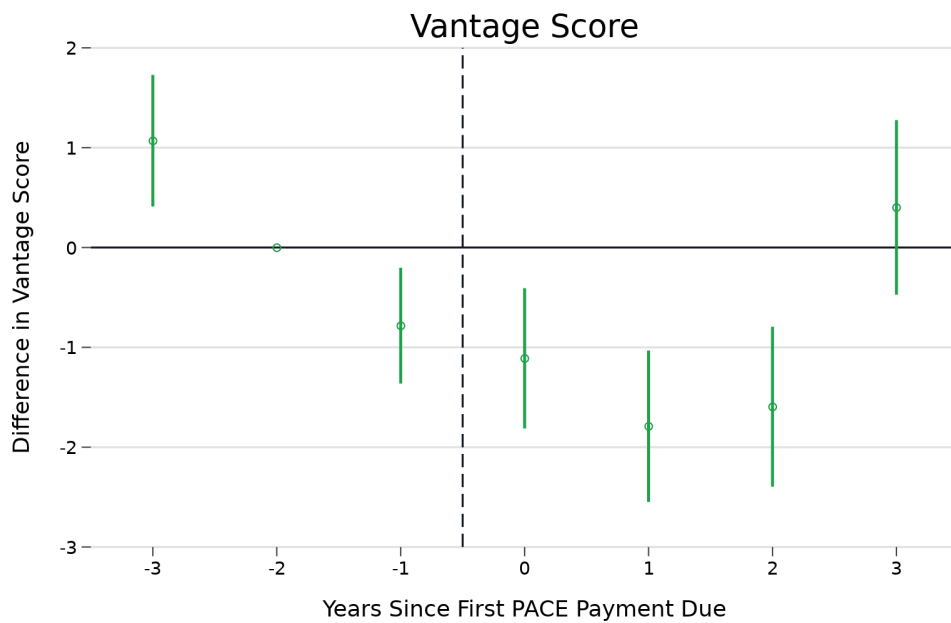
**FIGURE A11:** EFFECT OF PACE LOANS ON CREDIT CARD LIMITS, OVER TIME RELATIVE TO FIRST PACE DUE DATE (OUTCOME IS TOTAL LIMITS ACROSS ALL ACCOUNTS IN A GIVEN YEAR)



**FIGURE A12:** EFFECT OF PACE LOANS ON CREDIT CARD BALANCES, OVER TIME RELATIVE TO FIRST PACE DUE DATE (OUTCOME IS AVERAGE TOTAL MONTHLY BALANCES IN A GIVEN YEAR)

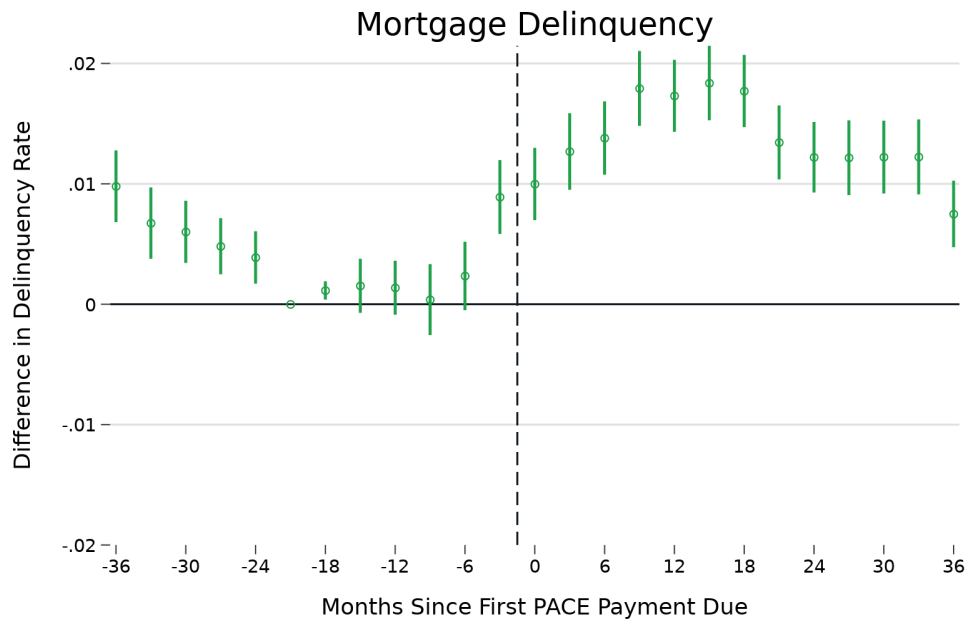


**FIGURE A13:** EFFECT OF PACE LOANS ON CREDIT SCORE, OVER TIME RELATIVE TO FIRST PACE DUE DATE (OUTCOME IS CREDIT SCORE IN A GIVEN YEAR)

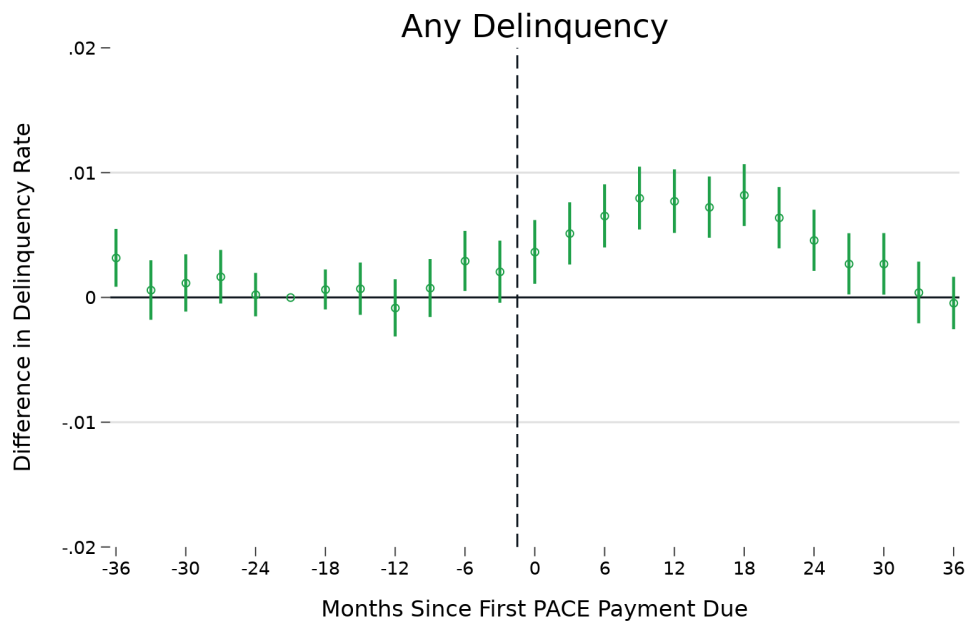




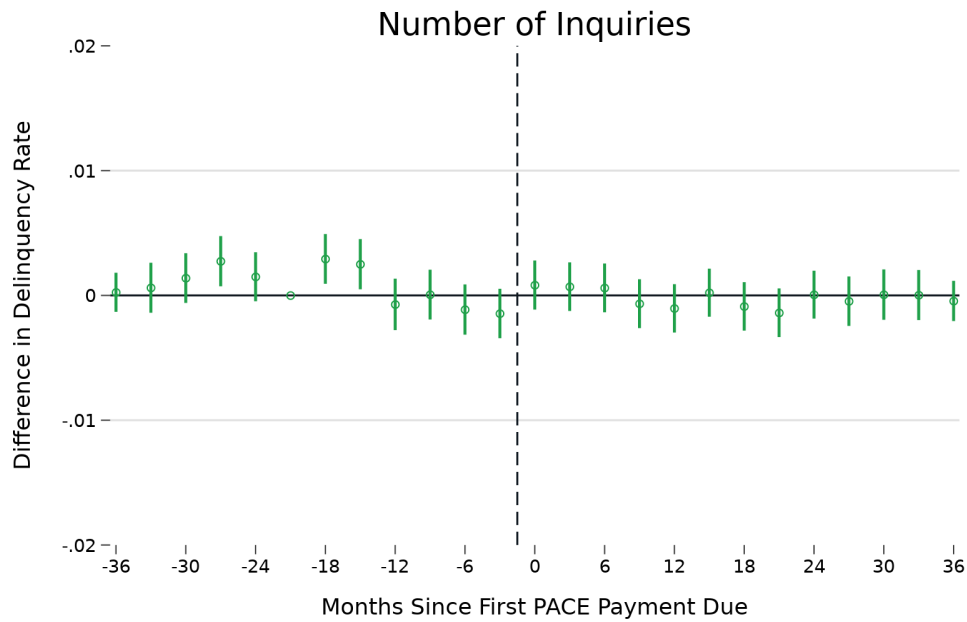
**FIGURE A14:** EFFECT OF PACE LOANS ON 30-DAY MORTGAGE DELINQUENCY, OVER TIME RELATIVE TO FIRST PACE DUE DATE (OUTCOME IS DELINQUENCY IN A GIVEN MONTH)



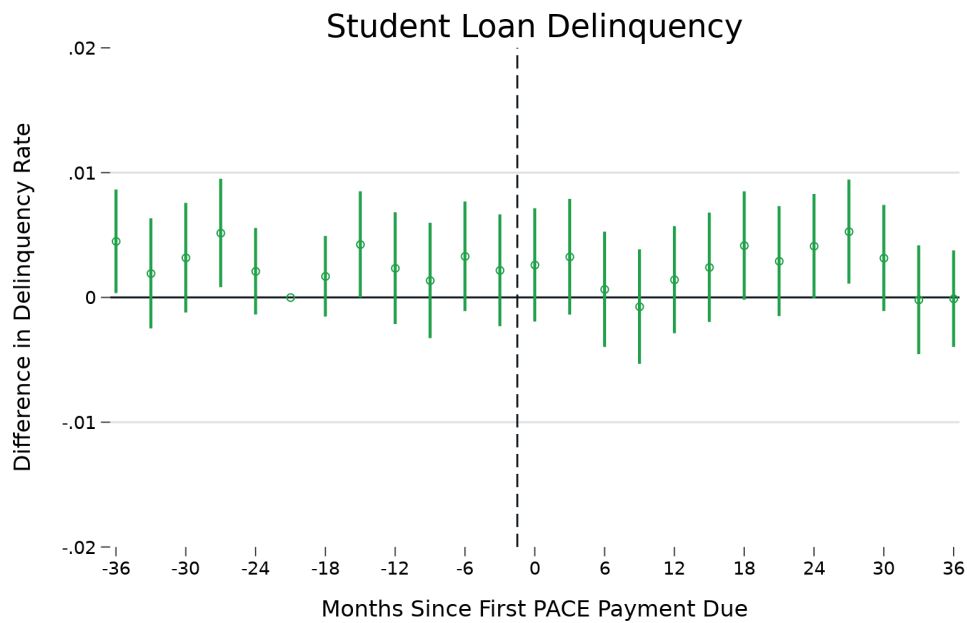
**FIGURE A15:** EFFECT OF PACE LOANS ON ANY 60-DAY DELINQUENCY, OVER TIME RELATIVE TO FIRST PACE DUE DATE (OUTCOME IS ANY DELINQUENCY IN A GIVEN MONTH)



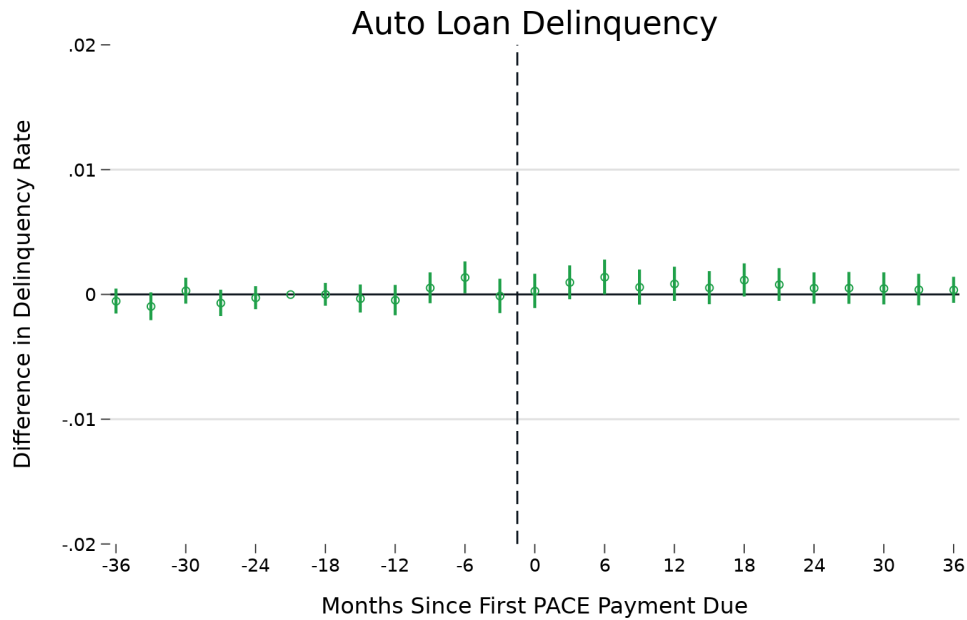
**FIGURE A16:** EFFECT OF PACE LOANS ON TOTAL INQUIRIES, OVER TIME RELATIVE TO FIRST PACE DUE DATE (OUTCOME IS NUMBER OF INQUIRIES IN A GIVEN MONTH)



**FIGURE A17:** EFFECT OF PACE LOANS ON 60-DAY STUDENT LOAN DELINQUENCY, OVER TIME RELATIVE TO FIRST PACE PAYMENT DUE DATE (OUTCOME IS DELINQUENCY IN A GIVEN MONTH)



**FIGURE A18:** EFFECT OF PACE LOANS ON 60-DAY AUTO LOAN DELINQUENCY, OVER TIME RELATIVE TO FIRST PACE PAYMENT DUE DATE (OUTCOME IS DELINQUENCY IN A GIVEN MONTH)



## B.4 Using the 2018 California PACE Reforms to measure the average impact of PACE on credit outcomes

The 2018 California PACE Reforms provide an opportunity to further test our estimate of the overall effect of PACE loans on consumer outcomes. To the extent one is concerned about the validity of using Application-Only consumers as a control group, the 2018 California PACE Reforms created an additional dimension of control group that can address those concerns. That is, even if the underlying trends in Originated PACE consumer outcomes differed from our control group of applicants for reasons unrelated to PACE, we would not expect this difference in trends to change around the effective date of the 2018 California PACE Reforms. This means we can use the 2018 California PACE Reforms to adjust for any bias in our difference-in-difference estimates due to differences in the underlying trends. This makes a difference-in-difference-in-differences, or “triple-difference” estimate (comparing Originated borrowers to Application-Only consumers, comparing before and after getting or applying for PACE, and comparing before and after the 2018 California PACE Reforms). For the triple-difference analysis, we include only PACE borrowers and applicants in California.

Because PACE borrowers in Florida were not affected by the 2018 California PACE Reforms, we can go a step further in refining our estimates. Even if there were changes in the PACE market or in the population of Originated PACE borrowers that coincidentally occurred around the time of

the 2018 California PACE Reforms but were unrelated to the laws, it seems safe to assume that such changes would be the same in Florida. As a result, if we difference out any changes after 2018 in Florida, that would address this concern. Our analysis is then a difference-in-difference-in-difference-in-differences, or “quadruple-difference” estimate (Originated/Application-Only, before/after PACE, before/after CA Law, California/Florida).

For both of these analyses, we examine outcomes at the monthly level equivalent to the Dynamic version of our difference-in-differences model, with the effect of PACE measured from the first month that PACE payments would be due for each consumer, compared to months prior to that time.

We caution that, in practice, both the triple- and quadruple-difference estimates will tend to understate the effect of PACE on consumer outcomes, relative to the truth. In this analysis, we effectively assume that Originated PACE borrowers in California after April 2018 are not “treated” by having a PACE loan. While the Section 5 shows that the law reduced the impact of PACE, the 2018 California PACE Reforms did not eliminate the impact of PACE on mortgage delinquency for California PACE borrowers.

Table A7 shows the results of our triple- and quadruple- difference analyses. We show results for the effect of a PACE loan on any 60-day delinquency, 60-day mortgage delinquencies, the probability of closing a mortgage, and total credit card balances. Panel A contains the results of the triple-difference analysis (limiting to California, comparing before/after the Reforms, before/after PACE, and originations/applicants), while Panel B contains the quadruple-difference analysis (further comparing California and Florida borrowers). As in our dynamic difference in differences model, all regressions include an indicator for being between the PACE Experience Data and the First PACE Due Date, as well as time fixed effects, year of origination fixed effects, and consumer fixed effects which subsume any other fixed observable or unobservable characteristics. As in our main difference-in-differences estimates in Section 4, we find that PACE loans increase the probability that consumers experience a delinquency, stemming primarily from mortgage delinquency. We find a somewhat larger effect of PACE loans on delinquency in the triple-difference model, compared to our baseline dynamic difference-in-differences model from Table 9. The quadruple-difference model shows a still larger effect on monthly delinquency rates. Given that using post-2018 California as a control group will tend to bias our estimates toward zero, this suggests that our baseline difference-in-differences estimates may be lower than the true effect of PACE, which is likely at least somewhat larger than the triple- and quadruple-difference estimates.

**TABLE A7:** EFFECT OF PACE LOANS ON CREDIT OUTCOMES FOR PACE BORROWERS: TRIPLE- AND QUADRUPLE-DIFFERENCE ESTIMATES

<i>Panel A: Triple Difference (After Reforms/After PACE/Originated)</i>				
	Outcome			
	(1)	(2)	(3)	(4)
	Any Delinquency	Mortgage Delinquency	Mortgage Closed	CC Balances
Effect of PACE Loan	0.00606*** (0.00183)	0.00468*** (0.00131)	0.000909 (0.000589)	-374.7** (180.9)
<i>N</i>	7476081	5952192	5952192	971886
Pre-PACE Outcome Mean	0.0413	0.0136	0.0135	8323.0
<i>Panel B: Quadruple Difference (After Reforms/After PACE/Originated/In CA)</i>				
	Outcome			
	(1)	(2)	(3)	(4)
	Any Delinquency	Mortgage Delinquency	Mortgage Closed	CC Balances
Effect of PACE Loan	0.00915*** (0.00264)	0.00805*** (0.00193)	-0.000504 (0.000707)	-228.2 (296.9)
<i>N</i>	13384460	10452637	10452637	1739841
Pre-PACE Outcome Mean	0.0502	0.0170	0.0105	8208.3

\*  $p < .1$ , \*\*  $p < .05$ , \*\*\*  $p < .01$

Notes: Unit of observation is a consumer-month (first three columns) or a consumer-archive (last column) for all consumers who applied for a PACE assessment between 2014 and 2020. Panel A is limited to consumers who resided in California when they applied for PACE. "Effect of PACE Payments" is the three- or four- way interaction of having a PACE assessment originated, having the assessment originated before April 1, 2018, being after the first payment would be due for the PACE assessment if placed, and, in Panel B, residing in California. All regressions controls for year of PACE origination or application, time fixed effects, and consumer fixed effects. Standard errors clustered by individual reported in parentheses.

# Appendix C: PACE Voluntary Data Request



1700 G Street NW, Washington, DC 20552

October XX, 2020

RE: Voluntary Request for Information to Inform the Consumer Financial Protection Bureau's PACE Rulemaking

Dear ,

Section 307 of the Economic Growth, Regulatory Relief, and Consumer Protection Act (EGRRCPA) mandates that the Consumer Financial Protection Bureau (Bureau) prescribe certain regulations relating to Property Assessed Clean Energy (PACE) financing. In order to better understand the PACE financing market and the unique nature of PACE financing, the Bureau issued an Advance Notice of Proposed Rulemaking on March 4, 2019.<sup>1</sup> To further understand the effect of PACE on consumers' financial outcomes and inform the development of the Bureau's proposed PACE rulemaking, we respectfully request that you respond to the attached voluntary request for information relating to PACE applications and assessments.

Responding to this request is voluntary. The Bureau does not intend to unduly burden respondents with any information request and asks only for data that is reasonably accessible. Even partial responses would be useful. If it is possible to respond to a question that is similar, but not identical, to one asked below, we welcome such responses, and ask that you clarify you are responding to a similar question.

Information provided in response to this request will be treated as confidential information in accordance with the Bureau's confidentiality rules, as described in 12 CFR part 1070. Where appropriate, you may wish to designate responses as confidential business information.

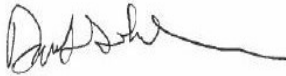
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<sup>1</sup> ANPR is available at 84 FR 8479 (Mar. 8, 2019), <https://www.federalregister.gov/documents/2019/03/08/2019-04177/advance-notice-of-proposed-rulemaking-on-residential-property-assessed-clean-energy-financing>.

Your participation in this request will contribute to the Bureau's efforts to ensure that the proposed regulations are evidence-based. Similar to the information the Bureau received in response to the ANPR, the information you provide in response to this information request will help the Bureau formulate a proposed PACE rule that would not only achieve statutory objectives but also would reflect a careful consideration of costs and benefits.

If you have any questions about this request, please contact Tricia Kerney-Willis, Assistant Director, Office of Stakeholder Management, Section for Financial Institutions, at [Tricia.Kerney-Willis@cfpb.gov](mailto:Tricia.Kerney-Willis@cfpb.gov) and copy Ryan Sandler at [Ryan.Sandler@CFPB.gov](mailto:Ryan.Sandler@CFPB.gov).

Sincerely,



Dan Sokolov  
Acting Associate Director  
Division of Research, Markets and Regulations





1700 G Street NW, Washington, DC 20552

October XX, 2020

**UNITED STATES OF AMERICA  
BUREAU OF CONSUMER FINANCIAL PROTECTION**

**VOLUNTARY REQUEST FOR INFORMATION TO SUPPORT THE BUREAU’S  
RULEMAKING TO IMPLEMENT SECTION 307 OF THE ECONOMIC  
GROWTH, REGULATORY RELIEF, AND CONSUMER PROTECTION ACT**

The Bureau of Consumer Financial Protection (Bureau) hereby requests that [Provider Name] voluntarily provide information to assist with the Bureau’s issuance of proposed regulations regarding Property Assessed Clean Energy (PACE) financing that the Bureau is developing pursuant to section 307 of the Economic Growth, Regulatory Relief, and Consumer Protection Act (EGRRCPA), codified at 15 U.S.C. 1639c(b)(3).

**Purpose**

Section 307 of EGRRCPA directs the Bureau to issue regulations with respect to PACE financing that (1) “carry out the purposes of” the Truth In Lending Act’s (TILA’s) Ability-to-Repay (ATR) requirements currently in place for residential mortgage loans, and (2) “apply” TILA’s general civil liability provision for violations of those requirements. The regulations must “account for the unique nature” of PACE financing.

Section 307 of EGRRCPA further authorizes the Bureau, in prescribing the regulations, to “collect such information and data that the Bureau determines is necessary.” To that end, the Bureau seeks the information requested herein to support the Bureau’s proposed rulemaking regarding PACE financing.

The Bureau requests that you submit responses on or before November 30, 2020.

## **Instructions**

Please note the following in regards to the questions below:

1. Please answer all questions using only information or data that are reasonably accessible, such as data that are already in electronic format.
2. *Coverage and Time Period:* Please provide the data on all PACE applications received and PACE assessments placed (as defined below) on or after July 1, 2014, or the earliest date that the information is reasonably accessible, whichever is later, and before January 1, 2020.
3. *Data Dictionary:* Please provide a data dictionary that describes the format and expected content of each data field you provide. You may wish to use the tables below as a basis for this data dictionary.
4. *Partial Responses:* The Bureau welcomes partial responses when a more complete response is not feasible. For instance, the Bureau recognizes that you may not have collected certain information in some years, or may not have stored it in reasonably accessible electronic form. As noted above, we request only information that is reasonably accessible. Please leave fields blank for particular records if the information for those fields is not reasonably accessible.
5. *Responses to Similar Questions or to Different Questions:* The Bureau welcomes responses to questions similar, but not identical, to those asked below when it is not feasible or practical to respond to the precise question asked. Please annotate all such responses accordingly in the included data dictionary.

The Bureau also welcomes information not directly responsive to any question below that you nonetheless believe would assist the Bureau in its efforts to develop a proposed rule regarding PACE. Please annotate all such submissions accordingly in the included data dictionary.

6. The Bureau may follow up with you and request additional information in connection with your responses.
7. Except as noted in the section below titled “Identifiers for Matching”, do not include any personally identifiable or other information that directly identifies any consumer, such as a consumer’s name, address, telephone number, Social Security number, or account number.
8. Please contact Usama Kamran via email at [Usama.Kamran@CFPB.gov](mailto:Usama.Kamran@CFPB.gov) or by phone at 202-297-5190 to discuss data output formats and how to transmit data via secure file transfer protocol (SFTP). If helpful, the Bureau can provide a spreadsheet template to be used for data output.

If you have any questions about the information specified in or requested by the request, please contact Ryan Sandler via email at [Ryan.Sandler@CFPB.gov](mailto:Ryan.Sandler@CFPB.gov).

## **Specifications**

*Please note the Coverage and Time Period as described in the Instructions (item #2).*

Note that we have asked for separate tables for assessments and applications because we assumed this would be less burdensome—if this assumption is incorrect, you should feel free to provide both sets of data in one table, leaving fields related to placed assessments blank for applications that did not lead to placed assessments.

### **Identifiers for Matching:**

As noted above, please do not include any personally identifiable or other information that directly identifies any consumer in the tables described below. However, the Bureau intends to link the information you provide to data from other sources, and the Bureau requests that you create a hashed unique identifier for each consumer in your data in order to enable that linking without including direct identifiers in the tables below. Specifically, please follow the following steps:

1. Create a string field containing the first name, last name, and street address of the consumer associated with the record. The exact format of the address is not important. For instance: “Joe|Consumer|123MainStreet” or “Joe Consumer, 123 Main Street” are acceptable.
2. Convert the field to a hexadecimal string using the SHA-256 hashing algorithm. The first example in step 1 would then be “f4bf6b6484e07a23f43c05doaf898fd219ed9e698921023395030a0bd92be5b3”. This is the *hashed unique identifier*.
3. Please attached the hashed unique identifier to every record related to the consumer in question.

In addition, please provide, *in a separate file*, a table containing the first name, last name, street address, and hashed unique identifier for each consumer (“key file”). The Bureau will provide this separate key file to a separate entity (“Contractor”) who will link the information you provide to data from other sources. The Contractor will not retain any information you provide after its work is complete, and will only return data to the Bureau that has been stripped of name and address information, leaving only the hashed unique identifier. Before uploading this file, please encrypt the key file using a PGP encryption key that the Bureau will provide. This public key corresponds to a private key belonging to the Contractor, which you can use to encrypt the key file. This means that the Bureau will not be able to read the names and addresses you provide, and would only be able to forward the encrypted file for matching.

The Bureau can also provide instructions to upload the key file directly to the Contractor. Please contact Ryan Sandler at [Ryan.Sandler@CFPB.gov](mailto:Ryan.Sandler@CFPB.gov) if you would like to utilize this option. The Bureau will not mingle name and address information with any information you provide in the tables described below, and will not provide any of your information to the Contractor except for the key file. Once the matching is complete, the Bureau will destroy its copy of the key file as well.

Application Data:

We are interested in obtaining information on applications that you received for PACE financing. Please provide a table where a row corresponds to an individual PACE application. The first column of the table should contain a unique identifier for the application, created as described above. The remaining columns of the table should include the following fields:

#	Field name	Field description	Notes
[1]	apn	Assessor's parcel number, hashed using the SHA-256 algorithm	Please remove any non-numeric characters such as spaces or hyphens before applying the hashing algorithm.
[2]	county_fips	The 5-digit FIPS code for the county where the applicant is located	
[3]	sponsor	String field giving the name of the program or local government sponsor that this application was made through (e.g. WRCOG).	
[4]	date_rec	Date the application was received in "MM/DD/YYYY" format.	If it would be less burdensome to use a different date format, please do so and note the format used in the included data dictionary
[5]	date_complete	Date the application was considered complete in your system, in "MM/DD/YYYY" format.	If it would be less burdensome to use a different date format, please do so and note the format used in the included data dictionary
[6]	type_solar	Equal to 1 if the home improvement project in the application included solar panel installation, and zero otherwise	If this information is not recorded for applications that are not approved, please omit this field, but if possible include fields 12-17 in the assessment data section.

[7]	type_windows	Equal to 1 if the home improvement project in the application included installation of new windows or doors, and zero otherwise	If this information is not recorded for applications that are not approved, please omit this field, but if possible include fields 12-17 in the assessment data section.
[8]	type_hvac	Equal to 1 if the home improvement project in the application included HVAC equipment, and zero otherwise	If this information is not recorded for applications that are not approved, please omit this field, but if possible include fields 12-17 in the assessment data section.
[9]	type_disaster	Equal to 1 if the home improvement project in the application included disaster hardening measures (e.g. wind resistance improvements, wildfire protection, seismic strengthening improvements), and zero otherwise	If this information is not recorded for applications that are not approved, please omit this field, but if possible include fields 12-17 in the assessment data section.
[10]	type_roofing	Equal to 1 if the home improvement project in the application included repair or replacement of the home's roof, and zero otherwise.	If this information is not recorded for applications that are not approved, please omit this field, but if possible include fields 12-17 in the assessment data section.
[11]	type_other	Equal to 1 if the home improvement project in the application included items other than solar, windows, HVAC or disaster hardening, and zero otherwise	If this information is not recorded for applications that are not approved, please omit this field, but if possible include fields 12-17 in the assessment data section.
[12]	requested_amt	The dollar amount initially requested in the application	If the dollar amount eventually approved changed during the application process, please use the initial value requested, if reasonably available on your system

[13]	income	Monthly income as of the date of the application, as used in your underwriting process	We understand this field may not be available for applications outside of California or for applications in California that were received before April 2018. If it is easier to provide annual income, please do so. Either way, please indicate what approach you take in the included data dictionary.
[14]	resid_income	Monthly residual income, as calculated and used in your underwriting process	We understand this field may not be available for applications outside of California or for applications in California that were received before April 2018. If it is easier to provide annual income, please do so. Either way, please indicate what approach you take in the included data dictionary.
[15]	assessed_value	Assessed value of the property as of the date of application, as used in your underwriting process	If your system stores multiple assessed values, you can either provide multiple columns, a single column with an average, or a single column choosing one source, as you prefer—please indicate what approach you take in the included data dictionary.
[16]	cltv	Combined loan-to-value ratio, calculated as the total of the primary mortgage amount, plus the PACE assessment principal balance applied for, divided by the assessed value (this should then be a decimal value between 0 and 1, such as 0.5)	If your system stores multiple assessed values, please use the assessed value reported in the assessed value field above
[17]	credit_score	The credit score(s) of the applicant(s) at the time of application	Please indicate in the included data dictionary what credit score version you are using

[18]	prior_mortgage_del	A field equal to 1 if the applicant had a mortgage delinquency in the 12 months preceding the PACE application, and 0 otherwise, as captured in your underwriting system.	If your system records the presence or absence of a mortgage delinquency during a different time period (e.g. as of the date of the application), as may be required by the relevant state law, use a value of 1 for that condition instead, and 0 otherwise. Please leave blank if unknown
[19]	prior_bankrupt	A field equal to 1 if the applicant had a bankruptcy in the seven years preceding the PACE application, and 0 otherwise, as captured in your underwriting system.	If your system records the presence or absence of a bankruptcy during a different time period (e.g. as of the date of the application), as may be required by the relevant state law, use a value of 1 for that condition instead, and 0 otherwise. Please leave blank if unknown
[20]	prior_tax_del	A field equal to 1 if the applicant had a property tax delinquency in the 12 months preceding the PACE application, and 0 otherwise, as captured in your underwriting system.	If your system records the presence or absence of a tax delinquency during a different time period (e.g. as of the date of the application), as may be required by the relevant state law, use a value of 1 for that condition instead, and 0 otherwise. Please leave blank if unknown
[21]	application_outcome	A field equal to 1 if the application was approved, and 0 otherwise.	



Assessment Data:

We are interested in obtaining information on PACE assessments that were funded and placed. Please provide a table where a row corresponds to an individual PACE assessment. The first column of the table should contain a unique identifier for the assessment, created as described above. The remaining columns of the table should include the following fields:

#	Field name	Field description	Notes
[1]	apn	Assessor's parcel number, hashed using the SHA-256 algorithm	Please remove any non-numeric characters such as spaces or hyphens before applying the hashing algorithm.
[2]	county_fips	The 5-digit FIPS code for the county where the assessed property is located	
[3]	sponsor	String field giving the name of the program or local government sponsor that this assessment was made through (e.g. WRCOG).	
[4]	date_complete	Date a completion certification was signed by the consumer or, if such certification is not required, the date the work was completed, or similar date, in "MM/DD/YYYY" format.	If it would be less burdensome to use a different date format, please do so and note the format used in the included data dictionary
[5]	date_funded	Date funding was made and payment provided to the home improvement contractor, in "MM/DD/YYYY" format.	If it would be less burdensome to use a different date format, please do so and note the format used in the included data dictionary
[6]	date_recorded	Date the assessment was recorded or otherwise transmitted to the special assessment administrator for placement on county tax rolls, in "MM/DD/YYYY" format.	If it would be less burdensome to use a different date format, please do so and note the format used in the included data dictionary
[7]	original_balance	Original principal balance	
[8]	interest_rate	Annual interest rate in percentage points (e.g. 7.25% interest expressed as the number 7.25, and not 0.0725)	Please specify values out to 2 decimal places (e.g. 7.25%) if possible.
[9]	fees	Aggregate dollar amount of any fees at origination, including those capitalized into the principal	If you do not track capitalized fees separate from the original balance, leave this field blank

[10]	cap_interest	Aggregate dollar amount of interest capitalized into the original principal balance	If you do not track capitalized interest separate from the original balance, leave this field blank
[11]	term	The original term of the financing, in years	If it would be less burdensome to provide this information in months, please do so, but please note this in the included data dictionary.
[12]	type_solar	Equal to 1 if the home improvement project in the application included solar panel installation, and zero otherwise	If this information is already provided in the application data above, you may omit this field.
[13]	type_windows	Equal to 1 if the home improvement project in the application included installation of new windows or doors, and zero otherwise	If this information is already provided in the application data above, you may omit this field.
[14]	type_hvac	Equal to 1 if the home improvement project in the application included HVAC equipment, and zero otherwise	If this information is already provided in the application data above, you may omit this field.
[15]	type_disaster	Equal to 1 if the home improvement project in the application included disaster hardening measures (e.g. wind resistance improvements, wildfire protection, seismic strengthening improvements), and zero otherwise	If this information is already provided in the application data above, you may omit this field.
[16]	type_roofing	Equal to 1 if the home improvement project in the application included repair or replacement of the home's roof, and zero otherwise.	If this information is already provided in the application data above, you may omit this field.
[17]	type_other	Equal to 1 if the home improvement project in the application included items other than solar, windows, HVAC or disaster hardening, and zero otherwise	If this information is already provided in the application data above, you may omit this field.

### Paperwork Reduction Act

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The OMB control number for this collection is 3170-0032. It expires on 01/31/2023. The time required to complete this information collection is estimated to average approximately 40 hours per response. Responding to this collection of information is voluntary. Comments regarding this collection of information, including the estimated response time, suggestions for improving the

usefulness of the information, or suggestions for reducing the burden to respond to this collection should be submitted to Bureau at the Consumer Financial Protection Bureau (Attention: PRA Office), 1700 G Street NW, Washington, DC 20552, or by email to [PRA\\_Comments@cfpb.gov](mailto:PRA_Comments@cfpb.gov)