How Do Payday Loans Affect Borrowers? Evidence from the U.K. Market

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Payday loans are controversial high-cost, short-term lending products, banned in many U.S. states. But debates surrounding their benefits to consumers continue. We analyze the effects of payday loans on consumers by using a unique data set including 99% of loans approved in the United Kingdom over a two-year period matched to credit files. Using a regression discontinuity research design, our results show that payday loans provide short-lived liquidity gains and encourage consumers to take on additional credit. However, in the following months, payday loans cause persistent increases in defaults and cause consumers to exceed their bank overdraft limits. (*JEL* D12, D14, D18, G2)

In contrast to neoclassical theory, behavioral theories suggest reasons why consumers may suffer welfare losses from access to credit, including present-biased preferences (Laibson 1997) or lack of financial capability (Agarwal et al. 2009). These theories can provide a rationale for regulatory interventions

restricting consumer lending, such as price caps or responsible lending rules. As any reduction in firm revenues or increases in lending costs due to regulation cause lenders to adjust their lending at the margin (Rigbi 2013), the welfare effects of loan access for marginal borrowers are the primary determinants of whether many regulatory interventions are net beneficial.

This paper examines the effects of extending credit to marginal borrowers in the context of the payday lending market. The emergence of payday loans has resulted in a surge of policy debate. Proponents of payday loans argue they improve consumption smoothing possibilities, especially in emergencies, and that restricting access causes consumers to use more expensive inferior substitutes, such as bank overdrafts. Critics argue that borrowing costs are excessive (and misunderstood by consumers), that consumers overborrow due to overoptimism about their ability to repay, and that they are vulnerable to "debt spirals."

A broad range of studies using U.S. data, mostly based on geographic variation in access to loans due to regulation, yield very mixed results on the effects of payday loans on consumers. One set of studies finds that payday loans cause financial hardship: households are more likely to miss bill payments and delay healthcare spending (Melzer 2011), make increased use of food stamps (Melzer 2018) and file for bankruptcy (Skiba and Tobacman 2015). Access to payday loans also increases local criminal arrest rates (Cuffe 2013) and gambling (Baugh 2016). However, another set of studies shows that access to loans has positive effects on consumption smoothing (Zaki 2016) and ability to cope with disasters (Morse 2011) or financial emergencies (Dobridge 2016). There are mixed results from studies exploiting random assignment of military personnel, with some evidence that payday loans cause a decline in job performance (Carrell and Zinman 2014), while Carter and Skinnyhorn (2017) find no effects. Studies based on state lending bans find that when bans are imposed, consumers turn to bouncing checks (Morgan, Strain, and Seblani 2008) use expensive bank overdrafts (Bhutta, Goldin, and Homonoff 2016) or miss payments (Desai and Elliehausen 2017). The overall financial effects of payday loans on consumer credit scores are unclear, with Bhutta (2014) and Bhutta, Skiba, and Tobacman (2015) finding no statistically significant effects.

The central challenge in answering the question we pose is that of finding high-quality econometric identification in representative data sets that allow the researcher to observe a broad range of outcomes affected by using payday loan products. We draw upon a data set comprising nearly all U.K. payday loans in 2012–13, including details of firm lending models, with matched consumer credit file records. For identification, we employ a regression discontinuity (RD) research design using lender proprietary credit score thresholds, which create discontinuities in the likelihood of obtaining a payday loan.

The United Kingdom has the world's second largest payday lending market after the United States. In 2013 approximately 10% of the U.K. adult population applied for a payday loan (4.6 million individuals), with 10 million payday loans

provided to 1.6 million successful applicants.[1] The U.K. market is primarily online (or accessed via mobile phone apps), enabling consumers to take out loans within minutes, typically via automated decisioning systems. The online market for payday loans has grown in the United States and is expected to grow in future, yet it has been the subject of very little research.[2] Our data on the U.K. market is particularly detailed. The data includes loan-level records for all payday loans granted in 2012-13 by the largest thirty-seven lenders (together constituting approximately 99% of loans issued). For eleven large lenders, covering approximately 90% of loans issued, the data set also contains details of all loan applications, denied and accepted, including lender credit scores and thresholds for individual loan decisions. Individual customers are matched across payday lenders and to their credit bureau files so that we can track each consumer through the market over the two-year period.[3]

We adopt a "fuzzy" RD research design and estimate Local Average Treatment Effects (LATE) of payday loans at the credit score margin of loan acceptance or denial to identify causal effects upon marginal borrowers. Our data is particularly suited for an RD design. It provides a large number of observations of loan applications in close proximity to lender credit score discontinuities for a range of lenders in the market. In the U.K. market, firms construct their own proprietary credit score models and discontinuities, which are unknown to consumers. Therefore, we can be confident that individual consumers have no opportunity to precisely manipulate credit scores around these discontinuities. Econometric tests find no evidence of discontinuities in the density of applications at lender credit score thresholds. We also show continuity of baseline covariates around the threshold in our design.

Crucially, with near-universal data we can accurately identify whether a loan denial resulted in an individual obtaining a payday loan from another lender. Hence we can avoid misclassifying consumers as "not treated" who may actually have received loans. This is important for identification, as applying to another lender is highly likely to be endogenous to the decision received on the first application. Also, without our market-wide data it would not be possible to identify the first application by a customer (and in particular first success

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[1] Cuffe (2013) estimates 5.5% of American adults took out a payday loan in the period 2008-13. The total volume of U.K. payday lending is worth £2.5 billion annually, with the average loan value at £260 lent for an average of 17 days. Annual percentage rates (APRs) on U.K. payday loans average around 500% (using the U.S. APR measure). But unlike in the United States, most U.K. payday lending occurs online—often via mobile phone apps (approximately 80% of issued payday loans result from an online application) with instant electronic transfer of funds to consumers.

[2] For discussion of the evolution of the online market in the United States, see page 10 and following of Consumer Financial Protection Bureau (2013).

[3] These files contain up to six years (2008–14) of data on mortgage and consumer credit applications, product holdings, balances, loan performance, and credit bureau credit scores. We therefore have a data set that allows us to track an individual over time and across the market and observe nearly every successful and unsuccessful payday loan application between 2012 and 2013, including the details of the applications, subsequent loan performance, and credit history for a minimum of two years before, during, and after loan applications.

in obtaining the product), in which case the estimated treatment effect might conflate prior treatment effects.[4] Our data allows us to avoid these pitfalls.

We provide many results which together provide a broad view of how payday loans affect consumers over time. Using the time dimension in our data, we estimate treatment effects at monthly time horizons up to one year after loan application. First, we find no evidence for substitution away from other forms of formal credit due to obtaining a payday loan. Results actually show using payday loans cause consumers to take on additional credit and debt. Estimates show that payday loan use causes consumers to apply for additional credit within the six months following payday loan acceptance, specifically seen in increased credit card and personal loan applications. Total consumer holding of non-payday credit increases, particularly personal loans, with non-payday loan balances increasing over the course of the year following payday loan acceptance.

We examine a broad range of outcomes, including delinquency and default on other credit held by the consumers, over-limit fees and charges on other credit (such as bank overdraft lines, which in the United Kingdom include over-limit fees), and household bill payment. Results show that payday loan use causes a small, short-lived decrease in the likelihood of these events in the first two to three months after loan acceptance. However, this pattern is reversed in subsequent months with a sharp worsening in consumer outcomes, which persists over the following year. While taking on additional debt in the form of payday loans might mechanically cause consumers to, on average, hold more debt in default (as holding more debt can only increase the likelihood of default), we find that payday loans cause an increase in the share of a consumer's total debt in default, including non-payday loans. Hence, taking on payday loans causes consumers to default on other debts.

The results from our RD estimates (which estimate local average treatment effects) are consistent with those from ordinary least squares (OLS) estimates (which estimate average treatment effects, albeit more likely to be biased). Using OLS models with interaction terms for applicant credit scores, we find that the negative effects of payday loans attenuate at higher credit scores. This suggests that payday loans may be net beneficial to some consumers, particularly consumers with good credit histories who, for some reason, choose to apply to a payday loan—possibly due to a short-term shock that causes them to apply to a credit product out of keeping with their credit score. Overall, our results suggest that payday loans are detrimental on average to consumers in the medium term.[5]

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[4] This is particularly relevant in the payday lending market, in which consumers typically repeat-borrow many times within the year. In our data in 2013, customers accepted for loans took on average six loans per year. In 2013, in the United States the typical payday loan user took on average seven loans per year (Consumer Financial Protection Bureau 2013).

[5] One caveat to this conclusion is that recent regulatory changes may give rise to changes in the average welfare effects. For example, in many U.S. states, payday loans are subject to interest rate limits, and since January

Our results are in line with studies that suggest that payday loans exacerbate financial hardship (Melzer 2011; Skiba and Tobacman 2015; Melzer 2018). Our finding that use of payday loans causes consumers to take on additional credit contrasts with U.S. studies that find payday loans are substitutes for other forms of credit, a finding obtained from studies that exploit state-level lending bans (Morgan, Strain, and Seblani 2008; Zinman 2010; Desai and Elliehausen 2017; Bhutta, Goldin, and Homonoff 2016). One explanation for this difference may be that in the U.K. online lending market, many loans are sourced via lead generators, who may sell-on leads to more than one lender (hence potentially generating more than one loan offer). Our results also contrast with the recent study by Liberman, Paravisini, and Pathania (2018), who also use U.K. data and find that applying for a payday loan worsens credit scores (for both successful and unsuccessful applicants), but use of the loan has no further effect on creditworthiness. Their study draws on data from only one lender (and hence they cannot observe whether the applicant receives a loan elsewhere) that serves approximately 2.3% of the market and issues a nonstandard loan product.[6]

The main caveats to our results arise from the time-varying nature of the effects of payday loans. The overall effect of payday loans on consumers includes the immediate beneficial effects of the injection of liquidity (i.e., the loan) with the downstream effects on repayment, default, and distress, which we show are on average negative for marginal consumers. In situations when the marginal utility of immediate consumption is high, payday loans may increase overall utility even if they lead to negative future outcomes (Morse 2011).[7] Our main findings must also be taken with the caveat that the RD research designs identify effects only for marginal borrowers.

1. Loan-Level Data

1.1 Data from payday lenders

The FCA data comprise loan-level records for applications to U.K. payday lenders from January 1, 2012, to December 31, 2013, including first-time and repeat applications. For thirty-seven lenders operating in the payday loan

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2015, payday loans in the United Kingdom have been subject to an interest rate cap, rollover limits, and stricter enforcement of affordability assessments. In some U.S. states and Canadian provinces, consumer application journeys for payday loans are now subject to mandatory "health warning" information disclosures. These interventions have most likely altered lender supply of, and borrower demand for, payday loans.

[6] The lender issues a longer maturity loan (six months compared with the typically one-month loan in the United Kingdom). Another difference between our study and Liberman, Paravisini, and Pathania (2018) is that the authors use data from a storefront U.K. payday lender.

[7] Payday loans may allow consumers to smooth consumption within the month but also increase the feasibility of temptation purchases. Zaki (2016) finds both effects using U.S. data on expenditure of military personnel. Parsons and Wesep (2013) view payday loans as potentially damaging, as individuals with lack of self-control can use the loan to bring forward consumption, potentially undoing the consumption smoothing effects of pay timing.

market, who together constitute 99% of the total market by loan volume, the data includes records of successful loan applications and loan performance (including information on default and late payments). Within these lenders, additional data was gathered for eleven large lenders who together constitute approximately 90% of the market by loan volume. Data includes details of unsuccessful applications and the credit score value assigned to each application. The data set also includes information about firm credit decision processes, including other screening procedures such as fraud screening.

Taking the loan-level data provided by lenders, the FCA commissioned a U.K. credit bureau to use its proprietary matching technology to identify unique individuals. The credit bureau matched identifying personal information (name, address, date of birth) from firm records to consumer records in their database, and when doing so also matched consumers to their credit files and provided these to the FCA. The resulting data set is a consumer-level data set including nearly all consumer loans and the vast majority of consumer loan applications in 2012-13 and complete credit files from 2008 to 2014. The data set comprises approximately 4.6 million individual consumers who applied for at least one payday loan in 2012-13 (around 10% of the U.K. adult population), including approximately 1.5 million customers who applied for their first payday loan in 2012-13. Our analysis focuses on these first-time loan applicants.

1.2 Credit file data

Our main set of outcome measures is taken from credit files provided by the credit bureau. U.K. credit bureau files contain six-year records of all credit and debt items held by a consumer. We use the "raw" credit file, which provides item-by-item details of all credit and debt applications and products held with monthly balance and records of delinquency and default for each product. From these credit file data, we construct four categories of outcome variables: First, loan application details that appear as credit "checks" on customer credit files. Second, credit balance variables that measure the products held by the consumer, the total credit balance of the consumer's portfolio plus individual balances on each product held (credit cards, personal loans, home credit, mail order products, hire purchase products, mortgage products, payday loan products, current accounts, household bill accounts, and other products). Third, measures of bad credit events, including the total number of missed (including late) payments on all credit obligations, plus missed payments by credit product type. Fourth, creditworthiness outcomes, including total balances in default and delinquency, default and delinquency balances expressed as a proportion of total credit balances, and indicators for personal insolvency events such as bankruptcy, which is a rare event in the United Kingdom.[8] This category also includes credit score information.

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[8] Creditworthiness data provides details of consumer performance on the loan products they hold. This includes delinquency (1-6 months in arrears) and default (non-payment after 6 months in arrears). These definitions are

2. Regression Discontinuity and Identification

We now explain our approach to econometric identification, which uses a RD methodology.[9] Our interest is in estimating the effects of payday loans on consumers. However, payday loans are not randomly assigned to customers. Consumers whose applications are declined are higher credit risks to the firm and typically exhibit lower income and worse credit histories. Hence the observed outcomes for individuals who use (do not use) payday loans are not necessarily a good indication of counterfactual outcomes for those individuals who do not use (use) payday loans. Prior U.S. studies have mostly addressed this identification problem by exploiting geographic variation in access to payday loans across or within states in the United States as a set of natural experiments. Our exceptionally rich data on credit scores for denied and accepted loan applicants allows us to adopt a RD approach and estimate LATEs, exploiting denied applicants with credit scores just below firm thresholds as a counterfactual for successful applicants with scores just above thresholds.

We now explain the lending decisions of U.K. payday lenders and how we exploit these for identification. A lender typically receives a loan application for a fixed price loan (a loan for which the price is not risk-adjusted to the applicant), which is often matched with the applicant's credit file provided by a credit bureau. Other data sources may also be matched into the loan application data. These, taken together, are used to calculate a lender's proprietary credit score. Some applications are declined before reaching this scoring stage. The credit score is normally a single numeric value on a continuous scale that indicates the willingness of the firm to lend to that individual given his or her characteristics and reflects the probability of default and expected profit of the loan.[10] The level of credit score required to be approved for a loan is known as the "credit score threshold." Applications with credit scores below this threshold are declined. Applications with credit scores at or above this threshold pass through the credit score stage onto loan approval, or possibly further stages in the decision model (including fraud screening and other checks). Hence, lender credit-score thresholds create discontinuities in the likelihood of obtaining a payday loan.

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those used by the credit bureau. The data also includes information on formal and informal forms of personal insolvency including bankruptcy and the use of a debt management plan.

[9] A RD methodology has also been used recently on U.S. data by Skiba and Tobacman (2015) and Bhutta, Skiba, and Tobacman (2015). Our study differs from Skiba and Tobacman (2015) and Bhutta, Skiba, and Tobacman (2015) in that, (i) we have access to data from nearly all firms in the market and, (ii) we examine a broad range of financial outcomes, whereas those studies focus on credit score and bankruptcy only. For detailed reviews and guides to the RD research designs approach, see Hahn, Todd, and Klaauw (2001), Imbens and Kalyanaraman (2008), McCrary (2008), and Lee and Lemieux (2010).

[10] In the payday lending market, nearly all lenders offer fixed prices on their product offerings. All individuals who are successful for loans are offered loans at the same basic price (though the APR on any particular loan will depend upon amount borrowed and loan period). Hence the purpose of the credit score is solely to inform a binary choice as to whether the loan is offered, or not. Therefore, the credit score calculated by the firm will normally represent an indication of the probability of default. Individuals with good credit scores (low probability of default) will be offered loans; individuals with bad credit scores (high probability of default) will be unsuccessful.

Our RD approach exploits these discontinuities in the likelihood of treatment. The firm data provide a very large number of observations across the credit score distribution both within and across firms. This provides a sufficiently large number of observations close to firm lending thresholds. While consumers can generally improve their credit scores through timely credit repayment and building up a history of credit usage, consumers do not have sufficient information to precisely manipulate their scores around lender thresholds, a key assumption for identification.

Our "treatment" variable of interest is receiving a payday loan. However, applicants declined due to a low credit score at one lender may be subsequently accepted at another lender, and the likelihood of applying to another lender is highly endogenous to the decision from the first lender. Hence we define the treatment variable as receiving a payday loan from any lender within a time period after first-loan application, with our instrument for "fuzzy" RD identification being the firm-specific credit score cutoff threshold of the first lender to which the customer applied. We calibrate the time period by assuming that at the point of payday loan application a customer has some urgent "need" for funds and is more short-term than other consumer credit markets (as implied by the nature of short-term, fast access, high-cost loans) Our main results use a seven day window to define the classification to treatment; however, results are robust to extending this window.[11]

2.1 RD first-stage discontinuities

We now show results for the "fuzzy" first-stage discontinuities in the data that underpin our RD approach. We use the term "lender process" to describe a sample of applications assessed at a particular credit score threshold by a lender during our sample time period. Some lenders have one lender process for the two-year period of our sample (i.e., they do not change their credit score threshold over the period); other lenders have three or four lender processes. Across the eleven lenders for which we have credit score information, we observe seventeen lender processes within the sample period.[12]

We estimate "'fuzzy" first-stage discontinuities using local polynomial regressions for each of the seventeen lender processes.[13] Not all lender-process data samples show jumps in the likelihood of acceptance at the credit score

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[11] A breakdown of success rates for obtaining loans is as follows: among all first-time applicants; 50.7% receive a loan from their first application with their first lender; 55.3% receive a loan (from the first lender or another lender) within 3 days of first application; 56.1% within 7 days; 57.8% within 30 days; 58.8% within 60 days; and 63% before the end of our sample period. Results are robust to using any of these windows to define treatment.

[12] We are obliged to protect the anonymity of firms in our data, and due to data confidentiality restrictions we cannot name which firms correspond to which lender processes or disclose the number of loan applications made under each lender process (as were we to do so, outlier firms could be identified).

[13] We estimate the jump in likelihood of obtaining a loan at the credit score threshold, where obtaining a loan is defined as within 7 days, 30 days, or until the end of our sample period (up to 2 years). Full results are shown in Online Appendix Table B1.

threshold. There are two reasons for this. First, some firms represented by these lender processes place very low weight on the credit score stage of the loan application process in final loan decisions (though this stage in the process may be important for intermediate decisions, such as whether to refer the application to underwriting). Second, the lack of any statistically significant jump may be explained by applicants declined by these firms being successful in obtaining a loan elsewhere. We exclude these non-experiments from our subsequent analysis.[14]

Pooling the data from the lender-process samples, we show a first-stage discontinuity plot in panel A of Figure 1 and plot a histogram of the running variable (lender credit score) in panel B. The figure illustrates a clear jump at the threshold in the likelihood of receiving a loan within seven days for first application. The estimated jump is 45 percentage points. Similar sized jumps exist if we extend the window for receiving a payday loan to 10 days, 30 days, or up to two years, with estimates shown in Table 1.[15]

The histogram of the credit score shown in panel B of Figure 1 indicates no large movements in the density of the running variable in the proximity of the credit score threshold. This is to be expected; as described above, features of lender credit decision processes make us confident that consumers cannot precisely manipulate their credit scores around lender-process thresholds. To confirm there are no jumps in density at the threshold, we perform the "density test" proposed by McCrary (2008), which estimates the discontinuity in density at the threshold using the RD estimator. On the pooled data in Figure 1 the test returns a coefficient (standard error) of 0.012 (0.028), failing to reject the null of no jump in density.[16] Therefore, we are confident that the assumption of non-manipulation holds in our data.

3. Regression Discontinuity Results

This section presents the main results from the RD analysis. We estimate the effects of receiving a payday loan on the four categories of outcomes described above: subsequent credit applications, credit products held and balances, bad credit events, and measures of creditworthiness. We estimate the two-stage fuzzy RD models using instrumental variable local polynomial regressions with a triangle kernel, with bandwidth selected

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[14] These lender processes are excluded as they offer no change in the probability of treatment at the boundary. In the fuzzy RD, the treatment effect is estimated as the jump in the outcome at the boundary divided by the jump in the probability of treatment at the boundary. For these lender processes, the latter is undefined; hence these samples are excluded from subsequent analysis.

[15] First-stage discontinuity plots are shown for time horizons of 10 days, 30 days, and 2 years in Online Appendix Figure A1. These estimates are not sensitive to variation in the estimation bandwidth, illustrated in Online Appendix Figure A2.

[16] We also report estimates of the density test on individual lender process data samples, which also fail to reject the null for each lender process, in Online Appendix Table B2.

A First-stage discontinuity

B Histogram of running variable
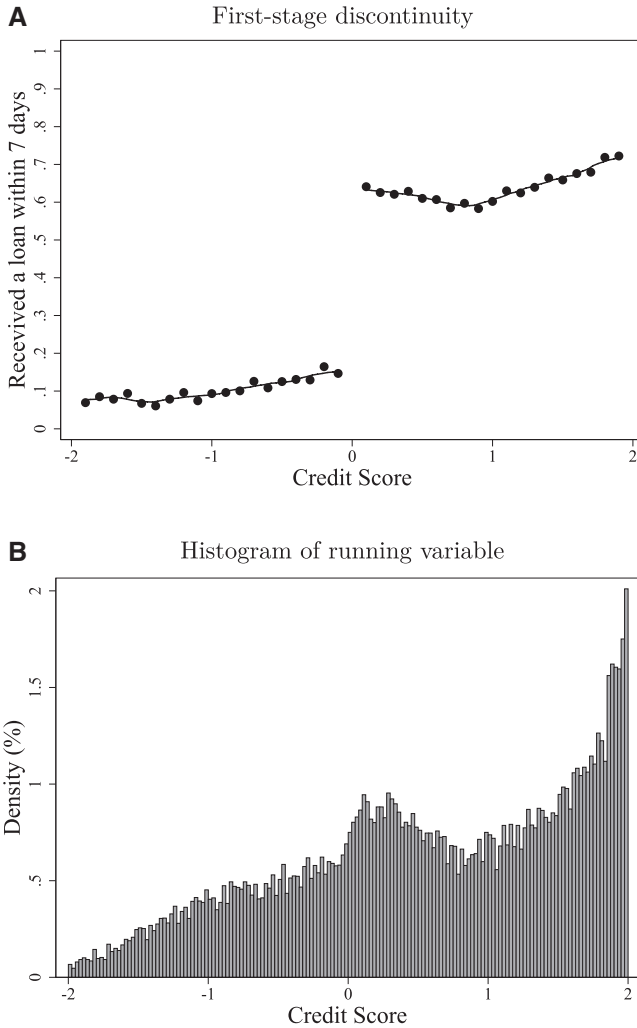
Figure 1
First-stage fuzzy RD: Credit score and receiving a payday loan
Figure shows in panel A an RD first-stage plot on which the horizontal axis shows standard deviations of the pooled firm credit scores, with the credit score threshold value set to 0. The vertical axis shows the likelihood of an individual applicant obtaining a loan from any lender in the market within seven days of application. Panel B illustrates a density histogram of credit scores.

using the method proposed by Imbens and Kalyanaraman (2008).[17] We pool together data from lender processes and include lender process fixed

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[17] The authors derive the asymptotically optimal bandwidth under squared error loss, providing a fully data-dependent method for choosing the bandwidth. The optimal bandwidth varies with sample size, to avoid unrealistically large bandwidth choices arising from the curvature of the regression function. However, the authors suggest that researchers should not rely on a single bandwidth but instead illustrate the sensitivity of

Table 1
First-stage RD estimates

Applicant receives loan within	(1) 7 days	(2) 30 days	(3) 60 days	(4) 2 years
Estimate	0.45***	0.43***	0.42***	0.38***
	(0.01)	(0.01)	(0.01)	(0.01)
Observations	735,192	735,192	735,192	735,192

Table shows local polynomial regression estimated change in likelihood of obtaining a payday loan (from any lender in the market within 7 days, 30 days, 60 days and up to 2 years) at the credit score threshold in the pooled sample of lender data. Sample comprises all first-time loan applicants. Statistical significance denoted at * 5%, ** 1%, and ***0.1% levels.

effects and lender process linear trends on either side of the credit score threshold.[18]

We examine a large number of outcome variables—seventeen main outcomes summarizing the data across the four categories of outcomes, with further estimates presented for more underlying outcomes (e.g., the sum of new credit applications is one main outcome variable, measures of credit applications for individual product types are the underlying variables). Given this, we need to adjust our inference for the family-wise error rate (inflated Type I errors) under multiple hypothesis testing. To do so, we adopt the Bonferroni Correction adjustment, considering estimated coefficients to indicate rejection of the null at a lower p-value threshold. With seventeen main outcome variables, a baseline p-value of 0.05 implies a corrected threshold of 0.0029, and a baseline p-value of 0.025 implies a corrected threshold of 0.0015. As a cautious approach, we adopt a p-value threshold of 0.001 as indicating rejection of the null.[19]

3.1 Results for loan applications, product holdings, and balances
First we present results for loan applications and product holdings, excluding payday loans. Table 2 reports the estimates of the jump at the acceptance threshold. In the period 0-6 months after first payday loan application, new credit applications increase by 0.59 applications (a 51.1% increase of on a base of 1.15) for the treated group and product holdings increase by 2.19 products (a 50.8% increase). The plots in Online Appendix Figure A3 illustrate these discontinuities in credit applications and holdings in the period after the payday loan, with those receiving a loan making additional applications and holding additional products compared with those marginally declined. The effect on credit applications disappears 6–12 months after receiving the payday loan.[20]

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estimates to alternative bandwidths. This is the approach that we follow in our analysis. All results shown in the paper are estimated using a triangle kernel. Very similar results are obtained using a rectangle kernel.

[18] The results are not sensitive to the exclusion of these linear trends.

[19] The Bonferroni adjustment to p-values adopts a conservative stance on inference from multiple hypothesis testing by reducing the likelihood of making a Type I error but, in doing so, increases the likelihood of a Type II error.

[20] Online Appendix Figure A3 shows second-stage pooled RD plots for two outcome variables, (i) the number of non-payday loan credit applications made by the payday loan applicant and, (ii) the number of credit products

Table 2
Effect of payday loans on non-payday credit applications, products held and balances

	Pre-payday loan		Post-payday loan	
	(6–12 months)	(0–6 months)	(0–6 months)	(6–12 months)
Panel (A): Non-payday credit applications				
Any credit item	0.01	−0.01	0.12***	−0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Number of credit items	0.03	−0.01	0.59***	−0.02
	(0.02)	(0.04)	(0.04)	(0.04)
Panel (B): Credit products held				
Any credit item	0.17	0.02	0.08***	0.12***
	(0.19)	(0.23)	(0.01)	(0.02)
Number of credit items	0.01	0.02	2.19***	2.51***
	(0.01)	(0.03)	(0.18)	(0.22)
Panel (C): Credit balances (log)				
All consumer credit	0.14	0.07	1.61***	0.88***
	(0.18)	(0.17)	(0.14)	(0.13)
All non-payday credit	0.09	0.16	0.49***	1.02***
	(0.18)	(0.17)	(0.08)	(0.04)

Table reports pooled local Wald statistics (standard errors) from IV local polynomial regression estimates for jump in outcome variables the lender credit score threshold in the pooled sample. Each row shows a different outcome variable with each cell reporting the local Wald statistic from a separate set of pooled coefficients. Statistical significance denoted at * 5%, ** 1%, and ***0.1% levels.

Online Appendix Figure A4 shows that estimates for credit products are not sensitive to variation in bandwidth. The estimate for credit applications (6–12 months), which is not statistically significant at the default bandwidth, attenuates at narrower bandwidths.

This suggests that consumers complement the receipt of a payday loan with new credit applications, in contrast to much of the prior literature, which suggests that payday loans substitute for other forms of credit. In Online Appendix Tables A1 and A2 we report estimates for individual product types. These show that applications increase for personal loans, and product holdings increase for personal loans and credit cards, in the year after receiving a payday loan. These are mainstream credit products with lower APRs compared with payday loans.

These results suggest that receiving a payday loan prompts consumers to apply for cheaper forms of credit. One explanation for this effect is that there may be an "encouragement effect" of receiving a payday loan. Having received a loan, consumers might believe that their credit prospects have increased and hence apply for more mainstream, cheaper forms of credit.[21] Another

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held excluding payday loan credit products. We present three figures showing binned scatterplots of the outcome variable with local polynomial lines of best fit shown in bold. The left panel shows the period before the payday loan application, the middle panel shows the period 0–6 months after application, and the right panel 6–12 months after application. The left panel plot is a form of falsification test: pre-payday loan jumps in the outcome variable would indicate preexisting difference between marginally accepted and marginally declined applicants in their credit portfolios (again excluding payday loans), confounding our RD identification strategy.

[21] Previous studies document that a share of individuals do not apply for credit because they are discouraged borrowers, choosing not to apply because they anticipate rejection (Jappelli 1990). One effect of a successful payday loan application may be to reverse this effect, prompting new credit applications.

explanation is that firms might solicit applications from these customers. We cannot distinguish between explanations in the data, as both mechanisms will result in increased loan applications. It is also possible that some consumers take personal loans with a view to consolidating existing debts onto a single cheaper, longer maturity product.

Results for credit balances confirm that this increase in applications leads to increased balances, seen in both total credit balances (including payday loans) and non-payday credit balances. Online Appendix Figure A5 illustrates results for (i) total credit balances and (ii) non-payday credit balances, confirming that increased product holdings also translate to increased credit balances.[22] Non-payday balances also increase. The estimated effects in Online Appendix Figure A5 imply an increase in non-payday balances at 6–12 months after receiving a first payday loan of 64.8%. At narrow bandwidths (below half the IK optimal), these effects are not statistically different from zero at the 0- to 6-month horizon for non-payday balances and at the 6- to 12-month horizon for total balances and non-payday balances, illustrated in Online Appendix Figure A6. Online Appendix Table A3 shows estimates for balances at the product level and shows, consistent with the results for product holdings, positive effects on balances for personal loans and credit cards, and also deposit account overdraft balances (reflecting additional liquidity arising due to the receipt of new loans).

## 3.2 Results for missed payments, defaults, and creditworthiness
Next we show results for measures of the consumer's credit portfolio performance. We first show results for missed payments (i.e., missing a contractual payment due on, for example, a personal loan) and then show results for measures of default balances and creditworthiness.[23]

Figure 2 illustrates results for missing a payment on least one credit account in panel 1 and on at least one non-payday credit account in panel 2. Of course, by definition the likelihood of incurring a bad credit event on a payday loan account can only increase for a first-time applicant who obtains a loan (compared with a denied applicant who does not obtain a loan and therefore cannot miss a payment). However, results show the likelihood of missing a payment rising in the period 0–6 months after receiving a payday loan, and rising for non-payday items in the period 6–12 months after receiving a loan. Results in Table 3 show that the likelihood of missing a payment on a non-payday credit item increases by 31 percentage points 6–12 months after receiving a payday loan,

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[22] Of course, by definition total credit balances increase with receipt of a payday loan, but these notably persist in the six- to twelve-month period, past the median duration of a payday loan in the data (30 days).

[23] In the credit bureau data a missed payment is called a "bad credit event," which includes all forms of missed payments, e.g., missing a minimum payment due on a credit card statement, missing a loan instalment payment, or failing to make a mortgage repayment by the due date. U.K. credit files also include some information on non-payment of household bills. These data are limited to household bills that involve credit agreements, such as mobile phone or utility bills. Housing rents and local taxes are not observed.

(1) Probability of a missed payment on any account

A 0–6 months before

B 0–6 months after

C 6–12 months after
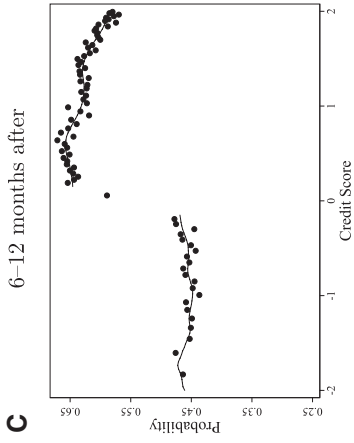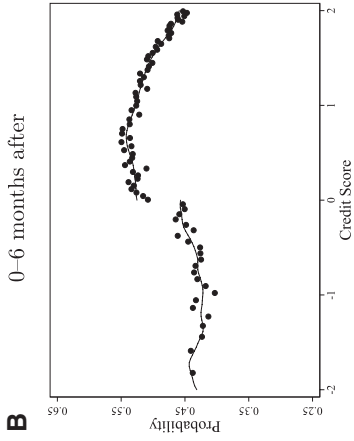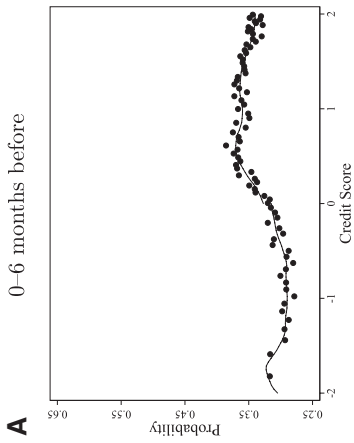
(2) Probability of a missed payment on any non-payday account

D 0–6 months before

E 0–6 months after

F 6–12 months after
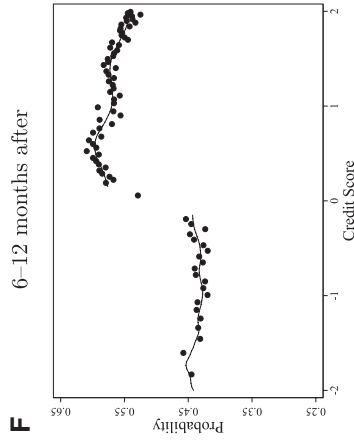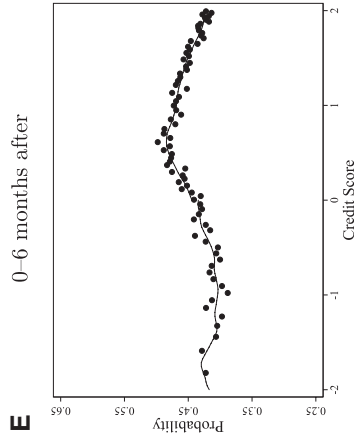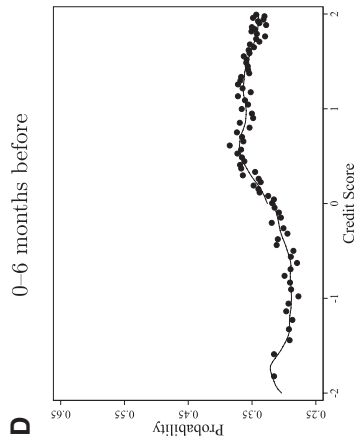
Figure 2
Effect of payday loan on missed payments
Figure shows RD second-stage plots for the pooled sample of first-time payday loan applications. The horizontal axis shows standard deviations of the firm credit score, with the credit score threshold value set to 0. The vertical axis shows the units of the outcome variable. Each data bin represents a set of loan applications within the two-year sample period. Fitted local polynomial regression lines are shown either side of the credit-score threshold.

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Table 3
Effect of payday loans on missed payments, default balances and creditworthiness

	Pre-payday loan		Post-payday loan	
	(6–12 months)	(0–6 months)	(0–6 months)	(6–12 months)
Panel (A): Missed payments				
All credit	−0.00	−0.01	0.14***	0.41***
	(0.01)	(0.01)	(0.01)	(0.03)
All non-payday credit	−0.00	−0.01	−0.01	0.31***
	(0.01)	(0.01)	(0.01)	(0.02)
Panel (B): Default balances				
Default balance	−0.04	−9.97	4.48	116.39***
	(7.35)	(11.65)	(18.41)	(30.04)
Delinquent balance	−8.12	−10.85	29.82*	42.18**
	(7.08)	(8.39)	(13.07)	(14.71)
Non-payday default balance as	−0.03	−0.04	−0.04**	0.07***
% total balances	(0.04)	(0.06)	(0.01)	(0.02)
Non-payday delinquent balance as	−0.01	−0.03	0.02*	0.03***
% total balances	(0.01)	(0.04)	(0.01)	(0.01)
Panel (C): Other outcomes				
Worst account status	−0.01	−0.01	0.26***	1.11***
	(0.06)	(0.07)	(0.03)	(0.06)
Worsening credit	0.03	−0.04	0.08	0.42***
	(0.08)	(0.14)	(0.25)	(0.10)
Exceed overdraft limit	−0.05	−0.06	0.12***	0.13***
	(0.06)	(0.07)	(0.01)	(0.01)
Change in credit score				−25.67***
				(0.98)

Table reports pooled local Wald statistics (standard errors) from IV local polynomial regression estimates for jump in outcome variables the lender credit-score threshold in the pooled sample. Each row shows a different outcome variable with each cell reporting the local Wald statistic from a separate set of pooled coefficients. Statistical significance denoted at * 5%, ** 1%, and ***0.1% levels.

an increase of 67.4% on the baseline. These estimates become larger (while still being precisely defined) at wider bandwidths, illustrated in Online Appendix Figure A7. This may reflect the "peaks" in the binscatter plots to the right of the credit score threshold in Figure 2, panels C and F.

Figure 3, panel 1, illustrates results for credit balances in default. Again, credit balances in default may mechanically increase among those receiving a payday loan compared with those not receiving a loan. Therefore, we construct a measure of default based on non-payday balances: the sum of default balances on non-payday products divided by the sum of all balances (including balances on payday products). An increase in this ratio implies the consumer has more non-payday debt in default as a proportion of the total credit portfolio. The illustration in Figure 3, panel 1, shows that this this measure is decreasing in credit score from highest risk to lowest risk. Notably, in the period 6–12 months after receiving a payday loan a discontinuity emerges, the estimates in Table 3 showing the ratio increases by 0.07, or approximately 20%. These results for the increased share of debt in default suggest that the effects of payday loans on subsequent defaults are not wholly attributable to increases in total borrowing. Defaulted loan balances increase even as a fraction of total loans. This suggests that payday loans put stress on existing loan commitments. One explanation for

(1) Non-payday default balances as proportion of total balances

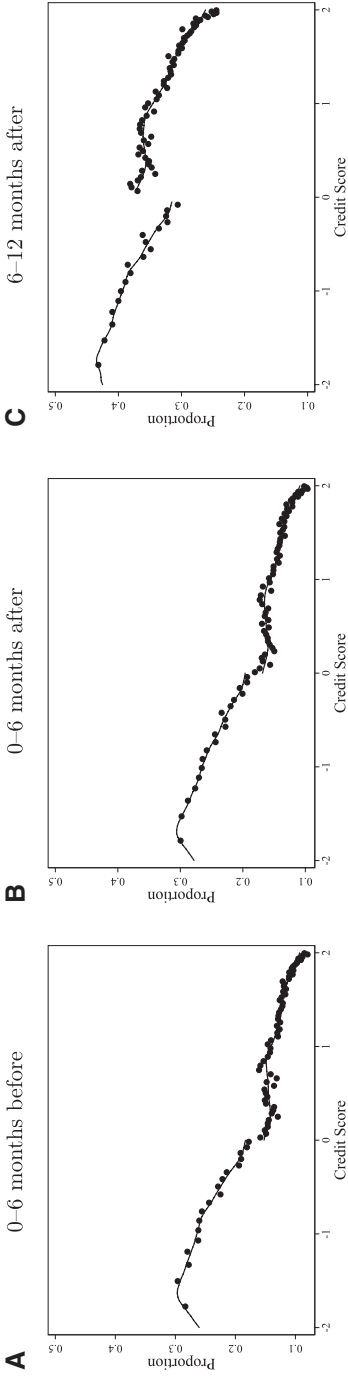*(2) Exceeding overdraft limit*
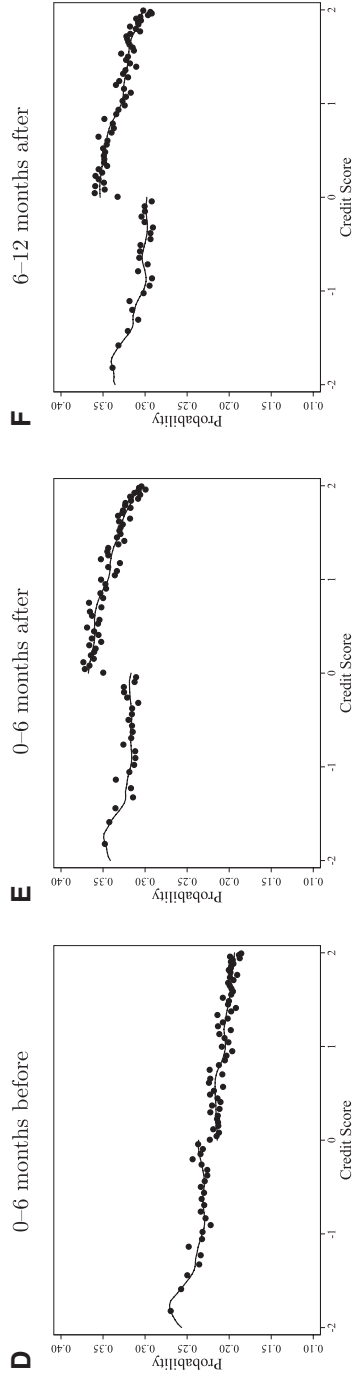
Figure 3
Effect of payday loan on default balances and bank overdrafts
Figure shows RD second-stage plots for the pooled sample of first-time payday loan applications. The horizontal axis shows standard deviations of the firm credit score, with the credit score threshold value set to 0. The vertical axis shows the units of the outcome variable. Each data bin represents a set of loan applications within the two-year sample period. Fitted local polynomial regression lines are shown either side of the credit score threshold.

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this result is that the high servicing cost of payday loans reduces the capacity of consumers to service their existing debt portfolio.

An additional measure of severe financial distress on consumers' deposit accounts is whether they have exceeded their overdraft limit.[24] Figure 3, panel 2, shows positive jumps in the likelihood of exceeding an overdraft limit at both the 0- to 6-month and 6- to 12-month horizons, with estimates in Table 3 implying a 33.4% increase in likelihood at 6–12 months at the threshold. Estimates for outcomes in Figure 3 are unchanged with variation in bandwidth, illustrated in Online Appendix Figure A8.

Given the results above, we should expect to observe effects on consumers' credit scores. As discussed earlier, the U.K. credit market does not have a widely used single credit score measure (unlike the U.S. FICO score), and lenders do not typically use a credit bureau credit score when making loan decisions.[25] The credit scores available from the credit bureau in our data are updated at annual frequency. We use the credit bureau's main whole-of-market credit score, from which we calculate the difference in credit score between January 2011 and January 2014. Hence we can estimate an RD model to recover the jump in the change in credit score at the threshold. The estimate, shown in panel C of Table 3, takes a value of –25.7 points, which against a baseline change in credit score in the sample of –31.7 points, implies an 80.1% additional deterioration in credit score due to receiving a payday loan. However, we add to this result the caveat that limited information can be inferred from credit bureau credit scores in the United Kingdom.

3.3 Month-by-month regression discontinuity estimates

Results in the previous section suggest time-varying effects of payday loans on consumers. In summary, we see: (i) credit applications, product holdings and balances increasing 0-6 months after receiving the loan (ii) missed payments, default balances, and other outcomes worsening at the 6- to 12-month horizon. In this section we explore these effects in more detail by estimating models for our main outcome variables defined at monthly time intervals up to 12 months before and 12 months after payday loan application. We cannot estimate effects as precisely in these smaller month-by-month samples.

Figure 4 illustrates month-by-month estimates for applications, products, and balances. The line graphs plot the coefficient estimates from the RD models, with 95% confidence intervals shown in bars.[26] The panels show that estimated effects on applications, product holdings, and total balances all

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[24] In the United Kingdom deposit accounts offer "arranged" overdraft limits, typically with APRs in the range of 10% to 20%. If a customer attempts to borrow beyond the overdraft limit, they incur a penalty fee and a market on their credit file.

[25] Detailed information on credit scoring in the United Kingdom is available in Guttman-Kenney and Hunt (2017).

[26] Here we illustrate 95% confidence intervals, with the caveat that these illustrations do not take account of the family-wise error rate.
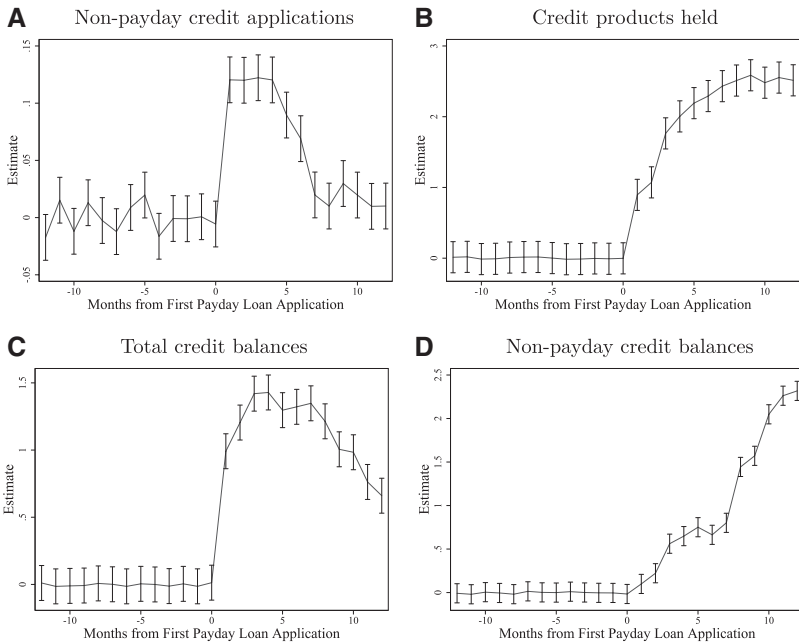
Figure 4
Month-by-month treatment effects I: Applications, products, and balances
Figures show RD second-stage estimates from models estimate on monthly data samples of the outcome variable relative to month of first payday loan application (separate regression estimated for each monthly outcome from 12 months before application to 10 months after). Sample comprises all first-time payday loan applications within sample period. 95% confidence interval illustrated by dashed line.

increase sharply in the month receiving a payday loan (the total credit balance obviously increases due to receipt of the payday loan itself), with non-payday credit balances subsequently rising as consumers receive new personal loan credit and increase credit card balances.

Figure 5 illustrates results for creditworthiness outcomes. Notably, in the months immediately following receiving a payday loan, there is an estimated reduction in non-payday default balances and the likelihood of exceeding a deposit account overdraft limit. However, the estimated effect becomes positive over the following months, correlating with a rise in the estimated effect on missed payments and the worst account status.

These results therefore suggest some immediate positive immediate effects from obtaining a payday loan in consumer financial outcomes. However, when repayment of the payday loan becomes due, typically after a few weeks' duration, this effect reverses persistently with a much larger effect size.

4. OLS estimates and heterogeneous effects

The RD models estimate local average treatment effects of receiving a payday loan. The advantage of this methodology is that it offers high-quality
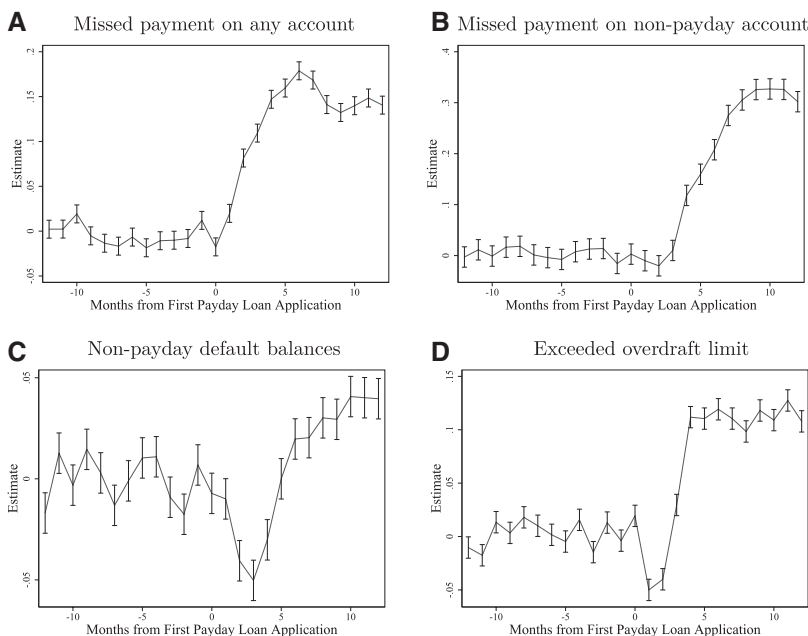
Figure 5
Month-by-month treatment effects II: Missed payments, defaults, and overdrafts
Figures show RD second-stage estimates from models estimate on monthly data samples of the outcome variable relative to month of first payday loan application (separate regression estimated for each monthly outcome from 12 months before application to 10 months after). Sample comprises all first-time payday loan applications within sample period. The 95% confidence interval is illustrated by the dashed line.

identification. The disadvantage is that estimates are local to the credit score threshold. As shown in the histogram of payday loan application credit score in Figure 1, much of the mass of applications is from consumers with credit scores away from the threshold. Given the potential for heterogeneous effects from using payday loans across consumers, we are naturally interested in understanding the effects of payday loans on these consumers. Consumers with better credit scores have higher incomes, less impaired credit histories, and generally more positive financial indicators. We might expect that the effects of payday loans would differ for these individuals; for example, it would seem less likely that the costs repaying of a payday loan would present financial difficulty to a high-income individual with access to cheaper credit such as credit cards (though of course it might nevertheless be suboptimal for such an individual to take a payday loan in the first instance). An important caveat in this analysis is that OLS estimates are most likely to be biased by omitted variables and selection effects. For example, consumers applying for payday loans while having high credit scores are likely to be a highly selected group.

In this section, we use simple OLS models to estimate average treatment effects on our main outcomes, then explore how estimated effects vary across

consumers by credit score and other characteristics. We condition our OLS models on the set of covariates available in the data, and use all of the observations in estimation (incorporating non-marginal accepted and declined applications). Table 4, panel A, reports results from a parsimonous model for the range of outcome variables, labeled in column headings, with controls listed in the table notes. The "received payday loan" variable is a dummy indicating whether the individual received a loan within seven days of application (regardless of the marginality of their credit score). Outcomes are measured at the 6- to 12-month time horizon. In cases where the estimated coefficients are statistically significant, the coefficient signs are positive for all models other than the model for credit score, indicating that receiving a payday loan is associated with higher applications, balances, default balances, and worsening credit outcomes.

Table 4, panel B, explores how the relationship between receiving a payday loan and the outcomes varies by applicant credit score.[27] The specifications in panel B incorporate interactions of the received payday loan dummy variable with a set of dummy variables indicating the decile of the credit score distribution in which the applicant's payday loan application credit score sits. The lowest decile contains the worst credit scores. The omitted interaction in the models is the sixth decile, which is the decile in which the credit score threshold is located in the RD design.

Estimates reveal a consistent pattern of statistically significant differences in outcomes by credit score decile. The relationship between receiving a payday loan and taking on additional credit products and balances is stronger at higher credit score deciles. This suggests that more creditworthy individuals may find a payday loan to be a gateway to accessing more credit, possibly due to encouragement effects or increased solicitations from lenders. Estimates also show that the negative effects from receiving a payday loan attenuate at higher credit score deciles. The estimated coefficients on the credit score decile interaction terms are negative (in all cases but for credit score, for which the positive coefficients indicate an improvement in credit score compared with the omitted group) and are generally statistically significantly different from the coefficient on the baseline dummy at the 8th–9th decile credit score interaction.

Hence, descriptively, payday loans are associated with reduced likelihood of poor creditworthiness outcomes for individuals with high credit scores. This may arise due to payday loans meeting the liquidity needs of individuals with much better credit scores who, owing to recent changes in their financial circumstances, apply for a payday loan. We might expect that individuals with good credit scores would only apply for a payday loan if they have suffered a recent negative shock (a persistent shock would have already caused

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[27] The loan acceptance rate increases at higher credit score deciles. Figure 1 illustrates the loan acceptance rate across the credit score distribution. At the highest credit score decile, the acceptance rate is 75.1%, compared with 66.2% at the loan approval threshold.

Table 4
Payday loans and credit outcomes, OLS estimates with credit score decile interactions

	No. products held	Log balances	Log non-PDL balances	No. bad credit events	Default balances	Delinquent balances	Worst acc. status	Worsening event	Exceeded overdraft	Δ Credit score
Panel (A): Baseline estimates										
Received payday loan	1.620***	1.799***	1.186***	0.116***	0.041***	0.012***	0.301***	0.300***	0.106***	−0.727
	(0.050)	(0.029)	(0.032)	(0.005)	(0.003)	(0.002)	(0.012)	(0.035)	(0.020)	(0.959)
Panel (B): Credit score interactions										
Received payday loan	3.200***	1.202***	1.164***	0.119***	0.001***	0.016***	0.461***	0.276***	0.133***	−6.820***
	(0.091)	(0.051)	(0.091)	(0.009)	(0.000)	(0.004)	(0.056)	(0.043)	(0.031)	(0.932)
Interaction with										
Decile 1	−1.879***	0.101***	−0.729***	0.079***	0.021***	0.029***	0.319***	1.629*	0.788***	−51.328***
	(0.142)	(0.072)	(0.08)	(0.011)	(0.007)	(0.008)	(0.075)	(0.923)	(0.098)	(10.203)
Decile 2	−1.277***	0.123*	−0.582***	0.058***	0.014*	0.024***	0.212***	1.180	0.496***	−29.235***
	(0.127)	(0.061)	(0.066)	(0.011)	(0.006)	(0.006)	(0.045)	(0.843)	(0.048)	(8.203)
Decile 3	−0.744***	−0.061	−1.158***	0.012*	0.009	0.014*	0.113***	0.388*	0.230***	−18.014***
	(0.102)	(0.062)	(0.061)	(0.006)	(0.007)	(0.007)	(0.023)	(0.153)	(0.029)	(4.102)
Decile 4	−0.145	0.088	−0.971	0.036***	0.015***	0.008	0.111***	0.327**	0.170***	−8.520***
	(0.101)	(0.061)	(0.065)	(0.007)	(0.008)	(0.005)	(0.021)	(0.103)	(0.008)	(1.923)
Decile 5	−0.568**	−0.108	−1.110	0.026***	−0.101***	0.011***	0.137***	0.266**	0.105***	−7.386***
	(0.201)	(0.061)	(0.660)	(0.007)	(0.008)	(0.004)	(0.021)	(0.110)	(0.010)	(1.839)
Decile 7	0.997***	0.224***	−0.052	−0.001	−0.017*	−0.018***	−0.120***	−0.014	−0.033***	4.940***
	(0.098)	(0.093)	(0.062)	(0.001)	(0.008)	(0.006)	(0.019)	(0.009)	(0.009)	(0.283)
Decile 8	1.872***	0.583***	−0.003	−0.005**	−0.046***	−0.032***	−0.214***	−0.116***	−0.118	11.681***
	(0.099)	(0.056)	(0.064)	(0.002)	(0.011)	(0.007)	(0.021)	(0.007)	(0.018)	(1.392)
Decile 9	2.845***	0.963***	0.594***	−0.012***	−0.073***	−0.045***	−0.303***	−0.154***	−0.181***	15.629***
	(0.098)	(0.057)	(0.063)	(0.003)	(0.008)	(0.008)	(0.029)	(0.005)	(0.031)	(1.399)
Decile 10	3.110***	1.264***	1.065***	−0.044***	−0.090***	−0.059***	−0.434***	−0.367***	−0.247***	22.383***
	(0.098)	(0.058)	(0.061)	(0.009)	(0.014)	(0.010)	(0.043)	(0.043)	(0.059)	(2.149)

Table reports OLS regression estimates for outcome variables written in column headings. Sample of all payday loan applications. Additional control variables not shown: age, age squared, gender, marital status dummies (married, divorced/separated, single), net monthly income, monthly rental/mortgage payment, number of children, housing tenure dummies (home owner without mortgage, home owner with mortgage, renter), education dummies (high school or lower, college, university), employment dummies (employed, unemployed, out of the labor force).
* denotes statistical significance at 5% level, ** at 1% level, and *** at 0.1% level.

a deterioration in their credit score), for which cases payday loans can provide emergency liquidity relief.

We also estimate models in which we add interactions with socioeconomic covariates to the specification used in Table 4, panel B. Results are shown for gender and age interactions in Table 5 and income and unemployment dummy interactions in Table 6. These results show two patterns. First, the association between receiving a loan and subsequent credit product holdings and balances changes with age and income. Estimated effects for older individuals are smaller, implying that receiving a loan encourages less accrual of new credit by older households. This is consistent with life-cycle patterns of borrowing needs, which are higher among younger individuals. Estimated effects for higher income groups are larger, implying receiving a loan encourages more accrual of new credit for higher income households. By contrast, we find no effects by gender or unemployment status.

Second, none of the interaction terms are statistically significant for any of the other outcome variables, including measures of default and credit score. However, this result is perhaps not surprising considering that these covariates enter credit scoring models, and hence loan allocation decisions are endogenous to these covariates. For example, if for a given loan approval, unemployment raises the likelihood of non-payment (which we would expect), then restrict lending to unemployed individuals through credit scoring models. Hence we should not be surprised that, conditional on the credit score, we find no independent information in these variables.

Overall, these results suggest that if we extrapolate away from the credit score thresholds using OLS models, we see heterogeneous responses in credit applications, balances, and creditworthiness outcomes across deciles of the credit score distribution. However, we interpret these results as being suggestive of heterogeneous effects of payday loans by credit score, again with the caveat that these OLS estimates are most likely biased in this analysis.

5. Discussion

5.1 Evaluating the overall effects of payday loans

Can we reconcile our results with a particular view on how payday loans affect consumers? In this section, we discuss how our results relate to three contrasting views that emerge from the prior literature. First is the view that payday loans are better for consumers than the alternatives they turn to when denied access. Second is the so-called debt trap hypothesis that payday loans create a cycle of worsening hardship for consumers. Third is the view that payday loans provide essential emergency consumption insurance to consumers.

The first view gains support from previous U.S. studies based on state lending bans, which show that consumers turn to expensive substitutes such as overdraft lines when payday loan access is removed (Morgan, Strain, and Seblani 2008; Zinman 2010; Bhutta, Goldin, and Homonoff 2016;

Table 5
Payday loans and credit outcomes by applicant gender and age, OLS estimates

	No. products held	Log balances	Log non-PDL balances	No. bad credit events	Default balances	Delinquent balances	Worst acc. status	Worsening event	Exceeded overdraft	Δ Credit score
Panel (A): Received payday loan dummy interaction with gender										
Interaction with										
Gender = Male	0.098	0.077	0.732	0.746	0.022	−0.035	−0.021	−0.036	0.037	−0.018
	(0.131)	(0.179)	(0.947)	(0.550)	(0.048)	(0.066)	(0.023)	(0.029)	(0.066)	(0.042)
Panel (B): Received payday loan dummy interactions with age										
Interaction with										
30 ≤ Age < 40	0.149***	0.854***	0.245***	0.277	0.075	0.040	0.019	0.233	0.428	0.059
	(0.027)	(0.068)	(0.040)	(0.243)	(0.097)	(0.041)	(0.023)	(0.316)	(0.548)	(0.428)
40 ≤ Age < 50	0.079**	0.571***	−0.154***	−0.104	0.081	0.058	0.027	0.254	0.401	−0.020
	(0.034)	(0.087)	(0.052)	(0.156)	(0.098)	(0.046)	(0.033)	(0.331)	(0.562)	(0.035)
50 ≤ Age < 60	0.025	−0.281	−0.620	−0.546	0.038	0.042	0.023	0.097	0.086	−0.027
	(0.049)	(0.423)	(0.474)	(0.580)	(0.072)	(0.078)	(0.045)	(0.090)	(0.188)	(0.150)
Age ≥ 60	−0.047	−1.513***	−1.030***	−0.913	−0.002	0.034	0.020	−0.034	−0.092	−0.063
	(0.086)	(0.216)	(0.129)	(0.839)	(0.021)	(0.064)	(0.018)	(0.052)	(0.154)	(0.088)

Table reports OLS regression estimates for outcome variables written in column headings. Sample of all payday loan applications. Additional control variables not shown: received payday loan dummy; controls for gender, marital status dummies (married, divorced/separated, single), net monthly income, monthly rental/mortgage payment, number of children, housing tenure dummies (home owner without mortgage, home owner with mortgage, renter), education dummies (high school or lower, college, university), employment dummies (employed, unemployed, out of the labor force), interaction terms between receiveing payday loan dummy and credit score decile. * denotes statistical significance at 5% level, ** at 1% level, and *** at 0.1% level.

Table 6
Payday loans and credit outcomes by applicant income and employment status, OLS estimates

	No. products held	Log balances	Log non-PDL balances	No. bad credit events	Default balances	Delinquent balances	Worst acc. status	Worsening event	Exceeded overdraft	Δ Credit score
Panel (A): Received payday loan dummy interactions with income										
Interaction with										
Quintile 2	0.191***	0.397***	0.225***	0.275	0.014	−0.006	−0.005	0.017	0.003	−0.005
	(0.035)	(0.089)	(0.051)	(0.256)	(0.009)	(0.006)	(0.007)	(0.021)	(0.062)	(0.036)
Quintile 3	0.202***	0.475***	0.444***	0.579	−0.004	−0.012	−0.017	−0.023	−0.006	0.015
	(0.029)	(0.075)	(0.043)	(0.547)	(0.007)	(0.009)	(0.023)	(0.018)	(0.052)	(0.030)
Quintile 4	0.042	0.378***	0.487***	0.605	−0.040	−0.025	−0.020	−0.043	−0.134	−0.003
	(0.033)	(0.084)	(0.049)	(0.553)	(0.038)	(0.035)	(0.023)	(0.320)	(0.259)	(0.034)
Quintile 5	0.148***	1.506***	0.802***	1.082	0.000	−0.023	−0.028	−0.085	−0.007	0.004
	(0.032)	(0.081)	(0.048)	(1.052)	(0.008)	(0.025)	(0.033)	(0.099)	(0.057)	(0.032)
Panel (B): Received payday loan dummy interactions with unemployed dummy										
Interaction with										
Unemployed	−0.069	−0.147	−0.117	−0.126	0.003	−0.042*	−0.002	0.000	0.249	0.167
	(0.140)	(0.354)	(0.208)	(0.224)	(0.034)	(0.024)	(0.014)	(0.085)	(0.252)	(0.144)

Table reports OLS regression estimates for outcome variables written in column headings. Sample of all payday loan applications. Additional control variables not shown: received payday loan dummy; controls for age, age squared, gender, marital status dummies (married, divorced/separated, single), net monthly income, monthly rental/mortgage payment, number of children, housing tenure dummies (home owner without mortgage, home owner with mortgage, renter), education dummies (high school or lower, college, university), employment dummies (employed, unemployed, out of the labor force), interaction terms between receiveing payday loan dummy and credit score decile. * denotes statistical significance at 5% level, ** at 1% level, and *** at 0.1% level.

Desai and Elliehausen 2017). Our results directly conflict with this view, as they show little or no substitution effects toward other forms of expensive credit for those denied loans. In contrast with the substitution hypothesis, we find evidence of complementary behavior, obtaining a loan causes consumers to apply for, and obtain, additional credit and debt—and these consumers are more likely to hit their overdraft limits in the medium run.

Our results are more consistent with the second view, that payday loans create a cycle of hardship for consumers (Melzer 2011; Melzer 2018; Carrell and Zinman 2014; Skiba and Tobacman 2015). While we show that obtaining a loan lowers the likelihood of breaching an overdraft limit or incurring a worsening credit event in the immediate time period when the loan is received, this risk increases significantly and persistently over many months. We do not observe the full range of negative effects found in U.S. studies, such as those on health outcomes.[28] For this pattern of outcomes to be consistent with increased overall utility, the short-term liquidity provided by the payday loan must be of extremely high value.

This leads us to the third view—that payday loans provide essential emergency consumption insurance. This view finds particular support in analysis of economic emergencies in Morse (2011). It may be the case that the negative medium-term effects of using payday loans do not apply to consumers facing emergency consumption needs, or that those risks are consistent with lifetime utility maximization for such consumers. Of course, these views are not necessarily mutually exclusive—there may be some truth in each of these views, and the suggestive evidence of heterogeneous effects of payday loans across consumers implies that this is the case. On average our results appear more consistent with the second view.

5.2 Comparison with the U.S. payday lending market

Many studies analyze the effects of payday loans on individuals in the large payday lending market in the United States, as we discuss in the introduction. This naturally raises the question of to what extent we might read-across results from our analysis to the U.S. market. While the essential features of payday loans are very similar in the United Kingdom and United States, we note two key differences that might limit the applicability of our results to the U.S. market.

First, the U.K. market is dominated by online lending, which has been substantially more profitable compared with storefront lending (Financial Conduct Authority 2014). In the period of our analysis, online lenders could access borrower bank accounts electronically. They also commonly used a facility known as a "continuous payment authority" whereby the lender could re-present to the borrower's account at very low marginal cost. This

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[28] We have no additional information on individual health status in our data. In our U.K. context, in which universal public healthcare provision dominates the market for healthcare, we might expect weaker effects of loan use on ability-to-pay related outcomes.

contrasts with the United States, where lenders typically re-present by staff traveling to a bank branch location and presenting the request in person, an activity incurring much higher marignal cost. This cross-country difference may partially explain our results for exceeding overdraft limits among our sample of U.K. borrowers, who are more likely to be depleted of funds in their deposit account due to the ability of firms to request funds frequently at very low marginal cost. Nevertheless, the growth of online lending market in the United States may has seen U.S. payday lenders begin to use similar payment mechanisms.[29]

Second, during the period of our data, there was widespread variation in lender reporting to credit bureaus and use of proprietary credit scores. Hence the effects on lender credit scores may be contingent on the data sharing agreements of the lender and the construction of a given credit score metric. U.S. studies draw on FICO scores as the widely used credit score metric allowing comparison across individuals and products over time, as in Bhutta (2014). No such universal credit score exists in the United Kingdom, so we cannot sum up our results in a single credit score metric. Despite these differences, many of our results are consistent with studies using U.S. data which estimate effects related to default as in Melzer (2011) and Skiba and Tobacman (2015).

6. Conclusion

Using a unique data set comprising near all U.K. payday loan applications in 2012–13, combined with customer credit files, we estimate the impact of payday loan use on consumers at the margin of firm lending decisions. We employ an RD research design that exploits lender-specific credit score discontinuities.

We find that payday loan use causes consumers to apply for additional credit card and personal loan credit within six months following payday loan acceptance. This results in successful loan applicants taking out more non-payday loans and total non-payday credit increases, particularly for personal loans. But payday loans cause deterioration in consumer creditworthiness. The likelihood of delinquency on non-payday debt increases. After a small one-month decrease, payday loan use persistently increases the likelihood that a consumer will exceed the arranged overdraft limit; the percentage of non-payday loan balances in default increases and consumers' credit bureau credit scores decline. Estimated average treatment effects from OLS models show that these negative effects of payday loan use decrease at higher credit score thresholds but do not appear to be heterogenous across consumers by other characteristics, conditional on credit score.

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[29] The Consumer Financial Protection Bureau (2016) describes the use of multiple electronic re-presentations by U.S. online lenders, including evidence that this facility pushes the checking accounts of some U.S. payday lending borrowers into debt. Statistics on the size of online payday lending in the United States market, which might put this behavior into the broader market context, are sparse. Pew Charitable Trusts. (2012) find that one-quarter of U.S. payday loan borrowers use online lenders in survey data from 2011.

References

Agarwal, S., Driscoll, J. C., Gabaix, X., and Laibson, D. 2009. The age of reason: Financial decisions over the life cycle and implications for regulation. *Brookings Papers on Economic Activity* 2:51–117.

Baugh, B. 2016. Payday borrowing and household outcomes: Evidence from a natural experiment. Working Paper.

Bhutta, N. 2014. Payday loans and consumer financial health. *Journal of Banking and Finance* 47:230–42.

Bhutta, N., Goldin, J., and Homonoff, T. 2016. Consumer borrowing after payday loan bans. *Journal of Law and Economics* 59:225–59.

Bhutta, N., Skiba, P. M., and Tobacman, J. 2015. Payday loan choices and consequences. *Journal of Money, Credit and Banking* 47:223–60.

Carrell, S., and Zinman, J. 2014. In harm's way? Payday loan access and military personnel performance. *Review of Financial Studies* 27:2805–40.

Carter, S. P., and Skinnyhorn, W. 2017. Much ado about nothing? New evidence on the effects of payday lending on military members. *Review of Economics and Statistics* 99:606–21.

Consumer Financial Protection Bureau. 2013. Payday loans and deposit advance products: A white paper of initial data findings.

———. 2016. Online loan payments.

Cuffe, H. 2013. Financing crime? Evidence on the unintended effects of payday lending. Working Paper.

Desai, C., and Elliehausen, G. 2017. The effect of state bans of payday lending on consumer credit delinquencies. *The Quarterly Review of Economics and Finance* 64(C):94–107.

Dobridge, C. 2016. For better and for worse? Effects of access to high-cost consumer credit. *Finance and Economics Discussion Series 2016-056. Board of Governors of the Federal Reserve System (U.S.).*

Financial Conduct Authority. 2014. Technical annexes—Supplement to CP14/10.

Guttman-Kenney, B., and Hunt, S. (2017) Preventing financial distress by predicting unaffordable consumer credit agreements: An applied framework. Financial Conduct Authority Occasional Paper No. 28.

Hahn, J., Todd, P., and Klaauw, W. 2001. Identification and estimation of treatment effects with a regression-discontinuity design. *Econometrica* 69:201–9.

Imbens, G., and Kalyanaraman, K. 2008. Regression discontinuity designs: A guide to practice. *Journal of Econometrics* 142:615–35.

Jappelli, T. 1990. Who is credit constrained in the u. s. economy? *The Quarterly Journal of Economics* 105(1):219–34.

Laibson, D. 1997. Golden eggs and hyperbolic discounting. *The Quarterly Journal of Economics* 112:443–78.

Lee, D. S., and Lemieux, T. 2010. Regression discontinuity designs in economics. *Journal of Economic Literature* 48:281–355.

Liberman, A., Paravisini, D., and Pathania, V. 2018. High-cost debt and perceived creditworthiness: Evidence from the U.K.

McCrary, J. 2008. Manipulation of the running variable in the regression discontinuity design: A density test. *Journal of Econometrics* 142:698–714.

Melzer, B. T. 2011. The real costs of credit access: Evidence from the payday lending market. *Quarterly Journal of Economics* 126:517–55.

———. 2018. Spillovers from costly credit. *Review of Financial Studies* 31(9):3568–3594.

Morgan, D. P., Strain, M. R., and Seblani, I. 2008. How payday credit access affects overdrafts and other outcomes. *Journal of Money, Credit and Banking* 44:519–31.

Morse, A. 2011. Payday lenders: Heroes or villains? *Journal of Financial Economics* 102:28–44.

Parsons, C., and Wesep, E. D. V. 2013. The timing of pay. *Journal of Financial Economics* 109:373–97.

Pew Charitable Trusts. 2012. Payday lending in america: Who borrows, where they borrow, and why.

Rigbi, O. 2013. The effects of usury laws: Evidence from the online loan market. *Review of Economics and Statistics* 95:1238–48.

Skiba, P. M., and Tobacman, J. 2015. Do payday loans cause bankruptcy? Working Paper.

Zaki, M. 2016. Access to short-term credit and consumption smoothing within the paycycle. Working Paper.

Zinman, J. 2010. Restricting consumer credit access: Household survey evidence on effects around the oregon rate cap. *Journal of Banking and Finance* 34:546–56.