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Small-Dollar Installment Loans: An Empirical Analysis

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From 2001 through 2004, Dr. Beales served as the Director of the Bureau of Consumer Protection at the Federal Trade Commission. In that capacity, he was instrumental in redirecting the FTC's privacy agenda to focus on the consequences of the use and misuse of consumer information. During his tenure, the Commission proposed, promulgated, and implemented the national Do Not Call Registry. He also worked with Congress and the Administration to develop and implement the Fair and Accurate Credit Transactions Act of 2003, and testified before Congress on numerous occasions. His aggressive law enforcement program produced the largest redress orders in FTC history and attacked high volume frauds promoted through heavy television advertising.

Dr. Beales also worked at the FTC from 1977 to 1987, as a staff economist, Assistant to the Director of the Bureau of Consumer Protection, Associate Director for Policy and Evaluation, and Acting Deputy Director. In 1987-88, he was the Chief of the Human Resources and Housing Branch of the Office of Information and Regulatory Affairs in the Office of Management and Budget.

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Small-dollar credit is a form of unsecured consumer credit primarily characterized by the low dollar amounts of loans. Traditional lenders such as consumer banks have avoided these products partly due to the different economics of small-dollar loans. Yet, the industry growth over the last two decades reflects consumer demand, which led to the emergence of alternative lenders. There has been increasing debate about the benefit and harm to consumers from small-dollar loans, along with recent discussion of greater regulation.

Determining the need for and appropriate form of regulation requires an understanding of the current state of the small-dollar credit industry based on actual industry data. Because of the rapid evolution of the industry, the debate may be based on outdated assumptions that do not reflect its current state. This paper focuses on one significant change, which is the shift from single-payment payday loans to multiple-payment loans or installment loans. Installment-loan products differ from single-payment loans in many significant ways, but there is hardly any systematic study of small-dollar installment loans. This study seeks to fill this gap in an effort to promote informed discussion about optimal regulation of the small-dollar credit industry.

The paper is organized as follows. Section 1 provides a background of the small-dollar lending and Section 2 briefly reviews the related research literature. Section 3 discusses how small-dollar lending is currently regulated and the debate about how it should be regulated. Section 4 summarizes the data on which this study is based and Section 5 examines the characteristics of the borrowers and the loans in this data. Section 6 examines how loan outcomes are related to borrower and loan characteristics. Section 7 discusses the expected impact of regulation based on payment-to-income ratio of loans. Section 8 examines the incidence of repeat borrowing in our data. Section 9 presents findings from multivariate analysis of the data. Section 10 discusses the evidence from a law change affecting the small-dollar lending in the state of Colorado. Finally, Section 11 concludes with a summary of our findings.

1. Industry Background

Small-dollar single-payment loans, often referred to as payday loans, emerged in the 1990s. However, consumer demand for small loans existed before then. State-sanctioned small-dollar lenders first emerged early in the 20th century (Herrmann and Tescher, 2008). Personal finance companies emerged by the 1920s in response to state legislation loosening usury laws on loans for $300 or less made by licensed and bonded lenders. Following World War II, the expansion of installment lending and the introduction of credit cards resulted in a surge in consumer credit. Advances in computing and improvements in credit reporting reduced costs of extending credit, but the essentially fixed costs of originating a loan or a line of credit remain. These costs can be recovered over a long period of time with continuing credit, such as credit cards or longer term installment loans. They can be prohibitive, however, in making single-payment loans, where recovering origination costs in a short period of time is difficult. This led to a decline in the supply of small unsecured loans.

Small-dollar loans emerged in the 1990s to meet the existing demand for such products. These loans were predicated on deferred deposit of checks, a practice legalized by the passage of new laws in California and in several other states thereafter.[1] The borrower signs an agreement committing to repay the loan and provides the lender with a post-dated check or authorization for electronic withdrawal from a bank account (ACH), or some other claim for the lender to receive a payment from the consumer (such as debit authorization in United Kingdom or electronic check presentation). These mechanisms reduce the probability of default and expected collection costs but they do not guarantee payment. Small-dollar loan availability and design varies across states based on differences in state regulation.

A small-dollar loan borrower typically visits a storefront location and requests a loan by providing identification, last bank statement, employment or income verification, often in the form of a paystub or evidence of a direct deposit to a checking account, and sometimes proof of ad-

[1] A deferred deposit transaction refers to accepting a postdated check and depositing it later.

dress. If the loan is approved, the consumer gets cash the same day or within two days. One study reports that over 80 percent of the loans are for amounts less than $300 (Stegman, 2007) and another reports that the median loan size is $350 (CFPB, 2013). The lender fee or interest charged by the lender typically ranges from $15 to $30 per $100 borrowed for approximately a two-week period. When expressed as an annual percentage rate (APR), the charge is much higher than APRs charged by banks and credit cards. However, this comparison is inappropriate since small-dollar loan borrowers either do not qualify for these other forms of credit, cannot obtain additional credit from these channels, or find small-dollar loans more convenient for some short-term credit needs. The fees associated with small-dollar loans are comparable to and often less than the fees for short term borrowing alternatives such as overdrafts, late payments, or bounced check fees (Campbell, Jackson, Madrian, and Tufano, 2011).

The use of electronic payment systems makes receiving funds and making payments convenient and faster. However, concerns have been expressed that some consumers may be disadvantaged by the use of the ACH network. NACHA, the network administrator establishes operating rules to govern the network. For example, NACHA rules establish thresholds for the percentage of returned debit entries for originating depository financial institutions. In addition to NACHA's enforcement, the Consumer Financial Protection Bureau (CFPB) supervises lenders' usage of ACH network and the U.S. Justice Department, through Operation Choke Point, recently severed access to payment networks for certain small-dollar lenders and other businesses (Issa, 2014). These initiatives have adversely affected some lenders and may result in reduction in tribal and offshore small-dollar lending (Hecht, 2014).

The volume of small-dollar loans was about $46 billion in 2013 with industry revenue (interest and fees) of about $9 billion (CFSI, 2014; Hecht, 2014). About 12 million American households take small-dollar loans each year (Bourke, Horowitz, and Roche, 2012). The number of stores was about 18,000 in 2013, down from the peak of about 24,000 in 2007. In addition to regulatory changes, one factor behind the decline is the increase over the last decade in the number of small-dollar loans that are made on the internet rather than at a storefront. Online lending accounted for about

one-third of the total volume of small-dollar loans in 2013 while contributing about half of the revenues (Hecht, 2014). Online borrowers complete online applications and provide social security number and bank account information. They also authorize lenders to electronically deposit loan proceeds and withdraw payments directly from the borrowers' bank accounts. Initially, the online loans were offered for an average amount of $380 and typical maturity of a month or less (CFA, 2011).

The most recent significant trend in the small-dollar credit industry is the rise of multiple-payment loans or installment loans, through both storefront and online lenders. Small-dollar installment lending has increased since 2011, and most small-dollar lenders have developed installment products. Industry analysts from Stephens Inc. report that there are approximately 8,000-10,000 individually licensed installment loan company branches in the United States (Hecht, 2014). As discussed below, installment loans have larger principal amounts and lower APRs than single-payment small-dollar loans. Unlike bank loans or credit card loans, these lenders cater to subprime to deep subprime borrowers and require no collateral (Hecht, 2014). Both customer demand and regulatory changes may be driving the installment loan trend.

2. Summary of Findings from Literature on Small-Dollar Loans

Small-dollar loans serve consumers who may not have access to other forms of credit. In a free market with rational consumers, access to credit allows consumers to time their consumption to suit their needs rather than being constrained by the timing of their income. Thus, access to credit, regardless of the cost of this credit, increases consumer choice and benefits society. However, if some consumers make decisions that are not in their best interest, increased access to credit may make these consumers worse off. The quantification of costs and benefits from access to small-dollar credit is therefore, an empirical issue. We briefly discuss findings from the existing literature.

2.1. Who Borrows and Why?

At least 25% of U.S. households are unbanked or underbanked and 27% of unbanked and 40% of underbanked households borrow through small-dollar loans, rent-to-own agreements, pawn shops, or refund anticipation loans (FDIC, 2009). The Center for Financial Services Innovation (CFSI) conducted a survey of small-dollar credit consumers who use payday loans, pawn loans, direct deposit advance, installment loans, or auto title loans (Levy and Sledge, 2012). The survey finds that these consumers are on average less educated, concentrated in the Southern U.S., from larger households, disproportionately African-Americans, and have below-average incomes. The Pew Charitable Trusts (Pew) has released a series of four reports on small-dollar lending, based on consumer surveys about small-dollar loan usage. Combining the survey results with data from certain state regulators, the first report estimates that on average a borrower takes out eight loans of $375 each per year and spends $520 on interest (Bourke et al., 2012).

In a white paper (CFPB, 2013) released in April 2013, CFPB analyzed a dataset of single-payment small-dollar loans from multiple lenders, with loans over a minimum of one year from each lender. The paper reports the median loan size is $350, the median loan term is 14 days, median fee per $100 is $15, and median APR is 322%. The median borrower income is $22,476.

Most consumers use small-dollar credit when they do not have access to other forms of credit. In a CFSI study, only 2% of unbanked and underbanked consumers reported that they would first go to a payday lender to borrow under $1,000 and most of the rest reported that they would first turn to a bank, credit union, family member, or friend (Schneider and Koide, 2010).

CFSI reports that the main use of borrowed funds is for expenses such as paying utility bills, food and clothing expenses, car repair, or home repair (Levy and Sledge, 2012). The common reasons for use of credit are expenses that exceed income, mismatch between timing of expenses and income, and unexpected events such as an expense or a drop in income. Most users of small-dollar credit products report taking steps in addition to borrowing such as reducing spending, going without basic needs, and deferring or skipping paying bills.

The second Pew report examines how borrowers choose to take and repay small-dollar loans (Bourke, Horowitz, and Roche, 2013b). Their survey finds that 86% of borrowers agree that terms and conditions of small-dollar loans are clear. They also find that majority of small-dollar borrowers have trouble meeting bills at least half the time. The authors argue that an average survey respondent can afford to pay the fees to renew small-dollar loan but only 14% can afford to repay the loan fully. The most common reason for taking small-dollar loan is a difficult situation in which the borrowers would borrow at almost any terms. About 40% of borrowers have used a credit card but most had "maxed out" their credit cards. About half of the borrowers have overdrafted a checking account in the previous year.

2.2. *Repeat Borrowing*

Bourke et al. (2012) estimate that even though the loans are sold as two week credit products, borrowers are indebted for an average of five months per year. CFPB (2013),using supervisory data, notes that repeat borrowing is common with the median borrower in the sample engaging in 10 transactions over a 12-month period and paying $458 in fees. The sampling methodology, however, oversampled frequent borrowers compared to those who use payday loans less frequently. CFPB released another study (Burke, Lanning, Leary, and Wang, 2014) in March 2014 using a different sampling methodology from the same supervisory data. This paper analyzed patterns of repeat borrowing by analyzing sequences of loans where each new loan is issued within 14 days of repayment of a previous loan. The data show that most loan sequences are short, with 40% consisting of a single loan and a majority renewed no more than once. Similarly, three-quarters of *borrowers* have no more than two sequences in an 11 month period. Most *loans*, however, are part of longer sequences, with over 80% of loans rolled over or followed by another loan within 14 days. About half of all loans are part of a sequence of 10 or more loans. An unchanged principal amount is the most frequent result in loan sequences, but increases are more common than decreases over time.

2.3. Costs and Benefits

The main policy debate about small-dollar credit products is whether these products enhance or reduce social welfare. As Morse (2011) discusses, small-dollar loans help distressed individuals bridge financial shortfalls by enabling them to smooth liquidity shocks. On the other hand, small-dollar lending may reduce welfare if the availability of cash from small-dollar loans tempts individuals to overconsume. This argument assumes that consumers either lack discipline to make the financial decisions that are in their best interest or are naive and mistaken in their views of their future situation.

Melzer (2011) uses geographic differences in the availability of small-dollar loans to estimate the real effects of credit access among low-income households. He finds that access to small-dollar loans does not alleviate economic hardship and can lead to increased difficulty in paying mortgage, rent and utilities bills.

In contrast, Bhutta (2013), who also assesses the effect of availability of small-dollar loans across different ZIP codes, finds that access to small-dollar loans has no effect on credit scores, new delinquencies, or the likelihood of overdrawing credit lines. He also finds that neighborhood racial composition has little influence on small-dollar lender store locations, after accounting for neighborhood income, wealth and demographic characteristics.

Morgan, Strain, and Seblani (2012) also examine variation in availability of small-dollar credit based on changes in states' payday loan laws. Using differences-in-differences regressions, they find that Chapter 13 bankruptcy rates decrease after small-dollar credit bans but complaints against lenders and debt collectors increase. They also find that the number of returned checks and overdraft fee income at banks increase after small-dollar credit bans.

Zinman (2010) examines the effect of the introduction of binding restrictions on small-dollar loan terms in Oregon. He finds that borrowing fell in Oregon relative to Washington and small-dollar borrowers shifted partially into substitutes such as bank overdrafts and late bill payment. He concludes that restricting access caused deterioration in the overall financial condition of

Oregon households.

Morse (2011) uses natural disasters as a community-level natural experiment to measure the impact of small-dollar lenders. She finds that natural disasters increase foreclosures by 4.5 units per 1,000 homes in the year following the event, but the availability of small-dollar lenders reduces this incidence by 1.0 to 1.3 units. She also finds that small-dollar lender availability reduces small property crimes such as larcenies in times of financial distress.

Bhutta, Skiba, and Tobacman (2014) examine the financial situation of small-dollar borrowers by matching administrative data from a small-dollar lender with credit bureau files. They find that small-dollar loan applications occur when consumers' access to mainstream creditors is lowest. They also find that small-dollar loan borrowers have persistently weak credit records. They fall behind on payments and apply for new credit much more frequently than the general population. The evolution of credit scores is similar for small-dollar loan borrowers and those small-dollar applicants whose applications are denied. This indicates that small-dollar borrowing does not lead to a deterioration in credit scores.

Priestley (2014) examines borrower histories and credit scores of about thirty thousand borrowers of small-dollar storefront loans and finds that borrowers who renew their loans more times, on average, experience larger improvements in credit scores. She also finds that borrowers in states with less restrictive regulation fare better in terms of credit score changes than borrowers in states with more restrictive regulation, after controlling for initial financial condition. Thus, the evidence on the impact of small-dollar loans on consumers is mixed with documentation of both costs and benefits of availability of small-dollar loans.

3. Regulation of Small-Dollar Loans

Small-dollar loan fees and interest rates are regulated at state level. Eighteen states cap APRs at 36%, essentially eliminating small-dollar lending.[2] Although most states impose some restrictions, five states have no restrictions (Kirsch, Mayer, and Silber, 2014; Pew Charitable Trusts, 2014). At the federal level, CFPB has the authority to regulate practices that are deceptive, unfair, or abusive, potentially giving it jurisdiction over some aspects of small-dollar loans such as product features, lending practices, and marketing. CFPB has been actively engaged in a process of data gathering, learning, and clarification of its regulatory authority (Kirsch et al., 2014).

While the literature has pointed out both costs and benefits of small-dollar credit products, an appropriate regulatory response must not only compare the relative magnitudes of costs and benefits, but must also identify the underlying causes for these benefits and costs. For example, if small-dollar credit products are serving a market need, as they apparently are, why does that need exist, and why are there no better alternatives? If some consumers are spending substantial amounts because of repeated borrowing, is that because they do not understand the products, they are unwittingly making wrong financial decisions, or are the available alternatives even worse?

Current regulations on small-dollar credit products have taken different forms in different states, providing a laboratory to examine the effectiveness of different forms of regulation. Kaufman (2013) uses a dataset of 56 million small-dollar loans in 26 states over 6 years and finds that price caps on small-dollar loans are strictly binding but restrictions on loan size are less binding.[3]

[2] FDIC launched a pilot project in 2008 to stimulate development of small-dollar loan products at banks with APRs capped at 36%. Twenty-eight banks participated. Most stated that they sought to generate long-term profitability through volume and by using small-dollar loans to cross-sell additional products, and FDIC viewed these as viable products. However, use of credit reports and reliance on cross-selling to borrowers suggests that these borrowers may have less overlap with typical borrowers of small-dollar loans. Some banks used to offer deposit advances, an alternative product for short-term credit, but all of these banks discontinued offering the product in 2014 (Durkin, Elliehausen, Staten, and Zywicki, 2014).

[3] A price cap may be an upper limit on APR or an upper limit on dollar cost per amount lent.

Prohibitions on simultaneous borrowing appear to have little effect on the total amount borrowed. Minimum loan terms affect loan length, but maximum loan terms do not. Rollover prohibitions, cooling-off periods, and price caps reduce the incidence of repeat borrowing, but these changes are disruptive and lower lending volumes.[4] In Virginia they resulted in a higher delinquency rate.

The costs and benefits of small-dollar lending and its impact on consumer welfare may differ across lenders. For example, the impact may be different for licensed and unlicensed lenders. Policis (2015) reports that unlicensed lending is more prevalent in U.S. states with more restrictive lending regulations or more effective enforcement of compliance.

In the third report in Pew's series on small-dollar lending, Bourke, Horowitz, Lake, and Roche (2013a) recommend regulation of small-dollar loans to ensure affordability by borrowers. They argue that payments on small-dollar loans should be limited to an affordable percentage of the borrower's periodic income, and suggest 5 percent of gross income as an affordable limit. They recommend payment in installments as a method of making payments smaller. They also discuss the experience in Colorado after a change in small-dollar loan regulations in 2010. The law replaced two-week small-dollar loans with six-month installment loans, with no prepayment penalty and a new fee structure, which Bourke et al. (2013a) conclude has reduced the cost to borrowers. They also argue that despite consolidation and a reduction in small-dollar storefronts in Colorado, the decline in access to credit has been limited. We discuss these conclusions in more detail in Section 10.

An examination of recent small-dollar installment loan data might help shed light on the potential effectiveness of different policy proposals. Regulations should be based on findings from actual loan data, rather than anecdotes or consumer opinion surveys. We examine a large sample of recent small-dollar installment loans to examine the issues that are central to various policy proposals.

[4] A cooling-off period is a required period of time between loans.

4. Data Summary

Our main sample consists of data about unsecured installment loans in the United States. The loans were made between January 2012 and September 2013 in 16 different states by four companies, licensed in accordance with state law for those states. The data were provided directly by the lenders and contain information regarding loan terms and certain borrower characteristics as reported by the borrowers. We have provided the CFPB with an anonymized copy of this data set.

We replicate some of our analyses using an expanded data sample that consists of all installment loans made in the United States by the same four companies during the same time. The additional loans in this sample may consist of loans offered under alternative business models, such as loans extended under tribal jurisdiction.

There are no single-payment small-dollar loans in our data. We excluded some loans in the data that were made outside of the January 2012 to September 2013 period and applied some other filters for data completeness. The resulting sample that we analyze consists of about 1.02 million loans. Table 1 summarizes the loan characteristics.

In our main data sample, 55% of loans are storefront loans and 45% are online loans. The average loan amount is $1,192 and the median loan amount is $900, more than twice the corresponding amounts for single-payment small-dollar loans (see CFPB, 2013). The total volume of the loans in the sample is about $1.2 billion. In comparison, the aggregate volume of small-dollar installment loans and larger collateralized installment loans by public lenders in 2013 is estimated as $7.1 billion by Stephens, Inc (Hecht, 2014). The average loan term in our sample is 221 days (median 181 days) with an average of 13.2 scheduled installments (median 12). Installment dates are usually scheduled to coincide with pay dates of the borrower. However, our communications with lenders and the data suggest that lenders often adjust installment dates to accommodate borrower requests. As described in more detail below, scheduled installments are typically separated by two weeks, which is also the typical duration of single-payment small-dollar loans (see CFPB,

Table 1. Summary Statistics for Main Data Sample

	Mean	25th Percentile	Median	75th Percentile
Number of Loans	1021580			
Percent Storefront	55.25%			
Principal ($)	1192	500	900	1600
Loan Term (Days)	221	161	181	269
Number of Installments	13.2	7.0	12.0	14.0
Installment Amount ($)	211	108	158	275
Annual Percentage Rate	299.8%	247.5%	294.9%	371.2%
Borrower Age (years)	43.1	32.9	42.1	52.2
Percent Borrowers Renting	66.44%			
Months Borrower in Residence	72.95	12.00	36.00	89.00
Percent Borrowers Employed	84.30%			
Borrower Gross Annual Income ($)	44623	23840	35057	51870
Percent Loans Paid Off	68.88%			

2013). The other installment frequencies are weekly, semimonthly, and monthly. In most loans, the time difference between the date on which the funds are issued and the first installment date differs (in either direction) from the regular interval between installments, probably to align the installment date with the pay date.

The median APR of loans in our sample is 295%, lower than the median APR of 322% for the sample of single-payment small-dollar loans in CFPB (2013). The APR reflects the total cost for a borrower who repays the loan as scheduled. The loans in our sample do not have any other fixed fees. However, lenders do charge a fee when electronic withdrawals from the borrower's bank fail due to insufficient funds, typically about $25 or $30. Some lenders limit such fees to one per payment cycle.

The median age of borrowers in our sample is 43.1 years. One fourth of borrowers are younger than 32.9 years and one fourth of borrowers are older than 52.2 years. About a third of the borrowers own their home while the remaining two-third rent. The median amount of time the

borrowers have been in their residence is about 3 years. However, the mean time is about 6 years. Our data identify the borrower's income source as employment, self-employment, or other. For 84% of loans, the borrower was employed at the time the loan was taken. Among unemployed borrowers, 1% report self-employment income as their source of income while 99% report a source other than employment or self-employment. The fraction of employed or self-employed in our sample, more than 84%, is higher than the corresponding figure of about 75% for the single-payment small-dollar loan sample in CFPB (2013).

The average gross annual income of borrowers in our sample is $44,623 with the median at $35,057. We do not know the total household income of the borrower, which may be higher than the borrower's income. Income is self-reported and may or may not have been verified independently by the lenders. The borrowers in our sample earn more than the borrowers of single-payment small-dollar loans in CFPB (2013) which reported mean income of $26,167 and median income of $22,476. This difference arises partly because the income reported in CFPB (2013) is based on gross income for some borrowers and net income for other borrowers. In contrast, we report gross income. For borrowers who report net income, we estimate gross income by assuming that net income is 80 percent of gross income. This adjustment explains only a part of the difference, so we can conclude that borrowers of small-dollar installment loans have higher incomes than single-payment small-dollar loan borrowers. Borrowers whose source of income is employment or self-employment tend to have higher income than borrowers who report some other source of income.

While our data do not contain information about cash flows for loans, we can determine whether a loan was repaid in full or not. The payoff rate, the percentage of loans for which all installments were fully paid, is 69%. The remaining loans may have been partly paid so the fraction of loan principal that is paid off is likely to be much higher than 69%. Without detailed information on installment cash flow, we cannot distinguish between loans that were 99% paid off and those where no installment was paid. Thus, the loan payoff rate for installment loans is not comparable to the repayment rate for single-installment small-dollar loans. Our data also in-

cludes information about charge-offs but in the absence of detailed information about charge-off policies of lenders (such as whether or not the charged-off amount is net of recovery), we cannot quantify the net repayment or the unpaid balance on loans that were not fully paid off.

Table 2. Summary Statistics for Expanded Data Sample

	Mean	25th Percentile	Median	75th Percentile
Number of Loans	1489979			
Percent Storefront	37.90%			
Principal ($)	1081	500	800	1300
Loan Term (Days)	240	166	187	287
Number of Installments	14.5	8.0	12.0	18.0
Installment Amount ($)	188	107	137	243
Annual Percentage Rate	313.6%	249.3%	319.1%	374.2%
Borrower Age (years)	43.0	33.1	42.0	51.7
Percent Borrowers Renting	64.83%			
Months Borrower in Residence	76.83	14.00	36.03	96.00
Percent Borrowers Employed	85.04%			
Borrower Gross Annual Income ($)	42978	24115	34634	49863
Percent Loans Paid Off	66.18%			

Table 2 shows the summary statistics for the expanded sample which adds about 300,000 additional loans offered under alternative business models, such as loans extended under tribal jurisdiction. The alternative models may explain the slight differences in summary statistics between Table 1 and Table 2. The average loan in the expanded sample is for a smaller amount, $1,081. The average loan term of 240 days is slightly higher than that for the main sample with the difference mostly driven by the longest maturity loans. The range of APR in the expanded sample is similar to that in the main sample, but because there are more loans with higher values of APR, the average APR is 314%, compared to 300% in the main sample. The average gross annual income of borrowers at $42,978 is lower than the average income of $44,623 in the main sample. The fraction of loans that were paid off is 66%, lower than the corresponding fraction of

69% in the main sample.

5. Borrower and Loan Characteristics

Table 3 compares the summary statistics for online loans and storefront loans in the main sample. These lending channels may differ in payment mechanisms and the nature of the interaction between borrower and lender, and may attract different kinds of borrowers. Online loans tend to have smaller loan principal, longer loan duration, more installments, higher APR, and younger borrowers who have lived for shorter periods in their current residence. Online borrowers are more likely to be employed, have larger self-reported incomes, and are more likely to be homeowners. The repayment rate of loans is higher for storefront loans than for online loans.

Table 3. Summary Statistics for Online Loans and for Storefront Loans

	Online Loans		Storefront Loans	
	Mean	Median	Mean	Median
Number of Loans	457118		564462	
Principal ($)	1080	800	1283	1000
Loan Term (Days)	259	203	191	167
Number of Installments	15.6	13.0	11.2	11.0
Installment Amount ($)	180	137	236	192
Annual Percentage Rate	327.7%	349.7%	277.3%	249.3%
Borrower Age (years)	42.2	41.1	43.9	43.2
Percent Borrowers Renting	61.76%		70.23%	
Months Borrower in Residence	60.16	30.10	83.29	37.00
Percent Borrowers Employed	87.99%		81.31%	
Borrower Gross Annual Income ($)	51357	39134	38413	31421
Percent Loans Paid Off	59.25%		76.73%	

We also examined the entire distribution of various loan and borrower characteristics, separately for online and storefront loans, again in the main sample. Figure 1 displays the distribution

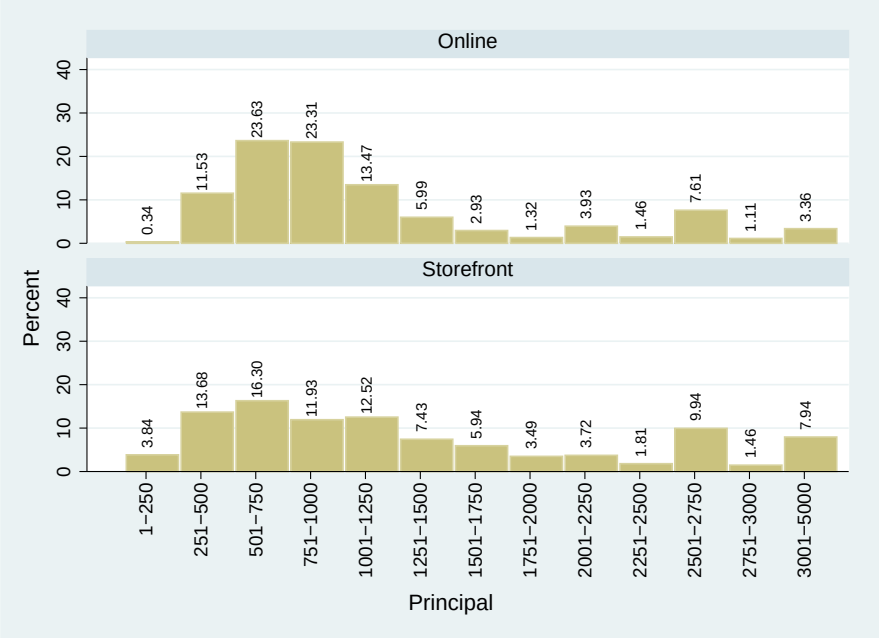

Fig. 1. Distribution of Principal Amount

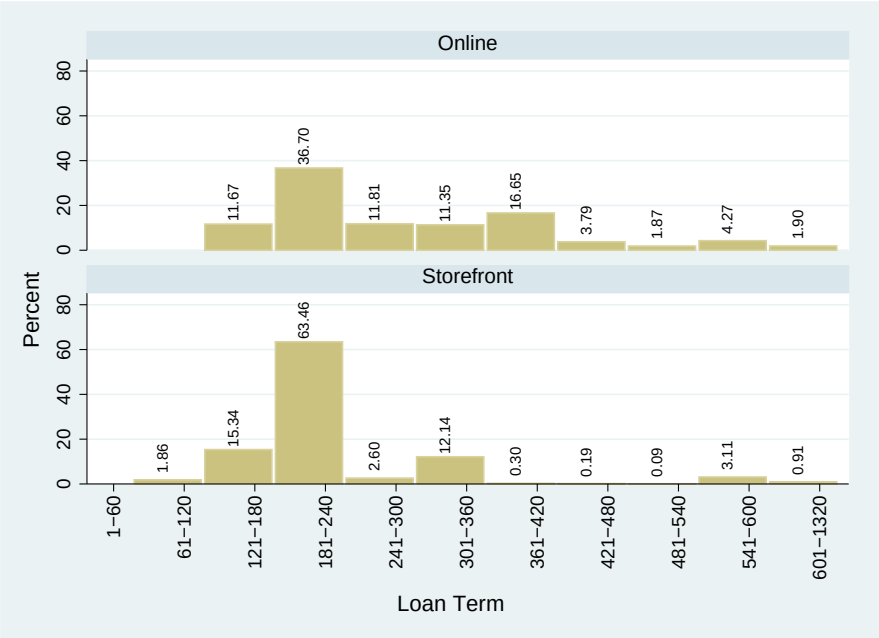

Fig. 2. Distribution of Loan Term in Days

of loan principal. The loan principal ranges from less than $100 to about $5,000, but the majority of loans have a principal amount between $250 and $1,250. Loans approved online tend to be smaller – loans for amounts less than $1,500 represent over 85% of online loans and about 61% of storefront loans.

Figure 2 displays the distribution of loan term in days. A typical loan has a term of about six months. Most storefront loans are scheduled to be paid within a year with more than three quarter scheduled to be repaid in four to eight months. Online loans display a greater variation in loan term. Although half of these loans have terms between four and eight months, more than a quarter are scheduled to be paid in more than a year.

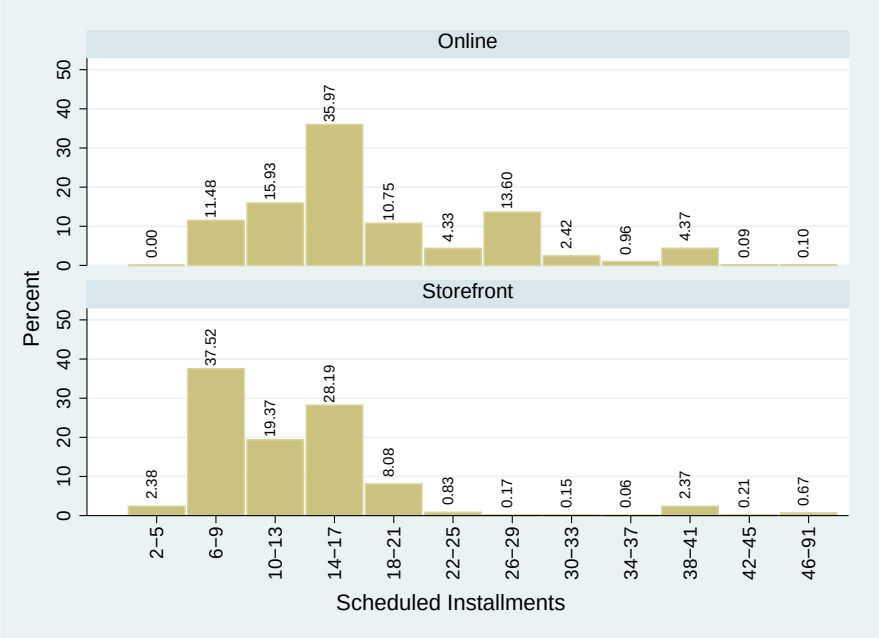

Fig. 3. Distribution of Number of Scheduled Loan Installments

Figure 3 displays the distribution of number of installments. There are few loans with less than six installments. However, there is a great variation in the number of installments, both for online and storefront loans – more than ten percent of loans have nine or fewer installments and more than ten percent of loans have eighteen or more installments. Storefront loans tend to have fewer

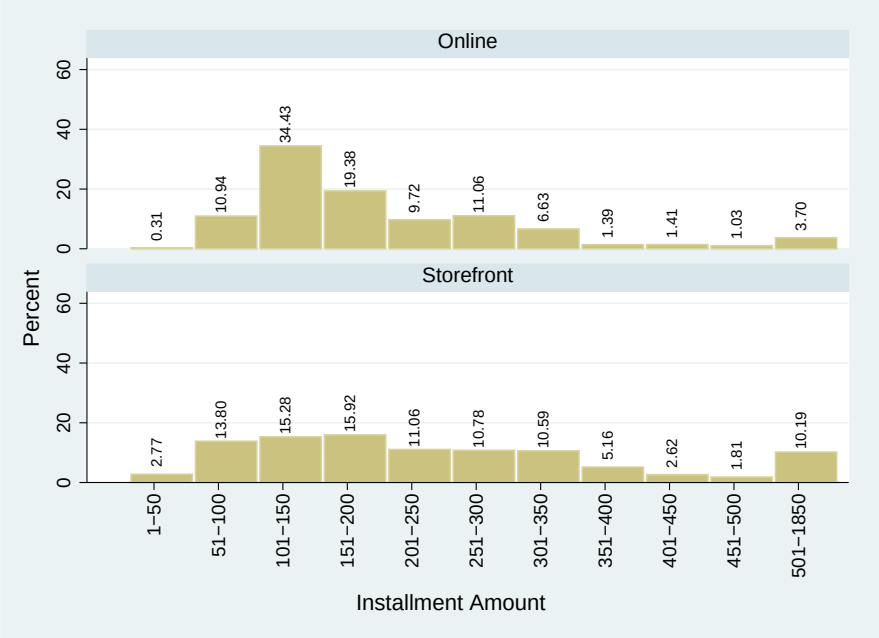

Fig. 4. Distribution of Scheduled Installment Amount

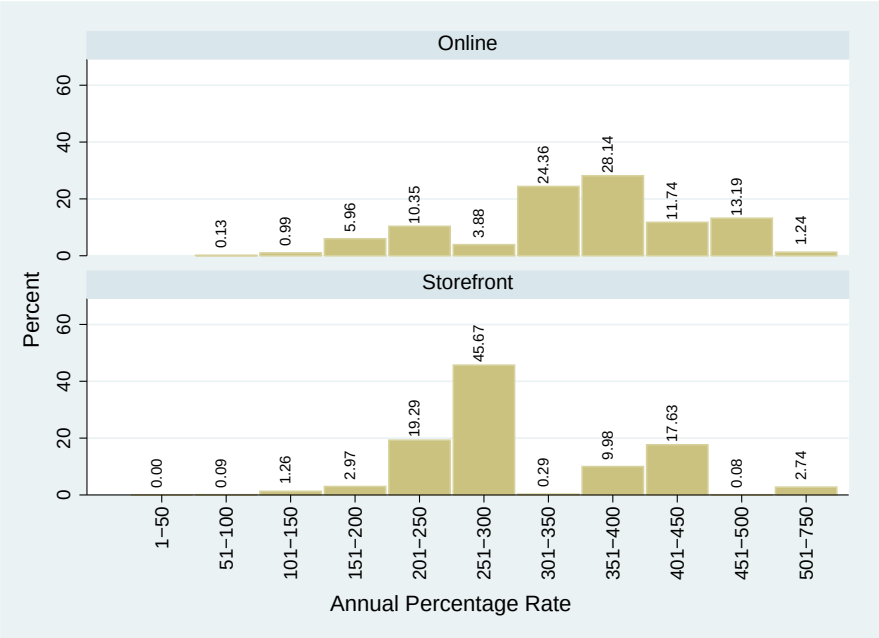

Fig. 5. Distribution of APR

installments than online loans, consistent with the shorter term of storefront loans. Less than five percent of storefront loans have more than twenty one scheduled installments, compared to about a quarter of online loans.

Figure 4 displays the distribution of scheduled installment amounts. About half of all online loans have installments between $100 and $200 and fewer than ten percent have installment amounts exceeding $350. In contrast, there is greater variation in the installment amount for storefront loans where over ten percent of loans have installments that exceed $500. As already noted, storefront loans tend to be for larger amounts and shorter maturities, and therefore tend to have larger installment amounts.

Figure 5 displays the distribution of APR for the loans in our sample. About 46% of storefront loans have APRs between 250% and 300%. About 24% have APRs less than 250% and about 31% have APRs exceeding 300%. The APR for online loans is more variable and higher on average. It is clear from Figure 5 that the lenders do not charge the same flat rate on all loans. We examine later whether the interest rate is related to loan and borrower characteristics and whether loans with higher interest rates tend to be riskier.

Figure 6 displays the distribution of installment frequency. Biweekly installments account for about two-thirds of storefront and online loans. This coincides with the most common duration of single-payment small-dollar loans. The remaining loans have semimonthly or monthly installments along with a small number of loans with weekly installments.

Figure 7 displays the distribution of borrower's pay frequency. The majority of borrowers in both online and storefront channels, are paid biweekly. Figure 8 shows that almost all (about 99%) borrowers paid weekly or biweekly repay their loans in biweekly installments. Similarly, about 99% of borrowers paid monthly repay their loans in monthly installments. Among borrowers paid semimonthly, about 58% have loans with semimonthly installments and most of the rest have loans with monthly installments.

Figure 9 displays the distribution of borrower age. For the purpose of this chart, we ignored a few loans for which the age of the borrower was recorded as less than 18. The distributions

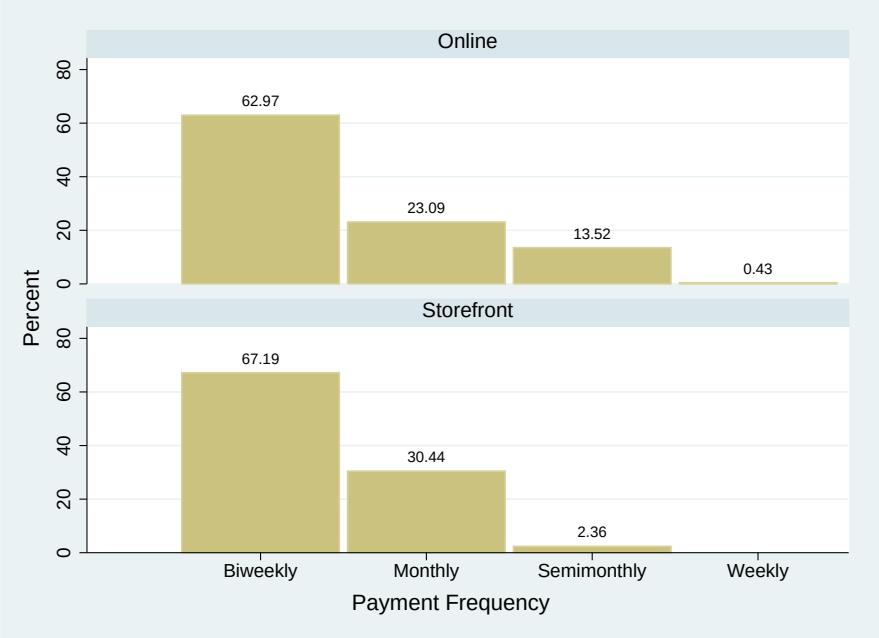

Fig. 6. Distribution of Installment Frequency

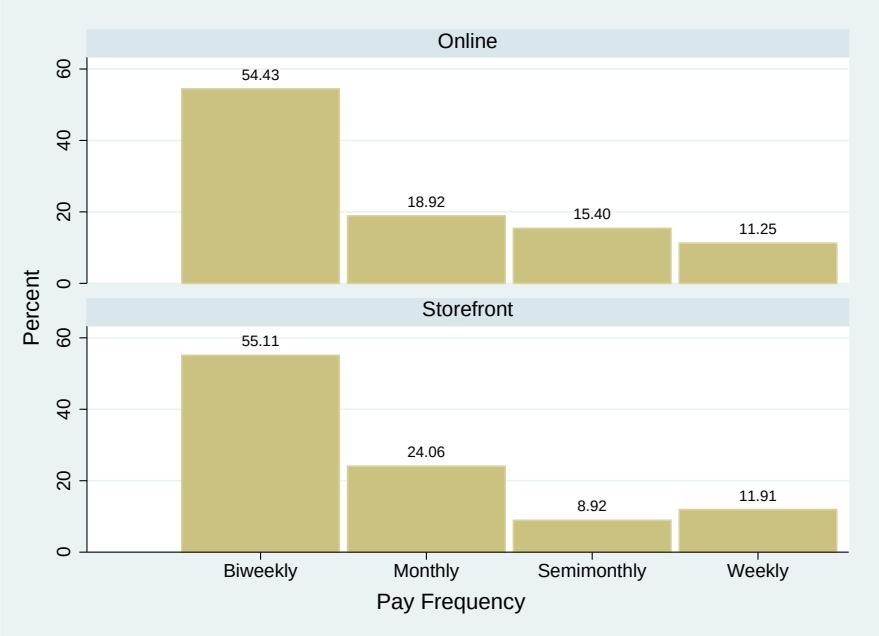

Fig. 7. Distribution of Borrower's Pay Frequency

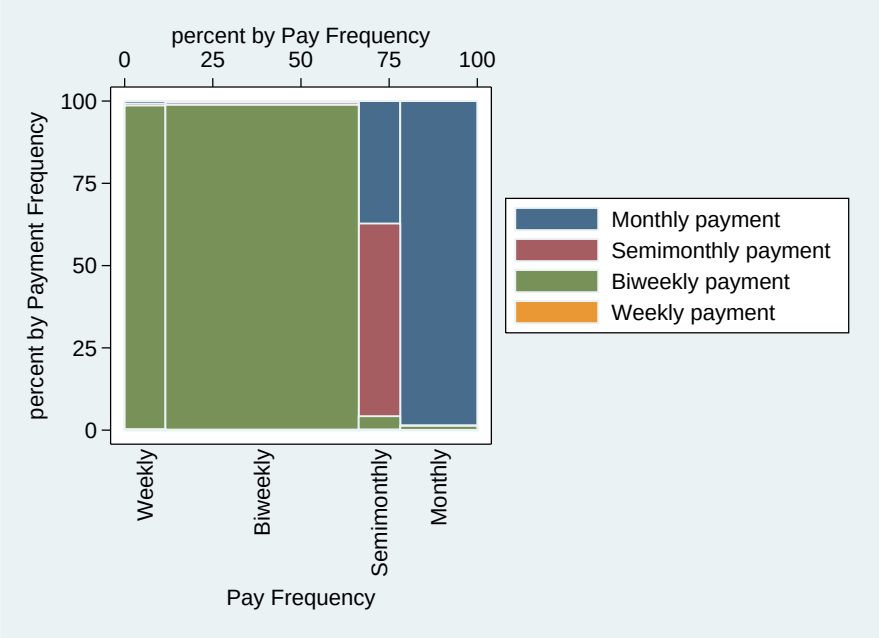

Fig. 8. Borrower's Payment Frequency By Pay Frequency

are similar for online and storefront loans. About half of the loans are taken by people between the ages of 38 and 57. Borrowers of online loans tend to be slightly younger than borrowers of storefront loans but there is no clear segregation in choice of loan type based on borrower age.

Figure 10 displays the distribution of borrower's self-reported annual gross income. More than 60% of borrowers report their annual gross income to be between $20,000 and $60,000 but there is a wide range of borrower incomes with many borrowers earning more than $100,000. Online borrowers on average have higher incomes than storefront borrowers. However, storefront borrowers tend to have more extreme incomes than online borrowers. That is, the percentages of borrowers earning low income (such as less than $30,000) or high income (such as more than $100,000) are higher for storefront loans than for online loans.

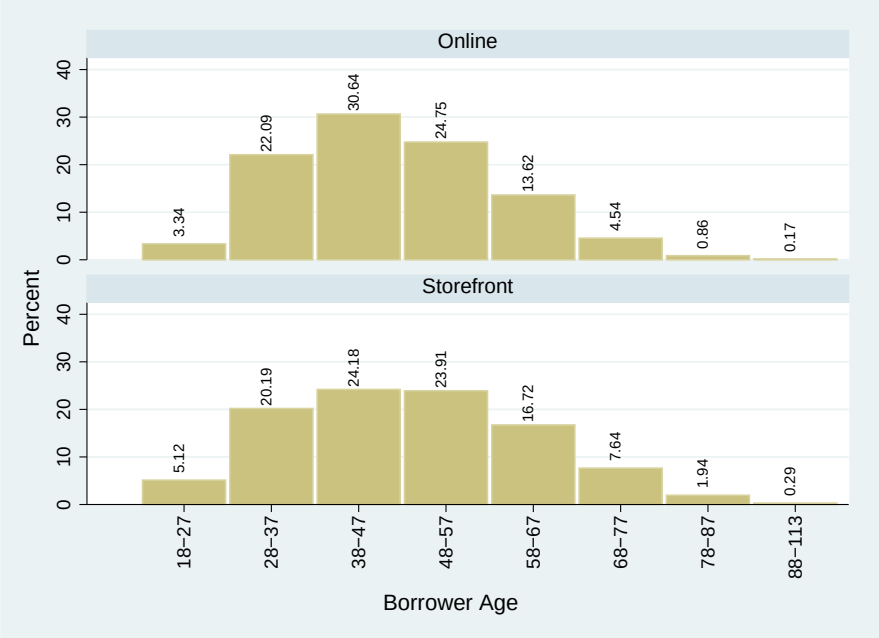

Fig. 9. Distribution of Borrower Age

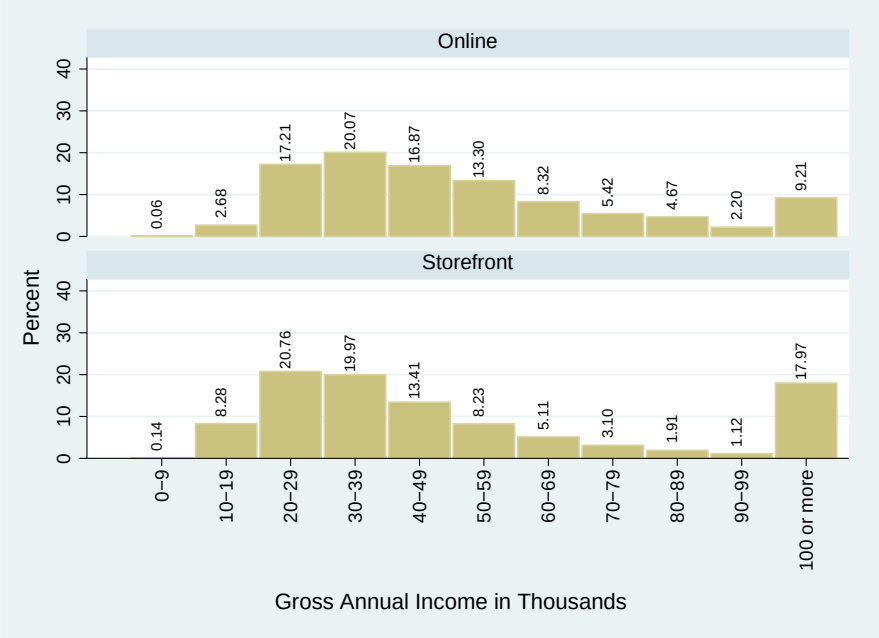

Fig. 10. Distribution of Borrower's Annual Gross Income in $000s

6. Loan Outcomes

We consider a loan to be paid off if our data identifies a date at which the loan was paid off or if there is no charge-off associated with the loan. We consider a loan to be not paid off if there is no date at which the loan was paid off but there is a charge-off. About one percent of loans are excluded from the analysis of this section because we are missing both a loan payoff date and a chargeoff report, and therefore cannot determine whether these loans were paid off.

The aggregate repayment rate for loans in our sample is 69%. It is difficult to compare this with the rate for single-payment small-dollar loans because of the widely reported high renewal rate for such loans.[5] For example, if a consumer renews a two-week small-dollar loan four times and defaults the fifth time, the repayment rate may be calculated as 80% because four out of five loans were repaid. On the other hand, if a consumer takes a ten week installment loan and defaults after eight weeks, the repayment rate will be considered zero. Since a borrower with an installment loan may have paid many installments before defaulting, the fraction of loan principal repaid may be significantly higher than the repayment rate.

Table 4 examines the relation between loan payoff rate and borrower characteristics by comparing the payoff rates for groups of loans that differ on a particular characteristic. The comparisons are for single characteristic, without regard to other differences. However, borrower and loan characteristics are interrelated. For example, borrower characteristics that reduce the payoff rate may also lead to a higher APR. We later consider multivariate analyses that attempt to account for these interrelationships.

The payoff rate for employed borrowers, 72.1%, exceeds the payoff rate of 51.2% for unemployed borrowers. As noted above, unemployed borrowers typically have other sources of income. The payoff rate is the same, 72%, for borrowers with income above or below median. The payoff rate for homeowners (72.7%) is higher than that for those who rent their home (66.9%). Borrowers who have stayed longer at their current residence are also more likely to repay their loans. Older

[5] We later examine the incidence of renewal of installment loans in our sample.

Table 4. Loan Outcomes Based on Borrower Characteristics

	Percent of Loans Paid Off	Percent of Loans Charged Off
Employment Status		
Unemployed (15%)	51.22%	50.29%
Employed (84%)	72.14%	30.74%
Gross Annual Income		
Below Median (45%)	72.01%	31.92%
Above Median (45%)	72.00%	30.24%
Missing (9%)	39.44%	59.10%
Pay Frequency		
Biweekly (54%)	69.27%	33.41%
Monthly (21%)	72.36%	31.07%
Semimonthly (11%)	66.66%	34.81%
Weekly (11%)	62.80%	39.93%
Homeownership Status		
Own (33%)	72.75%	29.47%
Rent (66%)	66.93%	36.01%
Months in Residence		
Below Median (53%)	65.58%	37.33%
Above Median (46%)	72.74%	29.74%
Missing (0%)	43.03%	57.37%
Age		
Below Median (50%)	63.63%	39.13%
Above Median (49%)	74.16%	28.49%
Missing (0%)	0.00%	100.00%
Total (100%)	68.88%	33.81%

borrowers are more likely to repay their loans. The repayment rate for borrowers below median age is 63.6% while the repayment rate for borrowers above median age is 74.1%.

Charge-off data provides an alternative measure of loan risk. From Table 4, it is clear that loan categories with higher payoff rates have lower charge-off rates so loan payoff rate and charge-off rates result in the same inferences about the relative performance of different loan categories. However, we believe that payoff rates are a more reliable measure because charge-off policies may differ across lenders, creating artificial differences across categories.

Table 5 examines the relation between loan payoff rate and loan characteristics. A comparison of online and storefront loans shows that storefront loans are more likely to be repaid than online loans. About 77% of storefront loans are repaid compared to 60% of online loans. The unique

Table 5. Loan Outcomes Based on Loan Characteristics

	Percent of Loans Paid Off	Percent of Loans Charged Off
Approval Location		
Online (44%)	59.25%	42.14%
Storefront (55%)	76.73%	27.07%
Loan Term in Days		
Below Median (50%)	72.87%	30.74%
Above Median (49%)	64.87%	36.90%
Scheduled Installments		
Below Median (63%)	72.06%	31.29%
Above Median (36%)	63.36%	38.18%
Payment Frequency		
Biweekly (65%)	68.71%	33.99%
Monthly (27%)	74.61%	28.73%
Semimonthly (7%)	60.95%	39.59%
Weekly (0%)	14.53%	97.37%
APR		
Below Median (55%)	77.53%	26.70%
Above Median (44%)	57.96%	42.79%
Principal		
Below Median (51%)	64.95%	36.99%
Above Median (48%)	73.09%	30.43%
Installment Payment Amount		
Below Median (50%)	65.37%	36.45%
Above Median (49%)	72.41%	31.18%
Missing (0%)	100.00%	0.00%
Payment-to-Income		
Below Median (44%)	72.52%	29.16%
Above Median (44%)	73.25%	31.33%
Missing (10%)	35.41%	63.19%
Total (100%)	68.88%	33.81%

challenges of online identity verification create additional risk of loss in many online transactions. In online credit card transactions, for example, unauthorized charges are three times more likely than in transactions where the card is physically present (Federal Reserve System, 2014).

Loans with monthly installments are more likely to be repaid than loans with more frequent installments. Loans with longer duration or a higher number of installments are less likely to be paid off. Since the loan term and the number of installments are choice variables, it is difficult to interpret these findings. They are consistent with the notion of "debt fatigue," – that at some point, borrowers are no longer willing to continue making payments. However, they are also consistent

with a higher likelihood of unexpected income or expense changes that make repayment more difficult. Loans with lower than median APR have a payoff rate of 77.5% compared to 58.0% for loans with higher than median APR, the largest performance difference in the table. Thus, the interest rate charged is a major predictor of payoff rate, which suggests that lenders are assessing the risk of default and charging higher rates for riskier loans.

Loans with a principal amount above the median have a payoff rate of 73.1% compared to 65.0% for those below the median. Similarly, loans with above median installment amounts have payoff rate of 72.4% compared to 65.4% for loans below median. One possible explanation for these findings is that lenders approve larger loans for borrowers who are more likely to repay their loans. In any event, these findings, along with the finding that loan payoff rate is same for lower income and higher income borrowers, suggest that the Bourke et al. (2013a) recommendation to limit payments in an attempt to make loans affordable may not be effective in achieving a higher loan payoff rate. This is also reflected in the finding that loans with payment to income ratio above median have a slightly higher payoff rate than loans with a ratio below median. We consider payment to income ratios in more detail in the next section.

In summary, no single borrower or loan characteristic clearly separates good loans from those that are not repaid. The differences in loan payoff rates from varying borrower characteristics are generally small with the exception of employment status and age. Among loan characteristics, APR is most closely related to the loan payoff rate.

7. Payment-to-Income Ratio

Bourke et al. (2013a) have proposed prohibiting loans where the payment-to-income ratio exceeds a threshold. We therefore examine the distribution of payment-to-income ratio in our loan sample, and estimate the relation between payment-to-income ratio and the loan outcome. We calculate the payment-to-income ratio using the same data that lenders would use to comply with any regulatory threshold. The ratio is calculated as the installment amount divided by the gross

income of a borrower over the loan installment period.

Table 6 displays the distribution of the payment-to-income ratio for the 910,985 loans from the main sample for which payment-to-income ratio is available and also for subsamples based on different borrower and loan characteristics. The average payment-to-income ratio for the loans in our sample is 41.5% and the median is 11%. One quarter of the loans have payment-to-income ratio less than 6.8% and another one quarter of the loans have payment-to-income ratio exceeding 16.6%. The large difference between the median and the mean shows a skewed distribution with very high payment-to-income ratios for a few loans. These high values are driven by some outlier loans with very low reported annual incomes. We therefore focus on the median payment-to-income ratio rather than the mean ratio.

The observed differences in payment-to-income ratios based on borrower characteristics such as age may reflect differences in income and loan size requirements across different segments of the population. They may also arise as a result of an underwriting process that uses information on borrower characteristics to approve and structure loans to control default risk - for example, offering smaller loans to riskier borrowers.

Table 6 shows that storefront loans have higher payment-to-income ratios. This is consistent with Tables 4 and 5, which show that storefront loans are made to borrowers with lower incomes and have larger loan principal amounts than online loans. However, the loan payoff rate is higher for storefront loans than for online loans, indicating that a lower payment-to-income ratio by itself cannot be viewed as a predictor of a higher loan repayment rate. The median payment-to-income ratio for employed borrowers is 11.0%, about the same as the corresponding value of 11.1% for unemployed borrowers.

Table 6 does not indicate a strong relation between payment-to-income ratio and age or home-ownership status. Borrower's income, loan principal, and installment amount are mechanically related to payment-to-income ratio. A higher income lowers the payment-to-income ratio, a higher loan amount and hence a larger installment amount increases the payment-to-income ratio. The payment-to-income ratio does not differ much across loans that vary in loan term or number of

Table 6. Payment-to-Income Ratio Based on Loan Characteristics and Borrower Characteristics

	Loan Payment-to-Income Ratio			
	Mean	25th Percentile	Median	75th Percentile
Approval Location				
Online (47%)	10.54%	5.76%	8.59%	12.20%
Storefront (52%)	69.38%	8.87%	14.35%	20.76%
Employment Status				
Unemployed (7%)	99.68%	7.40%	11.13%	15.98%
Employed (92%)	36.69%	6.80%	10.97%	16.71%
Homeownership Status				
Own (34%)	50.04%	6.54%	10.54%	16.20%
Rent (65%)	37.03%	7.02%	11.23%	16.88%
Age				
Below Median (50%)	30.88%	6.67%	10.61%	16.07%
Above Median (49%)	52.17%	7.03%	11.39%	17.26%
Missing (0%)	18.19%	16.35%	18.19%	20.02%
Gross Annual Income				
Below Median (50%)	73.64%	9.91%	14.05%	20.83%
Above Median (49%)	9.42%	5.17%	7.98%	12.61%
Principal				
Below Median (58%)	27.49%	5.51%	8.55%	12.72%
Above Median (41%)	61.05%	10.40%	15.24%	21.58%
Scheduled Installments				
Below Median (60%)	60.23%	7.14%	11.80%	17.88%
Above Median (39%)	12.80%	6.47%	10.01%	14.74%
Loan Term in Days				
Below Median (50%)	69.46%	7.02%	11.90%	18.14%
Above Median (49%)	12.84%	6.70%	10.29%	15.13%
APR				
Below Median (50%)	16.23%	9.25%	14.03%	20.17%
Above Median (49%)	66.86%	5.46%	8.50%	12.71%
Installment Payment Amount				
Below Median (50%)	19.67%	5.20%	8.04%	11.86%
Above Median (49%)	63.39%	10.05%	14.82%	21.10%
Total (100%)	41.53%	6.84%	10.99%	16.64%

installments.

The most interesting relation shown in Table 6 is with the interest rate (APR). The distribution of payment-to-income ratios for loans with below median APR is systematically higher than for loans with an APR above the median. The median payment-to-income ratio for lower APR loans is 14.0%, compared to 8.5% for higher rate loans. That is, higher payment-to-income ratios are associated with lower interest rates. Nevertheless, Table 5 shows that lower APR loans are more likely to be repaid. Thus, determining the likelihood that a loan will be repaid using the payment-to-income ratio alone is ineffective. If a higher payment-to-income ratio indicates lower probability of loan payoff, then loans with a higher ratio should have higher interest rates. We find exactly the opposite pattern in the data. Of course, this does not mean that making a larger loan to a given borrower reduces repayment risk. Rather, the data are consistent with an underwriting process in which decisions about loan approval and structure both are based on risk assessment. That is, the lender may approve a higher payment-to-income ratio for a more creditworthy borrower than for a less creditworthy borrower.

We next explore how a regulation that prohibits lenders from issuing loans with a payment-to-income ratio exceeding an illustrative limit may impact the volume of lending and the outcome of loans extended. An argument for using the payment-to-income ratio as the criterion for loan approval is presumably that borrowers with payment-to-income limit below a certain limit are more likely to repay because they can afford the payments. We call this the benefit of imposing a payment-to-income limit. Even if a higher repayment rate is the primary objective of regulation, which is questionable, it remains to be established that limiting the payment-to-income ratio results in an increase in the loan payoff rate. Opponents of payment-to-income limit highlight the potential cost of such a limit, the decline in the volume of lending and denial of credit to some prospective borrowers. We call this the cost of imposing a payment-to-income limit and seek to estimate the extent of denial of credit for illustrative payment-to-income limits.

Our estimate of the benefit and cost of an illustrative payment-to-income limit makes some assumptions. Specifically, we assume that the universe of loan applicants for the lenders in our

sample will not change as a result of any regulatory change. We assume that loan applicants who were denied credit during our sample period will still be denied credit. We assume that the loans in our sample with payment-to-income ratios below an illustrative regulatory limit will be made on the same terms and with the same payoff rate. When a sample loan exceeds an illustrative payment-to-income ratio limit, we consider two scenarios. In the first scenario, we assume that the loan will not be approved and no credit will be extended. This credit decision is independent across loans, so some loans to a borrower may be approved while others may be denied. Alternatively, we assume that if the payment-to-income ratio of a loan exceeds an illustrative regulatory limit, the loan size is reduced enough to conform to the payment-to-income ratio, holding constant the term of the loan. In this scenario, the regulatory limit will not change the number of loans but may reduce the amount of principal for some loans. A more realistic situation is likely a mix of the two scenarios in which some loans with payment-to-income ratio exceeding the regulatory limit will be approved with a reduced principal amount while others will not be issued at all, either because a smaller loan is insufficient for the borrower's cash needs or because lenders cannot recover the costs of issuing and servicing smaller loans.

Figure 11 shows the number of loans and payoff rate by range of payment-to-income ratio. Of 910,985 loans for which the payment-to-income ratio was available, only 126,120 (14%) have a ratio less than 5%, which Bourke et al. (2013a) have recommended as a regulatory limit. The most common payment-to-income range in our sample is 5% to 10%, which accounts for about one-third of the loans. About one-fourth of the loans have a payment-to-income ratio in the 10% to 15% range. Almost all loans (about 99%) have payment-to-income ratio less than 35%.

The payoff rates in Figure 11 do not show a monotonic relation with the payment-to-income ratio. The payoff rate for loans with payment-to-income ratios less than 5% is 73.6%. This payoff rate drops slightly to 70.5% for loans with ratios between 20% and 25%, but it rises again for loans with higher payment-to-income ratios, with a peak at 82.8% for loans with payment-to-income ratio between 30% and 35%. Thus, there is not a robust or simple relation between payment-to-income ratio and loan payoff rate.

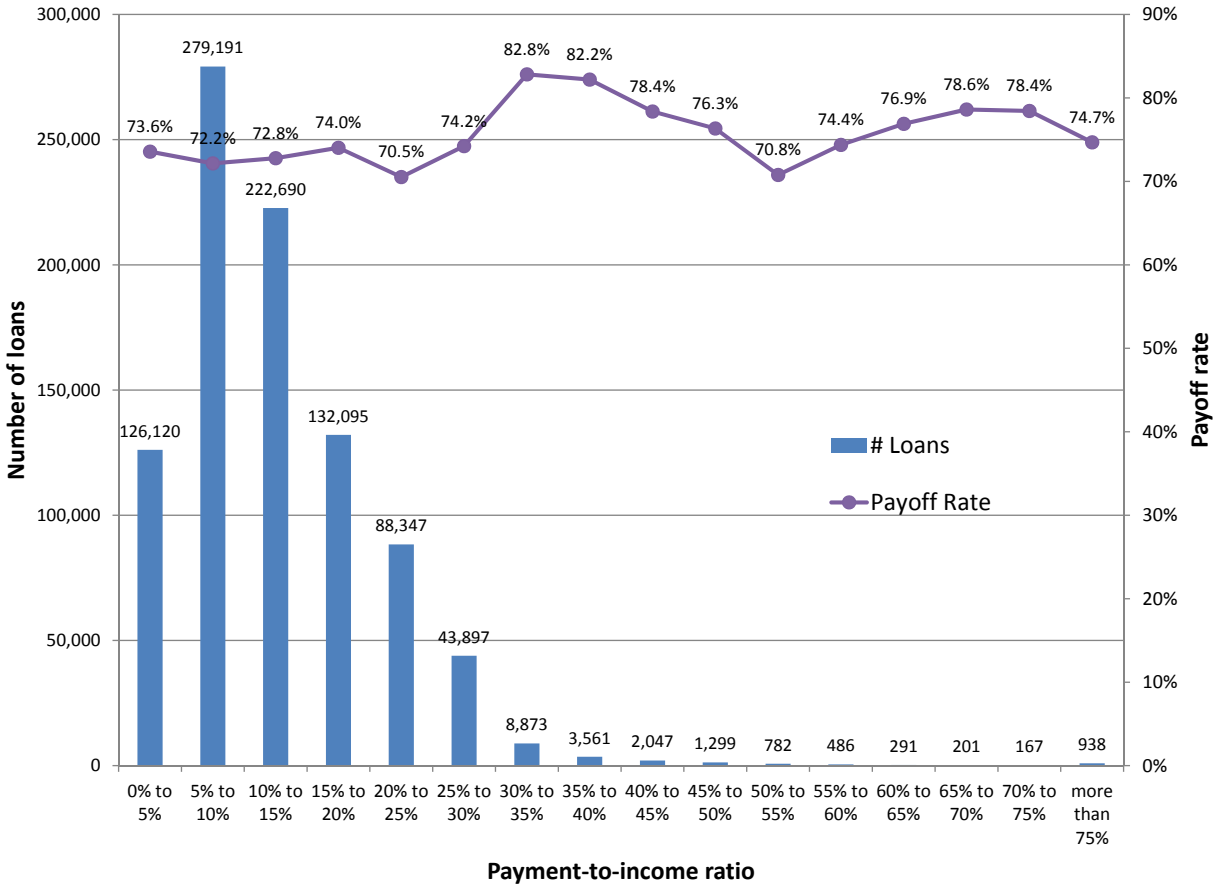

Fig. 11. Number of Loans and Payoff Rate By Payment-to-Income Ratio

Figure 12 assesses how illustrative regulatory limits on payment-to-income ratio will impact access to credit and loan outcomes. The horizontal axis represents different illustrative limits. The red curve (with square-shaped markers) plots the fraction of current loans that will fail to meet these limits. The blue curve (with diamond-shaped markers) plots the payoff rate for loans that meet these limits. The figure shows that the loans meeting a payment-to-income limit of 5% have a payoff rate of 73.6%, only 0.7% higher than the 72.9% payoff rate for all loans for which payment-to-income ratio can be calculated.[6] The modest increase in payoff rate will come at the

[6] The lower payoff rate for all loans, shown in Table 5, 68.9%, can be attributed to the low payoff rate for loans for

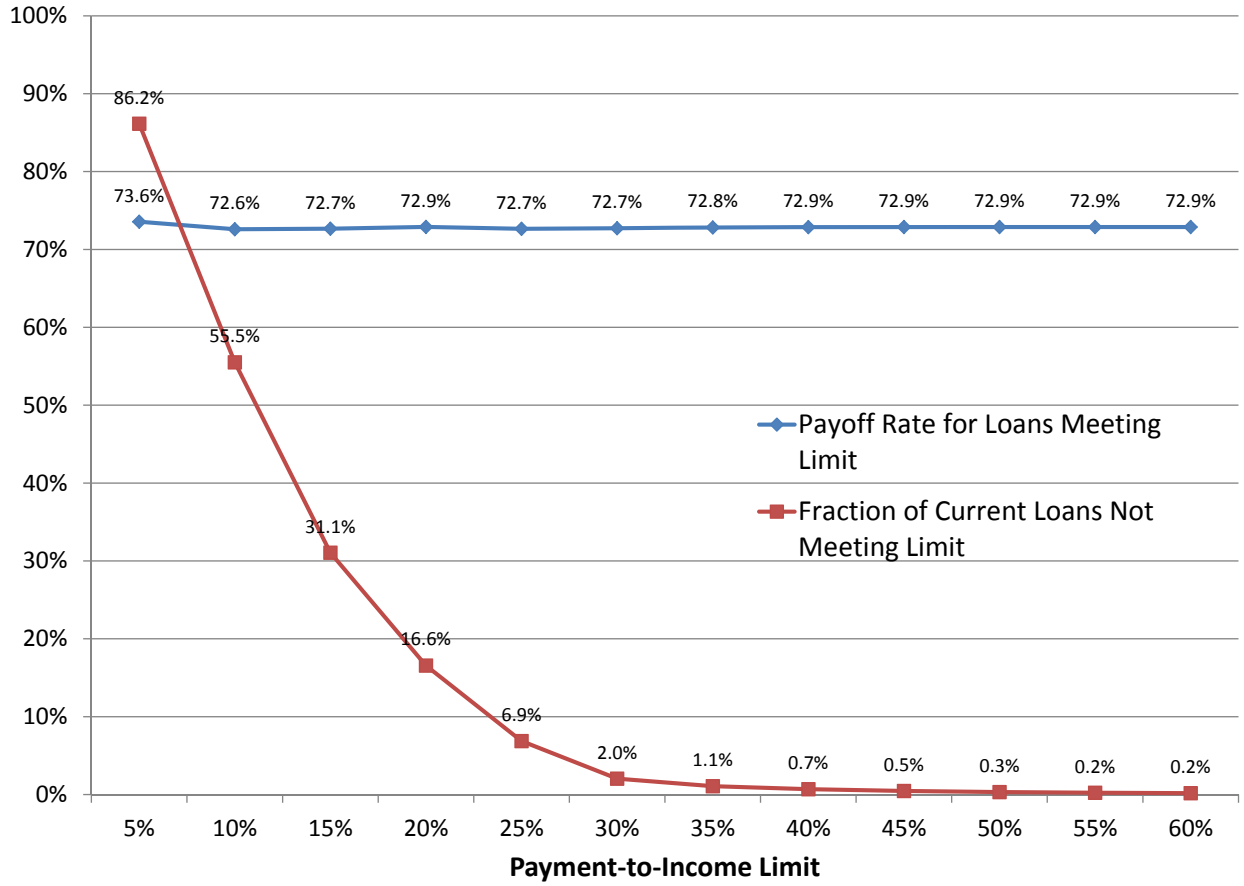

Fig. 12. Cost and Benefit of Illustrative Payment-to-Income Limits

expense of limiting access to credit for 86.2% of loans that fail to meet the 5% limit. A limit of 10% will result in a payoff rate of 72.6%, only trivially lower than the benchmark of 72.9%, and will disqualify about 55.5% of current loans. Similarly, limits of 15% or more result in no improvement in loan payoff rate relative to the benchmark. Yet, about 30% of the loans in our sample would not satisfy a limit of 15%, and about one-sixth would not satisfy a limit of 20%.

which payment-to-income ratio cannot be calculated. Most of these loans are missing income information. See Table 4.

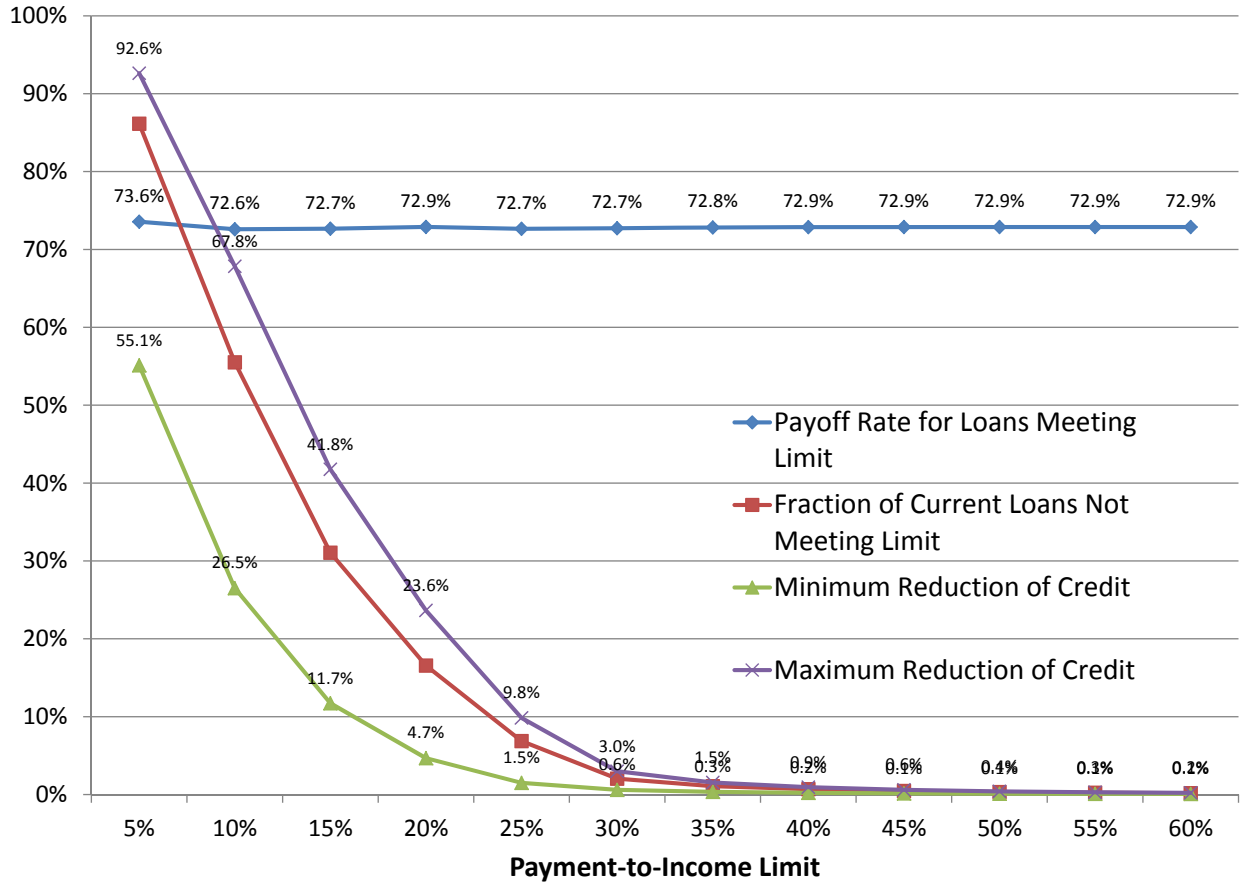

Fig. 13. Impact of Illustrative Payment-to-Income Limits on Access to Credit for Main Data Sample

Figure 13 estimates the dollar decline in lending from different illustrative payment-to-income limits. The horizontal axis represents different payment-to-income limits. The purple curve (with x-shaped markers) plots the maximum percentage decline in aggregate principal of loans extended assuming that a loan that fails to meet the payment-to-income limit is rejected altogether. The green curve (with triangular markers) plots the minimum percentage decline in aggregate principal of loans extended and assumes that a loan that fails to meet the limit will be approved with a reduced principal. The figure shows that a payment-to-income limit of 5% would reduce the amount of credit by at least 55.1%, and perhaps as much as 92.6%. A limit of 10% would

reduce credit by 26.5% to 67.8%. A 15% limit will result in reduction of credit between 11.7% and 41.8% with no improvement in loan payoff rate.

We now consider the impact of a payment-to-income regulatory limit using our expanded data sample. Figure 14 replicates the analysis reported in Figure 13 for 1,361,998 loans in the expanded sample for which payment-to-income ratio is available. The payoff rate for these loans is 68.9%. The results are similar to those for the main sample. A payment-to-income limit of 5% would result in a loan payoff rate of 73.2%, 4.3% higher than the benchmark rate of 68.9%, but reduces credit by at least 51%, and perhaps as much as 91%. A limit of 10% would reduce credit by 22.4% to 60.5% while resulting in loan payoff rate of 69.6%, only slightly higher than the benchmark. Higher payment-to-income limits reduce credit but result in no improvement in the loan payoff rate.

Thus, our data suggests that there is little benefit of imposing an upper limit on payment-to-income ratio, but there can be substantial costs in terms of reduced credit availability to borrowers who do not have access to alternative sources of credit. We acknowledge that this analysis cannot take into account other repercussions from regulatory changes which may weaken or strengthen the changes we predict. Proponents of a payment-to-income limit-based regulation may point out that the regulation may force some consumers into greater financial discipline and better long-term outcomes. Opponents may argue that the regulation that limits the supply of small-dollar credit without addressing the underlying causes for the demand of credit will hurt financially underserved consumers. Moreover, if small-dollar lending is no longer viable because of the regulation, the resulting exit of lenders may have a much larger negative impact on access to credit than what we predict. Our data do not permit us to speculate on these effects but our analysis suggests that the case for regulation based on payment-to-income limit is weak.

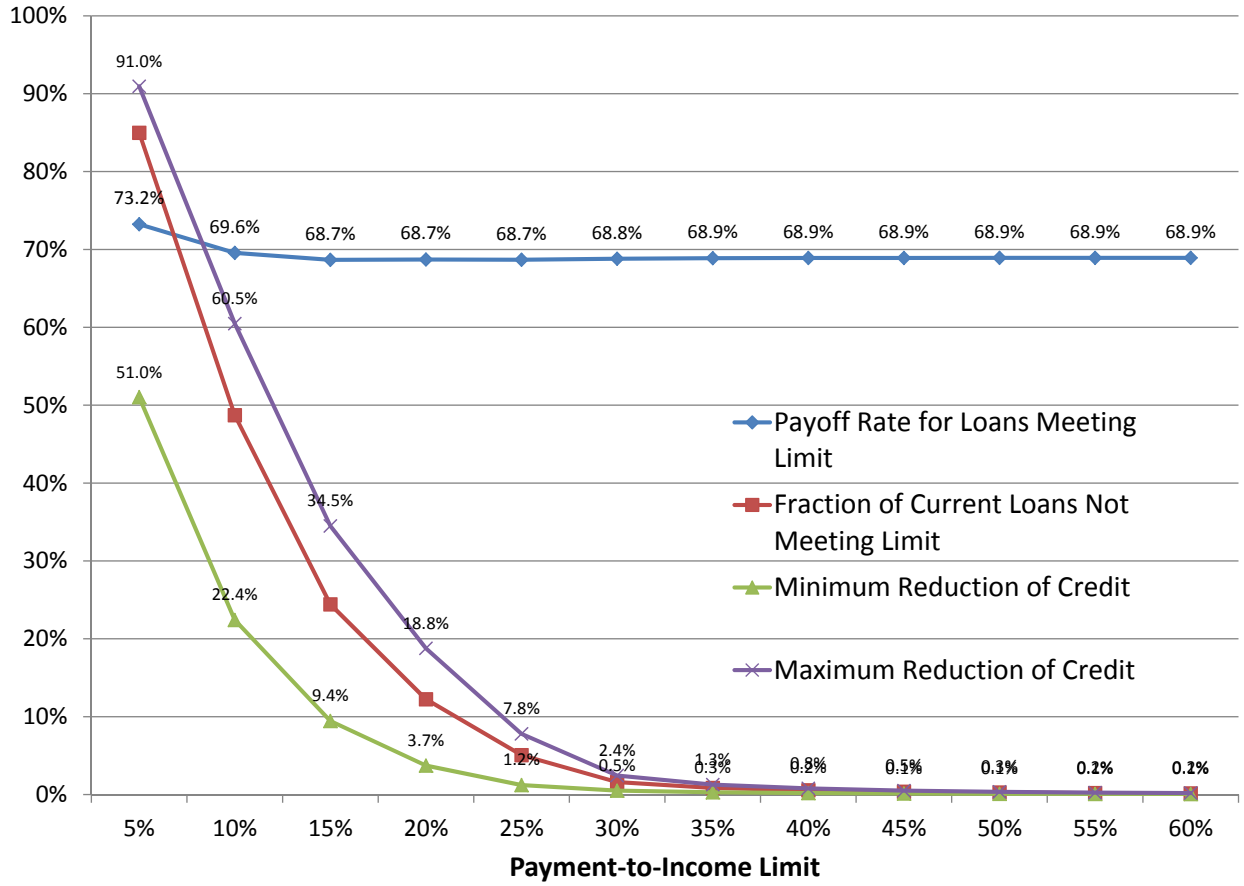

Fig. 14. Impact of Illustrative Payment-to-Income Limits on Access to Credit for Expanded Data Sample

8. Repeat Borrowers

A common criticism of single-payment small-dollar loans is that some borrowers renew their loans and remain indebted for periods that far exceed the term of the initial loan. Loan renewals by borrowers may at least partly result from a mismatch between borrowers' needs and the product design necessary to conform to state regulatory requirements. If a borrower is capable of repaying a loan in three months but the only available loans are biweekly loans, then the

borrower may rationally choose to take a two-week loan and renew as necessary. This in itself does not indicate inefficiency. However, critics of small-dollar loans contend that repeat borrowing results in excessive costs that borrowers do not anticipate when taking out a loan initially. This argument is based on two premises. First, it assumes that renewing short-term loans over a long term is more costly for the borrower than taking a long-term loan, and that a long-term loan is available. Second, it assumes the borrower does not act rationally and underestimates the cost of repeat borrowing.[7]

The installment loans in our sample have no upfront fees, fixed fees, or prepayment fees. This means that taking a six-month loan, paying the installment for three months and then renewing the loan for a second six-month loan changes the effective duration of the combined loan to nine months. This is equivalent to taking a nine-month loan at the outset with back-ended amortization. As long as the APR does not change significantly, renewing a loan allows a borrower to extend the term of the loan. One can ask why the borrower and the lender don't choose a nine-month loan in first place. A rational explanation is that the lender (and possibly borrower too) is uncertain whether the borrower will in fact repay the loan and therefore finds it valuable to retain the option to renew or deny a loan and to choose the APR of the renewed loan. This is also socially efficient.

To our knowledge, this important issue of repeat borrowing has not been examined for small-dollar installment loans. We describe the incidence of repeat borrowing in our sample. We also try to ascertain if repeat borrowing is more prevalent among borrowers who are unable to repay their loans or among borrowers who establish a track record and therefore can borrow repeatedly. We measure repeat borrowing by defining loan sequences as repeated loans by a borrower. We consider four alternative definitions:

1. **Same Lender, 7-day sequence**: A series of loans forms a loan sequence if all loans are to the same borrower from the same lender and if each loan in the series is issued within 7 days of the previous loan in the series.

[7] Mann (2013) presents survey evidence contradicting this assumption.

2. **Any sample lender, 7-day sequence**: A series of loans forms a loan sequence if all loans are to the same borrower but not necessarily from the same lender and if each loan in the series is issued within 7 days of the previous loan in the series.

3. **Same lender, 14-day sequence**: A series of loans forms a loan sequence if all loans are to the same borrower from the same lender and if each loan in the series is issued within 14 days of the previous loan in the series.

4. **Any sample lender, 14-day sequence**: A series of loans forms a loan sequence if all loans are to the same borrower but not necessarily from the same lender and if each loan in the series is issued within 14 days of the previous loan in the series.

These definitions require determination of when a new loan is issued and when a previous loan ends. While the issue date of loans is directly available, determining the end date of a loan is more complex. If the data provides a date on which the loan was paid off, we assume that is the date on which the loan ended. This date is not available for about one-third of our sample. For such loans, we consider the earlier of the last payment date and the originally scheduled loan maturity date as the date on which the loan ended.

Since our data consist of loans made between January 2012 and September 2013, we do not observe all loans in sequences which started before January 2012 or continued past September 2013. Therefore, we do not include sequences where the first loan was issued in the first 14 days (7 days for the 7-day sequences) of our sample period or the last loan ended in the last 14 days (7 days for the 7-day sequences) of our sample period. We use the main sample for this analysis.

It is common for installment loans to have terms of longer than six months and many have terms exceeding a year. This limits our ability to identify all loan sequences because we can not determine if borrowers in our sample took loans shortly after repaying previous loans that were issued prior to our sample period. Similarly, we do not know if borrowers with loans outstanding at the end of our sample period will borrow again after our sample period. This problem also afflicts the study of loan sequences in Burke et al. (2014). We have a longer sample period than

Table 7. Summary Statistics for Sequences of Loans Taken Within 7 Days From Same Lender

	All Sequences		Sequences with Single Loan		Sequences with Multiple Loans	
	Mean	Median	Mean	Median	Mean	Median
Number of Loan Sequences	486347		387061		99286	
Percent of Loan Sequences	100.00%		79.59%		20.41%	
Percent Storefront	44.94%		39.44%		66.38%	
Principal of First Loan ($)	1089	800	1093	800	1071	800
Number of Loans in Sequence	1.3	1.0	1.0	1.0	2.6	2.0
Last Loan Principal/First Loan Principal	1.10	1.00	1.00	1.00	1.48	1.20
Annual Percentage Rate of First Loan	309.7%	297.8%	312.5%	299.6%	298.8%	250.3%
Borrower Age (years)	42.0	40.9	41.8	40.7	42.6	41.6
Percent Borrowers Renting	66.95%		66.78%		67.62%	
Months Borrower in Residence	65.86	33.00	64.31	32.00	71.86	36.00
Percent Borrowers Employed	86.24%		86.82%		83.97%	
Borrower Gross Annual Income ($)	45411	34879	46250	35175	41932	34074
Percent Sequences Paid Off	53.51%		53.34%		54.16%	

the typical one-year sample in Burke et al. (2014) but the longer duration of installment loans makes it difficult to identify all spells of repeated borrowing.

Table 7 shows that there are 486,347 same lender 7-day loan sequences in our sample. Of these, almost 79.6% end with just one loan. That is, the borrower does not take another loan within 7 days of the first loan. The remaining 20.4% of sequences have at least two loans in the sequence. About 45% of the loan sequences start with storefront loans and the remaining 55% start with online loans. However, storefront loans form a larger fraction of the multiple-loan sequences, 66.4%. This suggests that storefront loans are more likely than online loans to result in sequences with multiple loans. The average principal for the first loan in a sequence is $1,089 while the median principal is $800.

The average loan sequence lasts 1.3 loans. Although 79.6% of the loan sequences will end with the first loan, remaining loan sequences with multiple loans consist of an average of 2.6 loans. For loan sequences with multiple loans, the principal of the last loan is on average 48% higher than

Table 8. Summary Statistics for Sequences of Loans Taken Within 7 Days From Any Lender

	All Sequences		Sequences with Single Loan		Sequences with Multiple Loans	
	Mean	Median	Mean	Median	Mean	Median
Number of Loan Sequences	453586		350021		103565	
Percent of Loan Sequences	100.00%		77.17%		22.83%	
Percent Storefront	46.94%		42.17%		63.05%	
Principal of First Loan ($)	1073	800	1074	800	1069	800
Number of Loans in Sequence	1.4	1.0	1.0	1.0	2.7	2.0
Last Loan Principal/First Loan Principal	1.11	1.00	1.00	1.00	1.49	1.20
Annual Percentage Rate of First Loan	310.1%	297.8%	313.2%	300.2%	299.5%	251.3%
Borrower Age (years)	41.9	40.7	41.7	40.5	42.5	41.5
Percent Borrowers Renting	67.37%		67.33%		67.52%	
Months Borrower in Residence	66.07	33.00	64.74	32.00	70.57	36.00
Percent Borrowers Employed	85.98%		86.60%		83.90%	
Borrower Gross Annual Income ($)	44828	34242	45491	34242	42464	34242
Percent Sequences Paid Off	53.60%		54.32%		51.17%	

the principal of the first loan in the sequence. However, the median increase in loan principal over the sequence is 20%, suggesting that a small fraction of loan sequences result in a more substantial increase in the amount of credit extended.

The APR on single loan sequences is 312% on average. The APR on first loans of multiple-loan sequences is 299% on average. This suggests that borrowers who are considered less risky by the lenders at the time of first loan in the sequence are more likely to borrow again. This finding better fits a view that more creditworthy borrowers are repeat borrowers than a view that those who have difficulty repaying their loans borrow more and fall into a debt trap. The debt trap view is also inconsistent with a comparison of the loan payoff rates for single and multiple loan sequences. (We consider a loan sequence to be paid off if all the loans in the sequence are paid off.) That view suggests that payoff rate should be higher for single loan sequences than for multiple loan sequences. However, Table 7 shows that the payoff rate is 53.3% for loan sequences which end after one loan, compared to 54.1% for sequences with multiple loans . Thus, the payoff rate is slightly higher for multiple-loan sequences than for single-loan sequences.

Table 9. Summary Statistics for Sequences of Loans Taken Within 14 Days from Same Lender

	All Sequences		Sequences with Single Loan		Sequences with Multiple Loans	
	Mean	Median	Mean	Median	Mean	Median
Number of Loan Sequences	445983		347770		98213	
Percent of Loan Sequences	100.00%		77.98%		22.02%	
Percent Storefront	44.39%		38.72%		64.45%	
Principal of First Loan ($)	1091	800	1102	800	1054	800
Number of Loans in Sequence	1.4	1.0	1.0	1.0	2.6	2.0
Last Loan Principal/First Loan Principal	1.10	1.00	1.00	1.00	1.47	1.20
Annual Percentage Rate of First Loan	310.5%	298.2%	313.1%	299.7%	301.2%	251.6%
Borrower Age (years)	41.8	40.7	41.7	40.5	42.5	41.5
Percent Borrowers Renting	67.17%		67.06%		67.57%	
Months Borrower in Residence	65.23	32.16	63.67	31.00	70.73	36.00
Percent Borrowers Employed	85.93%		86.45%		84.07%	
Borrower Gross Annual Income ($)	45575	34733	46562	34956	41886	34194
Percent Sequences Paid Off	50.82%		50.13%		53.25%	

Table 10. Summary Statistics for Sequences of Loans Taken Within 14 Days from Any Lender

	All Sequences		Sequences with Single Loan		Sequences with Multiple Loans	
	Mean	Median	Mean	Median	Mean	Median
Number of Loan Sequences	415218		313734		101484	
Percent of Loan Sequences	100.00%		75.56%		24.44%	
Percent Storefront	46.39%		41.42%		61.74%	
Principal of First Loan ($)	1075	800	1082	800	1053	800
Number of Loans in Sequence	1.4	1.0	1.0	1.0	2.7	2.0
Last Loan Principal/First Loan Principal	1.12	1.00	1.00	1.00	1.48	1.19
Annual Percentage Rate of First Loan	310.9%	298.4%	314.0%	300.6%	301.6%	265.3%
Borrower Age (years)	41.7	40.6	41.5	40.3	42.4	41.4
Percent Borrowers Renting	67.60%		67.62%		67.55%	
Months Borrower in Residence	65.41	32.02	64.04	31.00	69.65	35.97
Percent Borrowers Employed	85.66%		86.21%		83.96%	
Borrower Gross Annual Income ($)	44978	34112	45796	34047	42328	34242
Percent Sequences Paid Off	51.01%		51.21%		50.40%	

Tables 8, 9, and 10 describe loan sequences with alternative definitions of loan sequences. The inferences drawn from Table 7 continue to hold under alternative definitions. A comparison of Tables 7 and 8 (or Tables 9 and 10) shows that when we consider loan sequences consisting of loans from any lender rather than just one lender, the number of loan sequences with multiple sequences increases. However, the payoff rate for loan sequences with multiple loans drops. This may be driven by the low payoff rate for loan sequences where the borrower switched from one lender to another. For example, when we consider 14-day loan sequences across all sample lenders, the payoff rate is 23.6% for sequences in which the borrower switched lender compared to 54.9% for sequences in which the borrower did not switch lender. It seems plausible that in some cases, a borrower switches to a different lender when the borrower is denied a new loan by the previous lender either because the borrower has already defaulted or is considered less creditworthy and likely to default. The continued growth of credit reporting addressing the small dollar loan borrower will likely help reduce this tendency.

Tables 9 and 10 represent versions of Tables 7 and 8 for sequences of loans that are made within 14 days of previous loans. A comparison of Table 7 and Table 9 shows that expanding the 7-day window to 14-day window results in identification of more loan sequences with multiple loans. Still, 78% of sequences consist of only one loan. Moreover, the qualitative findings of Table 7 continue to hold.

In summary, our analysis of loan sequences suggests that repeat borrowers from same lender tend to be the borrowers who are offered lower interest rates, presumably because they are considered less risky when the initial loan is made.[8] That assessment is accurate, as reflected in the higher loan payoff rate for multiple loan sequences. Thus, additional loans from the same lender appear to reflect a willingness to extend more credit to borrowers who have demonstrated

[8] These conclusions are subject to the caveat that a limited sample period prevents us from observing long sequences of loans. Compared to the 415,218 sequences reported in Table 10, there are 236,1736 sequences for which we cannot determine whether the sequence will be continued with another loan issued after our sample period ends. However, we do not see an economic rationale for expecting qualitatively different results in a broader sample of longer loan sequences.

they can handle their obligations, rather than a debt trap. Borrowers who switch lenders do not necessarily share the same presumption.

Table 11. Outcomes for Sequences of Loans Taken Within 14 Days from Same Lender Based on Borrower Characteristics

	Loans in Sequence				Sequence Duration to Loan Term Ratio				Sequence Payoff
	Mean	25th Percentile	Median	75th Percentile	Mean	25th Percentile	Median	75th Percentile	Percent
Employment Status									
Unemployed (14%)	1.48	1.00	1.00	1.00	95.89%	48.13%	100.00%	105.56%	38.38%
Employed (85%)	1.34	1.00	1.00	1.00	62.04%	18.71%	47.43%	98.72%	52.84%
Gross Annual Income									
Below Median (45%)	1.33	1.00	1.00	1.00	64.30%	20.25%	50.00%	99.71%	50.61%
Above Median (45%)	1.33	1.00	1.00	1.00	60.48%	17.32%	45.61%	98.54%	55.29%
Missing (8%)	1.65	1.00	1.00	2.00	111.88%	92.57%	100.00%	118.99%	28.75%
Pay Frequency									
Biweekly (54%)	1.39	1.00	1.00	1.00	67.14%	20.87%	53.66%	100.00%	51.41%
Monthly (20%)	1.34	1.00	1.00	1.00	66.88%	20.57%	54.55%	100.00%	51.53%
Semimonthly (12%)	1.31	1.00	1.00	1.00	63.97%	19.46%	49.73%	100.00%	52.18%
Weekly (12%)	1.33	1.00	1.00	1.00	68.82%	22.65%	57.24%	100.00%	45.72%
Homeownership Status									
Own (32%)	1.36	1.00	1.00	1.00	67.01%	20.37%	54.07%	100.00%	55.56%
Rent (67%)	1.36	1.00	1.00	1.00	66.69%	20.86%	53.48%	100.00%	48.49%
Months in Residence									
Below Median (49%)	1.34	1.00	1.00	1.00	66.55%	20.11%	53.85%	100.00%	47.59%
Above Median (49%)	1.38	1.00	1.00	1.00	67.03%	21.25%	53.51%	100.00%	54.11%
Missing (0%)	1.18	1.00	1.00	1.00	70.50%	34.75%	58.86%	95.43%	31.72%
Age									
Below Median (50%)	1.34	1.00	1.00	1.00	63.88%	18.95%	49.22%	100.00%	46.53%
Above Median (49%)	1.38	1.00	1.00	1.00	69.71%	22.65%	57.72%	100.00%	55.10%
Missing (0%)	1.00	1.00	1.00	1.00	7.41%	0.00%	7.41%	14.81%	0.00%
Total (100%)	1.36	1.00	1.00	1.00	66.80%	20.70%	53.71%	100.00%	50.82%

We now examine if borrower and loan characteristics can be used to predict the length and outcome of a loan sequence. For this purpose, we focus on loans from the same lender within 14 days of a previous loan. Table 11 considers classifications of loan sequences based on borrower characteristics. For each subsample under each classification, the table lists the distribution of the number of loans in the sequence, the distribution of the ratio of the duration of the loan sequence to the term of the first loan in the sequence, and the payoff rate for the loan sequences.

The duration of loan sequence is defined as the length of time from the date the first loan in the sequence is issued to the date the last loan in the sequence ends (as defined previously).

Table 11 shows that an average loan sequence consists of 1.36 loans. The loan sequence duration is on average 67% of the term of the first loan in the sequence. A quarter of loan sequences end in less than 21% of the term of the first loan while half end in less than 54% of the term of the first loan. Thus, although there are repeat borrowers, the majority of borrowers do not hold the loan until maturity. Instead, they either repay early, with or without a new loan, or default before 54% of the loan term has elapsed. Even after accounting for repeat borrowers, at least 75% of borrowers have resolved their debt by payment or default on or before the maturity date of their original loan.

Employed borrowers tend to resolve their debt sooner and have higher payoff rate for loan sequences. Borrowers who earn less than the median stay in debt longer on average. This is mainly because they take longer to repay their loan, not because they take more loans in the sequence. These borrowers also tend to have a lower loan sequence payoff rate. Homeowners have higher loan sequence payoff rate than renters. There appears to be a relation between age and the duration of loan sequences. Borrowers above the median age resolve the loan on average after about 70% of the first loan's term, compared to 64% of the loan term for younger borrowers. However, they are more likely to pay off their loan sequence than younger borrowers.

Table 12 considers classifications of loan sequences based on terms of the first loan in the sequence. Loans approved in storefronts tend to have longer loan sequences, with 1.57 loans on average compared to 1.19 for online loans, and their borrowers stay indebted longer, 79% of first loan's term on average compared to 57% for online loans. However, the payoff rate at 61% is far higher than 43% for online loans. This is consistent with the evidence from Table 5 of higher payoff rates of storefront loans, and with the evidence from Table 9 of higher payoff rate for multiple loan sequences.

Borrowers with principal lower than the median take on average 73% of the loan term to resolve the loan, compared to 59% for larger loans. Loans with more installments or with longer duration

Table 12. Outcomes for Sequences of Loans Taken Within 14 Days from Same Lender Based on First-Loan Characteristics

	Loans in Sequence				Sequence Duration to Loan Term Ratio				Sequence Payoff
	Mean	25th Percentile	Median	75th Percentile	Mean	25th Percentile	Median	75th Percentile	Percent
Approval Location									
Online (55%)	1.19	1.00	1.00	1.00	57.40%	18.20%	43.78%	95.12%	42.94%
Storefront (44%)	1.57	1.00	1.00	2.00	78.57%	25.93%	70.79%	100.60%	60.75%
First Loan Term in Days									
Below Median (50%)	1.46	1.00	1.00	2.00	82.05%	31.06%	81.01%	101.71%	54.75%
Above Median (49%)	1.25	1.00	1.00	1.00	51.14%	15.36%	37.20%	83.25%	46.79%
Scheduled Installments									
Below Median (63%)	1.42	1.00	1.00	2.00	76.51%	27.43%	68.92%	100.00%	53.05%
Above Median (36%)	1.25	1.00	1.00	1.00	50.22%	14.93%	35.66%	81.82%	47.02%
Payment Frequency									
Biweekly (65%)	1.39	1.00	1.00	1.00	69.40%	23.34%	56.52%	100.00%	51.36%
Monthly (25%)	1.35	1.00	1.00	1.00	66.92%	20.53%	54.33%	100.00%	54.93%
Semimonthly (8%)	1.27	1.00	1.00	1.00	63.37%	21.53%	49.61%	100.00%	49.74%
Weekly (0%)	1.02	1.00	1.00	1.00	96.49%	100.00%	100.00%	100.00%	6.99%
APR									
Below Median (50%)	1.41	1.00	1.00	1.00	59.70%	15.58%	43.01%	96.75%	55.50%
Above Median (49%)	1.31	1.00	1.00	1.00	73.90%	27.08%	67.35%	100.00%	46.13%
Principal									
Below Median (53%)	1.36	1.00	1.00	1.00	73.37%	26.51%	66.12%	100.00%	49.58%
Above Median (46%)	1.36	1.00	1.00	1.00	59.23%	16.14%	42.15%	96.36%	52.24%
Installment Payment Amount									
Below Median (50%)	1.36	1.00	1.00	1.00	68.50%	23.59%	57.14%	100.00%	50.43%
Above Median (49%)	1.36	1.00	1.00	1.00	65.10%	18.01%	49.59%	100.00%	51.20%
Missing (0%)	1.29	1.00	1.00	2.00	88.96%	0.00%	47.62%	219.89%	100.00%
Payment-to-Income									
Below Median (44%)	1.33	1.00	1.00	1.00	65.38%	22.05%	53.57%	100.00%	58.39%
Above Median (44%)	1.34	1.00	1.00	1.00	62.58%	19.11%	46.87%	98.89%	50.19%
Missing (11%)	1.52	1.00	1.00	2.00	89.24%	26.29%	100.00%	106.74%	22.88%
Ratio of Last Loan Principal to First Loan Principal									
Single Loan (77%)	1.00	1.00	1.00	1.00	50.15%	15.64%	40.32%	91.44%	50.13%
Principal Declined (4%)	2.75	2.00	2.00	3.00	137.66%	84.03%	131.82%	179.55%	54.51%
Principal Did Not Decline (17%)	2.60	2.00	2.00	3.00	122.76%	65.22%	114.88%	168.29%	52.93%
First Loan Paid at Term									
Not Paid At Term (89%)	1.36	1.00	1.00	1.00	60.68%	18.15%	45.06%	93.59%	46.28%
Paid At Term (10%)	1.34	1.00	1.00	1.00	121.16%	100.00%	101.36%	103.70%	90.96%
Total (100%)	1.36	1.00	1.00	1.00	66.80%	20.70%	53.71%	100.00%	50.82%

offer borrowers more flexibility, and borrowers are more likely to resolve the debt by the time the loan matures. However, as discussed earlier, longer loan term and greater number of installments also lower the probability that the loan will be paid off.

Table 12 shows that the average duration of the loan sequence is higher for borrowers of loans with APR above median than for borrowers of loans with APR below median. Moreover, borrowers of loans with higher APR have a loan sequence payoff rate of 46% compared to 56% for the lower rate loans. This is consistent with interest rate determination based on loan risk.

To distinguish between borrowers who borrow repeatedly because they are unable to pay off their loans and repeat borrowers who take advantage of the ability to reborrow, we consider two more classifications. First, we divide loan sequences into (1) single-loan sequences, (2) multiple-loan sequences in which the last loan's principal is less than the first loan's principal, and (3) multiple-loan sequences in which the last loan's principal is greater than or equal to the first loan's principal. We find that borrowers with sequences in which the loan principal declined from first loan to last loan resolve the debt later but have a higher payoff rate than borrowers in sequences in which the loan principal did not decline. However, the payoff rate in each case was higher than that for single-loan sequences. This suggests repeat borrowers are more likely to pay off their loans. Among repeat borrowers, those who reduce the outstanding balance are more likely to pay off loan sequences than those who take loans with increasing balances.

The second classification we consider is based on whether the first loan in the sequence was paid at term. We consider a borrower to have paid the first loan at term if we can identify the date on which the borrower paid off the loan and if this date is less than 7 days away from the originally scheduled maturity of the loan. Table 12 shows that loan sequences in which the first loan was paid at term had a payoff rate of 91%, compared to 46% for the rest of the loan sequences. Thus, repayment of a loan at term is an indicator of a higher likelihood of paying off any subsequent loans. Of course, this information is not available to the lender when issuing the first loan to a borrower, but is probably used for decisions on subsequent loan requests.

We now examine how a regulation that prohibits lenders from issuing loans with a payment-

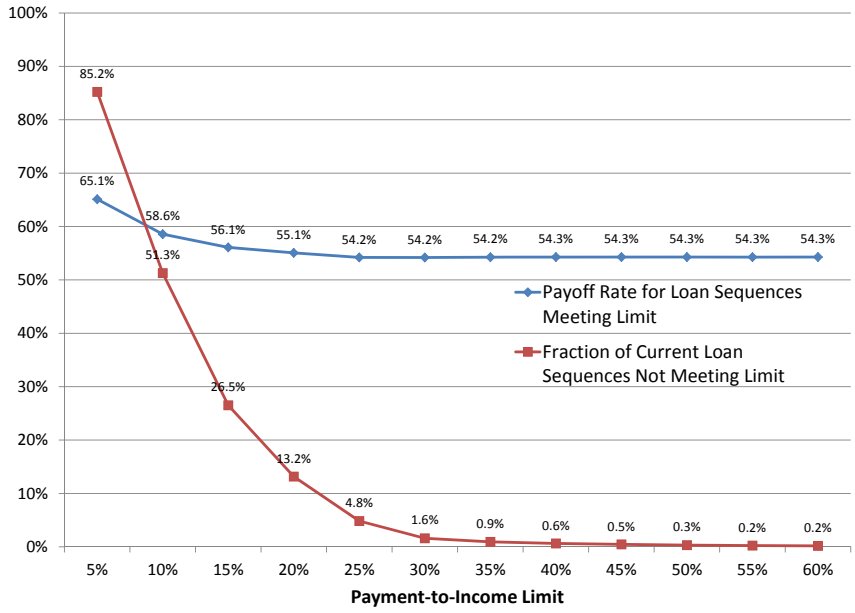

Fig. 15. Loan Sequence Based Analysis of Cost and Benefit of Illustrative Payment-to-Income Limits

to-income ratio exceeding a limit will impact loan sequences. As in Tables 11 and 12, we consider 14 day, same lender sequences. The horizontal axis in Figure 15 represents different illustrative limits on payment-to-income ratio. The red curve (with square-shaped markers) plots the fraction of current loan sequences that will fail to meet these limits based on the payment-to-income ratio of the first loan in the sequence. The blue curve (with diamond-shaped markers) plots the payoff rate for loan sequences that meet these limits. Loan sequences that meet a payment-to-income limit of 5% will have a loan sequence payoff rate of 65%, about eleven percentage points higher than the benchmark payoff rate of 54% for all loan sequences for which payment-to-income ratio was available. However, this limit eliminates access to credit for 85% of loan sequences. A limit

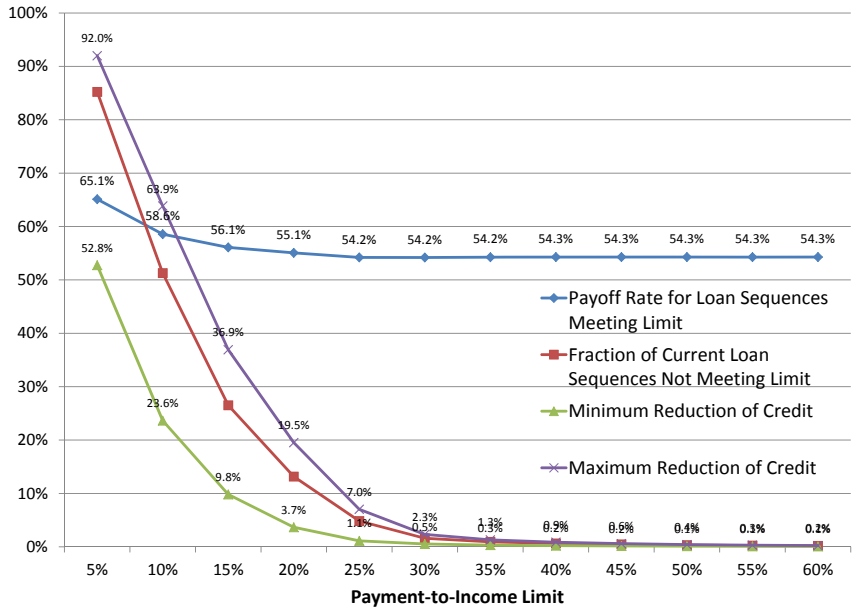

Fig. 16. Loan Sequence Based Analysis of Impact of Illustrative Payment-to-Income Limits on Access to Credit

of 10% will result in a loan sequence payoff rate of 58.6%, about four percentage points higher than the benchmark, but will disqualify 51.3% of current loan sequences. Limits of 15% or more result in less than 2 percentage points improvement in loan sequence payoff rate and limits of more than 20% have no impact on loan sequence payoff rate. About 26% of the loan sequences in our sample would not satisfy a limit of 15%, and about 13% would not satisfy a limit of 20%.

Figure 16 estimates the dollar decline in lending from different illustrative payment-to-income limits. Here we focus on the dollar amount of the first loan in the sequence, treating the subsequent loans in a sequence as continuation of the first loan and ignoring any change in the principal for subsequent loans. The horizontal axis represents different payment-to-income limits.

The purple curve (with x-shaped markers) plots the maximum percentage decline in aggregate principal of loan sequences extended, and assumes if the first loan does not meet the limit, it will be rejected. The green curve (with triangular markers) plots the minimum percentage decline in aggregate principal of loans extended, and assumes that if the first loan of a sequence loan fails to meet the limit, the size of the loan will be reduced enough to meet the limit. The figure shows that with a payment-to-income limit of 5%, the maximum reduction in credit will be 92% while the minimum reduction in credit will be 52.8%. The decline in credit corresponding to a limit of 10% will be between a 23.6% and 63.9%. A limit of 15% on payment-to-income ratio will result in decline of credit between 9.8% and 36.9% with no improvement in loan sequence payoff rate.

9. Multivariate Analysis

Having shown that a payment-to-income limit by itself is not a good predictor of loan outcome, we now examine whether payment-to-income ratio provides any predictive power for loan payoff rate beyond the information contained in other borrower and loan characteristics. We employ multivariate regression technique for this purpose. The variable we want to predict, loan payoff, is a binary variable so we utilize logistic regression to estimate the odds ratio for loan payoff as a function of the independent variables. The odds ratio equals the probability of loan payoff divided by one minus the probability of loan payoff. The independent variables consist of borrower characteristics and loan terms.

Table 13 provides regression results of six logistic regressions labeled (1) to (6) in the top row. Model (1) is a regression of loan payoff rate on the logarithm (or simply log) of the payment-to-income ratio. The exponentiated coefficient measures the sensitivity of the odds ratio to log of payment-to-income ratio. An exponentiated coefficient higher than one shows a higher payment-to-income ratio is associated with a *higher* loan payoff rate. Specifically, the exponentiated coefficient value of 1.0146 indicates that increasing the payment-to-income ratio by one increases the odds of loan payoff by 1.46 percent. The effect is statistically significant at the 1% significance

level. This result suggests that limiting the payment-to-income ratio by itself does not necessarily improve the loan payoff rate. Model (2) estimates the impact of payment-to-income ratio on the payoff rate of loan sequences. In this case, the exponentiated coefficient of 0.7370 is less than one and statistically significant. It indicates that a higher payment-to-income ratio is associated with lower loan sequence payoff rate.

Table 13. Regression Analyses of Loan Payoff and Loan Sequence Payoff

	(1)	(2)	(3)	(4)	(5)	(6)
	Loan Payoff	Sequence Payoff	Loan Payoff	Sequence Payoff	Loan Payoff	Sequence Payoff
Log of Payment-to-Income	1.0146	0.7370	0.5315	0.5426		
	(4.18)***	(-60.96)***	(-124.73)***	(-91.75)***		
Storefront Approval			3.0320	4.7933	2.7109	4.4242
			(60.96)***	(52.24)***	(54.40)***	(49.04)***
Loan Term in Days			0.9963	0.9975	0.9974	0.9986
			(-38.96)***	(-17.26)***	(-28.39)***	(-9.23)***
Scheduled Installments			1.0135	1.0220	1.0118	1.0225
			(9.22)***	(9.52)***	(8.29)***	(9.78)***
APR			0.7229	0.9049	0.6140	0.7878
			(-57.68)***	(-12.79)***	(-85.11)***	(-30.14)***
Employed			0.7874	0.7037	0.7836	0.6868
			(-15.73)***	(-16.96)***	(-16.02)***	(-18.05)***
Age			1.0164	1.0119	1.0175	1.0126
			(67.89)***	(37.13)***	(71.18)***	(38.92)***
Homeowner			1.3018	1.3994	1.3265	1.4212
			(43.57)***	(41.76)***	(46.40)***	(43.35)***
Months in Residence			1.0004	1.0002	1.0004	1.0001
			(14.10)***	(4.47)***	(12.56)***	(3.57)***
Log of Gross Annual Income					1.7782	1.7929
					(101.63)***	(76.93)***
Log of Principal					0.4771	0.4810
					(-112.62)***	(-83.36)***
Other Controls	No	No	Yes	Yes	Yes	Yes
Fixed Effects	No	No	Yes	Yes	Yes	Yes
Observations	903631	394274	890101	388023	890101	388023
Pseudo R^2	0.000	0.007	0.134	0.102	0.135	0.104
Probability	0	0	0	0	0	0

Exponentiated coefficients; t statistics in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < .01$

Model (3) includes borrower characteristics and loan terms as independent variables in addition to payment-to-income ratio. Models (3) to (6) also include fixed effects for lender, customer state, and the calendar month in which the loan was issued to account for variation in payoff

rates across lenders, states, and over time. Inclusion of these variables allows comparison of payoff rates for two loans that differ in payment-to-income ratio but are similar in other borrower and loan characteristics. The exponentiated coefficients from the regression in Model (3) show that loan payoff rate is higher for loans with storefront approval, shorter term, greater number of installments, lower APR, older borrowers, and homeowners. The exponentiated coefficient of employed is less than one suggesting that the employed are less likely to repay loans. This counterintuitive result is probably driven by the fact that the employment variable is correlated with income (part of payment-to-income ratio) and with other control variables that include pay frequency, installment frequency, and source of income. Most of the estimated regression coefficients are highly statistically significant.

The exponentiated coefficient of 0.5315 on payment-to-income ratio is less than one and indicates that higher payment-to-income ratio results in a lower loan payoff rate when other loan and borrower characteristics are held constant. Based on regression results, if loan terms are changed so that each borrower has a payment-to-income ratio of 5% or less, the limit proposed by Bourke et al. (2013a), while holding other borrower and loan characteristics unchanged, the predicted loan payoff rate increases from 72.9% to 80%. However, this hypothetical scenario requires reduction in loan sizes to meet the payment-to-income limit and would result in significant denial of credit, as discussed previously. If the payment-to-income ratio is changed to 10% or less for all borrowers, the predicted loan payoff rate increases from 72.9% to 75.5%.

Model (4) carries out the analysis of Model (3) at a loan sequence level. Again, the exponentiated coefficient of 0.5426 on payment-to-income ratio indicates that a higher ratio lowers the loan payoff rate. If the payment-to-income ratio changes to 5% or less, the loan sequence payoff rate is predicted to increase from 54.2% to 63.6% but this will result in denial of credit to a large fraction of borrowers. The loan sequence payoff rate is predicted to increase from 54.2% to 57.4% if the payment-to-income ratio is changed to 10% or less.

The payment-to-income ratio can change if either of borrower income or borrower loan payment changes. A policy based on both these variables can be more flexible than a policy based solely on

payment-to-income ratio. The latter ratio is not a good measure of affordability of credit because the amount of money people allocate to various needs is not proportional to their income. A more sophisticated rule based on income and payment separately may be more effective. This is confirmed in Model (5) and Model (6), which repeat the analysis of Model (3) and Model (4), respectively, by replacing the log of payment-to-income ratio with the log of borrower's income and the log of loan principal. The results confirm that a higher income and a lower principal increase the likelihood that the loan will be paid off.

Including the borrower's income and loan principal separately increases the explanatory power for loan payoff, as seen by slightly higher pseudo R-squared metrics in Models (5) and (6) than in Models (3) and (4). However, note that the pseudo R-squares for all models are less than 14%, indicating that it is very difficult to distinguish between payoff rates of different borrowers whose loans have been approved. In other words, there are no simple rules in our data that can identify which consumers are more likely to default. These results are consistent with a model of underwriting that chooses a uniform risk pool of borrowers on the basis of multiple risk factors.

10. Evidence from Law Change in Colorado

The state of Colorado amended its Deferred Deposit Loan Act (DDLA) in 2010. Bourke et al. (2013a) examine the impact of this change as support for their proposal to cap the payment-to-income ratio on small-dollar loans. Prior to this bill, HB10-1351, the DDLA permitted a single finance charge for each loan, which could not exceed 20% of the first $300 loaned plus 7.5% of any amount loaned in excess of $300. Loans could be written for any dollar amount, up to a maximum amount financed of $500. As a result, the maximum permitted finance charge on a $300 loan amount was $60 and the maximum permitted finance charge on a $500 loan amount was $75. Under this regime, most small-dollar loans in Colorado were short term, single payment loans – the traditional payday loan.

Since HB10-1351, the maximum allowable fees on a single small-dollar loan consist of a com-

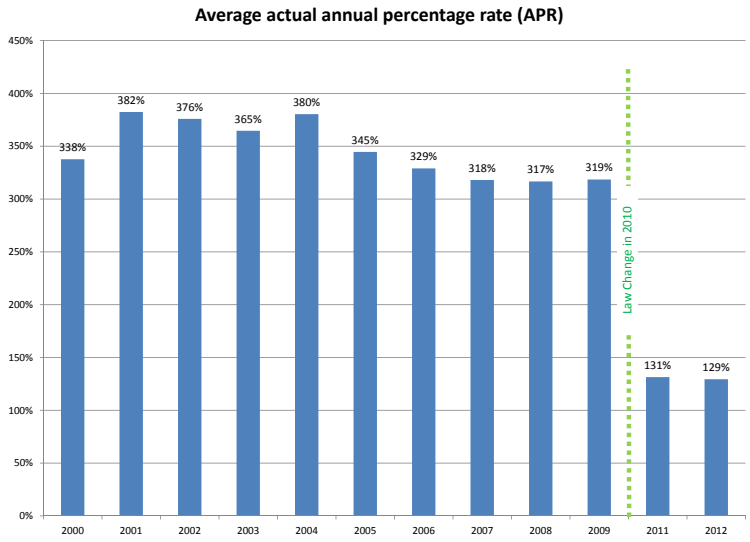

Fig. 17. Average Annual Percentage Rate of Deferred Deposit Loans in Colorado

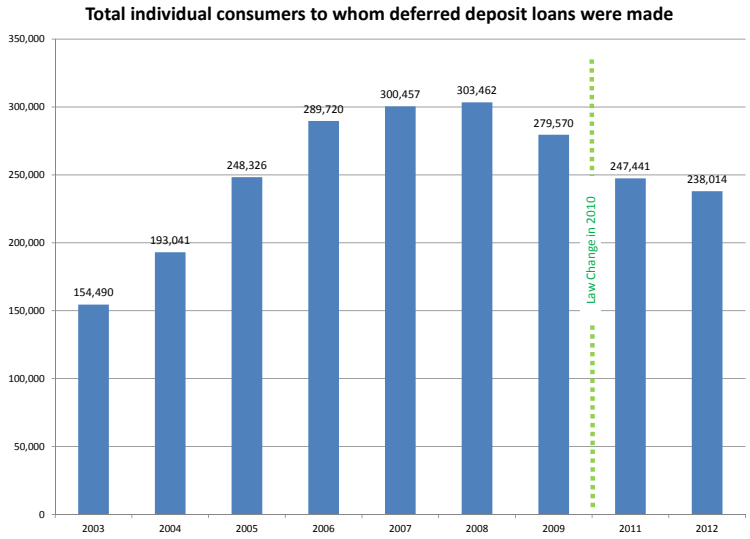

Fig. 18. Number of Consumers To Whom Deferred Deposit Loans Were Made in Colorado

bination of three charges, all of which must be disclosed as the total finance charge and as an APR:

1. The same finance charge used for the calculation of charges on pre-HB10-1351 loans (commonly referred to by small-dollar lenders as an origination charge or origination fee),
2. An interest rate, of a maximum of forty-five percent per annum (assessed on the amount financed), and
3. A monthly maintenance fee, based upon the original amount financed, up to a maximum of $30 for each month, assessed at the end of each month after the first 30 days the loan is outstanding.

Prior to HB10-1351 the maximum loan term permitted on any small-dollar loan was 40 days. Since HB10-1351, small-dollar loans have a minimum loan term of six months, with no maximum. There is no statutory requirement as to how these loans must be structured for repayment (i.e., single payment or multiple installments). While single-payment loans are permitted, 99.9% of all post-HB10-1351 loans have been scheduled to be repaid in regular installments (Meade, 2013). Lenders are free to choose the repayment terms, and have written their loans with monthly payments, semi-monthly payments, or biweekly payments. The actual number of installment payments on any particular loan depends on the contractual loan term and the repayment schedule selected by the lender/borrower. Some lenders write loans with a range of installment scheduling options (monthly, semimonthly, or biweekly installments) depending upon when and how often the borrower receives income. Other lenders offer only a single repayment schedule option (e.g., all loans are written to be repaid in six monthly installments).

The Colorado Office of the Attorney General releases annual summary data about small-dollar loans. To assess the impact of the change in the law, we compare data before and after the law became effective. Figure 17 shows that the APR on small-dollar loans in Colorado dropped sharply after the law change became effective. From a consumer perspective, lower interest rates are clearly preferable, other things being equal. However, APR may also reflect a shift in the segment

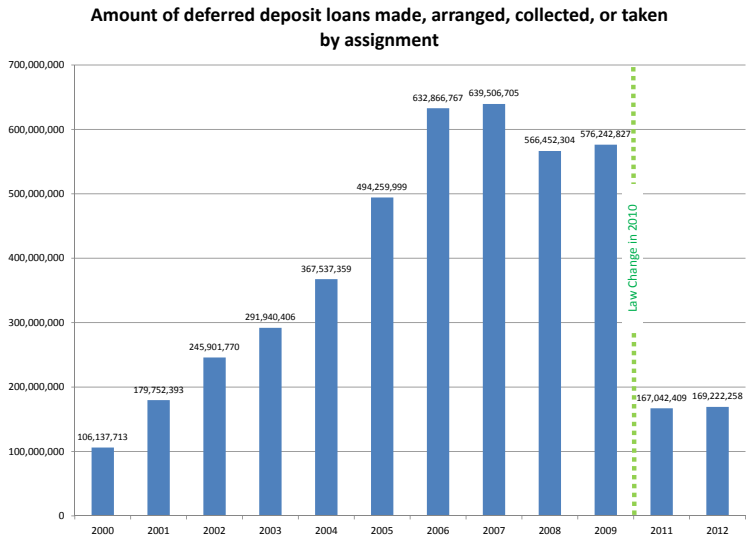

Fig. 19. Amount of Deferred Deposit Loans Made in Colorado

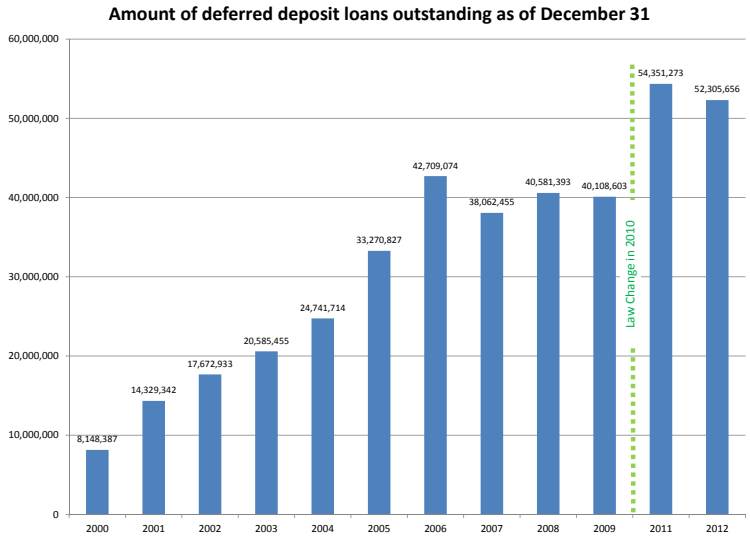

Fig. 20. Amount of Deferred Deposit Loans in Colorado Outstanding At Year-End

of population who received loans. If higher risk consumers are denied credit, the average APR would decline.

There was a reduction in the number of consumers to whom loans were made after the law (Figure 18). This number fell by about 15% from 2009 to 2012 and by about 21% from its peak in 2008.[9]

Not surprisingly, the volume of loans has declined after the change in the law in 2010 (Figure 19). The total amount of loans issued in 2009, $576 million, fell to about $169 million in 2012, a drop of about 70%. However, the amount of loans outstanding at year-end has gone up by about 30% from about $40 million in 2009 to about $52 million in 2012 (Figure 20).

The trends in the number of loans issued and the number of loans outstanding differ because the maturity structure of the loans has changed. As Figure 21 shows, the average actual loan term has increased from about 19 days to about 100 days. With longer loan terms, consumers take fewer loans in a year (Figure 22).

A key feature of the legal change in Colorado was the shift from a *maximum* small-dollar loan term of 40 days to a *minimum* term of 6 months. Colorado lenders made the obvious changes in the structure of the loans they offered to meet the new regulatory requirements and preserve their ability to make loans to consumers who want them – they extended the term of the loan. Consumers, however, chose shorter terms than the Colorado minimum – the average actual loan term was 100 days, not 180. Although an increase in "affordability" as proxied by the payment-to-income ratio may have been a result of the law, it was not a legal requirement. Even if we accept the Bourke et al. (2013a) contention that the Colorado law had little effect on credit availability, the Colorado experience offers no reason to assume that an additional regulatory constraint on loans that violate an arbitrary payment-to-income ratio would also be innocuous. Colorado's law required product restructuring; a payment-to-income limit would prohibit loans of an otherwise acceptable structure to certain consumers. Adding such a requirement to the installment loan

[9] The number of competing small-dollar lenders has also fallen. Some lenders have ceased operations in the state and some locations have been consolidated.(Bourke et al., 2013a)

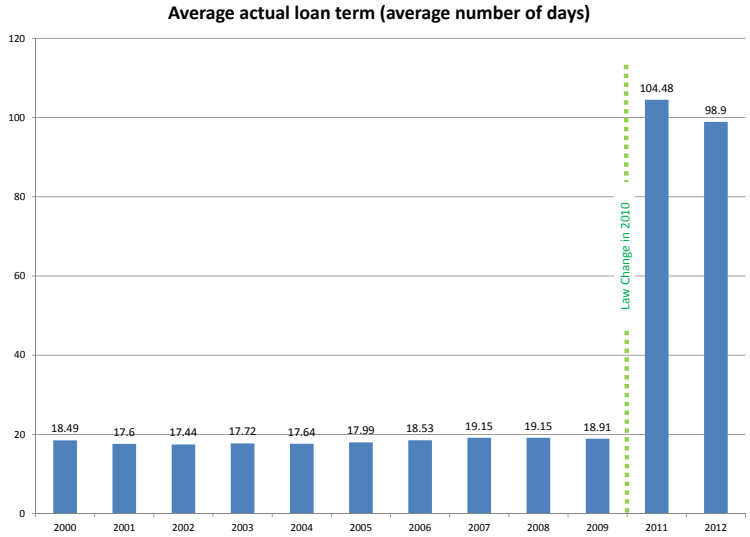

Fig. 21. Average Actual Loan Term Of Deferred Deposit Loans in Colorado

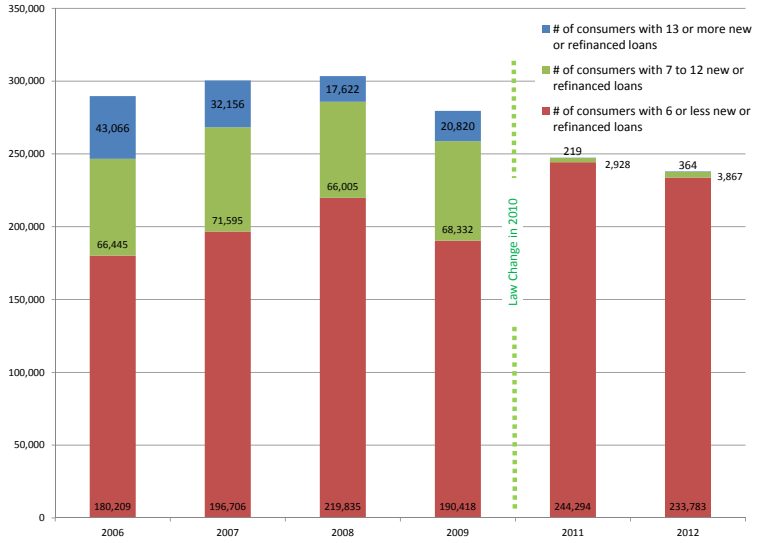

Fig. 22. Number of Consumers According to the Number of Loans Taken in a Year

products that emerged in Colorado and nationally is far more likely to impact credit availability than the changes Colorado made in 2010.

11. Conclusion

Given the trend from single-payment small-dollar loans to installment products and the paucity of data about installment loans, the findings of this paper can be useful in shaping the ongoing debate about regulation of small-dollar loans. Our main findings are as follows.

1. A typical installment loan is for $900 and is scheduled to be repaid in 12 biweekly installments over six months.
2. The Annual Percentage Rate for most loans is in the range of 200% to 400%.
3. There is considerable variation in the profile of borrowers with most borrowers in the age range 30 to 70 and with gross annual income between $20,000 and $70,000.
4. Payment-to-income ratio is a poor metric for predicting whether the loan will be paid off or not.
5. About 70% of installment loans are fully paid off, some by taking a new loan.
6. Less than a quarter of borrowers take another loan within 14 days of ending a previous loan.
7. Most borrowers do not keep their loan until maturity. Even repeat borrowers generally either pay off the loan or have it charged off before the maturity date of their original loan.
8. Those who borrow repeatedly are more likely to repay their loans on average and are offered lower interest rates, indicating that at least some of these repeat borrowers are utilizing the opportunity to borrow again based on their past track record of payments.

9. Regulation imposing an upper limit on payment-to-income ratio is likely to result in reduced access to credit for a large majority of current borrowers, without a large improvement in loan payoff rates. A payment-to-income limit of 5% would reduce the volume of credit between 55.1% and 92.6%. It would only increase the loan payoff rate by 0.7% (from 72.9% to 73.6%). A payment-to-income limit of 10% will result in reduction of credit between 26.5% and 67.8% without any increase in loan payoff rate.

Small-dollar loans offer an alternative form of credit to consumers. Like any other form of credit, some consumers choose these loans while others prefer other forms of credit. The products available reflect both consumer demand and the economics of lending within regulatory constraints. Efforts to regulate small-dollar loans should not be motivated solely by a desire to make them look more like other credit products. Differentiated credit products allow consumers the freedom to choose products that best serve their needs. In absence of regulatory restrictions, some may take smaller loans that are more affordable, while others choose larger loans after weighing their financial needs against their ability to pay. However, a regulation that prohibits lending based on simple affordability criteria risks substantial reductions in credit availability to a population that often has few available alternatives.

A cost-benefit analysis of the proposed regulation requires weighing the cost of reduced access to a financially underserved segment of the population against the benefit of a higher loan payoff rate and lower incidence of indebtedness. As judged by consumers themselves, the tradeoff is clear: they have chosen to take out the loan, presumably in the belief that doing so will make them better off. Limiting the payment-to-income ratio would benefit fewer than 1% of borrowers by reducing the incidence of loans that are not paid off, but it would impose costs on 86% of current borrowers, who could not be offered the same credit on the same terms that they now obtain. Raising the permitted ratio can reduce these costs, but it also reduces the benefits, because payment-to-income ratio alone is poor predictor of the likelihood of repayment.

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