ESSAYS IN CONSUMER FINANCE: BANKRUPTCY AND FRINGE BANKING

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TABLE OF CONTENTS

Chapter

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

PAYDAY LOAN AND PAWNSHOP USAGE: THE IMPACT OF ALLOWING
PAYDAY LOAN ROLLOVERS

I.1   Introduction

"WARNING: A small loan is not intended to meet long term financial needs. A

small loan should be used only to meet short term cash needs."[1] Despite regulators

forcing payday lenders to post this announcement, borrowers often do not heed the

warning and extend their payday loans for months by paying the interest on the loan and

prolonging repayment until the next period -- a process called "rolling over." The

practice of rolling over payday loans is popular, and 25 states have now prohibited

rollovers on payday loans.[2]

Unlike credit from banks and payday lenders, pawnshop loans do not depend on

credit scores and are available to anyone. Since payday borrowers often have low credit

scores and are credit constrained, pawnshops may be one of the only options low-income

borrowers have available after exhausting payday loan options.[3,4] This paper provides an

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[1] Indiana state law, IN ST 24-4.5-7-101, Ch. 7 "Small Loans", requires this warning.

[2] Over 50 percent of respondents in a national payday loan sample renewed payday loans three or more times (Lawrence and Elliehausen, 2008).

[3] Logan and Weller (2009) find that one-third of payday borrowers have been denied credit during the past five years. Carter, Skiba, and Tobacman (2011) show that payday borrowers are liquidity constrained relative to non-payday borrowers at a credit union in the western United States. Individuals at the credit union who did not take out payday loans had an average of $6,529 available liquidity in their checking, savings, and line of credit accounts. Individuals who used a payday loan during a given six-month period only had an average of $832 available. Additionally, 70.1 percent of the payday borrowers in the sample had no available line of credit when they took out a payday loan. Dobbie and Skiba (2011) find that payday borrowers take out loans that are at least 45 cents larger for each additional dollar available in credit, providing

empirical investigation of the effect of state legislation allowing payday loan rollovers on the use of both payday loans and pawnshops. I find that borrowers who can roll over payday loans three or more times are more likely to use pawnshops and payday loans together. Instead of the two forms of credit being substitutes, as we might expect, pawnshops are complements to rolling over loans. The ability to roll over payday loans may encourage borrowers to use a pawnshop loan to pay the interest on the payday loan and roll it over, rather than taking out a new payday loan or defaulting.

In the appendix, I use transaction data from a payday and pawnshop lender to show that relative to the full sample of payday borrowers, individuals who took out a pawnshop loan within one day of a payday loan due date were more likely to renew a payday loan (56 percent relative to 51 percent) and less likely to pay off a payday loan (35 percent relative to 40 percent).

Compared to traditional bank loans, credit unions, and credit card providers, both payday loans and pawnshops have high interest rates, with some charging up to 25 percent per loan (equivalent to an APR of 650 percent if the interest was rolled over every two weeks (25 percent x 26)). If a borrower who is paid bi-weekly rolls over a $300 payday loan at an interest rate of 15 percent for three months, the borrower pays $270 in interest on that loan. On average, individuals in Skiba and Tobacman's (2008) sample of Texas payday borrowers defaulted after paying almost 90 percent of their loan in interest payments.

To study the effect of allowing borrowers to roll over loans, I use new, national-level survey data collected by the Federal Deposit Insurance Corporation (FDIC) as a

evidence that payday borrowers are liquidity constrained. If they were not, an increase in available credit would not affect the size of the payday loan.
[4] Consumers also may turn to friends and family but there is minimal data on this form of credit.

supplement to the January 2009 Current Population Survey (CPS). The new supplement

asks questions on the use of payday loans and pawnshops and provides the first

opportunity for researchers to study the use of multiple alternative financial services at a

national level. Since the survey is coupled with the detailed information provided in the

CPS, I can control for demographic characteristics that may affect demand. According to

the data, 3.4 percent of households in the United States use payday loans and 2 percent

use pawnshops.[5] Conditional on using a payday loan, there is a 13.8 percent chance an

individual uses a pawnshop loan.

 The results of the paper reveal that the relative risk of using both pawnshops and

payday loans compared to neither service would increase by a factor of 1.67 for

individuals living in states that allow at least three rollovers relative to states that prohibit

rollovers. In other words, individuals are more likely to use both payday loans and

pawnshops together in states that allow at least three rollovers. This finding provides

evidence that laws regarding rollovers do influence the use of pawnshop loans along with

payday loans.[6]

 To better understand these findings, the chapter studies the locations of

pawnshops. I use information on pawnshop addresses in over 4,000 zip codes in thirteen

states where payday loans are illegal to study the location of pawnshops within a state. I

find that there are more pawnshops located along the border where borrowers can easily

cross the state line and secure a payday loan that allows rollovers. Under the reasonable

assumption that the cost of supplying pawnbroking services is not affected by the

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[5] In 2007, the Survey of Consumer Finance began asking about the use of payday loans. 2.38 percent of households had used them in the past year.
[6] The average monthly interest rate on a pawnshop loan in a state where payday loan rollovers are not allowed is greater than the average monthly interest rate in a state where rollovers allowed by only 0.1 percent.

proximity to a state that allows rollovers (after controlling for zip-code-level characteristics), these results suggest that the availability of payday loans that can be rolled over increases the probability of someone using a pawn loan.

Finally, I turn to a discussion of the utility impact of using pawnshops to roll over payday loans compared to using other payday lenders to repay their loan or defaulting, two alternative options when rollovers are not allowed. Using pawnshop loans is not necessarily more utility diminishing than the other options.

To my knowledge, this paper is the first to study the effect of renewal laws on the use of pawnshops together with payday loans. Understanding the services people use together and independently is important for giving a better understanding of the financial picture of individuals. Studies focusing on the reasons for using a particular service are important for determining the impacts of various regulations; however, the external impacts are important as well. For example, if payday loans are prohibited where else are borrowers turning? If borrowers are less constrained in terms of taking out payday loans (allowing more rollovers), does it have a positive or negative impact on substitutes? It remains to be studied empirically whether rolling over loans has a positive or negative effect on utility in general, but this paper studies the first order impact of rollovers on the use of the two services.

I.2   Background on Payday Loans and Pawnshops

To secure a pawnshop loan, a borrower leaves a material possession at the pawnshop in exchange for cash. If the loan is not repaid, the object is forfeited.

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Borrowers need neither a bank account nor a job to secure one of these loans. [7]

Pawnshops are regulated at the state (and sometimes local) level, with limits on the

length of the loan, the amount that can be charged for interest, and shop locations.

Meanwhile, to obtain a payday loan, a borrower writes a post-dated check in the

amount of the loan plus interest due on the borrower's next payday. On the next payday, a

borrower may choose to repay the loan, renew the loan by paying the interest again, or

default. While most states do not allow payday loans to be renewed, thirteen states allow

up to six renewals or do not regulate renewals at all. Research on whether payday loans

are harmful or beneficial to borrowers is mixed and, at present, no definitive conclusion

has been reached. [8]

There is surprisingly little economic research on pawnshops, despite having acted

as an important source of credit for low-income borrowers for centuries. An exception is

John Caskey's book *Fringe Banking: Check-Cashing Outlets, Pawnshops, and the Poor*,

published in 1994, bringing attention to the understudied markets of pawnshops. The

exact time and place where pawnshops began is uncertain, but there are biblical

references to them in the Old Testament (Caskey, 1994 from Levine, 1991). The symbol

of pawnshops (three gold circles) that continues to hang on most pawnshop storefronts

today has its roots in the coat of arms of the Lombards, who first began pawning items in

Britain (Caskey, 1994). In the United States, pawnbroking began in the 17th century. By

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[7] Johnson and Johnson (1998), however, report in their survey that 47.4 percent of their sample of active pawnshop borrowers had a checking account and 49.1 percent had a savings account. Only 36.4 percent had neither a checking nor a savings account.

[8] When payday loans are eliminated, the number of bounced checks increases and Chapter 7 bankruptcy filings rise (Morgan and Strain, 2008; Zinman, 2010). Additionally, with the availability of payday loans, individuals are better able to cope with income shocks caused by natural disasters (Morse, 2011). On the other hand, it has also been shown that access to payday loans may increase financial hardships, especially difficulty paying bills, the need to postpone medical care (Melzer, 2011), and filing for Chapter 13 bankruptcy (Skiba and Tobacman, 2011).

the 19th century, there were a number of philanthropic pawnshops.[9] Pawnshop

popularity diminished in the early 2000s; however, recent industry reports have revealed

that pawnshop demand has increased since the latest economic crisis (Haspel, 2011).

Today there are approximately 12,000 publicly and privately held pawnshops across the

United States.[10]

Payday loans began to gain popularity in the mid 1990s and into the early 2000s.

Caskey (2005) argues that the rise in payday lending helped lead to a decline of

pawnshops. Many individuals who visited pawnshops had bank accounts and jobs, and

therefore were eligible for payday loans. Additionally, large pawnshops began to offer

payday loans as well (Caskey, 2005). By 2009, more than 10 million households used

payday loans (Skiba and Tobacman, 2009). More recently, payday loans have spread to

traditional banks as well. Some banks, including U.S. Bancorp, Regions, and Fifth Third

Bank, have begun to offer direct-deposit advances which are similar to payday loans

(Randall and Zibel, 2011; Allyn, 2011).

To study the policy implications of changing the number of rollovers allowed, Li,

Mumford, and Tobias (2011) use online payday loan data to simulate the effect of

changing state laws from allowing unlimited rollovers to allowing no rollovers. They

estimate that this change would have no impact on the size of the loan taken out, would

decrease the number of days for which the loan was held, and would decrease the

probability of default.

Avery and Samolyk (2011) have the first paper (that I have seen) to use the FDIC

supplement used in this paper to study both payday and pawnshop loans. They look at the

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[9] Vanderbilt University's namesake, Cornelius Vanderbilt, helped to found one of the most prominent philanthropic pawnshops, the Provident Loan Society (Caskey, 1994).
[10] http://www.uspawnshopdirectory.com/maillist.php

use of payday loans and pawnshops and measure the relationship between interest rate ceilings and the use of these two forms of credit as well as the number of storefronts. Their results do not show a large effect of interest ceilings on the use of payday loans; meanwhile, there is a positive relationship between the number of stores in operation and interest ceilings. These results suggest that lowering interest rates will cause payday lenders to adjust their operations, but it will allow borrowers to continue to take out loans at a lower cost.

I.3   Data

I use national survey data and pawnshop location data to explore whether state variation in payday loan laws affects the use of payday loans and pawnshops. In January of 2009, the FDIC added a questionnaire to the Current Population Survey (CPS) to gain more information on the populations of individuals that do not have bank accounts and that use non-bank financial services. The survey asked questions on whether individuals had a bank account.[11] Additionally, it asked specific questions on the use of alternative financial services: payday loans, check cashing, pawnshops, rent-to-own usage, tax-refund anticipation loans, and non-bank money orders. For each of these services, the survey asked about the frequency of use and the reasons for using the service. This data gives us a better understanding of what combinations of services people are using.

For someone to be considered a pawnshop user in my analysis, they must answer "yes" to the question "Have you or anyone in your household ever sold items at a pawn

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[11] Approximately 7.7 percent of households were without bank accounts, and another 17.9 percent had bank accounts but also used alternative forms of finance (FDIC, 2009). A full summary of the findings as well as state averages can be found in the "Executive Summary" (FDIC, 2009) and the "Addendum" (FDIC, 2010).

shop?" and have a frequency of use of either "At least a few times a year" or "Once or twice a year." Meanwhile, an individual is coded as using payday loans if they answer "yes" to the question "Have you or anyone in your household ever used payday loan or payday advance services?" and they say that they have taken out at least one payday loan in the past twelve months.

Table I-1 presents summary statistics on the use of payday and pawnshop loans. More individuals use payday loans than pawnshops, and only a small fraction use them together. Individuals with lower income or education and minorities are more likely to use these services both individually and together.   For example, 7.47 percent of American Indians use payday loans, 3.70 use pawnshops, and 2.45 percent use them together.

Table I-1: The Percentage of People who Use Payday Loans, Pawnshops, and Both Payday Loans and Pawnshops

	Payday Loan	Pawn Loan	PDL & Pawn
All	3.44%	1.96%	0.46%
Age over 25	3.28%	1.80%	0.43%
Age Less than 25	4.48%	3.03%	0.66%
Don't Own Home	6.47%	3.89%	0.89%
Own Home	2.22%	1.20%	0.29%
No Response	3.87%	1.77%	0.52%
Income greater than $30,000	2.91%	1.34%	0.33%
Income less than $30,000	5.24%	4.07%	0.92%
Payday Lending Illegal	1.16%	1.37%	0.11%
Payday Lending Legal	4.26%	2.18%	0.59%
Less than HS	4.19%	3.47%	0.69%
HS Grad Max	4.21%	2.37%	0.58%
Some College	4.24%	1.99%	0.56%
College Plus	1.47%	0.78%	0.13%
American Indian only	7.47%	8.51%	2.45%
Asian Only	1.20%	0.44%	0.05%
Black	7.47%	3.70%	1.02%
Hispanic	3.84%	2.81%	0.53%
Mixed Race	5.41%	3.07%	0.25%
White Only	2.78%	1.55%	0.37%
Ever Been on Active Duty	3.24%	1.75%	0.47%

NOTES: Table I-1 shows the percentage of people in each group that use payday loans, pawn loans, and payday loans and pawn loans jointy, by group. Percentages are weighted to represent a national sample.
Source: Author's Calculations from January 2009 Current Population Survey

Table I-2 shows the reasons people give for using these two forms of credit. Pawnshop loan users in states where payday loans are illegal respond that they use pawnshops because of lack of alternative options (the reasons for which include both the fact that banks do not have small loans and the fact that they do not qualify). In states where payday loans are legal, payday borrowers are more likely to say that convenience and ease are reasons for using pawnshops.

Table I-2: The Reasons for Using Payday Loans and Pawnshops

		Why Use Payday Loans				
	Convenient	Ease	Comfort	Not Qualify	Other	Don't Know / No Response / Refuse to Answer
States where Payday are Not Legal	27.70%	41.49%	3.09%	15.56%	11.59%	0.57%
States where Payday are Legal	25.75%	43.98%	2.46%	16.92%	9.77%	1.13%

	Why Use Pawn Loans						
	Banks No Small Loans	Convenient	Ease	Comfort	Not Qualify	Other	Don't Know / No Response / Refuse to Answer
States where Payday are Not Legal	7.66%	25.46%	40.93%	0.76%	12.63%	12.04%	0.51%
States where Payday are Legal	7.47%	21.29%	41.56%	3.38%	12.04%	13.51%	0.74%
States where Payday are Not Legal, Payday Loan User	21.91%	15.22%	26.56%	0.00%	36.31%	0.00%	0.00%
States where Payday are Legal, Payday Loan User	11.69%	21.98%	40.19%	1.71%	14.64%	9.78%	0.00%

NOTES: Table I-2 shows the reasons people give for using payday loans, and pawn loans. Groups are split by states where payday loans are legal and illegal, and by whether people are payday loan users or not. These results are weighted to represent a national sample

Source: Author's Calculations from January 2009 Current Population Survey

In addition to using the CPS information to study what factors affect the probability that individuals will use payday loans and pawnshops, I look at the location decisions of pawnshops in states where payday loans are illegal. I obtain pawnshop locations through an online provider of pawnshop addresses.[12] Zip codes were coded based on their proximity to the border of states using the mapping software ArcGIS. To control for income within zip codes, I use data from the 2000 Census.

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[12] http://www.pawnshoplistings.com/

I.4   Identifying the Effect of Allowing Rollovers Using Variation in State Laws

As presented in Table I-3, the state rules on payday loans and pawnshops vary. I am interested in the effect of state policy variables on the use of payday loans and pawnshop loans, focusing on the number of renewals allowed and controlling for interest rates. State regulations on the number of rollovers vary from allowing zero to not specifying a limit. Geographically, states that allow rollovers are scattered across the United States, as are states that prohibit rollovers. Figure I-1 presents a map of the contiguous United States indicating states where payday loans are illegal, and for states where rollovers are legal, the number of rollovers allowed in each state.

Table I-3: Payday and Pawnshop Laws

State	Payday Loans Legal?	Rates	# Renewals Allowed	Rates / Month
		Payday Loans		**Pawn Loans**
Alabama	Legal	17.50%; 3%/month after default	1	25% / mo
Alaska	Legal	$5 + the lesser of $15 per $100 or 15%	2	20% / mo
Arizona	Legal (Prohibited in 2010)	15%	3	8% / mo
Arkansas	Legal	10% of check + $10; $5 ID card	0	none
California	Legal	15% of check	0	2.5% / mo
Colorado	Legal	20%: $0-$300 + 7.5%: $301-$500 plus 45% per annum interest plus monthly maintenance fee $7.50 per $100 borrowed, up to $30, after first month.	Not Specified	local rules
Connecticut	Prohibited		0	3% / mo
DC	Prohibited		0	5% / mo
Delaware	Legal	Not Specified	4	3% / mo
Florida	Legal	10% + verification fee	0	25% / mo
Georgia	Prohibited		0	25% / mo
Hawaii	Legal	15% of check	0	20% / mo
Idaho	Legal	Not Specified	3	none
Illinois	Legal	$15.50 per $100	0	3% / mo
Indiana	Legal	15%: $0-$250; 13%: $251-$400; 10%: $401-$500	0	3% / mo
Iowa	Legal	$15: $0-$100; $10 per $100 thereafter	0	none
Kansas	Legal	15%	Not Specified	10% / mo
Kentucky	Legal	$15 per $100 + $1 database fee	0	2% / mo
Louisiana	Legal	$5 documentation fee + the greater of 16.75% of check or $45 (After default: months 1-12: 36% per year; months 13 and beyond: 18% per year)	0	10% / mo
Maine	Prohibited		0	25% / mo
Maryland	Prohibited		0	none
Massachusetts	Prohibited		0	3% / mo
Michigan	Legal	15% of first $100, 14% of second $100, 13% of third $100, 12% of fourth $100, 11% of fifth $100, 11% of sixth $100 + any database verification fee	0	3% / mo
Minnesota	Legal	$5.50: $0-$50; 10%+$5: $51-$100; 7% (min. $10) + $5: $101-$250; 6% (min. $17.50) + $5: $251-$350 (After default: 2.75% per month)	0	3% / mo
Mississippi	Legal	18% of check	0	25% / mo
Missouri	Legal	75%	6	2% / mo
Montana	Legal	25%	0	25% / mo
Nebraska	Legal	$15 per $100 or pro rata for any part thereof on amount of check	0	none
Nevada	Legal	Not Specified	Not Specified	10% / mo
New Hampshire	Legal	36% annual interest	0	none
New Jersey	Prohibited		0	4% / mo
New Mexico	Legal	$15.50 per $100; $.50 verification fee per $100	0	max{7.50, 10%}
New York	Prohibited		0	4% / mo
North Carolina	Prohibited		0	2% / mo
North Dakota	Legal	20% + databasing fee	1	regulated by municipalities
Ohio	Legal	28% annual interest	0	5% / mo
Oklahoma	Legal	$15 per $100: $0- $300; $10 per $100: $301-$500	0	20% / mo
Oregon	Legal	36% APR interest, $10/$100 fee up to $30	2	3% / mo
Pennsylvania	Prohibited		0	2.5% / mo
Rhode Island	Legal	10%	1	5% / mo
South Carolina	Legal	15% of principal	0	$22.50/$100 / mo
South Dakota	Legal	Not Specified	4	none
Tennessee	Legal	the lesser of 15% of the check or $30	0	2% / mo
Texas	Legal	$10 per loan + 48% annual interest	0	$20 / mo
Utah	Legal	No usury limit	Not Specified	10% / mo
Vermont	Prohibited		0	3% / mo
Virginia	Legal	36% annual interest + $5 verification fee + 20% of loan	0	5% / mo
Washington	Legal	15%: first $500; 10%: remaining portion of the loan in excess of $500 up to the $700 maximum	0	3% / mo
West Virginia	Prohibited		0	none
Wisconsin	Legal	NO LIMIT	1	3% / mo
Wyoming	Legal	the greater of 20% or $30	0	20% / mo

Table I-3 shows the payday loan and pawnshop laws by state as of 2009. The state laws on payday loans come from
http://www.paydayloaninfo.org/state-information, and the state laws on pawn shops come from individual state regulating insitutions.
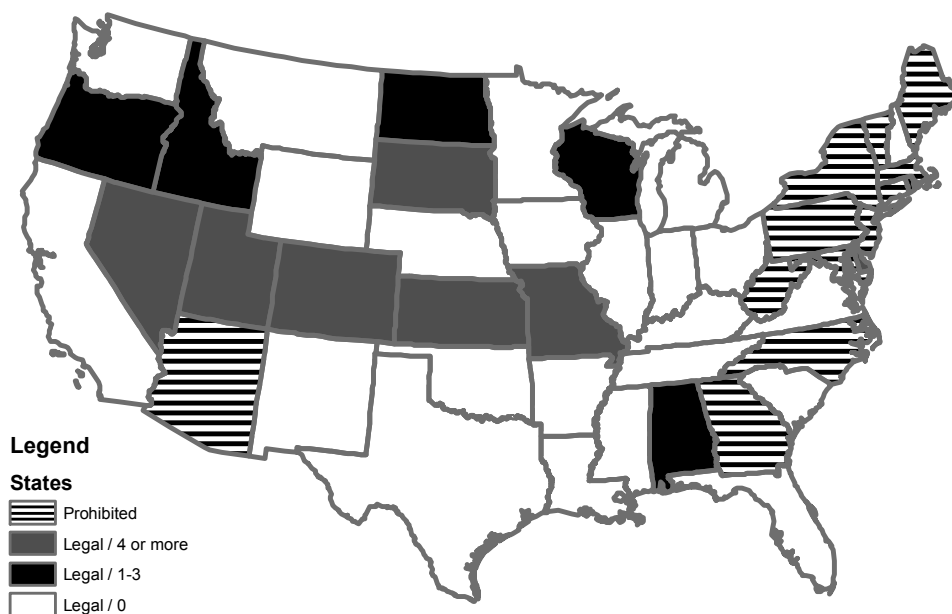
Figure I-1: Payday Loan Status and Number of Rollovers Allowed in Each State, 2011

I investigate whether there are endogeniety issues related to the state laws on payday loans. The concern is that the states where payday loan laws on rollovers are more lenient are different in other respects than just the law on rollovers that might influence the use of payday and pawnshops. I regress the median income in the state in 2008, the unemployment rate in 2008, the percent change in unemployment rate from

2007 to 2008, and foreclosure rates on the a number of outcomes.[13] The first outcome is an indicator for the state having a positive number of rollovers followed by the number of rollovers, an indicator for three or more rollovers allowed in the state, and an indicator for one or two rollovers allowed in the state. Percent change in unemployment rates and foreclosure rates are strongly significant predictors for a state having three or more rollovers. These results might suggest that something other than the number of payday loan rollovers allowed affects the use of payday loans and pawnshops. In the next section, I will examine the number of pawnshops in a state without relying on the state variation in laws that may have endogenous impacts. Additionally, I control for unemployment, percent change in unemployment, and foreclosure rates in the multinomial regressions.

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[13] Foreclosure rates are calculated from http://www.cnn.com/SPECIALS/map.economy/. Their numbers came from studies done by RealtyTrac. The unemployment rates come from the U.S. Census Bureau.

Table I-4: State Level Predictors of Rollovers

	Median Income in 2008	Unemployment in 2008	Percent Change in Unemployment	Forclosure Rates
Dependent: Indicatior for Positive Number of Rollovers				
Coefficient	0.0000204*	-0.0195	0.544	0.375
Standard Error	(0.0000113)	(0.0618)	(0.471)	(0.461)
N	37	37	37	37
Dependent: Number of Rollovers				
Coefficient	0.0000930*	-0.147	0.544	0.375
Standard Error	(0.0000490)	(0.268)	(0.471)	(0.461)
N	37	37	37	37
Dependent: 3 or more Rollovers				
Coefficient	0.0000117	-0.0477	0.764*	0.753*
Standard Error	(0.0000102)	(0.0534)	(0.399)	(0.387)
N	37	37	37	37
Dependent: 1 or 2 rollovers				
Coefficient	0.00000874	0.0282	-0.221	-0.378
Standard Error	(0.000009)	(0.046200)	(0.359000)	(0.344000)
N	37	37	37	37

NOTES: Table I-4 Reports the coefficients of a regression of median income, unemployment, percent change in unemployment, and forclosure rates on the number of rollovers allowed in a state. Only states where payday loans are legal are included.
Source: Author's Calculations from January 2009 Current Population Survey

I measure the factors that affect an individual's decision to use payday loans and pawnshops by employing a multinomial logit model and using variation in state laws. The multinomial logit is an extension of the binary logit model which enables a test of the probability of unordered responses. The four cases in this multinomial logit are: (1) neither payday loans nor pawnshops are used, (2) only payday loans are used, (3) only pawnshops are used, and (4) payday loans and pawnshops are both used.

State Level Number of Renewals Allowed represents the number of rollovers allowed in the state. For states where the number of rollovers permitted is not specified, I set the number of renewals to the maximum allowed in any other state, six. After running the initial regression, I split the number of renewals into two categories: states where one or two rollovers are allowed versus states where three or more rollovers are allowed to measure whether there is a difference in the effect on the use of payday loans and pawnshops depending on how many times an individual can roll over her loan.

Following Prager (2009), I create the variable *Pawn Rate Restriction* to represent how constrained a pawnshop is when setting the interest rate. The variable equals 0 if the state does not regulate pawn interest rates or if the state has an allowable interest rate of greater than or equal to 25 percent. If the state has an interest cap of less than 25 percent, then the variable is equal to 25 minus the interest rate.[14] In terms of consumer demand, lower interest rates would entice more individuals to take out pawn loans, unless the loan-to-value ratio is also reduced.[15] The lower interest rates may have a negative supply effect on the number of pawnshops available. The expectation on the sign of this variable, therefore, is ambiguous. The interest rates previously reported in Table I-3 show the monthly interest rate cap on a pawned item valued at $100. Interest rates vary from two percent to 25 percent, and some states do not regulate interest rates.

The *Payday Rate Restriction* variable represents the restrictiveness of state regulations on interest rates and is created in the same manner as *Pawn Rate Restriction*. Some states explicitly prohibit payday loans, while others allow interest rates up to

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[14] Shackman and Tenney (2006) instead set 25 percent to be the interest rate charged in states where there is no regulation because in practice pawnshops do not charge more than 25 percent in interest (which the authors confirmed by using a phone survey).
[15] Johnson and Johnson (1998) go through an exercise illustrating the relationship between interest rate and loan-to-value ratio.

twenty percent. The payday loan rate in Table I-3 represents the interest rate on a two-week loan of $100.[16] Payday interest rates may have either a positive or negative effect on the joint use of payday loans and pawnshop loans. Higher interest rates are more expensive, so individuals may have to supplement their use of payday loans by pawning items to either pay back the loan or to supplement their income after paying the higher rate. However, higher interest rates may deter individuals from using payday loans in general, so it may decrease joint use. The average payday loan interest rate for states where no renewals are allowed differs from the average interest rate in states where renewals are not allowed by only 0.05 percent. The interest rate for Ohio changed during 2008 and New Hampshire's interest rate is only 36 percent APR, an interest rate that limits payday lenders ability to survive; therefore, I dropped those two states.[17]

To capture observed factors that would affect the use of both payday loans and pawnshops, I control for a number of demographic characteristics including sex, age, marital status, income, the presence of children, and education. I also include a dummy for whether someone has been on active duty in the military.[18]

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[16] If the state-regulated interest rate is given in terms of an APR, I calculate it to be (APR/365)*14 to put it in term of two week loans.

[17] In unreported regressions, I used the payday loan interest rate categories used in Avery and Samolyk (2011). The results on the number of renewals remains unchanged.

[18] The "John Warner National Defense Authorization Act for Fiscal Year 2007" (H.R.5122) made it illegal a lender for providing a loan of greater than 36 percent APR to any military personnel, effectively prohibiting payday lenders from providing loans to military personnel because of the concern that payday lenders were targeting people in the military ("Military Payday Loans," 2009). Graves and Peterson (2005) study the location decisions of payday lenders in relation to military bases, and find that there is large concentration of payday lenders near military bases. Carrell and Zinman (2008) investigate the impact of payday loans on military personnel and find that the presence of payday loans in states where an airman is assigned increases the likelihood of being ineligible for reinlistment and unfavorable reports, especially for the young and financially unsophisticated (proxied for by job assignment), which provides support for the Pentagon's concern that payday loans cause financial distress for military personnel.

To control for location, I include a dummy for Metropolitan Statistical Area (MSA) size and variables on state unemployment rates in 2008 and the change in unemployment rates between 2007 and 2008. I cluster standard errors at the state level. Further descriptions of the control variables can be found in Table I-5.

Table I-5: Definition of Variables

Variable	Definition of Variable
Payday Loan	An individual is coded as using payday loans if they answer yes to the question "Have you or anyone in your household ever used payday loan or payday advance services?" and they say that they have taken out at least one payday loan in the past 12 months.
Pawn Rate Restriction	The variable equals 0 if the state does not regulate pawnshop interest rates or if the state has an interest rate allowable of greater than 25%. If the state has an interest cap of less than 25%, then the ceiling is 25 minus the interest rate.
Payday Rate Restriction	The variable equals 0 if the state does not regulate payday loan interest rates or if the state has an interest rate allowable of greater than 25%. If the state has an interest cap of less than 25%, then the ceiling is 25 minus the interest rate.
Military	An indicator variable if an individual has ever served on active duty in the military, otherwise 0.
Female	An indicator variable equal to 1 if the individual is Female, otherwise 0.
Age	A discrete variable for the individuals age. A quadratic form of age is included in the regression.
Not-Citizen	An indicator equal to 1 if an individual reports to not being a citizen, 0 otherwise.
Married	An indicator equal to 1 if an individual is married, 0 otherwise.
Employed	An indicator equal to 1 if an individual reports to being employed, O otherwise.
One Child	An indicator equal to 1 if an individual has one child, and zero otherwise, O otherwise.
More than One Child	An indicator equal to 1 if an individual has more than one child, 0 otherwise.
HS Grad Max	An indicator equalt to 1 if an individual graduated from college, 0 otherwise.
Some College	An indicator equal to 1 if an individual had some college experience but did not graduate from college, 0 otherwise.
College Plus	An indicator equal to 1 if an individual graduated to colllege and may have had some graduate schooling, 0 otherwise.
Unbanked	An indicator equal to 1 if an individual reports to not have a checking or savings account, 0 otherwise.
Black	An indicator equal to 1 if the individual's race is black, 0 otherwise.
Hispanic	An indicator equal to 1 if the individual is of Hispanic Origin, 0 otherwise.

NOTES: Table I-5 reports definitions for variables used in the later regressions. The variables come from the January 2009 CPS.

I.4.1   Results

Results of the multinomial regression are reported in Table I-6. The relative risk ratio reported shows the average times more likely someone is to use just a payday loan, just a pawnshop loan, or both. The relative risk ratio reports the ratio of the

probability that a borrower takes out the loan or loans over the probability of taking out

neither in a state that allows rollovers relative to a state that does not. The relative risk

ratio on the *State Level Number of Renewals Allowed* variable is greater than one,

revealing that the greater the number of renewals allowed in a state, the greater the

likelihood that people will use only payday loans relative to using neither, although the

result is not statistically significant. More renewals allowed reduces the likelihood an

individual uses just pawnshops at a statistically insignificant level. Most importantly for

this paper, the coefficient is greater than one and significant for the use of both payday

loans and pawnshops together. Allowing more rollovers increases the likelihood of

using both payday loans and pawnshops by an average of 1.08.

<div align="center">Table I-6: Multinomial Regression, Relative Risk Ratios</div>

	(1) status: Payday Loan = 1	(2) status: Pawnshop Loan = 1	(3) status: Pawnshop & Payday Loan = 1
Pawn Ceiling	1.011	0.981 ***	0.993
	(0.102)	(0.005)	(0.638)
Payday Loan Ceiling	1.016	1.045 **	1.034
	(0.358)	(0.038)	(0.206)
State Level Number of Renewals Allowed	1.054	0.952	1.080 **
	(0.116)	(0.205)	(0.019)
Unbanked	0.861	2.393 ***	1.990 ***
	(0.238)	(0.000)	(0.001)
Employed	0.900 *	0.754 ***	0.914
	(0.064)	(0.001)	(0.658)
Own Home	0.428 ***	0.522 ***	0.668 **
	(0.000)	(0.000)	(0.014)
Female	1.004	1.163 **	1.051
	(0.939)	(0.032)	(0.647)
Not Citizen	0.568 ***	0.566	0.244 **
	(0.000)	(0.164)	(0.017)
Married	0.791 **	0.739 ***	0.841
	(0.035)	(0.002)	(0.197)
One Child	1.330 **	1.182	1.129
	(0.020)	(0.364)	(0.560)
More than One Child	1.398 ***	1.254	1.167
	(0.001)	(0.123)	(0.434)
HS Grad Max	1.069	0.887	0.820
	(0.507)	(0.429)	(0.251)
Some College	0.994	0.784 **	0.779
	(0.949)	(0.038)	(0.241)
College Plus	0.487 ***	0.569 **	0.246 ***
	(0.000)	(0.018)	(0.001)
Black	2.362 ***	1.103	2.007 ***
	(0.000)	(0.580)	(0.006)
American Indian	2.427 **	2.429 *	1.347
	(0.012)	(0.053)	(0.669)
Asian	0.583 ***	0.605	0.243 *
	(0.007)	(0.210)	(0.063)
Hispanic	1.047	1.013	1.044
	(0.737)	(0.920)	(0.875)
Income Quartile 2	1.231 *	0.843	1.161
	(0.069)	(0.345)	(0.283)
Income Quartile 3	0.960	0.454 ***	0.656
	(0.777)	(0.000)	(0.119)
Income Quartile 4	0.541 ***	0.250 ***	0.079 ***
	(0.005)	(0.000)	(0.000)
Custer at the State Level	Yes		
Number of Observations	48,413		
Pseudo R Squared	0.1072		

NOTES: Table I-6 reports results the relative risk ratios from a multinomial logit regression in states where payday loans are legal. The base category is someone who does not take out a payday loan or a pawnshop loan in the past year.***, **, * represent significance at the 1%, 5%, and 10% level, respectively. P-values are given in parentheses. Additional controls included but not reported are age, age^2, age^3, and age^4, dummies for MSA size, state unemployment rate in 2008, the change in state unemployment rate between 2007 and 2008, and the average foreclosure rates in 2008. Regressions are weighted to represent a national sample.
Source: Author's calculations from January 2009 Current Population Survey

I then break the states into three categories: states that prohibit rollovers, states that allow one or two rollovers, and states that allow at least three rollovers. The results in Table I-7 show that individuals in states that allow only one or two rollovers have a lower probability of using both payday loans and pawnshops (relative risk ratio less than one); however, this result is not statistically significant. In states that allow three or more rollovers, individuals are 1.67 times more likely to use both payday loans and pawnshops.

Table I-7: Multinomial Regression 2, Relative Risk Ratios

	(1) status: Payday Loan = 1	(2) status: Pawnshop Loan = 1	(3) status: Pawnshop & Payday Loan = 1
Pawn Ceiling	1.012 **	0.982 **	0.994
	(0.038)	(0.010)	(0.658)
Payday Loan Ceiling	1.022	1.039 *	1.037
	(0.169)	(0.096)	(0.163)
One or Two Payday Loan			
Rollovers Allowed	0.729	0.738	0.531
	(0.224)	(0.340)	(0.171)
Three ore more Payday Loan			
Rollovers Allowed	1.520 ***	0.660 *	1.674 ***
	(0.007)	(0.064)	(0.007)
Unbanked	0.856	2.405 ***	1.980 ***
	(0.208)	(0.000)	(0.001)
Employed	0.900	0.754 ***	0.912
	(0.062)	(0.001)	(0.650)
Own Home	0.425 ***	0.521 ***	0.659 **
	(0.000)	(0.000)	(0.011)
Female	1.002	1.164 **	1.050
	(0.962)	(0.032)	(0.656)
Not Citizen	0.576 ***	0.564	0.249 **
	(0.000)	(0.161)	(0.018)
Married	0.789 **	0.740 ***	0.838
	(0.033)	(0.002)	(0.189)
One Child	1.327 **	1.180	1.121
	(0.021)	(0.370)	(0.583)
More than One Child	1.393 ***	1.253	1.162
	(0.001)	(0.125)	(0.448)
HS Grad Max	1.068	0.888	0.819
	(0.513)	(0.432)	(0.250)
Some College	0.993	0.786 **	0.779
	(0.944)	(0.040)	(0.239)
College Plus	0.485 ***	0.570 **	0.244 ***
	(0.000)	(0.018)	(0.001)
Black	2.370 ***	1.092	2.010 ***
	(0.000)	(0.618)	(0.006)
American Indian	2.451 **	2.545 **	1.342
	(0.014)	(0.038)	(0.684)
Asian	0.588 **	0.599	0.244 *
	(0.011)	(0.203)	(0.062)
Hispanic	1.041	1.018	1.033
	(0.761)	(0.888)	(0.906)
Income Quartile 2	1.232 *	0.843	1.164
	(0.069)	(0.348)	(0.274)
Income Quartile 3	0.969	0.455 ***	0.665
	(0.829)	(0.000)	(0.132)
Income Quartile 4	0.546 ***	0.250 ***	0.080 ***
	(0.006)	(0.000)	(0.000)
Custer at the State Level	Yes		
Number of Observations	48,413		
Pseudo R Squared	0.1088		

NOTES: Table I-7 reports results from a multinomial logit regression in states where payday loans are legal. The base category is someone who does not take out a payday loan or a pawnshop loan in the past year.***, **, * represent significance at the 1%, 5%, and 10% level, respectively.   P-values are given in parentheses. Additional controls included but not reported are age, age^2, age^3, and age^4, dummies for income quartiles, dummies for MSA size, state unemployment rate in 2008, and the change in state unemployment rate between 2007 and 2008.   Odds ratios are reported in Table I-9. Regressions are weighted to represent a national sample.
Source: Author's Calculations from January 2009 Current Population Survey

In states where pawnshop interest rates are more heavily regulated, payday loans are used more often. More stringent regulation, however, reduces both the use of pawnshops and combined payday loan and pawnshop use. This result is not surprising given that Shackman and Tenney (2006) find that interest-rate ceilings reduce the number of pawnshops, the number of small loans made, and the loan-to-value ratios of the pawnshop loans. Payday loan interest rate regulations have a positive effect on the probability that an individual uses a payday loan, and an insignificant effect on the use of pawnshops and joint use.

Being unbanked reduces the probability an individual uses a payday loan, increases the probability an individual uses a pawnshop, and increases the probability that the two services are used jointly. Similarly, being employed does not significantly increase the probability of using a payday loan or using both a payday loan and pawnshop, which is surprising because payday borrowers are required to have proof of employment. The question in the CPS on bank status and employment does not ask whether the payday loan was taken out at the time that an individual was unbanked or employed. Therefore, an individual may have used a payday loan in the months before the survey and then be unbanked or unemployed when the survey occurs. The coefficients from the remaining control variables are as expected.

Table I-8 breaks down these results based on different demographic categories: women, men, individuals with income below average, whites, blacks, and Hispanics. As the results show, the relative risk ratio is greater than one for using both payday loans and pawnshops in states that allow at least three rollovers and is statistically significant for all

23

categories. In the Hispanic population, borrowers are nine times more likely to use both

payday loans and pawnshops. [19]

Table I-8: Relative Risk Ratio of Using Payday Loans and Pawnshops Relative to States
that Do Not allow Rollovers by Category

	(1)		(2)		(3)	
			status: Pawnshop Loan =		status: Pawnshop &	
	status: Payday Loan = 1		1		Payday Loan = 1	
White						
1 or 2 Payday Loan Rollovers Allowed	0.601		0.750		0.46	
	(0.14)		(0.41)		(0.22)	
3 or more rollovers allowed	1.468		0.760		1.62	**
	(0.11)		(0.24)		(0.04)	
Black						
1 or 2 Payday Loan Rollovers Allowed	0.862		0.404	**	1.81	
	(0.77)		(0.04)		(0.23)	
3 or more rollovers allowed	1.523		0.392	**	3.09	**
	(0.20)		(0.03)		(0.02)	
Hispanic						
1 or 2 Payday Loan Rollovers Allowed	0.392		1.136		2.61E-14	***
	(0.281)		(0.849)		(0.000)	
3 or more rollovers allowed	3.191	***	0.410		9.179	**
	(0.001)		(0.177)		(0.026)	
Income Below Average						
1 or 2 Payday Loan Rollovers Allowed	0.830		0.671		0.65	
	(0.43)		(0.21)		(0.35)	
3 or more rollovers allowed	1.397	**	0.719		1.40	*
	(0.02)		(0.18)		(0.17)	
Female						
1 or 2 Payday Loan Rollovers Allowed	0.688		0.690		0.56	
	(0.33)		(0.27)		(0.20)	
3 or more rollovers allowed	1.672	**	0.658	*	1.92	**
	(0.01)		(0.07)		(0.02)	
Male						
1 or 2 Payday Loan Rollovers Allowed	0.760		0.799		0.46	
	(0.15)		(0.48)		(0.11)	
3 or more rollovers allowed	1.404	**	0.651		1.52	**
	(0.02)		(0.10)		(0.02)	

NOTES: Table I-8 reports the relative risk ratios from multinomial regressions. Column (1) is the relative risk ratio of using just
payday loans. Column (2) is the relative risk ratio of only pawnshop loans. Column (3) is the relative risk ratio of using both payday
loans and pawnshop loans. The numbers reported are relative risk ratios using of loans for states that allow 1 or 2 or 3 or more
rollovers relative to states that do not allow any. Additional controls included but not reported are payday loan and pawnshop loan
interest rate restrictions, banking status, employment status, home ownership, gender, citizenship, children, education, race, age, age2,
age3, and age4, dummies for income quartiles, dummies for MSA size, state unemployment rate in 2008, the change in state
unemployment rate between 2007 and 2008, and average foreclosure rates. P-values are in parentheses.
Source: Author's Calculations from January 2009 Current Population Survey

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[19] Lee and Hanna (2008) find that Hispanics in the U.S. are less likely to report to be delinquent
on a loan suggesting that this population use credit differently than others in the U.S.

I.5   Cross-Border Effects

I have shown that the probability that an individual uses both payday loans and pawnshops is greater in states where individuals are legally able to roll over payday loans, relative to states where rollovers are not permitted. In this section, I supplement those findings with a study of how pawnshop locations vary within a state depending on whether residents have access to payday loans. State laws on payday loans may be endogenous to the use of these services. By looking within states where payday loans are illegal, I hope to mitigate the impact of endogenous factors.

Melzer (2011) shows that there is a significant increase in the number of payday loan stores in zip codes that are less than 25 miles from the border of a state where payday loans are illegal, signaling that borrowers cross the border to obtain loans. I apply this idea to pawnshop locations by examining data from states where payday loans are illegal. Individuals who live in states where paydays loans are illegal may be able to easily obtain payday loans by crossing the border into states where they are legal. If the payday borrowers who cross the border to obtain loans are also using pawnshops, then the number of pawnshops located where the borrowers live may be greater; therefore, I would expect there to be more pawnshops located in zip codes that border states where payday loan renewals are allowed.

After controlling for border proximity and zip-code level characteristics, I assume that the cost of locating a pawnshop next to a state that allows payday loans with rollovers is no different than locating a pawnshop anywhere else in the state. Therefore, any differences I find in the number of shops should be related to differences in demand. If there are more pawnshops located along the borders of states where payday loans are

legal, this would suggest that the demand for pawnshops is higher when individuals have access to payday loans. More specifically, if I look at the zip codes adjacent to states where payday loans are legal and renewals are allowed, then I can determine whether there may be an increase in demand for pawnshops in these areas.

I.5.1 Methodology

As in Melzer (2011), I define a zip code to be bordering a payday-legal state if the center of the zip code is within 25 miles of the border. For example, the state of Georgia prohibits payday loans and borders four states where payday loans are legal (Alabama, Florida, South Carolina, and Tennessee) and one state where payday loans are prohibited (North Carolina). If the center of a zip code located in Georgia is within 25 miles of Alabama, Florida, South Carolina, or Tennessee, then it is in a *Border Legal Zip* (dummy variable equal to one). As mentioned previously, Figure I-1 shows a map of the contiguous United States, marking states where payday loans are legal and illegal, and where they are legal, how many rollovers are allowed. I am only considering zip codes in states where payday loans are illegal and studying within state variation in pawnshop locations.

Zip codes along borders are often located next to rivers, so it is important that I control for border states in the regression. *Border* signals that the center of the zip code is within 25 miles of the border of a state. *Border Legal with Renewals Allowed* is a dummy variable equal to one if a zip code is bordering a state where payday loans are allowed with a positive number of rollovers. *Border Legal with Renewals Prohibited* is a dummy variable equal to one if a zip code is bordering a state where payday loans are

allowed but rollovers are prohibited. The omitted category is zip codes bordering states where payday loans are illegal. *Border Interest* is the interest rate on payday loans across the border.

Zip codes within 25 miles of a state where payday loans are allowed will have more pawnshops located in zip codes if individuals use payday loans and pawnshops together. *Border Legal with Renewals Allowed* will have a positive coefficient if there are more pawnshops located where individuals have access to payday loans and where a positive number of renewals is allowed. *Border Interest* will also have a positive coefficient if there are more pawnshops located where individuals have access to payday loans with higher interest rates.

I also control for the different interest rates on pawnshop loans for the bordering zip codes. Pawnshops' supply and demand may be affected by the difference in interest rates between states. I control for this effect using a dummy variable called *Cheaper Out* which is equal to one when pawnshop loans are cheaper in zip codes across the border. In the example above, zip codes within 25 miles of Tennessee and South Carolina would have a *Cheaper Out* variable equal to one because pawnshop interest rates are capped at lower levels in these two states than in Georgia. Additionally, I control for the interest rate on pawnshop loans. If a state does not have a law capping interest rates, I set the interest rate equal to 25 percent (the maximum allowed in any other state).

Because interstate highways ease transitions between states, they may increase access to payday and pawnshop loans in general. I include an indicator variable equal to one if any part of a zip code is within a five-mile radius of an interstate

(*NearInterstate*).[20] Three income variables are included in the regression: the log of

median income for the zip code (Ln(*MedianIncome*)), percentage of the population in the

zip code with income less than $15,000 (*%PopulationLess15*), and percentage of the

population in the zip code with income between $15,000 and $50,000

(*%Populationbetween15&50*). Population density for each 1,000 square miles in the zip

code controls for the relative density of the population in the zip code

(*PopulationDensity*). Additionally, I control for each state using a state-level dummy.

The entire regression appears as follows:

$$
\begin{aligned}
\text{\#ofPawnshops}_z = {} & \beta_1\text{Border}_z + \beta_2\text{Border Legal with Renewals Allowed}_z + \\
& \beta_3\text{Border Legal with Renewals Prohibited}_z + \beta_4\text{NearInterstate}_z + \\
& \beta_5\text{Ln(MedianIncome}_z) + \beta_6\text{PawnRate}_s + \beta_7\text{CheaperOut}_z + \beta_8\text{PopulationDensity}_z + \\
& \beta_9\text{\%PopulationLess15}_z + \beta_{10}\text{\%Populationbetween15\&50}_z + \\
& \text{constant} + \varepsilon_z
\end{aligned}
\tag{I-1}
$$

where *#ofPawnshops$_z$* is the number of pawnshops in a zip code.

I.6   Results

Table I-9 reports results from OLS and Poisson regressions on the number of

pawnshops located in a zip code. Columns (1) and (3) show OLS and Poisson results

when not including dummies for renewals. Columns (2) and (4) include Border Legal

with Renewals Allowed and Border Legal with Renewals Prohibited. The coefficient on

the variable Border Legal with Renewals Allowed is positive and significant in both

columns (2) and (4). Residing in a zip code that has access to renewals increases the

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[20] "Because of the change in the nature of items pawned and the greater availability of
transportation, today's pawnshops are more likely to be along highways in strip malls with ample
parking." (Johnson and Johnson, 1998, p. 12).

number of pawnshops in that zip code by 0.68 and 0.80, which is large considering the average number of pawnshops in each zip code is 0.45. In other words, there are more pawnshops located in zip codes where individuals have access to payday loans with renewals. Coupled with the results found in the previous section, that fact suggests that individuals are more likely to use pawnshops along with payday loans when they are allowed to roll over their payday loans.

Table I-9: Number of Pawnshops in a Zip Code

	OLS		Poisson	
	(1)	(2)	(3)	(4)
Border	0.0121	0.0258	0.0590	0.00336
	(0.0560)	(0.0651)	(0.0920)	(0.113)
Border Legal with Renewals Allowed		0.685***		0.803***
		(0.173)		(0.200)
Border Legal with Renewals Prohibited		0.0699		0.149
		(0.0848)		(0.145)
Border State Interest Rate	0.00425	-0.00909*	0.00115	-0.0194**
	(0.00372)	(0.00522)	(0.00554)	(0.00783)
Cheaper Out	0.0131	0.0575	0.00599	0.190**
	(0.0680)	(0.0692)	(0.0853)	(0.0928)
Pawn Rate	-0.00726*	-0.00998**	-0.0264***	-0.0333***
	(0.00386)	(0.00390)	(0.00520)	(0.00540)
Percent of Population with Income Less than $15,000	0.0229***	0.0231***	0.0442***	0.0431***
	(0.00767)	(0.00766)	(0.0121)	(0.0122)
Percent of Population with Income between $15,000 and $50,0000	0.0124**	0.0114**	0.0355***	0.0336***
	(0.00487)	(0.00486)	(0.00658)	(0.00661)
Near Interstate	0.210***	0.193***	0.527***	0.498***
	(0.0486)	(0.0489)	(0.0666)	(0.0667)
Ln(Median Income)	-0.0328	-0.0339	-0.0570	-0.118
	(0.264)	(0.264)	(0.423)	(0.424)
Population Density every 1,000 Square Miles	-0.0345***	-0.0328***	0.00284	0.00636
	(0.00679)	(0.00678)	(0.00855)	(0.00845)
Population (in 1,000's)	0.0491***	0.0493***	0.0510***	0.0512***
	(0.00160)	(0.00160)	(0.00126)	(0.00126)
Constant	-0.743	-0.749	-3.853	-6.847
	(3.112)	(3.107)	(4.946)	(5.050)
N	4,044	4,044	4,044	4,044

NOTES: Table I-9 shows results from OLS and Poisson regressions on the number of pawnshops in a zip code. The regression only includes zip codes in states where payday loans are illegal. State and Region Fixed Effects are included. Border is a dummy variable for a zip code within 25 miles of the state border. Border Legal with Renewals Allowed is a dummy for a zip code that borders a state where payday loan rollovers are allowed. Border Legal with Renewals Prohibited is a dummy for a zip code that borders a state where payday loan rollovers are prohibited. Standard errors are given in parentheses. ***, **, * represent significance at the 1%, 5%, and 10% level, respectively.

Border Legal with Renewals Prohibited is insignificant with small coefficients suggesting no relationship between the demand for pawnshops and payday loans when rollovers are not allowed. The Border coefficient is economically and statistically insignificant in all specifications with coefficients ranging from 0.003 to 0.06. The coefficient on Border State Interest Rate is negative in columns (2) and (4) and statistically significant, suggesting that access to payday loans with higher interest rates reduces the demand for pawnshops. The economic effect of this impact is, however, small. Higher interest rates on pawnshop loans within the state has a negative effect on the number of pawnshops. Being near an interstate and population density has a statistically and economically significant positive effect on the number of pawnshops, while average zip code income has a negative effect on the number.

More pawnshops are located in areas where individuals have access to payday loans with rollovers. In conjunction with the empirical evidence that more people use payday loans and pawnshops together in states where rollovers are allowed, the evidence suggests that rollovers do affect the use of pawnshops.

I.7   Discussion

While allowing rollovers may cause more individuals to use pawnshops, it may not be any more harmful to the borrowers than prohibiting rollovers. On the due date of the payday loan, the borrower will have six options: 1) repay the loan; 2) default on the loan; 3) take out a new payday loan from a different lender to repay the loan; 4) renew the payday loan by using cash to pay the interest; 5) take out a pawnshop loan to renew

the loan; or 6) take out a pawnshop loan to repay the loan. If renewals are not allowed, then a borrower is left with options 1), 2), 3), and 6).

The borrower's third option is to go to another payday lender, take out another payday loan and return to the original payday lender to repay the original loan plus interest. Lawrence and Elliehausen (2008) find that 16.5 percent of respondents to their survey used one payday lender to pay off another lender. However, this option is not always available. A borrower may have a credit score high enough to get a payday loan at one institution but too low to get a loan at another.[21] Additionally, some states and firms have maximum amounts that individuals can borrow.[22] If the borrower took out the maximum amount possible on the first payday loan, then she can only take out an amount equal to or less than that in the next period. If she does not have the cash to renew the loan that also means that she will not have enough cash to repay the original loan plus interest.

The benefits and costs of rolling over a payday loan with pawnshops or payday loans will depend on the value of the item the borrower has to pawn and the interest rates on payday loans and pawnshops. If the interest rate on a payday loan is higher, then the cost from the payday loan may be greater and vice versa.

If the borrower defaults on the loan, she would experience costs from defaulting but would not have to repay the loan. Costs of defaulting include immediate pecuniary

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[21] Taking out a payday loan does not affect an individual's regular credit score, but payday lenders use a different score provided by a company called Teletrack to determine whether individuals may access their payday loans. The score reports whether a borrower has defaulted on a payday loan from another institution and whether she has outstanding loans from other institutions (Caskey, 2005). Skiba and Tobacman (2011) show graphically that borrowers below a credit scoring threshold (as set by the individual lender) have almost no chance of securing a loan. Individuals at or above the threshold have at least a 90 percent chance of obtaining the loan.
[22] Dobbie and Skiba (2011) report that firms in their data set will lend an amount of money up to but not exceeding half of an individual's net pay.

costs, the cost of exclusion from future borrowing opportunities (Skiba and Tobacman, 2008), annoyance from collectors, and possible overdraft fees (Caskey, 2005).

It is not clear whether defaulting or renewing a payday loan with a pawnshop loan has a higher utility in the long run. Borrowers who are not allowed to roll over loans may be more likely to default while borrowers who can roll over loans may be more likely to use pawn loans. The borrower will originally have a higher utility from pawning an item to renew the loan as long as the immediate cost of defaulting is greater than the utility loss of not having the item. In future periods the borrower may lose the option of taking out a payday loan if she has defaulted. If the borrower renews the loan with a pawnshop, she has more debt to repay and risks losing the pawned item permanently. Skiba and Tobacman (2009) found that borrowers often default after rolling over the loan multiple times. In the event that a borrower defaults on her payday loan after taking out a pawnshop loan, her utility would be higher if she defaulted in the first period rather than paying interest for multiple periods before defaulting. If a borrower repays eventually, it is not clear whether defaulting or renewing was more welfare diminishing.

I.8   Conclusion

The Consumer Financial Protection Bureau (CFPB), a product of the 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act, opened this year with rule-making power over traditional banking services as well as alternative financial products. Many of these products, including payday loans and pawnshop loans, are currently regulated at the state level. With the potential national-level impact that the CFPB could have over these services comes the renewed need for research on consumers' financial

decisions and the impact of state laws, including on the interactions between payday loans and pawnshops.

Payday loans are an expensive form of credit used by millions of low-income people each year. State laws on payday loans vary in terms of the interest rate and the number of rollovers allowed (if any). Recent papers on payday loans have focused on the welfare costs or benefits of allowing access to short-term credit. This paper instead focuses on the impact of allowing rollovers on payday loans and how that affects the use of another form of non-traditional credit, pawnshop loans. The paper is one of the few to look at the combined use of payday loans and pawnshops and the first to measure the impact of allowing rollovers.

Using data from a survey conducted by the FDIC, I find that individuals living in areas where three or more rollovers are permitted are more likely to use pawnshops and payday loans. Location data on pawnshops suggests that demand for pawnshops is greater when borrowers have access to payday loans with rollovers. The utility impacts of rolling over payday loans need to be examined further.

In this appendix, I present previously unreported statistics on pawnshop loans. Pawnshops have been around for centuries and by 2009, just under two percent of households in the United States had used a pawnshop loan in the past year. Detailed information on pawnshops is generally lacking in the literature, but with a unique transaction dataset from a pawnshop lender, we show information on pawnshop collateral and repayment using pawnshop transaction data between 1997 and 2004 from a proprietary dataset from a national pawnshop in Texas with multiple stores in operation. Information on collateral, due dates, and repayment probabilities as well as some demographic characteristics is included. Additionally, we merge pawnshop data with transactional payday loan data to show the interplay between these two forms of credit.

Pawnshop loans are short-term (typically thirty-day) loans backed by personal possessions. An individual must show identification (to deter pawning stolen items) and forfeit their use of jewelry, stereo, or other material item for the duration of the loan. If the individual returns at the due date of the loan with the loan plus interest, she can take the item home. If she defaults on the item, she loses her rights to the good and the pawnshop will sell the item in their store.

The majority of the loans are collateralized with jewelry, with over half of the items in the jewelry category consisting of rings, including men's and women's class and wedding rings (Figure I-2). The next most popular category is TV's and Electronics, including satellites, stereos, and CD players. Individuals also pawn tools, household

items (such as vacuum cleaners), sporting equipment, guns, musical instruments, and camera equipment.
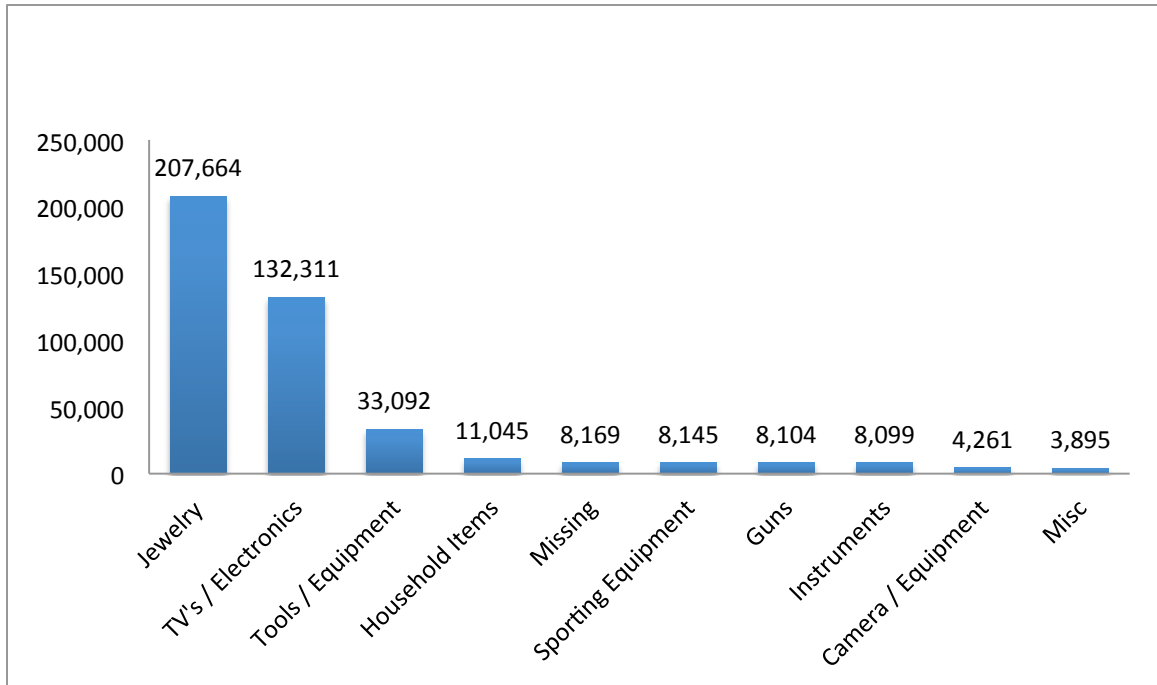
Figure I-2: Collateral by Category

Not surprisingly, the items pawned differ by the gender of the borrower. Jewelry is the most popular item for women to pawn (over 60 percent of the pawned items by women are jewelry). Meanwhile, less than 35 percent of the pawned items by men are jewelry and men are more likely to pawn electronics and tools than women.

The value of the items pawned varies. Guns have the highest average value of $147 with instruments ($116) and jewelry ($96.47) coming in second and third. The overall average amount pawned about is $79. The averages for all categories are shown in Table I-10.

Table I-10: Average Amount Pawned

Collateral Category	Number of Observations	Average Amount Pawned	Standard Deviation
All	416,640	$79.45	90.76
MISSING	8,169	$63.41	72.64
CAMERA EQUIPMENT	4,261	$75.89	78.84
ELECTRONICS	132,311	$58.62	62.40
GUNS	8,104	$147.13	99.20
HOUSEHOLD ITEMS	11,045	$42.80	45.14
INSTRUMENTS	8,099	$116.91	105.40
JEWELRY	207,664	$96.47	105.31
MISC. ITEMS	3,895	$52.51	63.37
TOOLS	33,092	$50.02	60.74

I.9.1   Default

The probability of repayment varies by the type of collateral, gender of the borrower, and the value of the item. Figure I-3 depicts the probability of repaying and defaulting by the collateral category. Instruments, guns, and jewelry have the highest probability of repayment, and lowest probability of defaulting. Tools, household items, and miscellaneous items have the highest probability of defaulting and lowest probability of repaying.   In unreported statistics, women defaulted on forty percent of their loans while men only defaulted on 37 percent of their loans.

	Instruments	Guns	Jewelry	Camera Equipment	Missing	Electronics	Tools	Household Items	Misc. Items
Default	33.86	35.25	36.5	39.87	41.31	41.55	42.39	44.73	49.96
Pickup	65.76	63.99	63.03	59.82	58.5	58.24	57.32	55.06	49.6
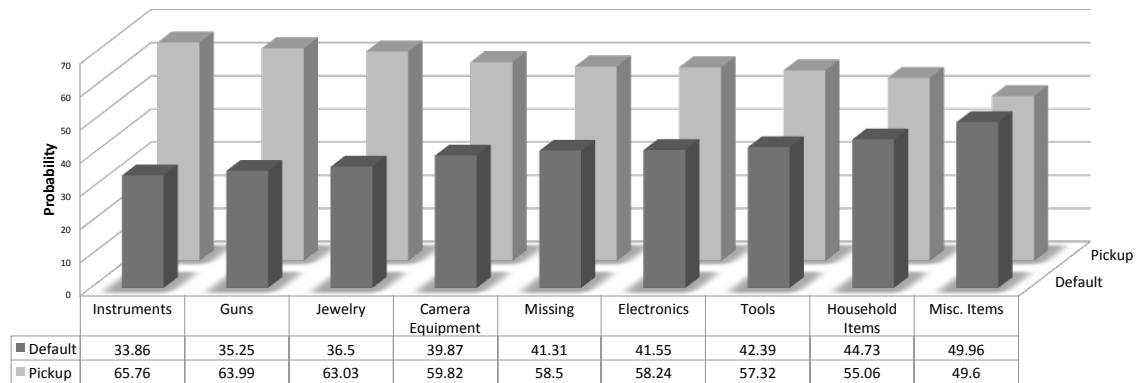
Figure I-3: Default by Collateral Category

I.9.2   Sentimental Items

Individuals often pawn wedding and engagement rings which have sentimental value attached to them. Pawning these items may serve as a commitment mechanism to encourage the individual to repay, or they might be the only item the borrower has available to pawn. We examine the probability of repayment for "sentimental" and "non-sentimental" items, counting sentimental items as wedding rings, class rings, engagement rings, and mother's rings. As shown in Figure I-4, when borrowers pawn sentimental items they are less likely to default and are more likely to repay the loan.
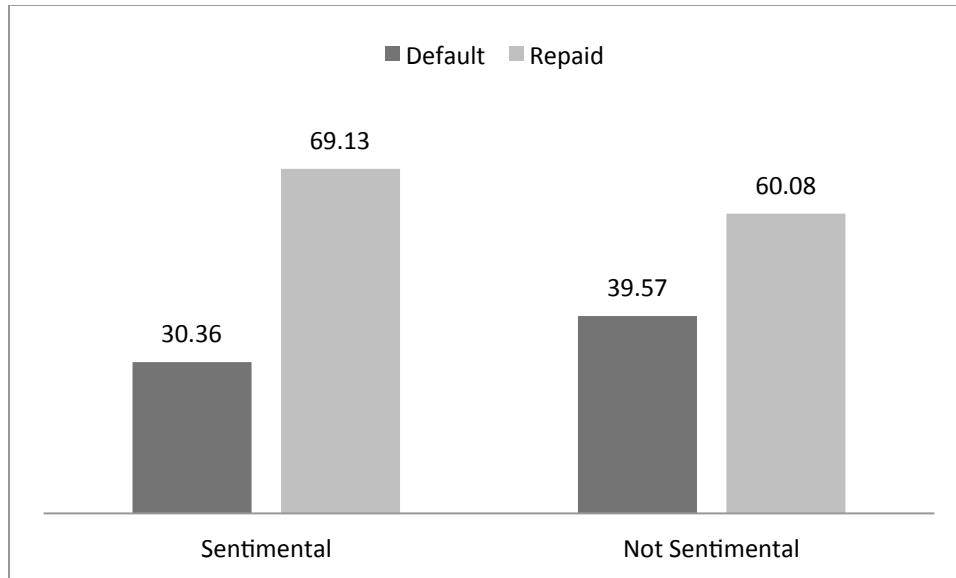
Figure I-4: Repayment on Sentimental Items

Additionally, we regress the probability of default on the amount loaned, an indicator for each merchandise category, and month-year dummies. Pawning a sentimental item significantly decreases the probability of defaulting by 6.7 percentage points.

I.9.3   Relationship with Payday Loans

We find that when borrowers are using a pawnshop loan within a day of their payday loan due date, they are more likely to renew the payday loan and less likely to repay the payday loan; their probability of defaulting however remains similar (Figure I-5). This result, along with other literature, highlights an important relationship between payday loans and pawnshop loans and further reveals that payday borrowers are credit constrained if they need to turn to pawnshop loans as well and strengthens the argument for more research on these loans.
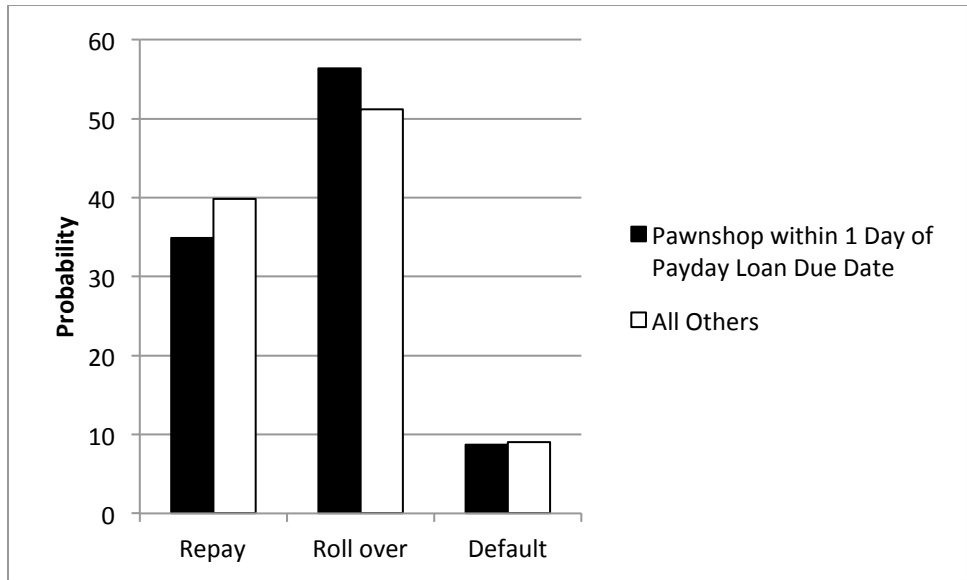
Figure I-5: Status of Payday Loan

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CHAPTER II

THE DIFFERENCE A DAY MAKES: MEASURING THE IMPACT OF PAYDAY
LOAN LENGTH ON THE PROBABILITY OF REPAYMENT

(with Paige Marta Skiba and Justin Sydnor)

II.1   Introduction

Payday loans are short-term, high-interest, small-dollar loans, typically used by

low income consumers. A typically payday loan provides the borrower with around $300

in cash that is collateralized with a personal check from the borrower. The loan, along

with an interest fee of around $50, comes due on the borrower's next payday. The short-

term nature of these loans results in very high effective annual interest rates, generally on

the order of 500 percent. This type of lending began in the 1990s and grew rapidly, with

an estimated $40 billion in loans originated annually by 2007 (Stegman, 2007).

Payday loans are highly controversial. One perspective is that payday loans

provide an important source of credit to temporarily cash-strapped customers who would

otherwise face bank overdraft fees, bounced checks, and late fees on bills. Another view,

however, is that payday loans appeal to borrowers who have fundamental problems with

budgeting and self-control and simply exacerbate their problems by generating a new

cycle of debt that goes unpaid and accumulates enormous amounts of interest (Caskey,

2010).

The controversy over these different perspectives on payday lending is reflected

in the active struggles of policymakers working to regulate the industry. At the national

level, the newly formed Consumer Financial Protection Bureau (CFPB) will have authority to regulate payday lending. In a speech in January 2012, the recently appointed CFPB chief Richard Cordray stated that "[Regulators at the CFPB] recognize the need for emergency credit. At the same time, it is important that these products actually help consumers, rather than harm them. Now the Bureau will be giving payday lenders much more attention." Payday lending is effectively banned in thirteen states but a few states allow lending with almost no regulations (Stegman, 2007). Many states are currently revising their regulations and appear to be searching to find a balance between providing access to needed credit while helping prevent debt-spiral problems for borrowers. Beyond outright bans, regulations can take a variety of approaches, including capping the interest rates on loans, capping loan amounts, limiting the ability of loans to be renewed or rolled over, and imposing minimum durations. Several recent studies have examined the effect of payday loan borrowing.[23] Although the results of this literature on whether payday loans help or hurt consumers are mixed, it does provide some hard evidence for policymakers weighing bans on payday loans. There has, however, been much less research that would help inform less extreme regulations to limit but not ban payday lending.

In this paper we study the effect of increasing the length of time a borrower has to repay a payday loan. This is a question of interest for policymakers and a subject of recent regulatory changes.[24] For example, as part of a broader revision to payday lending regulations in 2009, Virginia began requiring that payday borrowers be given at least two

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[23] See, for example, Carrell and Zinman (2008), Graves and Peterson (2005), Melzer (2011), Morse (2011), Skiba and Tobacman (2011), Stegman and Faris (2003), Stoianovici and Maloney (2008) and Zinman (2010). See also Caskey (2011) for a nice overview.
[24] The consumer group Center for Responsible Lending advocates that states "Limit the loan amount as well as the length of the loan."

pay cycles (rather than the typical one) to repay their loans. There are two primary mechanisms through which regulations increasing loan durations could benefit borrowers. First, as long as interest charges are held constant, loans with longer durations will have lower annualized borrowing costs. A second potential benefit, and the focus of our research, is that having more time to repay the loan may make it more feasible for a borrower to repay an initial payday loan and hence help him or her avoid a debt spiral. The extent to which having longer to repay will help people avoid rolling loans over, however, likely depends on the underlying reasons for payday borrowing. Payday loans with more time to repay should be most useful for those who are using payday loans to overcome a very temporary shock. Those whose use of payday loan reflects more of a chronic budget problem are less likely to change their decisions about rolling over a loan simply because of a little extra time to pay back the loan. Ultimately, whether or not having more time to repay a loan affects repayment behavior is an empirical question.

We attempt to answer this question using a unique dataset on payday loan transactions provided by a large payday lending company that is active in a number of states. Our goal is to explore how different loan durations, holding all else constant, affect the probability that a borrower will repay the loan, rather than rolling it over or defaulting. To do that we focus on borrowers taking out new loans and exploit variation in the length of time a borrower has to repay a loan—variation that is generated by the combination of state-level regulations on minimum loan lengths and the institutional feature that loans come due on a payday. For example, if we focus on states with regulations that loans must be at least seven days long, borrowers who come in for a

payday loan seven days before their next paycheck will in fact get a loan for seven days. However, a borrower who comes in six days before their next paycheck will have much longer to repay because their loan will be due two paychecks later. For borrowers paid biweekly, the jump in loan durations is thirteen days; while for those who are paid monthly coming in for a payday loan one day later can increase the time to repay by nearly a month.

We analyze the effect of these discontinuous jumps in loan lengths for a range of different pay-frequency and state-level regulation combinations. Throughout, we find statistically significant, but very modest, impacts of longer loan durations on repayment. Our estimates show that an additional week to repay a new loan, all else equal, increases the probability of repayment for borrowers paid biweekly (our largest group) by approximately 2.4 percentage points, which is roughly a 5 percent increase from the baseline repayment rate of 48 percent.

Of course, this empirical strategy is valid only to the extent that borrowers who come in six days before a paycheck are similar to borrowers who come in seven days before a paycheck. Because that decision is at the discretion of the borrower, it could be that there is something fundamentally different about these two groups of borrowers. Given our finding that loan length has little impact on repayment, the type of selection problem we worry about here is the possibility that higher-risk borrowers (those less likely to repay) value the extra time to repay more and make up a disproportionate share of the borrowers who come in six days prior to being paid, effectively eliminating the benefits of longer loans that we would otherwise observe. Fortunately, we have a large amount of data about our customers, including observable information on the size of the

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loan they choose to take out, their sub-prime credit score, whether they own a home, their recent checking-account balance, their net paycheck amounts, their race, their age, and their gender. We look for differences in these measures at our discontinuity point for each of the different specifications in our data and generally find no meaningful differences. This result suggests that borrowers who come in six or seven days before are not different on observable dimensions. Including controls for these observables in a regression does not make loan length a significant predictor of repayment, and in fact tends to diminish the estimated effect of loan length on repayment.

Our finding that increasing the length of loans has little impact on repayment behavior is relevant both for policy discussions and for those interested in better understanding the motivations of payday loan borrowers. On the policy end, our results suggest that the benefit of regulations requiring longer loan lengths comes only from the ability of those regulations to lower effective annualized interest rates. There is no evidence that such a policy will help borrowers avoid a pattern of repeat borrowing that becomes very costly over time. This result is an important, and unfortunate, realization for policy discussions because requiring longer loan durations is an easier regulation to implement than a regulation that restricts rollovers. Effectively limiting rollovers requires regulators to develop a system that can track rollover behavior both for an individual payday lender and more importantly across payday lenders, since without such a system borrowers could simply use a payday loan from a different lender to repay an initial loan. Our analysis suggests that policymakers concerned with limiting loan renewals will likely need to focus on these types of efforts rather than relying on simpler reforms such as requiring longer loan durations.

In terms of understanding borrower behavior, we discuss in Section II.2 that time-inconsistent borrowers will respond less to an increase in loan lengths than time-consistent borrowers (i.e., those with self-control problems) because the time-inconsistent borrowers are less willing to save in the intervening periods to help their "future selves" repay the loan. Our results are consistent, then, with the idea that the failure to repay initial payday loans is driving demand for payday loans—but this phenomenon may largely be attributed to people who have time-inconsistency problems that result in chronic budgeting problems. These results complement recent findings from Bertrand and Morse (2011) showing that "psychology-guided information disclosures" that help customers think more broadly about the consequences of repeat payday borrowing help to lower use of payday loans. They are also consistent with the simulation results from Skiba and Tobacman (2008), who find that predominant patterns of payday loan borrowing are most consistent with partially naïve time-inconsistent preferences.

Though numerous papers have studied the consequences of borrowing with payday loans, to our knowledge, ours is the first to study the effect of loan durations and adds to a small literature that has started to analyze the impact of different features of payday loans. Carter (2011) studies the impact of allowing rollovers and concludes that borrowers are more likely to use payday loans and pawnshops together when rollovers are allowed. Li, Mumford, and Tobias (2011) simulate the impact of a change in the number of rollovers allowed, interest rates, and maximum loan amounts to study their impact on the amount borrowed, the length of time the loan is held, and the probability of default. They conclude that limiting rollovers will reduce the probability of ultimate default. Dobbie and Skiba (2011) study the impact of loan sizes on the probability of

default using discontinuity in loan-size eligibility rules by state and conclude that while those who endogenously choose larger loans are more likely to default, an exogenous increase in loan amount leads to a modest reduction in default rates.

This work also complements a literature in microfinance that has explored the effect of loan terms on repayment rates with mixed results. This literature has focused on the frequency of repayment, which serves a role similar to that of the loan length in the payday loan market. Pollio and Obuobie (2010) find no significant effect of decreasing the frequency of repayment on borrowers' default or delinquency rates. Field and Pande (2008) conduct a field experiment randomizing borrowers into biweekly and monthly repayment schedules and find no significant effect of repayment rates between the arms of the study. Armendariz and Morduch (2005) describe studies that find that decreasing the frequency of repayment does increase the delinquency rate for borrowers. On the other hand, McIntosh (2008), in a study of microfinance in Uganda, finds that there is a slight increase in loan repayments for those paid biweekly as opposed to weekly— although since borrowers self-selected into the two groups there is possible selection bias.

II.2   Theoretical Framework

Imagine two situations, one where the payday loan is due on the borrower's next payday and one where a borrower has two pay periods to repay it. In Period 1, the individual takes out an initial payday loan. In a "short-duration" setting, a loan is due in Period 2 and the borrower has the ability to renew the loan one time and have it come due in Period 3 with an extra interest charge. The "long-duration" setting is nearly identical

(with interest rates remaining the same), except the initial loan is due in Period 3 with the option in that period to rollover the loan to Period 4.

Consider first the case of a rational time-consistent borrower with standard exponential discounting. When deciding whether or not to renew the initial loan, the borrower compares the utility gain from smoothing the burden of repayment over two periods (Period 2 and Period 3 in this case) with the utility loss that comes from paying an extra interest charge. That basic tradeoff exists whether the initial loan is due in Period 2 ("short duration") or Period 3 ("long duration"). In the "long duration" case, however, Period 2 has the option to save some money (i.e., reduce consumption) to help ease the burden on Period 3, thereby making it more attractive to repay the loan in Period 3 and avoid the extra interest charge. That is, in the "long duration" case the borrower has the ability to smooth the repayment shock over two periods at no cost. In the "short duration" case the only way to smooth over two periods (instead of just one period) is to incur the interest cost. It is straightforward to show that in an environment with stochastic income, the rational borrower will repay the initial loan with higher probability if there is an extra period.

Imagine the borrower is instead (partially) naïve and time inconsistent. The extra period to repay the loan in the "long-duration" case has less of an impact on the probability of repayment for these borrowers. The intuition is rather simple: For a time-consistent borrower, the advantage of the additional period in the "long-duration" setting is that in the intervening period the borrower restrains her consumption somewhat and saves money for the period when the loan is due. The naïve time-inconsistent borrower saves much less in the intervening period. Because she is overoptimistic about the level

of patience of her future self, in the intervening period in the "long-duration" setting, the borrower does not save much to help smooth consumption. Thinking that the next period's self will be patient and willing to "take the hit" of repaying the loan, the borrower during the intervening period (wrongly) believes that she does not need to save very much to influence her future self's repayment decision.

As with most hyperbolic discounting models, we cannot rule out that borrowers are not just mis-predicting their income stream, rather than mis-predicting their preferences (as we just discussed). To receive a payday loan, a borrower needs to show a steady source of income, so we believe this issue would not be driving the results.

II.3   Data

We use administrative records from a large national payday lender. Data consist of loan applications made between January 2000-August 2004. From these applications we glean information on loan size, application date and maturation date, finance charge, employer, pay frequency, net pay, subprime credit score,[25] homeownership, gender, race and checking-account balance from the most recent bank statement. These variables serve as our main controls in our regressions described below. We also observe the outcome of each loan: whether the loan was repaid in full, defaulted on, or renewed. A borrower is in default if the lender is unable to collect on the post-dated check (for the loan amount plus interest) provided at the time of the application. This sample includes 2,250,166 loans.

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[25] This credit score differs from traditional FICO scores. For more on the payday lending credit score, see Agarwal, Skiba and Tobacman (2009).

We restrict our sample in two ways. First, we include only "new loans," that is, first-time applications and those loans that come from borrowers who had not taken out a loan within the past 90 days. By restricting the sample in this way, we ensure that the loans we are observing are not rollovers from previous loans. Second, for continuity we restrict our analysis to states where rollovers are allowed and the minimum loan length is seven days (Alabama, Colorado, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Missouri, North Carolina, Ohio, Oklahoma, Tennessee, Texas, and Utah).[26] Our final sample consists of 184,177 loans.

Table II-1 reports summary statistics of these data. The typical borrower is 37 years old and female. Forty-six percent of the borrowers are black and 28 percent Hispanic. The implied annual salary of the average borrower is $21,663.06 net of taxes. Nearly three-quarters of the borrowers use direct deposit to receive their paychecks. Half of borrowers receive biweekly paychecks. The other half is a mix of borrowers who are paid semimonthly (16 percent), monthly (17 percent) or weekly (12 percent). Default rates are 15 percent on "new" loans. Thirty-eight percent of borrowers are homeowners, though there is no information on homeownership recorded in the data for a sizeable fraction of the sample.

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[26] Several states changed their duration restrictions during our sample so we restrict to observations where the minimum loan length during that month is seven.

Table II-1: Descriptive Statistics

	Mean	S.D.	Min.	Max	N
Borrower Charateristics					
Age	37.29	10.99	18	70	182,741
Female	0.63	0.48	0	1	87,030
White	0.24	0.43	0	1	86579
Black	0.46	0.50	0	1	86579
Hispanic	0.28	0.45	0	1	86579
Race, Other	0.01	0.10	0	1	86579
Home Ownership	0.38	0.48	0	1	93,608
Months at Residence	67.49	85.35	1	456	182,455
Credit Score	499.58	193.20	200	1,000	182,213
Checking Account Balance	263.51	436.75	-499.86	2,999.82	178,117
Net Pay per Year	21,663.06	10,075.53	4,200	81,388.84	173,236
Fraction Direct Deposit	0.73	0.44	0	1	184,159
Loan Characteristics					
Amount Loaned	284.03	137.05	55.59	968	184,209
Interest Charge	50.62	24.63	10.01	174	184,209
Loan Length	13.89	5.69	7.00	45	184,209
Repayment Probabilities					
Fraction who Repay	0.41	0.49	0	1	184,209
Fraction who Renew	0.45	0.50	0	1	184,209
Fraction who Default	0.15	0.35	0	1	184,209
Pay Frequency					
Fraction Paid Biweekly	0.50	0.50	0	1	184,177
Fraction Paid Semimonthly	0.16	0.36	0	1	184,177
Fraction Paid Monthly	0.17	0.38	0	1	184,177
Fraction Paid Weekly	0.12	0.33	0	1	184,177

NOTES: This table reports summary statistics for a payday lending firm between 2000 and 2004. The sample represents first time applicants and borrowers who had not taken out a loan for 90 days. States where the minimum loan length is seven and borrowers are allowed to roll over their loan are represented in the sample.

II.4 Empirical Strategy

We implement two empirical strategies to identify the effect of loan durations on repayment and default. First, we run cross-sectional regressions of the following form:

$$Pr(\text{repay}_i) = \beta_0 + \beta_1(\#\ \text{days to repay}_i) + e_i \qquad\qquad \text{(II-1)}$$
$$Pr(\text{repay}_i) = \beta_0 + \beta_1(\#\ \text{days to repay}_i) + X'_i + e_i. \qquad\qquad \text{(II-2)}$$

That is, we use a linear probability model regressing an indicator for repayment on the number of days a borrower has to repay. The regression represented in Equation II-2 includes our full set of controls described above plus month and year controls. Second, we implement a regression discontinuity approach.

Regression discontinuity (RD) designs are an increasingly common approach to estimate the causal impact of an intervention absent a true randomized experiment. In general, this method exploits some exogenous threshold that determines assignment to a "treatment" and "control" group.[27]

In our payday framework, the treatment is a longer loan duration created by the constraints states place on minimum loan lengths. Our threshold bifurcates borrowers into those who arrive at the payday lender six or fewer days before their next payday ("treatment") and those who arrive seven or more days before their next payday ("control"). Though the two types of borrowers at the threshold arrive just one day apart, their loan lengths differ in a discontinuous way. (One group receives a seven-day loan and the other a 20-day loan in the biweekly-borrower case).

To estimate the effect on repayment rates from this discontinuity, we simply compare the probability of repayment for borrowers on either side of the threshold. To appropriately attribute any differences in these probabilities to loan lengths per se, borrowers on either side of the threshold must not be significantly different from each

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[27] Thistlethwaite and Campbell (1960) pioneered the approach. For econometric foundations, see Hahn, Todd and der Klaauw (2001) and McCrary (2008). Angrist and Lavy (1999), and Imbens and Lemieux (2008) provide useful guides for best practices.

other in other ways. Our first evidence of borrowers being similar at the threshold are plots of covariates across the threshold (described in more detail below). We will also formally test whether borrowers to the left and right of the threshold vary in an important way using demographics we can observe in our data (including credit score, age, race, gender, income, etc.). As long as these observable characteristics capture the relevant differences that could affect repayment behavior (i.e., no important unobservable characteristics), the regression discontinuity estimates will be valid. We can additionally restrict our sample to those borrowers closest to the threshold as described below. By restricting our analysis to a narrow window, we are comparing treatment and control groups who are most similar to each other save the treatment.

More formally, our running variable is the number of days until a borrower's next paycheck on the day the borrower arrives at the lender. For borrowers paid biweekly, *days until next paycheck* is assumed to be the loan length as long as the loan length is less than 14. For borrowers who have a loan length greater than 14, then we assume their *days until next paycheck* equals their loan length minus 14. Because the minimum loan length is seven, if a borrower enters payday lenders with less than seven days until he is paid, the due date of his loan will be the days until paid plus 14 (the time until his next pay date).

We also have a sample of borrowers paid monthly through Social Security checks paid out on the 3rd of the month. Borrowers in this sample will again experience a discontinuity in loan length if they arrive less than seven days before the 3rd of the month. *Days until next paycheck* was calculated as a borrower's loan length if he took out a loan after the 3rd of the previous month. If he took out the loan prior to the 3rd of the previous

month, then days until paid was calculated as the 3rd of the previous month minus the day

the loan was taken out. For example, if a borrower took out a loan on the 5th of June and

the due date of the loan was the 3rd of July, then days until paid would be 28. If a

borrower took out the loan on the 30th of May, then days until paid would be five (June 3

– May 30).

Finally, we split the sample into borrowers paid semimonthly who typically have

pay dates on either the 15th or the first (the most popular due dates for semimonthly

borrowers in our sample).[28] In these regressions our running variable is *day of the month*.

Discontinuities in average loan length occur between the 8th and 9th of the month and the

23rd and the 26th. The second discontinuity is not as sharp as the first because some

months have 28, 29, 30, and 31 days.

For our first stage, we estimate the following equation:

Loan Length$_i$ = ß$_0$+ ß$_1$(*days_until_next_paycheck$_i$*) +
ß$_2$(*<7_days_before_next_paycheck$_i$*)+
ß$_3$ (*days_until_next_paycheck$_i$*) x (*<7_days_before_next_paycheck$_i$*) + e$_i$ (II-3)

Our results exploring repayment rates for all borrowers come from a similar regression

but with the dependent variable being repayment:

Repay$_i$ = ß$_0$+ ß$_1$(*days_until_next_paycheck$_i$*) +
ß$_2$ (*<7_days_before_next_paycheck$_i$*)+
ß$_3$ (*days_until_next_paycheck$_i$*) x (*<7_days_before_next_paycheck$_i$*) + e$_i$ (II-4)

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[28] Borrowers paid semi-monthly differ from bi-weekly borrowers in that they are paid twice a month, at the beginning of the month and the middle. Borrowers paid bi-weekly are paid once every two weeks.

For ease of interpretation, we subtract six days from the variable *days until next paycheck*. With 7 days until the next pay date, the coefficient β_1 represents the impact that coming in that day has on the probability of repayment. When a borrower comes in 6 days before their next payday, then the *days until next paycheck* (minus 6), equals 0, so the impact of coming in 6 days before your next paycheck (beyond the effect of the controls) is equal to β_2. The coefficient β_2 plus the coefficient β_1 in Equation (4) can therefore be interpreted as the percentage-point difference in repayment rates from taking out a payday loan six days before one's payday compared to seven.

II.5   Results

First, we present raw data on each pay cycle.   Figure II-1 presents the sample of biweekly-paid borrowers, restricted to those paid on Fridays. The *x*-axis of each of the five plots shows the days until receipt of the borrower's next paycheck. *Y*-axes plot loan amount, net pay, credit score, frequency of applications, and homeownership rates. The discontinuity in loan lengths is replicated in each figure with a noticeable jump in loan length at seven days. The figures are comforting for our research design in that there are no noticeable jumps in observations (or any jumps for four of the five figures) near the discontinuity. Figure II-2 shows the same results as Figure II-1 but for biweekly borrowers paid on Thursday.[29]

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[29] There is a drop in observations twelve days and five days before the next payday for biweekly borrowers paid on Friday and eleven and four days before the next payday for biweekly borrowers paid on Thursday. These days fall on Sundays when the payday lender is closed.
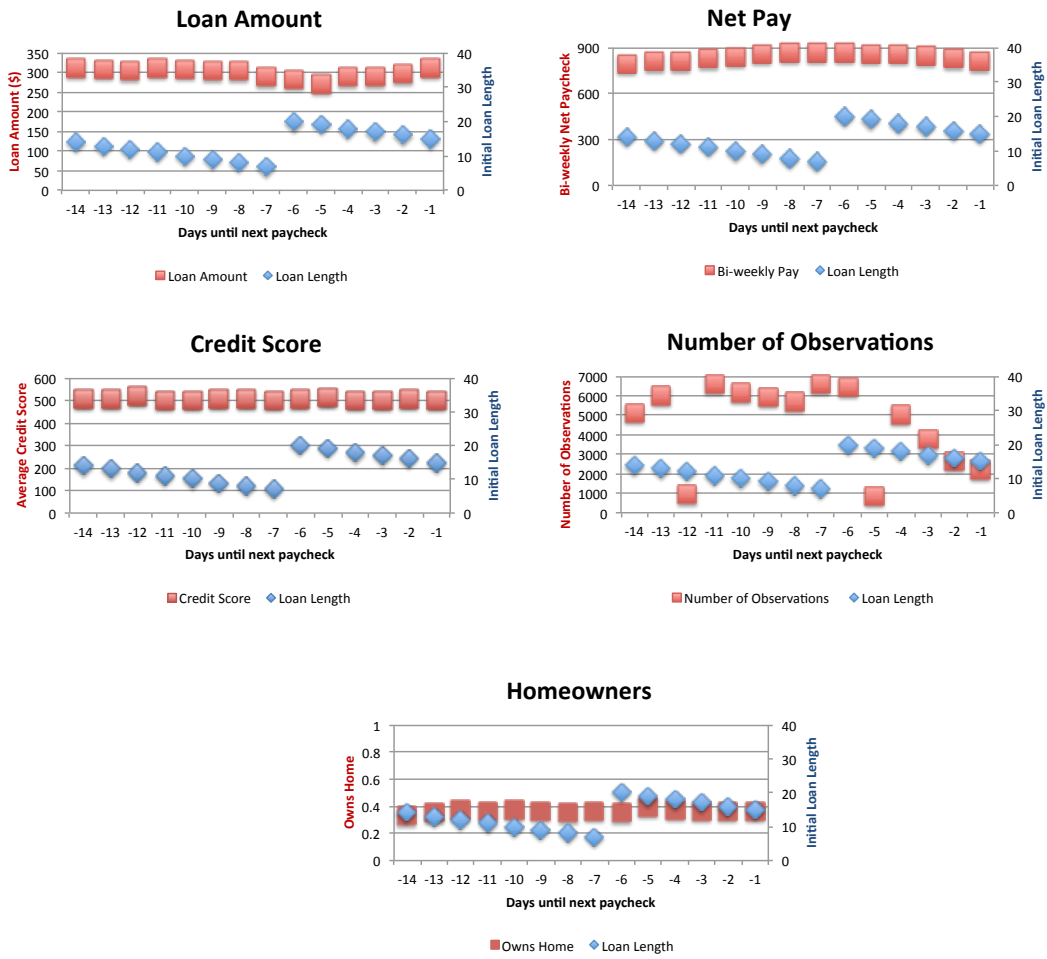
Figure II-1: Bi-Weekly Borrowers Paid on Friday
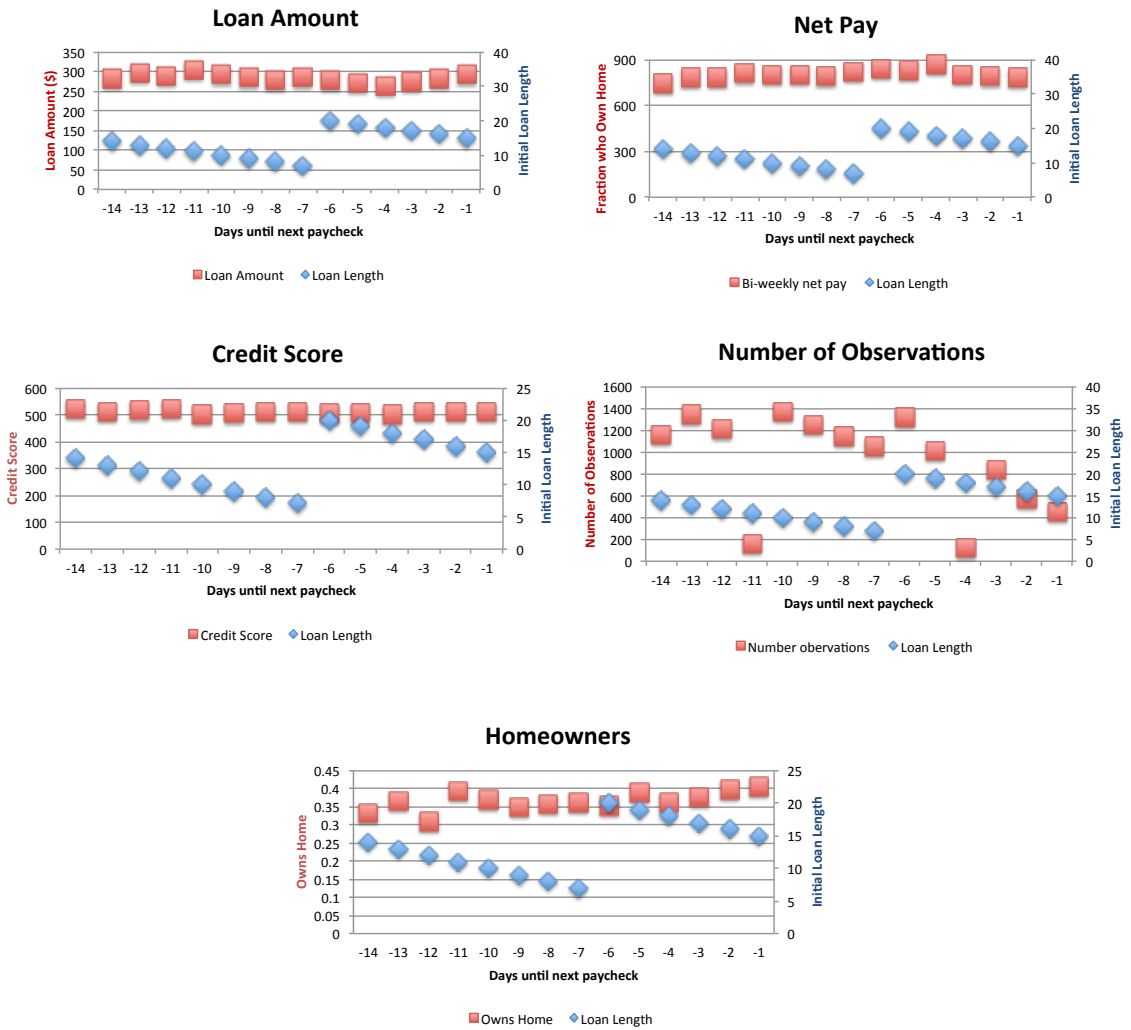
Figure II-2: Bi-Weekly Borrowers Paid on Thursday

In Figures II-3 and II-4, we plot repayment rates and initial loan length for biweekly borrowers paid on Fridays and Thursday, respectively. The figures show there is a slight increase in repayment occurring at the discontinuity. We do the same analysis for Social Security recipients paid on the 3rd of the month, and the pictures look similar.
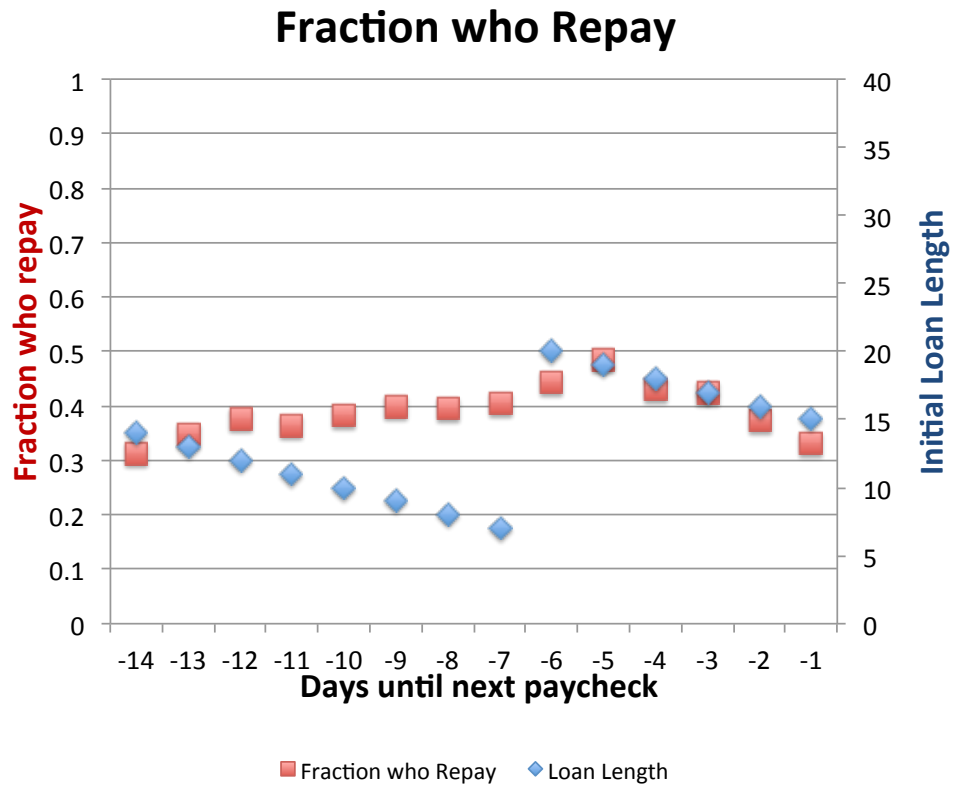
Fraction who Repay

Figure II-3: Fraction of Bi-Weekly Borrowers Paid on Friday who Repay Loan
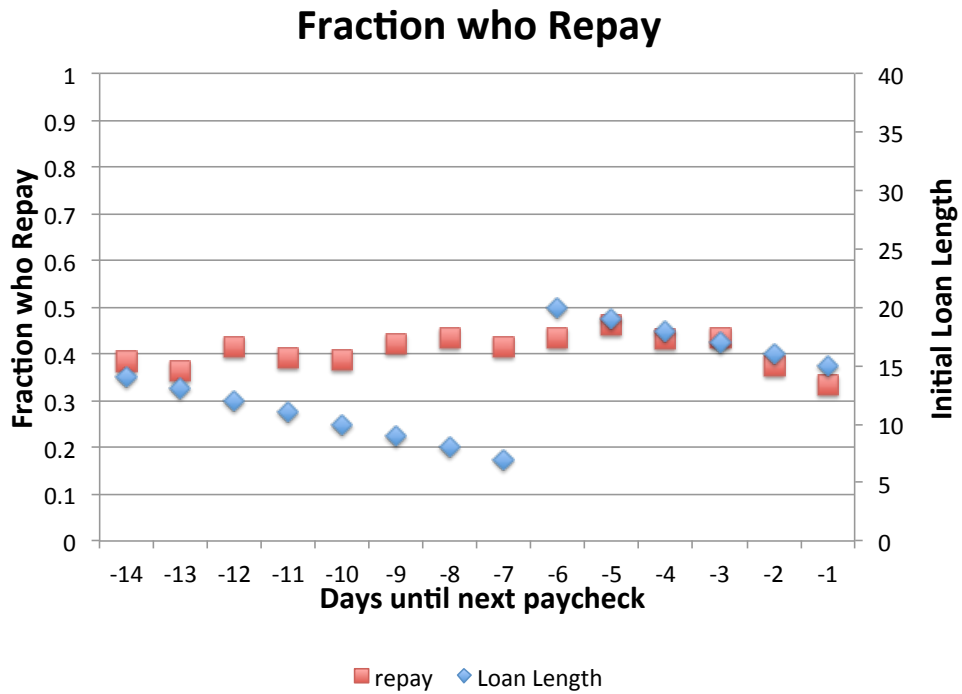
Figure II-4: Fraction of Bi-Weekly Borrowers Paid on Thursday who Repay Loan

Next we run reduced form regressions. Equations (II-1) and (II-2) are estimated separately for biweekly, weekly, semi-monthly, and monthly borrowers (i.e., Social Security recipients). Results are presented in Table II-2. Univariate regressions (Columns 1-4) show that the correlation between loan length and repayment is negative and significant for biweekly and monthly borrowers. The correlation is positive and significant for weekly borrowers and small and insignificant for semi-monthly borrowers. Columns 5-8 add the full set of controls. Controlling for observables, we see positive and significant, but small, effects of loan lengths for biweekly and weekly borrowers. The results are positive but very small and insignificant for semi-monthly borrowers and significant but negative for monthly borrowers.

Table II-2: Probability Repay

Dependent Variable: Dummy Variable Equal to 1 if an Individual Repays his/her Payday Loan

	Bi-Weekly	Monthly	Weekly	Semi-Monthly	Bi-Weekly	Monthly	Weekly	Semi-Monthly
Mean Loan Length (in weeks)	1.85	1.49	2.72	1.96	1.85	1.49	2.72	1.96
Loan Length (in weeks)	0.018***	-0.025***	0.041***	-0.00071	0.0094***	-0.012***	0.046***	0.000082
	(0.003)	(0.002)	(0.009)	(0.004)	(0.003)	(0.002)	(0.009)	(0.004)
Loan Amount ($100)					-0.049***	-0.030	-0.068	-0.054
					(0.018)	(0.028)	(0.049)	(0.034)
Home Ownership					0.045***	0.035***	0.035***	0.012
					(0.005)	(0.008)	(0.010)	(0.009)
Credit Score (Per 100)					0.079	0.0013	0.036	0.36
					(0.089)	(0.109)	(0.109)	(0.242)
Age					0.00023	0.00017	0.00048	-0.000017
					(0.0002)	(0.0002)	(0.0003)	(0.0003)
Female					-0.027***	-0.017**	-0.0090	-0.042***
					(0.005)	(0.008)	(0.009)	(0.009)
Finance Charge					-0.0033***	-0.0035**	-0.0034	-0.0025
					(0.001)	(0.002)	(0.003)	(0.002)
Checking Balance ($100)					0.0072***	0.0070***	0.010***	0.0063***
					(0.0004)	(0.001)	(0.001)	(0.001)
Months at Residence					-0.000052**	0.000032	-0.00011***	0.0000098
					(0.00002)	(0.00003)	(0.00004)	(0.00004)
Net Pay ($1000)					0.0097***	0.011***	0.0068***	0.0075***
					(0.0002)	(0.0004)	(0.0004)	(0.0003)
Owns Home					0.032***	0.018*	-0.0040	0.014
					(0.006)	(0.010)	(0.013)	(0.010)
Black					-0.073***	-0.067***	-0.067***	-0.095***
					(0.006)	(0.009)	(0.012)	(0.011)
Hispanic					-0.025***	-0.043***	-0.017	-0.035***
					(0.007)	(0.011)	(0.013)	(0.012)
Race, Other					0.0059	-0.087**	0.026	0.044
					(0.022)	(0.037)	(0.043)	(0.041)
Month X Year Dummies Included					X	X	X	X
State Dummies Included					X	X	X	X
Number of Observations	92,568	31,953	22,896	29,063	90,830	31,343	22,562	28,501
Adjusted R-squared	0.0005	0.0031	0.0009	0.000	0.0906	0.0758	0.0585	0.0882

NOTES: Table II-2 presents the results from an OLS Regression on the liklihood of repaying a payday loan. Dummies for missing home ownership, months in residence, age, checking account balance, net pay, and credit score variables included in columns 5 through 8. The ommitted category for race is white. Standard errors are in parentheses underneath each coefficient. The sample of payday loan borrowers include first time applicants and borrowers who had not taken out a loan for 90 days. States where the minimum loan length is seven and borrowers are allowed to roll over their loan are represented in the sample. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

To estimate the effect using the plausibly exogenous variation created by states' restriction on loan-length minimums, we turn to our regression discontinuity. Table II-3

reports the results from Equation II-4. The first four columns use no controls, while Columns 5 through 8 include a number of controls which may affect repayment rates— loan amount, homeownership, credit score, age, gender, interest payment, month at the residence, net pay, and race. Columns 1 and 5 include only individuals who are paid biweekly. We further split these individuals into two groups: those paid on Thursdays (Columns 2 and 6) and those paid on Fridays (columns 3 and 7). Columns 4 and 8 restrict the sample to Social Security recipients receiving benefits on the 3rd of the month.

Table II-3: Regression Discontinuity, Probability Repay

Dependent Variable: Dummy Variable Equal to 1 if an Individual Repays his/her Payday Loan

	(1) Biweekly	(2) Biweekly Paid on Thursday	(3) Biweekly Paid on Friday	(4) Monthly	(5) Biweekly	(6) Biweekly Paid on Thursday	(7) Biweekly Paid on Friday	(8) Monthly
Days until Paid (minus 6)	-0.0087***	-0.0070***	-0.012***	-0.0033***	-0.0057***	-0.0058**	-0.0068***	-0.0020**
	(0.0009)	(0.0024)	(0.0010)	(0.0012)	(0.0009)	(0.0028)	(0.0012)	(0.0010)
Less than 7 Days Until Paid	0.033***	0.022	0.031***	-0.012	0.012*	0.0075	0.015	-0.021
	(0.0064)	(0.0171)	(0.0077)	(0.0506)	(0.0074)	(0.0265)	(0.0118)	(0.0516)
Days until Paid (minus 6) X Less than 7 Days Until Paid	0.027***	0.025***	0.031***	0.039**	0.018***	0.016***	0.019***	0.026
	(0.0019)	(0.0051)	(0.0023)	(0.0168)	(0.0020)	(0.0056)	(0.0026)	(0.0173)
Loan Amount ($100)					-0.11***	-0.12***	-0.11***	-0.13***
					(0.0015)	(0.0040)	(0.0018)	(0.0102)
Home Ownership					0.045***	0.036***	0.044***	0.048**
					(0.0052)	(0.0136)	(0.0063)	(0.0241)
Credit Score (Per 100)					0.0023	0.0073	0.0015	-0.0068
					(0.0020)	(0.0053)	(0.0024)	(0.0085)
Age					0.00040**	-0.00011	0.00053**	0.0015**
					(0.0002)	(0.0005)	(0.0002)	(0.0007)
Female					-0.026***	-0.065***	-0.021***	-0.0092
					(0.0053)	(0.0140)	(0.0063)	(0.0201)
Interest Rate					-0.031***	-0.040***	-0.029***	-0.058***
					(0.0024)	(0.0061)	(0.0031)	(0.0096)
Checking Balance ($100)					0.0071***	0.0078***	0.0069***	0.0046*
					(0.0005)	(0.0012)	(0.0005)	(0.0025)
Months at Residence					-0.000013	0.0000048	-0.000027	0.00020***
					(0.0000)	(0.0001)	(0.0000)	(0.0001)
Net Pay ($1000)					0.0094***	0.0096***	0.0093***	0.011***
					(0.0002)	(0.0006)	(0.0003)	(0.0016)
Black					-0.051***	-0.052***	-0.051***	-0.044*
					(0.0065)	(0.0166)	(0.0078)	(0.0236)
Hispanic					-0.029***	-0.018	-0.031***	-0.079***
					(0.0072)	(0.0189)	(0.0086)	(0.0282)
Race, Other					-0.0040	-0.094	0.024	-0.0013
					(0.0253)	(0.0578)	(0.0316)	(0.1118)
Month X Year Dummies Included					X	X	X	X
State Dummies Included					X	X	X	X
Dummy for Day of Week Taken Out					X	X	X	X
Constant	0.42***	0.43***	0.42***	0.51***				
	(0.0044)	(0.0121)	(0.0052)	(0.0163)				
Number of Observations	91,833	12,878	63,599	5,162	90,119	12,608	62,537	5,064
Adjusted R-squared	0.0035	0.0023	0.0053	0.0031	0.0776	0.0834	0.0759	0.0530

NOTES: Table II-3 presents the results from an OLS Regression on the likelihood of repaying a payday loan. *Less than 7 Days until Repaid* is an indicator variable equal to one if there were less 7 days until the borrowers next pay date. 6 days are subtracted from the *Days Until Paid* variable for ease of interpretation. Dummies for missing home ownership, months in residence, age, checking account balance, net pay, and credit score variables included in columns 5 through 8. The omitted category for race is white. Standard errors are in parentheses underneath each coefficient. The sample of payday loan borrowers include first time applicants and borrowers who had not taken out a loan for 90 days. States where the minimum loan length is seven and borrowers are allowed to roll over their loan are represented in the sample. Standard errors are clustered at the individual level. *** p < 0.01, ** p < 0.05, * p < 0.1

For all biweekly borrowers and biweekly borrowers paid on Friday, results suggest there is a 3.1 to 3.3 percentage-point increase in the probability of repayment when the individual comes in to take out their loan six days before their payday when no controls are included. The effect for biweekly borrowers paid on Thursday is even smaller (2.2 percentage points). The estimated probability of repayment actually decreases by 0.12 percentage points at the threshold for those paid monthly; however, neither of those effects are statistically significant. All of these results become smaller and lose statistical significance when full controls are added, except for monthly borrowers, which stay significant but the effect falls to 1.2 percentage points.

In the above regressions, we used the constructed *days until paycheck* variable dependent on loan length. Now, we will do the same analysis for semi-monthly borrowers but instead relying on the day of the month, relative to the 15th, that they took out the loan. In Figures II-5 and II-6, we graphically show the discontinuity in the loan length as well as the credit scores, homeownership, net pay, number of observations, loan amount and probability of repayment over the days until paid. As confirmation that loan length is significantly different between 6 and 7 days before the payday loan due date, we run the first stage regression for semi-monthly borrowers based on the day they took out their loan. We subtract all days after the 15th to focus on the first discontinuity. In this regression, the independent variable we focus on is *day of the month*. For ease of interpretation, we subtract nine days from this day, and have the discontinuity occur at the 9th day of then month (when there are less than 7 days until repayment on the 15th).
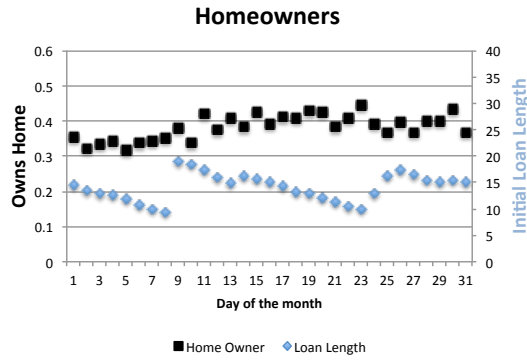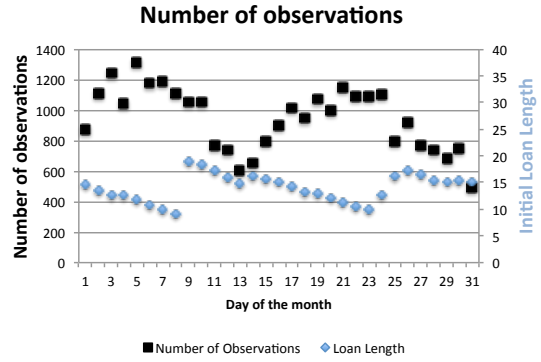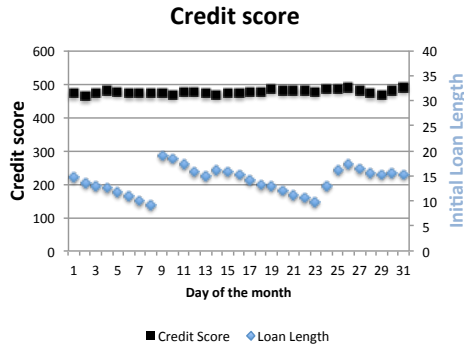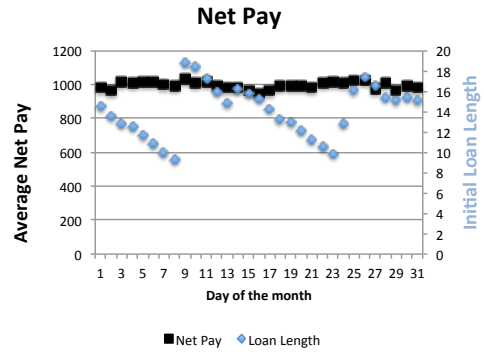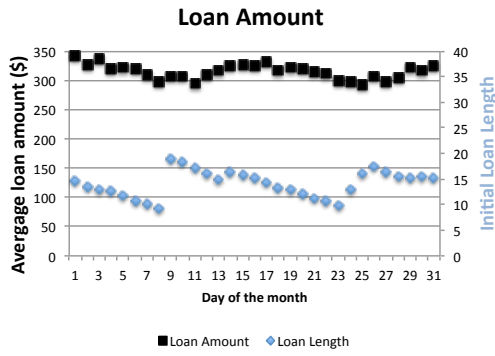
Figure II-5: Semi-Monthly Borrowers
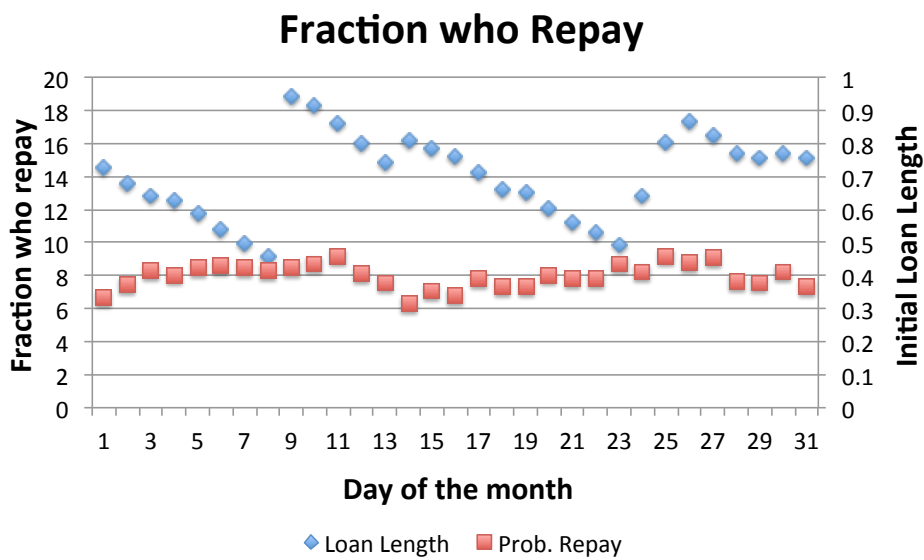
Fraction who Repay

Figure II-6: Fraction of Semi-Monthly Borrowers Paid on Thursday who Repay Loan

Table II-4 presents these first stage results. The coefficient on *Less than 7 days until Paid* is significantly positive, economically and statistically. Coming in on the 9th causes an increase in the average loan length of 10 days. Our second state regression is reported in Table II-5. Coming in on the 9th in this case has no impact (the coefficient is between 0.00089 and -0.0072) on the probability of repayment. These results confirm the previous estimations that, in this case, an increase in the average loan length of 10 days has no effect on the probability of repayment.

Table II-4: Regression Discontinuity, Loan Length for Semi-monthly Borrowers

Dependent Variable: Loan Length

	(1)	(2)
	Borrowers Paid Semi-Monthly	
Day of Month (minus 9)	-0.74***	-0.74***
	(0.0183)	(0.0186)
Less than 7 days until Paid	9.99***	10.0***
(9th of Month or Later)	(0.1496)	(0.1498)
Day of Month (minus 9)	0.15***	0.15***
X Less than 7 days until Paid	(0.0353)	(0.0358)
Loan Amount ($100)		0.029
		(0.0316)
Home Ownership		-0.039
		(0.1205)
Credit Score (Per 100)		-0.10**
		(0.0448)
Age		-0.0025
		(0.0039)
Female		-0.049
		(0.1194)
Interest Rate		-0.19**
		(0.0804)
Checking Balance ($100)		0.0026
		(0.0080)
Months at Residence		-0.00021
		(0.0005)
Net Pay ($1000)		0.0032
		(0.0045)
Black		-0.11
		(0.1354)
Hispanic		-0.10
		(0.1537)
Race, Other		0.18
		(0.7065)
Month X Year Dummies Included		X
State Dummies Included		X
Dummy for Day of Week Taken Out		X
Constant	8.57***	
	(0.0934)	
Number of Observations	14,641	14,355
Adjusted R-squared	0.3505	0.3537

NOTES: Table II-4 presents the results from an OLS Regression on the likelihood of repaying a payday loan. *Less than 7 Days Pay Day* is an indicator variable equal to one if there were less than 7 days until the borrowers next pay date. 6 days are subtracted from the *Day of Month* variable for ease of interpretation. Dummies for missing home ownership, months in residence, age, checking account balance, net pay, and credit score variables included in columns 5 through 8. The omitted category for race is white. Standard errors are in parentheses underneath each coefficient. The sample of payday loan borrowers include first time applicants and borrowers who had not taken out a loan for 90 days. States where the minimum loan length is seven and borrowers are allowed to roll over their loan are represented in the sample. Standard errors are clustered at the individual level. *** p < 0.01, ** p < 0.05, * p < 0.1

Table II-5: Regression Discontinuity, Probability Repay for Semi-monthly Borrowers

Dependent Variable: Dummy Variable Equal to 1 if an Individual Repays his/her Payday Loan

	(1)	(2)
	Borrowers Paid Semi-Monthly	
Day of Month (minus 9)	0.0097***	0.0048**
	(0.0025)	(0.0024)
Less than 7 days until Paid	0.00089	-0.0072
(= 9th of Month or Later)	(0.0169)	(0.0166)
Day of Month (minus 9)	-0.027***	-0.015***
X Less than 7 Days until Paid	(0.0042)	(0.0041)
Loan Amount ($100)		-0.096***
		(0.0036)
Home Ownership		0.011
		(0.0143)
Credit Score (Per 100)		0.019***
		(0.0051)
Age		-0.00028
		(0.0005)
Female		-0.044***
		(0.0145)
Interest Rate		-0.023***
		(0.0085)
Checking Balance ($100)		0.0061***
		(0.0010)
Months at Residence		-0.000032
		(0.0001)
Net Pay ($1000)		0.0072***
		(0.0005)
Black		-0.063***
		(0.0167)
Hispanic		-0.029
		(0.0187)
Race, Other		0.0056
		(0.0597)
Month X Year Dummies Included		X
State Dummies Included		X
Dummy for Day of Week Taken Out		X
Constant	.45***	
	(0.012)	
Number of Observations	14,641	14,355
Adjusted R-squared	0.0032	0.0685

NOTES: Table II-5 presents the results from an OLS Regression on the likelihood of repaying a payday loan. *Less than 7 Days Pay Day* is an indicator variable equal to one if there were less than 7 days until the borrowers next pay date. 6 days are subtracted from the *Day of Month* variable for ease of interpretation. Dummies for missing home ownership, months in residence, age, checking account balance, net pay, and credit score variables included in columns 5 through 8. The omitted category for race is white. Standard errors are in parentheses underneath each coefficient. The sample of payday loan borrowers include first time applicants and borrowers who had not taken out a loan for 90 days. States where the minimum loan length is seven and borrowers are allowed to roll over their loan are represented in the sample. Standard errors are clustered at the individual level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

While all of the aforementioned regressions use a linear regression estimation, we run all of our results for the outcome of success using a probit estimation, rather than OLS estimations, and find the results unchanged.

II.6   Robustness

In some states in our sample, the minimum loan length in a particular month was greater than 7, ranging from 8 to 31 days. We estimate the first stage regressions for semi-monthly borrowers in states without seven-day minimums, and there is actually a decrease in the average loan length between 6 and 7 days before the next pay date. There is between a 1.3 and 3.2 percentage point increase in the probability of repayment between the cut off, but this result is not statistically significant, even if the control variables are not included. These results are reported in Table II-6.

Table II-6: Probability Repay for States with Minimum Loan Lengths Greater than Seven

	(1)	(2)	(3)	(4)
	States with Minimum Loan Lengths greater than 7			
	Success		Loan Length	
Day of Month (minus 9)	-0.0020	-0.0093	-0.0022	0.063
	(0.0111)	(0.0107)	(0.1498)	(0.1026)
Less than 7 days until Paid	0.013	0.032	-2.67***	-2.48***
(= 9th of Month or Later)	(0.0641)	(0.0618)	(0.6859)	(0.4535)
Day of Month (minus 9)	0.00050	0.0073	-0.036	-0.075
X Less than 7 Days until Pai	(0.0114)	(0.0110)	(0.1523)	(0.1041)
Loan Amount ($100)		-0.090***		0.17*
		(0.0103)		(0.0872)
Home Ownership		0.066*		-0.038
		(0.0355)		(0.3289)
Credit Score (Per 100)		0.038**		-1.02***
		(0.0151)		(0.1433)
Age		0.0020*		0.014
		(0.0012)		(0.0109)
Female		-0.049		0.13
		(0.0437)		(0.3503)
Interest Rate		0.0058***		0.57***
		(0.0017)		(0.0141)
Checking Balance ($100)		0.0036		0.020
		(0.0028)		(0.0267)
Months at Residence		-0.00022		-0.0012
		(0.0001)		(0.0014)
Net Pay ($1000)		0.0054***		0.015
		(0.0015)		(0.0131)
Black		0.0051		-0.21
		(0.0426)		(0.3572)
Hispanic		0.23***		-1.93***
		(0.0688)		(0.5467)
Race, Other		-0.24**		-3.57***
		(0.1205)		(1.1953)
Month X Year Dummies Included		X		
State Dummies Included		X		
Dummy for Day of Week Taken Out		X		
Constant	0.51		24.26	
	(0.055)		(0.601)	
Number of Observations	2,304	2,257	2,304	2,257
Adjusted R-squared	-0.0009	0.0816	0.0430	0.5622

NOTES: Table II-6 presents the results from an OLS Regression on the likelihood of repaying a payday loan. *Less than 7 Days Pay Day* is an indicator variable equal to one if there were less than 7 days until the borrowers next pay date. 6 days are subtracted from the *Day of Month* variable for ease of interpretation. Dummies for missing home ownership, months in residence, age, checking account balance, net pay, and credit score variables included in columns 5 through 8. The omitted category for race is white. Standard errors are in parentheses underneath each coefficient. The sample of payday loan borrowers include first time applicants and borrowers who had not taken out a loan for 90 days. States where the minimum loan length is seven and borrowers are allowed to roll over their loan are represented in the sample. Standard errors are clustered at the individual level. *** p < 0.01, ** p < 0.05, * p < 0.1

We follow McCrary (2008) and test for distortions in density on either side of the cutoff by running our regression discontinuity with the outcome variable being the fraction of people in the sample (separately for each pay frequency). The results of the test are found in Table II-7. We did find a statistically significant change in the number of people taking out loans; however, this affect is in the range of -1.88 to 0.47 percentage point changes.

Table II-7: Percentage of Observations

	All Bi-Weekly	Bi-Weekly Thursday	Bi-Weekly Friday	Monthly	Semi-monthly
Days until Paid (minus 6)	-0.13***	0.11***	-0.34***	-0.036***	0.14***
	(0.0018)	(0.0002)	(0.0000)	(0.0018)	(0.0042)
Less than 7 Days Until Paid	-0.65***	0.47***	-1.88***	-2.75***	-1.52***
	(0.0213)	(0.0056)	(0.0029)	(0.0310)	(0.0217)
Days until Paid (minus 6)	1.22***	1.14***	1.34***	0.14***	-0.57***
X Less than 7 Days Until Paid	(0.0046)	(0.0029)	(0.0016)	(0.0058)	(0.0067)
Month x Year Dummies	X	X	X	X	X
State Dummies	X	X	X	X	X
N	91833	12878	63599	5162	14641
adj. R-sq	0.6703	0.9894	0.9941	0.5751	0.7226

NOTES: Table II-7 presents the results from an OLS Regression on the percentage of observations each day. *Less than 7 Days Pay Day* is an indicator variable equal to one if there were less than 7 days until the borrowers next pay date. 6 days are subtracted from the *Day of Month* variable for ease of interpretation. Standard errors are in parentheses underneath each coefficient. The sample of payday loan borrowers include first time applicants and borrowers who had not taken out a loan for 90 days. States where the minimum loan length is seven and borrowers are allowed to roll over their loan are represented in the sample. Standard errors are clustered at the individual level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

We then verify that controls are not changing around the cut-off. If individuals with higher credit scores are arriving 7 days before they are paid, then it might bias the results against finding any effect of longer loan lengths. These results are reported in Tables II-8 through II-12 for each pay period. Credit scores are significantly lower for borrowers arriving 6 days before the pay date, but the magnitudes of these effects are small. Semi-monthly borrowers arriving 6 days before their next paycheck have an increase in their checking account balance of $38. Monthly borrowers are 12 percentage

points less likely to be female. Bi-weekly borrowers paid on Friday are younger, and bi-

weekly borrowers paid on Thursday are taking out larger loans. Bi-weekly borrowers in

general, however, are taking out smaller loans and have a lower net pay.

Table II-8: Controls for Bi-Weekly Borrowers

	Amount (in $100)	Homeownership	Credit Score (in 100 points)	Age	Female
Days until Paid (minus 6)	0.026***	-0.0019***	-1.4e-13***	-0.041**	0.0032***
	(0.0025)	(0.0007)	(0.0000)	(0.0203)	(0.0009)
Less than 7 Days Until Paid	-0.069***	-0.0093*	-4.4e-13***	-0.25	0.0020
	(0.0205)	(0.0055)	(0.0000)	(0.1610)	(0.0071)
Days until Paid (minus 6)	-0.060***	0.00014	2.1e-13***	0.044	-0.0082***
X Less than 7 Days Until Paid	(0.0056)	(0.0015)	(0.0000)	(0.0432)	(0.0019)
Month x Year Dummies	X	X	X	X	X
State Dummies	X	X	X	X	X
N	91833	91833	91833	91833	91833
adj. R-sq	0.0485	0.1289	1	0.0058	0.0094

	Interest Rate	Checking Account Balance	Months in Residence	Net Pay ($1,000)	
Days until Paid (minus 6)	-0.00070	-0.038***	-0.19	-0.26***	
	(0.0006)	(0.0079)	(0.1578)	(0.0180)	
Less than 7 Days Until Paid	-0.0083*	-0.038	-1.03	-0.35**	
	(0.0049)	(0.0628)	(1.3802)	(0.1444)	
Days until Paid (minus 6)	-0.0010	0.063***	0.39	0.46***	
X Less than 7 Days Until Paid	(0.0014)	(0.0169)	(0.3604)	(0.0385)	
Month x Year Dummies	X	X	X	X	
State Dummies	X	X	X	X	
N	91833	91833	91833	90119	
adj. R-sq	0.81	0.0041	0.0092	0.0196	

NOTES: Table II-8 presents the results from an OLS Regression on the control variables. *Less than 7 Days Pay Day* is an indicator variable equal to one if there were less than 7 days until the borrowers next pay date. 6 days are subtracted from the *Day of Month* variable for ease of interpretation. Standard errors are in parentheses underneath each coefficient. The sample of payday loan borrowers include first time applicants and borrowers who had not taken out a loan for 90 days. States where the minimum loan length is seven and borrowers are allowed to roll over their loan are represented in the sample.   Standard errors are clustered at the individual level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table II-9: Controls for Bi-Weekly Borrowers Paid on Thursday

	Amount (in $100)	Homeownership	Credit Score (in 100 points)	Age	Female
Days until Paid (minus 6)	0.017**	-0.0031	-2.2e-14***	-0.017	0.0050
	(0.0085)	(0.0023)	(0.0000)	(0.0707)	(0.0030)
Less than 7 Days Until Paid	-0.13*	-0.013	-2.5e-14	0.48	0.032
	(0.0735)	(0.0196)	(0.0000)	(0.6028)	(0.0260)
Days until Paid (minus 6) X Less than 7 Days Until Paid	-0.063***	-0.0038	9.5e-14	0.24*	-0.0040
	(0.0158)	(0.0041)	(0.0000)	(0.1230)	(0.0054)
Month x Year Dummies	X	X	X	X	X
State Dummies	X	X	X	X	X
N	12878	12878	12878	12878	12878
adj. R-sq	0.0453	0.1298	1	0.0044	0.01

	Interest Rate	Checking Account Balance	Months in Residence	Net Pay ($1,000)
Days until Paid (minus 6)	0.0011	-0.037	0.83	-0.28***
	(0.0023)	(0.0250)	(0.5248)	(0.0596)
Less than 7 Days Until Paid	0.024	0.18	4.87	-0.47
	(0.0200)	(0.2187)	(4.8073)	(0.5211)
Days until Paid (minus 6) X Less than 7 Days Until Paid	0.0023	0.17***	0.46	0.41***
	(0.0042)	(0.0470)	(1.0594)	(0.1134)
Month x Year Dummies	X	X	X	X
State Dummies	X	X	X	X
N	12878	12878	12878	12608
adj. R-sq	0.8059	0.0043	0.0097	0.0194

NOTES: Table II-9 presents the results from an OLS Regression on the control variables. *Less than 7 Days Pay Day* is an indicator variable equal to one if there were less than 7 days until the borrowers next pay date. 6 days are subtracted from the *Day of Month* variable for ease of interpretation. Standard errors are in parentheses underneath each coefficient. The sample of payday loan borrowers include first time applicants and borrowers who had not taken out a loan for 90 days. States where the minimum loan length is seven and borrowers are allowed to roll over their loan are represented in the sample. Standard errors are clustered at the individual level. *** p < 0.01, ** p < 0.05, * p < 0.1

Table II-10: Controls for Bi-Weekly Borrowers Paid on Friday

	Amount (in $100)	Homeownership	Credit Score (in 100 points)	Age	Female
Days until Paid (minus 6)	0.036***	-0.0023**	8.9e-16	-0.084***	0.0021*
	(0.0036)	(0.0010)	(0.0000)	(0.0283)	(0.0013)
Less than 7 Days Until Paid	-0.022	-0.012	-2.5e-12***	-0.79***	-0.013
	(0.0331)	(0.0088)	(0.0000)	(0.2562)	(0.0116)
Days until Paid (minus 6) X Less than 7 Days Until Paid	-0.059***	0.00030	-2.1e-12***	-0.031	-0.0096***
	(0.0074)	(0.0019)	(0.0000)	(0.0567)	(0.0025)
Month x Year Dummies	X	X	X	X	X
State Dummies	X	X	X	X	X
N	63599	63599	63599	63599	63599
adj. R-sq	0.0388	0.1315	1	0.0076	0.0096

	Interest Rate	Checking Account Balance	Months in Residence	Net Pay ($1,000)
Days until Paid (minus 6)	-0.0015*	-0.037***	-0.35	-0.27***
	(0.0008)	(0.0117)	(0.2189)	(0.0252)
Less than 7 Days Until Paid	-0.014*	-0.078	-2.83	-0.16
	(0.0077)	(0.1046)	(2.0095)	(0.2291)
Days until Paid (minus 6) X Less than 7 Days Until Paid	-0.00018	0.046**	0.054	0.56***
	(0.0018)	(0.0229)	(0.4469)	(0.0506)
Month x Year Dummies	X	X	X	X
State Dummies	X	X	X	X
N	63599	63599	63599	62537
adj. R-sq	0.7748	0.0042	0.0102	0.0208

NOTES: Table II-10 presents the results from an OLS Regression on the control variables. *Less than 7 Days Pay Day* is an indicator variable equal to one if there were less than 7 days until the borrowers next pay date. 6 days are subtracted from the *Day of Month* variable for ease of interpretation. Standard errors are in parentheses underneath each coefficient. The sample of payday loan borrowers include first time applicants and borrowers who had not taken out a loan for 90 days. States where the minimum loan length is seven and borrowers are allowed to roll over their loan are represented in the sample. Standard errors are clustered at the individual level. *** p < 0.01, ** p < 0.05, * p < 0.1

Table II-11: Controls for Monthly Borrowers

	Amount (in $100)	Homeownership	Credit Score (in 100 points)	Age	Female
Days until Paid (minus 6)	0.011***	0.00030	-1.3e-15***	0.060	0.0015
	(0.0023)	(0.0008)	(0.0000)	(0.0473)	(0.0011)
Less than 7 Days Until Paid	-0.077	-0.050*	1.2e-13***	1.06	-0.12**
	(0.1031)	(0.0269)	(0.0000)	(2.2350)	(0.0491)
Days until Paid (minus 6) X Less than 7 Days Until Paid	-0.10**	-0.010	4.1e-14***	1.23	-0.049***
	(0.0433)	(0.0094)	(0.0000)	(0.8732)	(0.0176)
Month x Year Dummies	X	X	X	X	X
State Dummies	X	X	X	X	X
N	5162	5162	5162	5162	5162
adj. R-sq	0.0146	0.207	1	0.0029	0.0078

	Interest Rate	Checking Account Balance	Months in Residence	Net Pay ($1,000)
Days until Paid (minus 6)	-0.0011	-0.0016	0.10	-0.027*
	(0.0010)	(0.0075)	(0.2934)	(0.0157)
Less than 7 Days Until Paid	-0.018	-0.042	-7.25	-1.09
	(0.0396)	(0.3576)	(11.7945)	(0.7105)
Days until Paid (minus 6) X Less than 7 Days Until Paid	-0.0027	-0.13	-2.29	-0.21
	(0.0117)	(0.1239)	(4.1861)	(0.2537)
Month x Year Dummies	X	X	X	X
State Dummies	X	X	X	X
N	5162	5162	5162	5064
adj. R-sq	0.6644	0.0041	0.009	0.0086

NOTES: Table II-11 presents the results from an OLS Regression on the control variables. *Less than 7 Days Pay Day* is an indicator variable equal to one if there were less than 7 days until the borrowers next pay date. 6 days are subtracted from the *Day of Month* variable for ease of interpretation. Standard errors are in parentheses underneath each coefficient. The sample of payday loan borrowers include first time applicants and borrowers who had not taken out a loan for 90 days. States where the minimum loan length is seven and borrowers are allowed to roll over their loan are represented in the sample. Standard errors are clustered at the individual level. *** p < 0.01, ** p < 0.05, * p < 0.1

Table II-12: Controls for Semi-Monthly Borrowers

	Amount (in $100)	Homeownership	Credit Score (in 100 points)	Age	Female
Day of Month (minus 6)	-0.049***	0.0014	3.5e-14*	0.023	-0.00028
	(0.0072)	(0.0015)	(0.0000)	(0.0504)	(0.0023)
Greater than 6 Days Until Paid	0.014	0.0044	-1.9e-13*	0.49	0.0037
	(0.0499)	(0.0104)	(0.0000)	(0.3453)	(0.0151)
Day of Month (minus 6) X Greater than 6 Days Until Paid	0.093***	0.0017	-3.9e-14	-0.059	0.0049
	(0.0126)	(0.0027)	(0.0000)	(0.0883)	(0.0038)
Month x Year Dummies	X	X	X	X	X
State Dummies	X	X	X	X	X
N	14641	14641	14641	14641	14641
adj. R-sq	0.0436	0.1494	1	0.0053	0.0183

	Interest Rate	Checking Account Balance	Months in Residence	Net Pay ($1,000)
Day of Month (minus 6)	-0.0011	-0.028	0.71*	0.062
	(0.0014)	(0.0230)	(0.3811)	(0.0520)
Greater than 6 Days Until Paid	0.0074	0.38**	1.95	0.42
	(0.0105)	(0.1600)	(2.6111)	(0.3633)
Day of Month (minus 6) X Greater than 6 Days Until Paid	0.0017	-0.066*	-0.74	-0.28***
	(0.0026)	(0.0396)	(0.6779)	(0.0906)
Month x Year Dummies	X	X	X	X
State Dummies	X	X	X	X
N	14641	14641	14641	14355
adj. R-sq	0.6377	0.0047	0.008	0.0157

NOTES: Table II-12 presents the results from an OLS Regression on the control variables. *Less than 7 Days Pay Day* is an indicator variable equal to one if there were less than 7 days until the borrowers next pay date. 6 days are subtracted from the *Day of Month* variable for ease of interpretation. Standard errors are in parentheses underneath each coefficient. The sample of payday loan borrowers include first time applicants and borrowers who had not taken out a loan for 90 days. States where the minimum loan length is seven and borrowers are allowed to roll over their loan are represented in the sample. Standard errors are clustered at the individual level. *** p < 0.01, ** p < 0.05, * p < 0.1

II.7   Conclusion

States are considering numerous options to regulate payday loans, and several are moving toward regulating the lengths borrowers can take out a payday loan. Our analysis suggests this will have little impact on repayment. We use individual-level transaction data and exploit a discontinuity in loan lengths caused by state minimum loan length laws of 7 days and the fact that payday loans are due on your payday.

If the intent of changes in regulations is to lower the APR paid by borrowers, then we do not find any negative impacts of allowing longer loans. If the intent of the regulations is to give an individual more time to repay and thus increasing their ability to repay, then our study finds no impacts of these regulations.

As states consider changes in the loan lengths, it will be important to study the effects on the supply side. If longer minimum loan lengths reduce profits for the lender, it might be expected that the lender will adjust whom it lends to by becoming more selective. In our sample, however, cut-offs did not vary by state. Within states, lenders also do not adjust the interest rate based on the length of the loan.

II.8   References

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CHAPTER III

HOMEOWNERSHIP POST BANKRUPTCY

III.1 Introduction

Bankruptcies are common in the U.S. with 1.5 million households filing in 2010, a 27 percent increase in bankruptcies from 2009 (US Courts, 2010). The purpose of bankruptcy is to free an individual from debt obligations and give them a 'fresh start.' [30] While a number of studies investigate who files for bankruptcy and why,[31] there is less information on what happens to someone after she files. Bankruptcy laws are federal, but states may set their own exemptions that specify the assets an individual may retain after bankruptcy. These exemption laws affect the supply and demand of credit in the state, as well as who files for bankruptcy. This chapter will help to determine whether bankruptcy improve their assets enough to own a home, controlling for the role of state exemptions, after they file for bankruptcy.

When choosing to file for bankruptcy, an individual must decide between filing chapter 7 or chapter 13. Both chapters help to alleviate the pressures brought on by overdue debt; however, they have very different procedures. If a person files under chapter 7, her non-exempt assets are liquidated to pay off creditors and those debts that are not repaid are discharged. If an individual has exempt assets (such as a home), she may keep the home but must continue paying the interest payments. The assets that are exempt vary by state. While in some states a person's residence is completely exempt, in

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[30] See Braucher, 2004, for a good explanation.
[31] See for example: Fay, Hurst, White, 2002; White, 2010; White, 2007; White, 1998.

other states there are very low or even no homestead exemptions. Under chapter 13, however, a filer proposes a three to five year repayment plan. Instead of having all of their non-secured debts discharged, they must pay a portion of them back from their future income over a set time period. Often people file under chapter 13 to keep from losing their house (White and Zhu, 2010).

Zagorsky and Lupica (2008) examine post bankruptcy filers' financial statuses years after they file; however, they do not consider exemptions due the fact that their dataset that does not give location where the individual filed.   They find that chapter 7 bankruptcy filers catch up to non-filers in terms of their homeownership after 13.5 years. Chapter 13 filers surpass their non-filer comparison group. It has been shown that individuals filing in states with low levels of bankruptcy exemptions have lower assets than in states with high homestead exemptions. If a study does not distinguish between these two groups, estimates on assets post-bankruptcy may be over estimated.

I use data from the 1996 Panel Study of Income Dynamics (PSID), which asked questions on whether, when, and where individuals had filed for bankruptcy.   Using cross-sectional data from the 1996 PSID, I find evidence that (after controlling for demographics) those individuals filing in states with low homestead exemption are 40 percentage points less likely to own a home within a year after filing compared to the average individual in the state, and while that magnitude decreases the more time that passes since the individual filed, individuals are still 26 percentage points less likely to own a home ten years after bankruptcy. I do not find any evidence that bankruptcy filers are any different than non-filers using two other measures of financial health: food stamp use and owning a business. Bankruptcy filers in states with high levels of exemptions

appear the same as non-filers with respect to homeownership; however, these results are difficult to interpret given the small sample of bankruptcy filers in that group.

Chapter 7 filers have a statistically significant 55 percentage point lower probability of owning a home than the average non-filer. The chapter 7 filers are 19.1 and 31.2 percentage points less likely to own a home as time passes suggesting some improvement from the time they filed. Interestingly, while chapter 13 filers are 2.6 percentage points more likely to own a home within a year of filing for bankruptcy, chapter 13 filers two to ten years and more than ten years after bankruptcy are 23 and 21 percentage points less likely to own a home. The difference in the probability of owning a home is not statistically different between chapter 7 and chapter 13 filers two to ten years out and more than then years out. So, while chapter 13 filers may be filing to save their home (and are equally as likely to own a home when they file), their probability of owning a home diminishes and does not recover even 10 years after filing.

Using the panel nature of the PSID, I confirm that bankruptcy filers in states with low homestead exemptions have similar patterns before and after filing for bankruptcy regardless of whether they filed in the 1980s or the 1990s. In both cases, homeownership status is significantly below the average in the rest of the country.

I focus on homeownership in this paper because it is typically the largest portion of individuals assets, easy to identify, and is believed to provide positive benefits.[32] Rossi and Weber (1996) find a relationship between homeownership and life satisfaction, self-esteem, and community improvement. DiPasquale and Glaeser (1999) find that

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[32] This believed benefit is reflected in the fact that $80 billion of tax revenue was forgone in the United States in 2007 as a result of the Mortgage Interest Deduction. Over $477 billion dollars in mortgage interest were deducted in 2007 (Brannon et. al (2011)).

homeowners build greater social capital for their community as a result of their longer

tenure in the area from owning a home as opposed to renting.

There are costs to society of filing for bankruptcy, in addition to the costs that it

might cause creditors. These costs include legal and administrative costs of the

bankruptcy procedure, as well as direct costs, such as increased interest rates by the

creditor or negative social stigma attached to the individual from filing. If

homeownership by filers increases after bankruptcy, then the positive homeowner

benefits might make up for some of the costs. I find no evidence that individuals filing in

states with low homestead exemptions are able to reach the status of non-filers post-

bankruptcy with respect to homeownership and limited evidence of improvement over

time. To the best of my knowledge, this paper is the first to look at post-bankruptcy

homeownership status while taking into account the differences in exemption laws.

III.2 Exemptions

While there is a federal exemption level (set in title 11 section 522(2) of the U.S.

Bankruptcy Code), a number of states have opted out of federal exemptions. If a state

opts out, then its citizens must use the state exemption level. In some states, such as

Texas, a consumer's entire homestead is exempt, thus they will not lose their home by

filing a chapter 7, but they still must continue paying their mortgage. Other states, such

as Pennsylvania, have little or no homestead exemptions, and all non-exempt assets are

sold by the bankruptcy trustee at auctions and the proceeds are used to pay off some of

the debt. If a state has not opted out of the federal bankruptcy exemptions, then a citizen

in that state can choose either the state's exemption levels or the federal exemption levels

(not a combination of the two). Presumably, the individual would choose the higher

exemption. Table III-1 presents the homestead exemptions by state and whether

individuals are allowed to file under the federal exemption levels.

Table III-1: Homestead Exemptions by State

State	Federal Allowed	Homestead Exemption	Homestead Exemption if Married	High/Low Homestead Exemption
Alabama	No	5000	10000	Low
Alaska	No	54000	54000	Low
Arizona	No	100000	100000	Low
Arkansas	Yes	Unlimited	Unlimited	High
California (Exemptions 1)	No	50000	75000	Low
California (Exemptions 2)	No	7500	7500	Low
Colorado	No	30000	30000	Low
Connecticut	Yes	0	0	Low
DC	Yes	0	0	Low
Delaware	No	0	0	Low
Florida	No	Unlimited	Unlimited	High
Georgia	No	5000	5000	Low
Hawaii	Yes	30000	30000	Low
Idaho	No	50000	50000	Low
Illinois	No	7500	15000	Low
Indiana	No	7500	7500	Low
Iowa	No	Unlimited	Unlimited	High
Kansas	No	Unlimited	Unlimited	High
Kentucky	No	5000	5000	Low
Louisiana	No	15000	15000	Low
Maine	No	7500	15000	Low
Maryland	No	0	0	Low
Massachusetts	Yes	100000	100000	Low
Michigan	Yes	3500	3500	Low
Minnesota	Yes	Unlimited	Unlimited	High
Mississippi	No	75000	75000	High
Missouri	No	8000	8000	Low
Montana	No	40000	40000	Low
Nebraska	No	10000	10000	Low
Nevada	No	95000	95000	Low
New Hampshire	No	30000	30000	Low
New Jersey	Yes	0	0	Low
New Mexico	Yes	20000	40000	Low
New York	No	10000	20000	Low
North Carolina	No	10000	10000	Low
North Dakota	No	80000	80000	High
Ohio	No	5000	5000	Low
Oklahoma	No	Unlimited	Unlimited	High
Oregon	No	15000	20000	Low
Pennsylvania	Yes	0	0	Low
Rhode Island	Yes	0	0	Low
South Carolina	Yes	5000	10000	Low
South Dakota	No	Unlimited	Unlimited	High
Tennessee	No	5000	7500	Low
Texas	Yes	Unlimited	Unlimited	High
Utah	No	8000	10000	Low
Vermont	Yes	30000	30000	Low
Virginia	No	5000	10000	Low
Washington	Yes	30000	30000	Low
West Virginia	No	7500	7500	Low
Wisconsin	Yes	40000	40000	Low
Wyoming	No	10000	20000	Low
Federal		7500	15000	Low

NOTES: Table III-1 reports the homestead exemptions by state. In states where federal exemptions are allowed, an individual has the choice between high and low homestead exemptions. The fifth column reports whether the effective homestead exemption (the greater of either the state exemption or the federal if allowed) is greater than the median home value in the state ("High") or lower ("Low"). California has two exemption plans filers can choose from. The exemption laws are from Elias (1993) "How to File for Bankruptcy."

Exemption laws have been shown both theoretically and empirically to affect the supply and demand for credit in a given state, as well as affect who files for bankruptcy.[33] As a simple model to show this, consider an individual who accumulates assets, A, and debt, D, in period one. If she files for bankruptcy in period 2 in a state with exemption levels of E, then she will keep min[A, E]. If his assets are less than the exemptions, then she will be able to keep all of his assets. If the exemption level is less than his assets, she will only be able to keep the exemption level. Assuming the individual is risk averse, then she would prefer to live in a state with higher exemptions, and she will build up more assets as long as the exemption level is higher.

Higher exemption laws, however, lead to tighter credit constraints. Assume a lender is risk neutral, the risk free interest rate is R, and the interest rate she is willing to lend at is r. She will be willing to lend D_t, as long as

$$(1\text{-Prob(file)})*[D_t(1+r)]+ \text{Prob(file)}*\max\{A\text{-}E,0\}\geq D_t(1+R).$$

In other words, as long as the expected repayment when the borrower does not file $(D_t(1+r))$ plus his expected payment if the borrower files for bankruptcy ($\max\{A\text{-}E,0\}$) is greater than his outside option of lending in a risk free environment, then she will lend. If exemption levels increase and the probability of filing stays the same (for simplification), the lender will constrain the credit market either through increasing interest rates or decreasing the amount allowed to borrower.

Lin and White (2001) confirm empirically that there is credit rationing by finding that individuals in unlimited exemption states, as opposed to states with low exemptions, are more likely to be turned down for a mortgage and a home improvement loan. Taking

[33]Pavan (2008) simulates that higher exemptions on net have negative welfare impacts but that small (as opposed to none) exemptions are beneficial.

this further, Gropp, Scholz, and White (1997) find evidence that the high asset borrowers are able to obtain more credit from an increase in demand in high exemption states while low asset borrowers obtain less credit. They conclude that exemption laws redistribute credit towards high asset borrowers.

Corradin et. al (2011) investigate whether state homestead bankruptcy exemptions affect homeownership and home equity of individuals. They find no evidence that exemption laws affect the probability of owning a home in general; however, they do find that higher exemption laws increase the equity that individuals put into a home. One argument for higher homestead exemption laws is based on the idea that it may increase the desirability of owning a home, which has positive externalities. Their paper, however, does not find evidence that would support this argument.

Higher exemptions surprisingly lead to fewer bankruptcies in that state (see, for example, Shiers and Williamson, 1987).[34] Initially, it would appear that more people would file for bankruptcy when exemption levels are high since a filer would be left with more assets when she leaves bankruptcy. However, because exemption laws affect access to credit by lenders, it affects who gets into more financial trouble.

Miller (2011) uses a hand-collected sample of bankruptcy filers along with a sample of (mostly) non-filers and finds that high bankruptcy exemptions increase the probability that households with high levels of assets file for bankruptcy, meanwhile high

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[34]While the general consensus has been that exemption laws lead to lower filing rates, Dawsey and Ausubel (2004) find that people in states with high garnishment laws are more likely to file for bankruptcy, while in states where creditors are not allowed to garnish wages people are more likely to not file for bankruptcy and instead go through what they call "informal bankruptcy." Informal bankruptcy refers to people who do not go through bankruptcy proceedings but stop making their payments. They use variation in garnishment laws to help explain why states with high exemptions (where you would expect more people to file), have lower filing rates than states where there are lower exemptions.

garnishment rates increase the probability that households with low income file for bankruptcy. She supports this evidence with a two-period theoretical model.

These results suggest that high homestead exemptions help wealthier individuals in terms of accessing credit and giving them a higher incentive to file. When studying individuals after filing, it is important to distinguish between these two groups of filers since they have different wealth levels and are faced with different credit markets. If a study combines the two, then it may over-estimate the assets of filers.

III.3   What Happens Post Bankruptcy? (Previous Literature)

Studying bankruptcy filers post-filing is important for determining the impact of bankruptcy on individuals. A few studies have begun to investigate whether bankruptcy is a turning point as designed. While these papers are all important in understanding whether bankruptcy provides the 'fresh start' as intended, to the best of my knowledge, my paper is the first to look at post-bankruptcy statuses while taking into account the differences in exemption laws.

Thorne and Porter (2006) survey chapter 7 bankruptcy filers one year after filing and ask them questions on their ability to pay bills and on their financial situation in general compared to what it was before. While the majority of people were better off (65 percent), 27 percent were the same, and 8 percent were actually worse off. Their study is important and informative, but it is limited by the length of time between the filing and the survey response (just one year).

Fisher and Lyons (2010) and Han and Li (2009) examine the credit market for borrowers after they have filed for bankruptcy. Fisher and Lyons find that a bankruptcy

flag, which is placed on an individual's credit report for ten years post-filing, increases the likelihood of an individual being denied credit, increases the interest rate for unsecured loans, and decreases credit limits. Similarly Han and Li (2009) explore the effects on supply and demand for credit post bankruptcy using the Survey of Consumer Finance. They find that bankruptcy filers, not surprisingly, pay higher interest rates for all debt. Meanwhile, the filers borrow more with secured debt as availability to unsecured debt is more limited. Their results also show that filers do not often have a real 'fresh start' as they struggle with access to credit.

Zagorsky and Lupica (2008)'s analysis of post-bankruptcy filers is the most closely related to my own. In their paper, they compare bankruptcy filers in the National Longitudinal Survey of Youth 1979. The authors study the differences between individuals that file for bankruptcy and those that do not by combining individuals in all states without distinguishing between whether they are filing in a low or high exemption state. They find that bankruptcy filers take between 12 and 24 years to catch up to non-filers in terms of total income, net worth, and homeownership. Bankruptcy filers, however, are more likely to own a car (and have car debt) and work more hours.

III.4 Panel Study of Income Dynamics

This chapter uses survey responses from the *Panel Study of Income Dynamics* (PSID). The PSID is a nationally representative study that follows families through time starting in 1968. Survey responses include information such as health, income, employment, and residence location. In 1996 the survey asked a question about past

bankruptcy filings. Respondents reported if and when they filed for bankruptcy and how many times.

I use both the panel aspect of the data as well as a cross-section from 1996 when the question was asked. For the cross-section data, I compare individuals who have filed in high (low) asset exemption states to non-filers in high (low) asset exemption states, and I rely on the variation in time since filing. In 1996, they also asked a number of other questions related to the financial health of the family. In addition to studying the effects on homeownership, I look at two other measures of financial health: food stamp usage and owning a business. I then use the panel aspect of the PSID to study the homeownership decision of each individual from before they file for bankruptcy until after.

Table III-2 reports summary statistics on individuals in the PSID. The sample includes 8,491 total people reported with 525 having filed for bankruptcy in the past. Bankruptcy filers in states with low homestead exemptions are less likely to own a home, are more likely to be divorced and unemployed, and less likely to have either a college or graduate degree. Respondents who filed for bankruptcy in states with high homestead exemptions are more likely to use food stamps and have lower levels of education, but are equally as likely to own a home.

Table III-2: Summary Statistics

	All Individuals in Sample		Bankruptcy Filers			
			Low Homestead Exemption States		High Homestead Exemption States	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Number of Observations	8,491		423		102	
Fraction Using Food Stamps	0.12	(0.33)	0.12	(0.32)	0.20	(0.40)
Fraction Owning a Business	0.09	(0.29)	0.12	(0.32)	0.09	(0.29)
Fraction Owning a Home	0.57	(0.50)	0.46	(0.50)	0.56	(0.50)
Year Last Filed	1988.14	(6.87)	1987.86	(7.09)	1989.31	(5.77)
Fraction Ever Filed for Bankruptcy	0.06	(0.24)				
Average Number of Filings	0.07	(0.26)	1.06	(0.24)	1.06	(0.24)
Number of Children	0.90	(1.19)	1.07	(1.24)	1.39	(1.32)
Age	44.48	(16.13)	42.49	(11.02)	40.04	(12.69)
Fraction with Head of Household Female	0.31	(0.46)	0.30	(0.46)	0.29	(0.46)
Fraction Divorced	0.15	(0.35)	0.26	(0.44)	0.19	(0.39)
Fraction Black	0.35	(0.48)	0.34	(0.47)	0.43	(0.50)
Fraction Not White or Black	0.05	(0.21)	0.05	(0.22)	0.02	(0.14)
Fraction Unemployed in the Past Year	0.07	(0.26)	0.10	(0.30)	0.14	(0.35)
Income (ln)	10.23	(1.08)	10.34	(0.88)	10.22	(0.94)
Fraction with Education Less HS	0.26	(0.44)	0.23	(0.42)	0.24	(0.43)
Fraction with a High School Degree	0.55	(0.50)	0.66	(0.47)	0.65	(0.48)
Fraction with a College Education	0.12	(0.32)	0.07	(0.25)	0.05	(0.22)
Fraction with Graduate School	0.08	(0.26)	0.04	(0.19)	0.05	(0.22)

NOTES: Table III-2 reports summary statistics from the 1996 cross-section of the Panel Study of Income Dynamics (PSID). Low (High) Homestead Exemption States are states where the homestead exemption in that state is less (greater) than the median house value in that state.

There are a few limitations of the dataset. The first issue is that the bankruptcy question was only asked in 1996; therefore, I cannot study the impact of the 2005 Federal Bankruptcy Abuse Prevention and Consumer Protection Act.[35] Another limitation is that detailed wealth variables (including assets and debts) only began to be asked in 1984 and were just asked every five years until 2001. Family income, however, is tracked every year, as well as divorce, education, and homeownership.

It is important to note that there are only 525 observations of bankruptcy filers, and when splitting between states with high and low exemptions, only 102 observations

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[35] In 2005, the Bankruptcy Abuse Prevention Consumer Protection Act (BAPCPA) dramatically changed the bankruptcy laws by increasing the costs of filing and re-specified who is eligible to file under chapter 7. One of the provisions of the act requires debtors to complete a debtor education course prior to filing (Elias, 2009). It serves as a deterrent for filing, but it is presumably also intended to help debtors successfully emerge from bankruptcy. By studying who struggles after a filing, it will give a clearer picture of who the education policies should target and how. In addition to requiring financial education, BAPCPA forced people to wait longer before filing for bankruptcy a second time.

in high-asset exemption states. Therefore, following others that have used the same dataset, I treat all bankruptcy filers as the same and do not distinguish between chapter 7 and chapter 13 in my initial analysis. I then split those living in states with low homestead exemption into those filing for chapter 7 and chapter 13 to measure any affects that filing for a specific chapter has on ability to repay. Additionally, because of the low number of observations for states with high exemptions, I cannot make conclusive statements about these filers.

III.5   Empirical Strategy

I investigate whether filing for bankruptcy affects the likelihood that someone owns a home, runs a business, or relies on food stamps relative to the average individual in the state. If bankruptcy really gives someone a 'fresh start,' then those individuals who file for bankruptcy may resemble non-filers years after they file for bankruptcy. Additionally, if they are showing improvement over time, then the borrowers would begin approaching the same homeownership level as non-filers. I compare filers to non-filers in the same states because exemptions affect who selects into filing for bankruptcy. Thus, if I compare people in high exemption states to low exemption states I would be comparing people with different incentives to file. In robustness checks, I run a difference in difference regression and look at the changes in homeownership since filing. Finally, a bankruptcy flag is placed on a filers credit report for 10 years, which will affect an individual's access to credit, so I will want to consider those filers who no longer have the flag.

According to the Social Security Administration, households must be below certain income and resource requirements to qualify for food stamps. Presently, a family cannot have more than $2,000 in resources, which includes cash, money in bank accounts, and other property ("Food Stamp Facts," 2012). I use the question in the PSID on whether a family had used food stamps in the past year as an indicator of poor financial health of the household.

As mentioned before, a bankruptcy system provides individuals with consumption insurance and encourages entrepreneurship. Risk averse individuals will be more willing to borrow or start a business with a bankruptcy system that provides protection in the event of an unexpected shock or unsuccessful business venture (White, 2009). In fact, a number of famous (and now wealthy) individuals have filed for bankruptcy in the past. Walt Disney and Milton Hershey are just a couple of people who had businesses fall into bankruptcy before they were able to emerge and have successful ventures. Owning a business after bankruptcy would be a signal of 'fresh start.'

For all three outcomes, I begin measuring the impact of filing for bankruptcy and the time since filing using all people who had filed for bankruptcy, regardless of the state where the person files. I then categorize states into two groups: those where homestead exemptions are less than the median house price in that state (according to the census in 1990 and 2000) and those where the homestead exemption are greater than or equal to median state house price. In states where individuals have the option of filing under the federal or state exemptions, I use the maximum of the two exemptions. I run a probit regression separately for the two types of states to measure whether there appears to be a differing effect between the two.

My basic probit regression appears as follows:

$$P(Y_i = 1) =$$

$$\Phi[\beta_1(Filed\ within\ the\ Past\ Year) + \beta_2(Filed\ 2\ to\ 10\ Years\ Ago) +$$

$$\beta_3(Filed\ More\ than\ 10\ Years\ Ago) + \gamma X_i],$$

where Y_i is an indicator for someone using food stamps, owning a business, or owning a home and Φ is the normal cumulative distribution function. The three time variables indicate how long ago someone filed for bankruptcy (if they filed). All three variables are equal to zero if the individual never filed. X_i is a vector of demographics, including number of children, and age. X_i also includes dummies for the head of the household being female, the head being black, the head being neither white nor black, and a dummy if race is missing are also included. I include a square on the number of children to test whether there is a diminishing effect and include a quartic function of age to provide a flexible form of the variable. As education may also affect whether an individual owns a home or a business, I include dummies for whether someone graduated from high school, graduated from college, or attended graduate school. The omitted category is not graduating from high school. Finally, I cluster the results at the state level, and I weight the results using the PSID weighting to give a representative sample.[36]

To measure whether people are improving over time, I need to assume that people who filed in the 1980s are filing for the same reason as people who filed in the 1990s. If the people filing in different decades have different probabilities of owning a home, then

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[36] Unfortunately the PSID does not give information whether individuals live in cities or not.

it will show how people fare years after filing, but I cannot compare the outcomes over time.

Using the panel aspect of the PSID I compare bankruptcy filers across decades to examine the differences directly for each group. Figure III-1 reports these results.
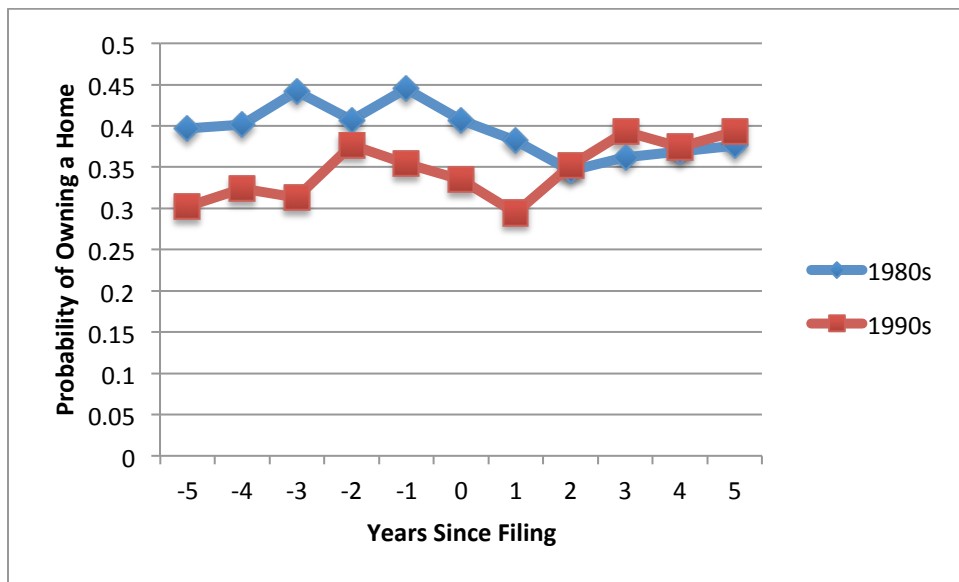
Figure III-1: Probability of Owning a Home in Low-Homestead Exemption States

Figure III-1 plots the fraction of people owning a home for bankruptcy filers in the 1980s and 1990s. The figure shows that filers in the 1980s had a higher probability of owning a home in the 1980s. Individuals who filed in the 1990s have an increasing probability of owning a home after filing for bankruptcy.[37] In un-reported results, I regress homeownership on a dummy for filing in the 1980s for each year since filing; the dummy on filing in the 1980s has no affect.

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[37] When examining this graph for high exemption states, there do appear to be differences between decades, but the number of observations is again small, making it hard to analyze.

III.6   Results

I start with an examination of how people fare years after filing for bankruptcy, regardless of the exemptions offered after bankruptcy. These results are reported in Table III-3. In the first column, the first three variables (*Filed within the past year, Filed two to ten years ago, Filed more than ten years ago*) represent individuals that have filed for bankruptcy and the comparison group is never filing for bankruptcy. Individuals who filed for bankruptcy are one to three percent more likely to use food stamps; however, after ten years, that probability falls to less than -0.01. These results suggest that individuals who file for bankruptcy are marginally more likely to use food stamps, but the magnitude of the effect is small and the results are not statistically significant. People who filed for bankruptcy in the last year are six percentage points less likely to own a business, but that effect diminishes to 2 to 0.4 percentage points as time passes.

Table III-3: Post Bankruptcy Financial Status

	Food Stamps	Own Business	Own Home
Filed within the Past Year	0.0348	-0.0620***	-0.324***
	(0.0304)	(0.0144)	(0.0783)
Filed two to ten years ago	0.00972	0.0197	-0.163***
	(0.0150)	(0.0192)	(0.0479)
Filed more than ten years ago	-0.000718	0.00413	-0.213***
	(0.0137)	(0.0267)	(0.0453)
Number of Children	0.0247***	0.00606	0.181***
	(0.00482)	(0.00613)	(0.0209)
Number of Children (Squared)	-0.00151	-0.0000604	-0.0316***
	(0.000989)	(0.00180)	(0.00493)
Age	-0.00287	-0.0153	-0.0478
	(0.00572)	(0.0132)	(0.0369)
Age Squared	0.0000534	0.000684	0.00240**
	(0.000185)	(0.000431)	(0.00113)
Head of Household Female	0.0589***	-0.0798***	-0.219***
	(0.00924)	(0.00878)	(0.0207)
Divorced	0.0107	0.00353	-0.159***
	(0.00761)	(0.0131)	(0.0291)
Black	0.0595***	-0.0551***	-0.231***
	(0.0140)	(0.00668)	(0.0297)
Not White or Black	0.0243	-0.00785	-0.122***
	(0.0171)	(0.0191)	(0.0345)
Unemployed in Past Year	0.0327**	0.0253	-0.142***
	(0.0152)	(0.0195)	(0.0264)
High School Graduate	-0.0518***	0.0216*	0.107***
	(0.00795)	(0.0125)	(0.0199)
College Graduate	-0.0519***	0.0508***	0.143***
	(0.00602)	(0.0171)	(0.0242)
Graduate School	-0.0394***	0.0815***	0.114***
	(0.00416)	(0.0184)	(0.0335)
Number of Observations	8,345	8,347	8,347

NOTES: Table III-3 presents the marginal results from probit regressions on the liklihood of owning a home. Cubic and Quadratic forms of age were also included but not reported, as well as a dummy when the race of an individual was missing. The second column includes only states where the exemption level for the state is below the median house price. The third columns includes only states where the exemption level for the state is above the median house price.   Standard Errors Clustered at the state of residence level and are reported in parentheses below the coefficient. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Bankruptcy filers are 32 percentage points less likely to own a home when they filed for bankruptcy in the past year and while the magnitude of that effect falls over time, even ten years after bankruptcy filers are 21 percentage points less likely to own a home. Overall, these results show that individuals filing for bankruptcy are significantly less likely to own a home than the average individual in the sample. However, they are no different than other individuals in their state with respect to food stamps and owning a business.

Next, I run a regression using an indicator for whether someone filed in a state with high or low homestead exemptions crossed with the number of years since they filed. The results from this regression are reported in Table III-4. People who filed for bankruptcy in states where individuals have high homestead exemptions are significantly less likely to rely on food stamps ten years after filing. This coefficient is significantly different than the corresponding coefficient for states with low homestead exemptions where individuals who filed ten years previously are not more or less likely to use food stamps. The results for owning a business are inconclusive from this regression. While filers are less likely to own a business, the differences between the coefficients on high and low homestead are not statistically different.

Table III-4: Low versus High Exemption States

	Food Stamps	Own a Business	Own Home
Filed within the Past Year x Filed in State with High Exemptions	0.0376 (0.0307)	-0.0238 (0.0565)	-0.166 (0.133)
Filed two to ten years ago x Filed in State with High Exemptions	0.0268 (0.0259)	-0.0307 (0.0187)	-0.0583 (0.0833)
Filed more than ten years ago x Filed in State with High Exemptions	-0.0234*** (0.00657)	0.179 (0.168)	0.184* (0.0948)
Filed within the Past Year x Filed in State with Low Exemptions	0.0355 (0.0383)	-0.0731*** (0.00768)	-0.389*** (0.0875)
Filed two to ten years ago x Filed in State with Low Exemptions	0.00791 (0.0159)	0.0317 (0.0235)	-0.192*** (0.0548)
Filed more than ten years ago x Filed in State with Low Exemptions	0.00410 (0.0154)	-0.00817 (0.0270)	-0.255*** (0.0421)
Number of Children	0.0246*** (0.00492)	0.00687 (0.00590)	0.177*** (0.0208)
Number of Children (Squared)	-0.00150 (0.000981)	-0.000339 (0.00181)	-0.0308*** (0.00493)
Age	0.00153 (0.00458)	-0.00331 (0.0117)	-0.0622 (0.0393)
Age Squared	-0.000114 (0.000145)	0.000271 (0.000370)	0.00286** (0.00122)
Head of Household Female	0.0582*** (0.00946)	-0.0806*** (0.00860)	-0.217*** (0.0209)
Divorced	0.0113 (0.00794)	0.00402 (0.0130)	-0.150*** (0.0301)
Black	0.0601*** (0.0144)	-0.0557*** (0.00650)	-0.239*** (0.0288)
Not White or Black	0.0251 (0.0172)	-0.0146 (0.0197)	-0.114*** (0.0332)
Unemployed in Past Year	0.0305** (0.0148)	0.0263 (0.0195)	-0.143*** (0.0254)
High School Graduate	-0.0515*** (0.00824)	0.0246* (0.0129)	0.0999*** (0.0214)
College Graduate	-0.0501*** (0.00596)	0.0541*** (0.0174)	0.131*** (0.0260)
Graduate School	-0.0378*** (0.00413)	0.0866*** (0.0199)	0.0985*** (0.0340)
Number of Observations	8,159	8,160	8,160

NOTES: Table III-4 presents the marginal results from probit regressions on the liklihood of owning a home. Cubic and Quadratic forms of age were also included but not reported, as well as a dummy when the race of an individual was missing. The second column includes only states where the exemption level for the state is below the median house price. The third columns includes only states where the exemption level for the state is above the median house price. Standard Errors Clustered at the state of residence level and are reported in parentheses below the coefficient. *** p < 0.01, ** p < 0.05, * p < 0.1.

Filers in states with low homestead exemptions are less likely to own a home, even 10 years after their filing. The differences in the coefficients between states with high exemptions and low exemptions are significantly different for every year. These results suggest that relative to the average individual in all states, individuals in high exemption states are better off after filing for bankruptcy relative to the individuals in low exemption states with respect to owning a home.

As cited earlier in the paper, individuals living in states with high homestead exemptions may have a higher demand for owning a home because they will be protected from losing their home if they file for bankruptcy. Creditors in states with high exemption laws, however, may be more restrictive in giving out loans. As a comparison group when studying an individual post bankruptcy, I want to use individuals who are faced with similar incentives and restrictions on getting a loan. Therefore, for my next set of regressions, I split the sample into individuals residing in states with high homestead exemptions versus low homestead exemptions.

Table III-5 reports results for all three outcomes split up by the state of residence. States with low homestead exemptions are represented in columns one, three, and five and states with high homestead exemptions appear in columns two, four, and six. As is shown in the first column, filing for bankruptcy in states with low exemptions increases the probability of using food stamps, but the magnitude is less than one percentage point for all outcomes except in the initial year after filing. Ten years after bankruptcy, individuals in states with high exemptions are two percentage points less likely to use food stamps, suggesting some improvement by those individuals. There is no evidence

that individuals living in states with low exemptions have continued poor financial

health.

Table III-5: Financial Status Split by State Exemptions

	Food Stamps		Own Business		Own Home	
	Low Exemption States	High Exemption States	Low Exemption States	High Exemption States	Low Exemption States	High Exemption States
Filed within the Past Year	0.0357 (0.0387)	0.0284 (0.0303)	-0.0705*** (0.00872)	-0.0371 (0.0447)	-0.401*** (0.0866)	-0.129 (0.128)
Filed two to ten years ago	0.0106 (0.0170)	0.00486 (0.0204)	0.0324 (0.0237)	-0.0294** (0.0148)	-0.206*** (0.0549)	-0.000429 (0.0663)
Filed more than ten years ago	0.00193 (0.0148)	-0.0273*** (0.00832)	0.000120 (0.0292)	0.0627 (0.0835)	-0.258*** (0.0426)	0.0310 (0.177)
Number of Children	0.0230*** (0.00505)	0.0333*** (0.0107)	0.00464 (0.00639)	0.0176 (0.0154)	0.185*** (0.0239)	0.168*** (0.0427)
Number of Children (Squared)	-0.00152 (0.00110)	-0.00226 (0.00206)	0.000887 (0.00182)	-0.00579 (0.00423)	-0.0326*** (0.00575)	-0.0302*** (0.00951)
Age	0.00161 (0.00502)	-0.0365* (0.0207)	0.00171 (0.0185)	-0.0570 (0.0361)	-0.0680** (0.0331)	0.0869 (0.0977)
Age Squared	-0.0000910 (0.000161)	0.00104 (0.000645)	0.0000784 (0.000566)	0.00216* (0.00116)	0.00313*** (0.00102)	-0.00191 (0.00302)
Head of Household Female	0.0553*** (0.00941)	0.0670** (0.0290)	-0.0791*** (0.0102)	-0.0722*** (0.0136)	-0.226*** (0.0234)	-0.182*** (0.0428)
Divorced	0.0106 (0.00869)	0.0139 (0.0148)	0.00929 (0.0139)	-0.0245 (0.0321)	-0.143*** (0.0335)	-0.228*** (0.0620)
Black	0.0524*** (0.0157)	0.105*** (0.0185)	-0.0517*** (0.00742)	-0.0609*** (0.0124)	-0.251*** (0.0339)	-0.143*** (0.0419)
Not White or Black	0.0246 (0.0196)	0.0298 (0.0349)	0.00224 (0.0198)	-0.0500*** (0.0167)	-0.111*** (0.0363)	-0.153 (0.108)
Unemployed in Past Year	0.0295** (0.0146)	0.0539 (0.0548)	0.0339 (0.0229)	-0.0117 (0.0196)	-0.144*** (0.0293)	-0.135** (0.0573)
High School Graduate	-0.0544*** (0.00846)	-0.0351** (0.0154)	0.0271** (0.0111)	0.00216 (0.0387)	0.110*** (0.0215)	0.0869 (0.0544)
College Graduate	-0.0524*** (0.00703)	-0.0445*** (0.0100)	0.0557*** (0.0197)	0.0305 (0.0271)	0.158*** (0.0254)	0.0885 (0.0721)
Graduate School	-0.0382*** (0.00379)	-0.0391*** (0.0136)	0.0868*** (0.0188)	0.0615 (0.0392)	0.107*** (0.0377)	0.130 (0.0815)
Number of Observations	6,571	1,774	6,572	1,775	6,572	1,775

NOTES: Table III-5 presents the results from probit regressions on the liklihood of using foodstamps, owning a business, or owning a home in the past year. Cubic and Quadratic forms of age were also included but not reported, as well as a dummy when the race of an individual was missing. The second column includes only states where the exemption level for the state is below the median house price. The third columns includes only states where the exemption level for the state is above the median house price. Standard Errors Clustered at the state of residence level and are reported in parentheses below the coefficient. *** p < 0.01, ** p < 0.05, * p < 0.1.

Columns three and four examine the likelihood of owning a business. Individuals are

seven and three percentage points less likely to own a business if they live in a state with

low or high homestead exemptions and filed for bankruptcy in the past year. Individuals

in states with low homestead exemptions have a positive likelihood of owning a business

(although not statistically significant) years after filing. Individuals in high exemption

states have a lower likelihood of owning a business two to ten years after filing,

suggesting some evidence of difficulty recovering.

Finally, the last two columns report results for the likelihood of owning a home.

Bankruptcy filers living in states with low exemption laws are 21 to 40 percentage points

less likely to own a home. These results suggest a struggle by bankruptcy filers to obtain

a home even after the bankruptcy flag has been lifted from their credit report after ten

years of filing. While filers are 40 percentage points less likely to own a home the year

after they file, the magnitude of the effect does diminish, again suggesting that some

people are able to improve, while on average the impact is negative. Bankruptcy filers in

states with high homestead exemptions appear to be on par with non-filers in their state

with no significant coefficients and magnitudes close to zero.

III.6.1 Robustness

To study my results in a different light, I follow both a difference in difference

method with the cross-sectional data and run a regression on the change in

homeownership since the year the individual filed or the year before she filed using the

panel data. The results confirm no change in homeownership as time passes since

bankruptcy, suggesting there is no improvement over time.

Table III-6 reports the results from a difference in difference regression. The first difference is states with high homestead exemptions versus states with low homestead exemptions. The second difference is borrowers who filed for bankruptcy versus borrowers who did not file for bankruptcy. Bankruptcy filers in states with high levels of exemptions are more likely to own a home than bankruptcy filers in low asset exemption states. The results show some improvement over time in probability of owning a home, however the effect is only on a magnitude of 0.4 percentage points per year and not statistically significant.

Table III-6: Difference-in-Difference

Dependent Variable: Owning a Home in 1996

Filer	-0.158***
	(0.0327)
High Exemption State	0.0245
	(0.0249)
Filer in High Exemption State	0.130*
	(0.0659)
Years Since Filed	0.00457
	(0.00276)
Number of Children	0.123***
	(0.0114)
Number of Children Squared	-0.0204***
	(0.00273)
Age	-0.0214
	(0.0246)
Age Squared	0.00141*
	(0.000756)
Head of House Female	-0.191***
	(0.0131)
Divorced	-0.0970***
	(0.0162)
Black	-0.191***
	(0.0176)
Not White or Black	-0.120***
	(0.0334)
Unemployed in Past Year	-0.0852***
	(0.0183)
Completed High School	0.109***
	(0.0187)
Completed College	0.170***
	(0.0237)
Grad School	0.141***
	(0.0312)
Missing Education	0.00323
	(0.0437)
Constant	0.173
	(0.289)
N	8,477
R-sq	0.278

NOTES: Table III-6 presents the results from difference in difference regressions on the liklihood of owning a home. Cubic and Quadratic forms of age were also included but not reported, as well as a dummy when the race of an individual was missing. Standard errors clustered at the state of residence level and are reported in parentheses below the coefficient. *** p < 0.01, ** p < 0.05, * p < 0.1.

Table III-7 presents results with the outcome variable being the change in homeownership status since the year the borrower filed for bankruptcy. The results show a positive impact on the change in homeownership if the borrower filed in a state with low homestead exemptions; however this result is not significant. Borrowers in states with low homestead exemptions are less likely to own a home the more years that pass relative to bankruptcy filers in high homestead exemption states. Borrowers are slightly more likely to own a home relative to the year before the borrower filed, but this result is not statistically significant and the magnitude is only 3 percentage points and not statistically significant. These results suggest that relative to states with high homestead exemptions, bankruptcy filers in states with low homestead exemptions are not more likely to buy a home years after bankruptcy.

Table III-7: Change in Homeownership, Low versus High Homestead Exemptions

	Change in Home Ownership Since Year Filed		Change in Home Ownership Since Year Before Filed	
Low Homestead Exemption State	0.0781	0.0781	0.0308	0.0308
	(0.0520)	(0.0679)	(0.0553)	(0.0892)
Change in Income	0.00000176***	0.00000176**	0.00000208***	0.00000208**
	(0.000000306)	(0.000000764)	(0.000000332)	(0.000000857)
Change in Divorce Status	-0.299***	-0.299***	-0.110***	-0.110
	(0.0286)	(0.0818)	(0.0319)	(0.0735)
Change in Health Limitation	0.0230	0.0230	0.127***	0.127**
	(0.0247)	(0.0443)	(0.0276)	(0.0579)
Years Since Filed	0.0141	0.0141	-0.00249	-0.00249
	(0.00897)	(0.0185)	(0.00942)	(0.0172)
Years Since Filed if in Low Homestead Exemption State	-0.0157*	-0.0157	0.00246	0.00246
	(0.00948)	(0.0195)	(0.0100)	(0.0185)
Constant	-0.0895*	-0.0895	-0.0992*	-0.0992
	(0.0480)	(0.0617)	(0.0506)	(0.0810)
Cluster at Individual	No	Yes	No	Yes
N	2,353	2,353	2,216	2,216
R-sq	0.066	0.066	0.033	0.033

NOTES: Table III-7 presents the results from an OLS regression with the dependent variable being the change in homeownership status. Change in divorce status and health limitation are from the year the borrower filed. Change in income is from the year the borrower filed in columns one and two and from the year before the borrower filed in columns three and four. Standard Errors are reported in parentheses below the coefficient and are clustered at the individual level in columns two and four. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Finally, I run a first difference regression with the panel data on the change in homeownership. The results in Table III-8 again reveal that while there might be a general increase in homeownership as years since bankruptcy pass, for individuals in states with low homestead exemptions this effect is not as strong as for borrowers in states with high homestead exemptions (a negative coefficient on Low Exemption State * Years Since Filed).

Table III-8: First Difference, Low versus High Homestead Exemptions

Change in Income	0.000000593**
	(0.000000244)
Change in Health Status	0.0144
	(0.0165)
Change in Divorce Status	-0.0524**
	(0.0253)
Years Since Filed	0.00871**
	(0.00348)
Low Exemption State * Years Since Filed	-0.00236
	(0.00322)
Year Filed	0.00257*
	(0.00135)
Constant	-5.138*
	(2.687)
N	3054
R-sq	0.008

NOTES: Table III-8 reports results from a first differenceing regression on the change in homeownership over time for all years since an individual filed for bankruptcy. Standard Errors are reported in parentheses below the coefficient and are clustered at the individual level in columns two and four. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

III.7 Chapter 7 versus Chapter 13

As mentioned previously, when filing for bankruptcy an individual can choose to file either a chapter 7 or a chapter 13 bankruptcy. In a chapter 7, the filer's debts are liquidated, while in a chapter 13 the borrower sets up a new repayment plan. Borrowers who have homes with values below the exemption level can keep their home by filing a chapter 13 rather than a chapter 7. Individuals filing for a chapter 13, therefore, are likely to have higher assets than the chapter 7 borrowers. Because of the fundamental differences between these borrowers, in my next analysis, I control for the chapter under which the borrower filed.

I perform the same analysis, but only including individuals in states with low homestead exemptions. The results are reported in Table III-9. Bankruptcy filers who filed a chapter 13 in the past year have a higher probability of owning a home by 2.6 percentage points, but this result is not statistically significant. Meanwhile, chapter 7 filers have a statistically significant 55 percentage point lower probability of owning a home. Interestingly, however, borrowers who filed a chapter 13 two to ten years ago and more than ten years ago are 23 and 21 percentage points less likely to own a home. The chapter 7 filers are 20 and 31 percentage points less likely to own a home as time passes suggesting some improvement from the time they filed. The difference in the probability of owning a home is not statistically different between chapter 7 and chapter 13 filers two to ten years out and more than ten years out. The chapter 13 filers seem to be getting worse, while there are some signs that the chapter 7 filers are improving.

Table III-9: Chapter 7 versus Chapter 13
Low Homestead Exemption States

	Own a Home
Filed Ch. 13 within the Past Year	0.0263
	(0.111)
Filed Ch. 13 two to ten years ago	-0.229***
	(0.0859)
Filed Ch. 13 more than ten years ago	-0.206***
	(0.0703)
Filed Ch. 7 within the Past Year	-0.550***
	(0.0714)
Filed Ch. 7 two to ten years ago	-0.191***
	(0.0653)
Filed Ch. 7 more than ten years ago	-0.312***
	(0.0579)
Number of Children	0.183***
	(0.0216)
Number of Children (Squared)	-0.0320***
	(0.00556)
Age	-0.0732**
	(0.0335)
Age Squared	0.00332***
	(0.00105)
Head of Household Female	-0.226***
	(0.0233)
Divorced	-0.135***
	(0.0353)
Black	-0.258***
	(0.0322)
Not White or Black	-0.0938**
	(0.0366)
Unemployed in Past Year	-0.142***
	(0.0281)
High School Graduate	0.108***
	(0.0233)
College Graduate	0.151***
	(0.0271)
Graduate School	0.0984***
	(0.0380)
Number of Observations	6,419

NOTES: Table III-9 presents the results from probit regressions on the liklihood of using foodstamps in the past year. Cubic and Quadratic forms of age were also included but not reported, as well as a dummy when the race of an individual was missing. The second column includes only states where the exemption level for the state is below the median house price. The third columns includes only states where the exemption level for the state is above the median house price. Standard Errors Clustered at the state of residence level and are reported in parentheses below the coefficient. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Using the panel data, I graph the same individuals before and after filing. As shown in Figure III-2, regardless of the decade, individuals who file for chapter 13 bankruptcy have a decreased probability of owning a home as time passes since bankruptcy. Chapter 7 bankruptcy filers show an improvement in their probability of owning a home as time since bankruptcy passes.
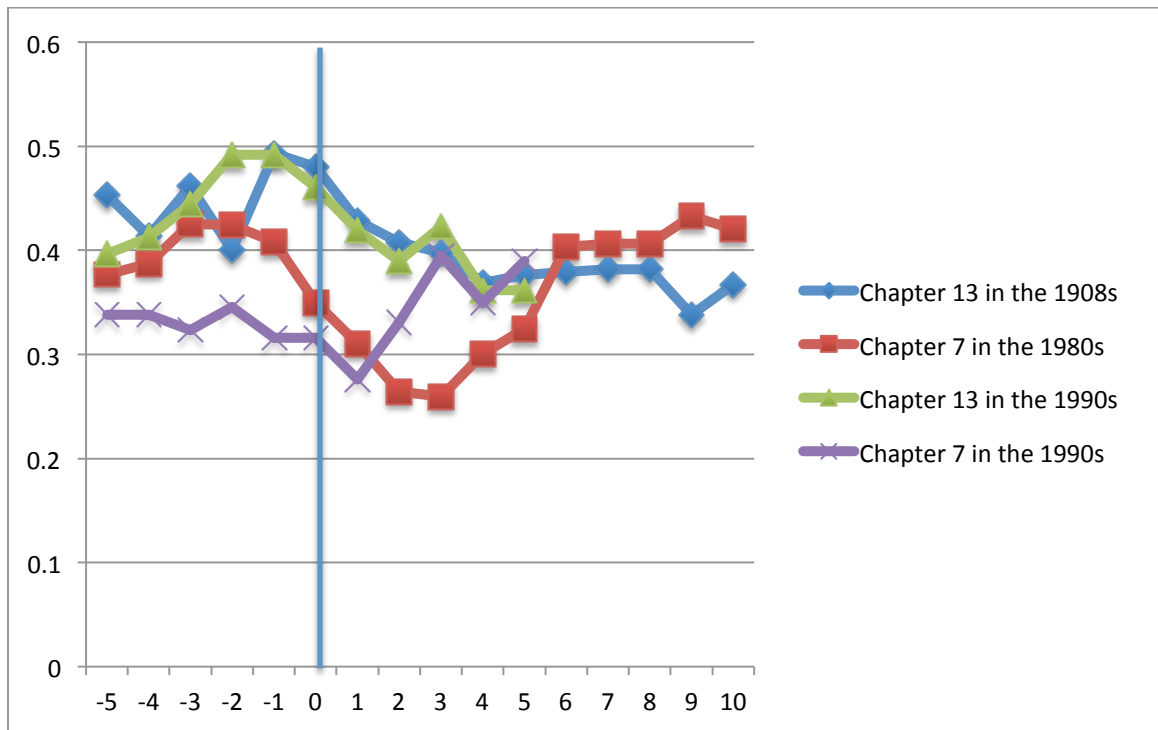

Figure III-2: Probability of Owning a Home for Chapter 7 and Chapter 13 Bankruptcy Filers in States with Low Homestead Exemptions

These results support the previous findings that chapter 7 filers are less likely to own a home than chapter 13 filers the year that they file. Chapter 7 filers show some improvement, while chapter 13 filers have a decline in their probability over time.

If I include only people in the sample who had owned a home at some point prior to filing for bankruptcy, this picture looks the same (Figure III-3) except the probability of owning a home is higher for all filers. There is a general decline in the immediate years after filing. There is an increase in the probability of owning a home for chapter 7 filers as more years since bankruptcy pass; meanwhile, chapter 13 filers continue to decline over time.
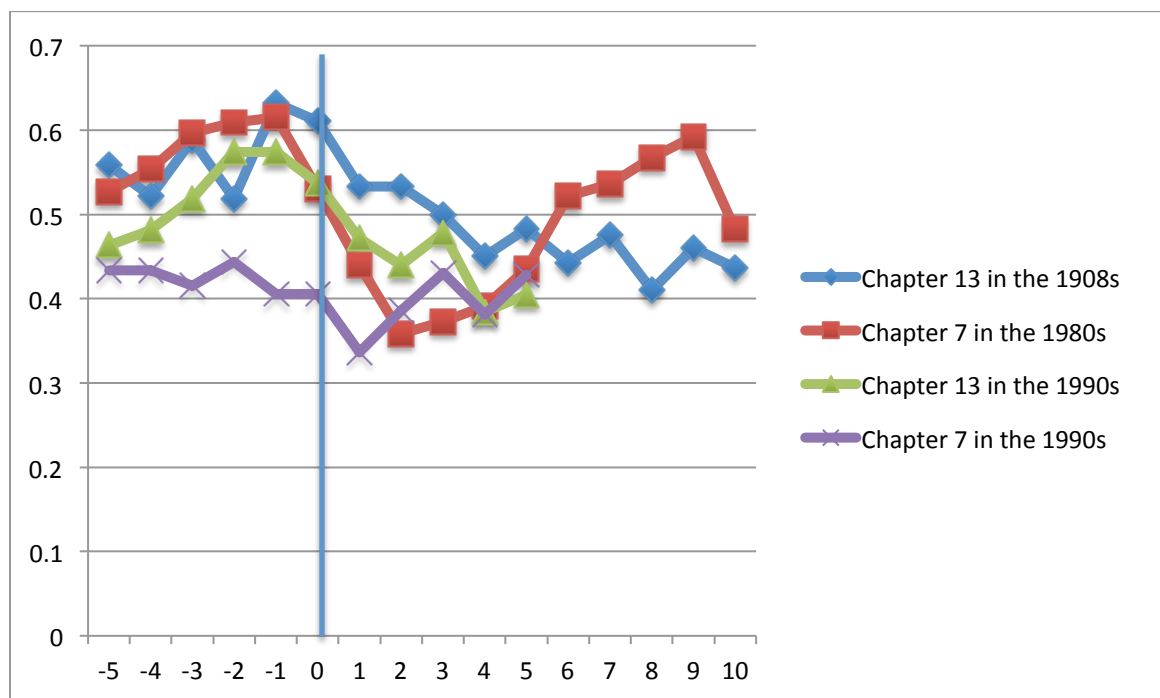

Figure III-3: Probability of Owning a Home for Chapter 7 and Chapter 13 Bankruptcy Filers in States with Low Homestead Exemptions, Conditional on Owning a Home at Some Point Prior to Bankruptcy

I then ran a regression on the change in homeownership post bankruptcy. The dependent variable is the change in homeownership from the year that the individual filed (Table III-10). I also run the same regression with the change in homeownership from

the year before the individual filed. Bankruptcy filers may be falling into trouble years

before they file, so it is not clear what the appropriate comparison group is. As the

results show, the more years since filing, the greater the chance that a filer owns a home.

However, for chapter 13 filers this effect is negative. As time passes, chapter 13

bankruptcy filers in states with low homestead exemptions are losing their homes. These

results support the graphical results showing that chapter 13 filers are struggling post

bankruptcy, while there is a slight increase in homeownership for the chapter 7 filers.

When these results are clustered at the individual level, their statistical significance

disappears.

Table III-10: Change in Homeownership, Chapter 7 versus Chapter 13

	Change in Home Ownership Since Year Filed		Change in Home Ownership Since Year Before Filed	
Change in Income	0.00000141***	0.00000141	0.00000218***	0.00000218**
	(0.0000003)	(0.000000868)	(0.000000368)	(0.00000107)
Change in Divorce Status	-0.328***	-0.328***	-0.134***	-0.134
	(0.031)	(0.0912)	(0.0346)	(0.0838)
Change in Health Limitation Status	0.0258	0.0258	0.142***	0.142**
	(0.027)	(0.0489)	(0.0302)	(0.0671)
Years Since Filed	0.00353	0.00353	0.00582	0.00582
	(0.004)	(0.00891)	(0.00467)	(0.00983)
Filed Chapter 13	-0.0107	-0.0107	0.0325	0.0325
	(0.007)	(0.0120)	(0.0470)	(0.0720)
Filed Ch. 13 * Years Since Filed	-0.00873	-0.00873	-0.0162**	-0.0162
	(0.043)	(0.0553)	(0.00754)	(0.0145)
Constant	-0.00892	-0.00892	-0.0809***	-0.0809
	(0.026)	(0.0399)	(0.0276)	(0.0516)
Cluster at Individual	No	Yes	No	Yes
N	2,001	2,001	1,859	1,859
R-sq	0.071	0.071	0.043	0.043

NOTES: Table III-10 presents the results from an OLS regression with the dependent variable being the change in homeownership status. Change in divorce status and health limitation are from the year the borrower filed. Change in income is from the year the borrower filed in columns one and two and from the year before the borrower filed in columns three and four. Standard Errors are reported in parentheses below the coefficient and are clustered at the individual level in columns two and four. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Finally, I run a first differencing regression looking at the change in

homeownership over time. The results shown in Table III-11 are again the same. While

there is some improvement over time for borrowers likelihood of owning a home for each

year since filing (a 0.6 percentage point change for each additional year), this variable is

offset slightly for borrowers who filed a chapter 13 bankruptcy.

Table III-11: First Differencing on Homeownership	
Change in Income	0.000000535*
	(0.000000275)
Change in Health Status	0.00774
	(0.0178)
Change in Divorce Status	-0.0617**
	(0.0268)
Years Since Filed	0.00600***
	(0.00204)
Chapter 13 Filer * Years Since File	-0.000548
	(0.00167)
Year Filed	0.00225
	(0.00137)
Constant	-4.500
	(2.736)
N	2680
R-sq	0.007

NOTES: Table III-11 reports results from a first differenceing
regression on the change in homeownership over time for all years
since an individual filed for bankruptcy. Only states with low
homestead exemptions are included in the table. Standard Errors are
reported in parentheses below the coefficient and are clustered at the
individual level in columns two and four. *** $p < 0.01$, ** $p < 0.05$,
* $p < 0.1$.

III.8 Conclusion

Federal exemption laws are set in the bankruptcy code title 11 section 522(d), but

individual states can opt out of the federal exemption laws and set their own. If a state

does not opt out, an individual can choose either the federal or state exemption level, whichever makes him better off. Because of this, there is wide variation in the exemption laws people face.

Previous researchers have found that exemption laws affect the number of people that file for bankruptcy, individuals' demand and supply for credit, and the type of person (high or low asset) to file for bankruptcy. Fewer people but higher asset individuals file for bankruptcy in states with high homestead exemptions.

In this paper, I examine whether individuals are able to improve post bankruptcy and find that filers are not different than the average individual with respect to the use of food stamps and owning a business. Bankruptcy filers, however, are less likely to own a home even 10 years after filing. This result is driven by people who filed for bankruptcy in states with low homestead exemption laws and confirmed using multiple specifications. This paper confirms results that bankruptcy filers living in high exemption states have greater assets than those filers in low exemption states, but also shows that the lower level of assets continues years after bankruptcy. This paper expands our understanding of how successful individuals are in escaping bankruptcy by taking into account the different impact of state exemptions.

I then split individuals who file in states with low homestead exemptions into two groups: those who file for a chapter 7 and those who file a chapter 13. The probability that individuals who file chapter 13 own a home falls as time since bankruptcy passes. The probability that individuals that file a chapter 7 own a home increases slightly from the year that they filed; however, they still remain below the average individual in terms of their likelihood of owning a home. These results show that bankruptcy filers in states

with low homestead exemptions are not able to reach the same homeownership status of the average individual in the state and that chapter 13 filers have a lower likelihood of owning a home years after filing.

Further studies are needed to examine why filers in high exemption states are different in different decades, and whether that may impact post-filing behavior and financial status. Additionally, a better dataset, possibly through a repeat question in the PSID on bankruptcy, will help get more power in understanding the effect for high exemption states.

While these results show that borrowers in states with low homestead exemptions are not able to reach the same level of homeownership as non-bankruptcy filers, it is not clear that this result is negative. Of the sample, only approximately six percent of bankruptcy filers in the sample file for a second bankruptcy. If borrowers are filing chapter 13 to keep their home, but then end up losing their home it may be a choice that does not necessarily mean that they are any worse off relative to a non-filer.

These results are in contrast to other findings that bankruptcy filers catch up to non-filers years later. These results show that borrowers in states with low homestead exemptions do not catch up to non-filers and chapter 13 filers household assets decline over time.

III.9   References

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