Determinants of Short-term Consumer Lending Interest Rates *

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Abstract

One of the most striking characteristics of the short-term consumer lending industry is the high level of interest rates. This study tests a theory of consumer lending interest rates in which fixed processing costs of short-term loans are the main determinant of interest-rate levels. I perform empirical tests using store-level data from payday and title lenders in the State of Utah from 2010, combined with zip-code level socioeconomic data from the U.S. Census Bureau and the Internal Revenue Service representing potential borrowers. I find that competition among lenders reduces average interest rates and that riskiness of borrowers, as measured by defaults, increases average interest rates. I also find that short-term consumer interest rates have a nonlinear and significant relationship to average income, consistent with anecdotal evidence from the payday lending industry but inconsistent with the hypothesis that short-term consumer lenders prey upon the poor. Lastly, I find no evidence that race or eduction affect the short-term lenders' interest rates.

keywords: Consumer lending, interest rates, payday lenders.

JEL classification: D91, E43, G29.

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1 Introduction

One of the most striking characteristics of the short-term consumer lending industry—as exemplified by payday and title lenders—is the high level of interest rates charged for these types of loans, sometimes in excess of 500 percent in annual percentage rate (APR) terms. Many consumer groups categorize these loans as predatory. However, the results from meaningful assessments of these prices or interest rates that include some measurement of outcomes from and determinants of those prices are mixed. Morgan (2007) and Morgan et al. (forthcoming) find evidence that payday lenders are not predatory using outcomes such as debt delinquency, personal bankruptcy, returned check fees, and complaints against lenders. In contrast, Melzer (2011), Skiba and Tobacman (2011), and Carrell and Zinman (2008) find evidence that payday lenders decrease welfare using outcomes such as delinquency in mortgage, rent, and utilities payments, personal chapter 13 bankruptcy filings, and military personnel performance.

This study identifies the main determinants of interest rate levels in the short-term consumer lending market and estimates the magnitude of the effect of those factors on the interest rates. The analysis is based on a theory of loan supply in which fixed processing costs are a key feature of the supplier prices. I perform empirical tests using store-level data from payday, title, and pawn lenders in the State of Utah from 2010, combined with zip-code level socioeconomic data from the U.S. Census Bureau and Internal Revenue Service representing potential borrowers.

The main difficulty in any study of the short-term consumer lending industry is the lack of detailed data. Many states collect annual industry- and firm-level averages of key statistics, such as interest rates, but no organization publishes store-level data on payday, title, and pawn lenders. This study combines high-response-rate survey data of individual Utah payday, title, and pawn lender locations with U.S. Census Bureau and IRS data to estimate the main determinants of interest rates in the short-term consumer lending market.

Melzer (2011), Prager (2009), Damar (2009), and Burkey and Simkins (2004)

study the factors that influence where lenders locate.[1] In this paper, I take as given the location of payday lenders and assume that their primary customer base is comprised of the population in the immediate surroundings. I use lender average loan characteristics in 2010, location and market concentration data, and zip-code level data on surrounding potential borrower characteristics in order to estimate how different factors affect equilibrium interest rates.

Utah is an ideal state in which to conduct this experiment because its regulation of short-term consumer lenders is one of the least restrictive relative to other states and, therefore, has fewer policy distortions. Utah has no cap on interest rates and no cap on loan amounts. This study is also the first of its kind to use multiple short-term consumer lending industries. Until now, most studies have focused solely on the payday lending industry. And this study estimates the general equilibrium factors affecting interest rates by simultaneously incorporating the supply side of the market (lenders) and the demand side (borrowers).

The first contribution of this study is the survey data itself. The survey data collected for this study had a response rate of more than 50 percent for the Utah payday and title lenders, although the response rate for the Utah pawn lenders was just under 7 percent. These response rates make these data some of the most representative of their kind. In addition to their value to this study, these data will be important in answering many other questions regarding this industry. Furthermore, these data might serve as a model for short-term lending data collection in other states.

One benefit of the high response rate among Utah payday and title lenders is that I could impute the data for the lenders who did not respond to the survey and estimate the total size of the Utah payday and title lending markets in 2010. The estimated market size of the Utah payday lending industry in 2010 was a total principal lent of $280.4 million, and the estimated market size of the Utah title lending industry in

[1] Although some of the papers mentioned here find that short-term lenders' location is correlated with demographics, Donald Morgan and Kevin Pan have a post on the Federal Reserve Bank of New York blog (http://libertystreeteconomics.newyorkfed.org/2012/02/do-payday-lenders-target-minorities.html) in which they use the Survey of Consumer Finances and find that minorities are no more likely to use payday or pawn loans once financial characteristics of the individual are controlled for.

2010 was a total principal lent of $34.7 million. Compare these numbers to the size of Utah's more traditional revolving and nonrevolving credit markets of $6.4 billion and $10.8 billion. A finding of this study is that the short-term lending market is small in comparison to the more traditional credit markets.

The other main contributions of this study are the empirical results estimating how different factors affect interest rates in the short-term lending industries. Consistent with standard economic theory, I find that the interest rates charged by short-term lenders decrease with the number of other lenders nearby. Competition reduces prices. This finding is significant in that it allows policymakers to quantify the cost of higher interest rates that is likely to result from limiting the number of lenders that can locate in a given geographic area.

I also find that short-term consumer interest rates increase with the riskiness of borrowers as measured by the default rate. Riskier borrowers are more costly to lend to. I find no evidence that race or education influences short-term consumer lending interest rates. However, I do find that areas with younger populations have slightly higher interest rates.

Consistent with anecdotal evidence from payday lenders, I find a statistically significant nonlinear relationship between income and interest rates. However, the results suggest that average interest rates increase with income up to a threshold of around $47,000 in median individual income, and average interest rates decrease for median incomes higher than $47,000. This finding is consistent with the comments from some payday lenders that they prefer to locate in areas in which incomes are neither too low nor too high. This result also provides evidence against the claim that payday and title lenders prey upon the poor. On the contrary, lower incomes are associated with lower interest rates for most of the range of incomes.

I also present a theoretical model in which short-term consumer lending interest rates are primarily determined by fixed loan processing costs. This theoretical model predicts that the interest rates that lenders charge on a particular loan should decrease with the amount of the loan and the term (duration) of the loan. This relationship seems to hold true in simple correlations among aggregate industry data for the U.S.

that I present in Section 2. However, these relationships go away in the more detailed statistical model of Section 5, in which I control for loan type, demographics, and both supply and demand in these markets. This could be because the market for short-term loans segments on loan type rather than on interest rates. Or it could also mean that the data did not have enough observations to measure the relationship with statistical significance.

The paper proceeds as follows. Section 2 describes the payday, title, and pawn industries in the United States. Section 3 presents a general equilibrium theory of a lending market in which the supply side is characterized by fixed processing costs and in which loans of varying amounts and varying maturities are offered. Section 4 describes the survey data and Census data used in the empirical tests in Section 5. Section 6 concludes.

2 U.S. Short-term Lending Industries

Stegman (2007), Elliehausen (2009), and Lawrence and Elliehausen (2008) provide descriptions of both the supply side and demand side of the payday lending industry. Table 1 provides a description from the recent literature of consumer credit loan characteristics across a number of different subindustries. Notice that bank overdraft and non-sufficient funds (NSF) charges were included as short-term consumer loans.[2] One pattern that emerges from Table 1 is that average interest rates across loan types tend to fall as the durations of the loans increase.

Although revolving credit, such as credit card balances, is significantly different from payday, title, and pawn loans, credit cards are clearly an alternative source of borrowing for fringe borrowers (see Agarwal et al., 2009). The Federal Reserve Board (April 7, 2009) consumer credit statistical release shows that the average credit card interest rate on cards that were assessed interest was estimated to be 13.08 percent in February 2009. This includes credit cards for which the balances are paid every

[2]In effect, the average bank overdraft fee in 2008 was $20, for which the average overdraft amount was $66, and the average duration the account was overdrawn was two weeks. That amounts to the implied APR of 1,067%. See Bachelder et al. (2008, p. v).

Table 1: Descriptive statistics of U.S. short-term lending industries from literature

Loan type	Avg. APR[a]	Avg. amount	Avg. term (days)	Default rate
Credit card	13%	$10,695	+1 year	
Pawn broker	240%	$67	56	20%
Title lender	250%	$350	28	
Payday lender	469%	$300	14	14%
Bank overdraft/NSF	1,067%	$66	14	

[*] Sources: These statistics and rankings come from Elliehausen (2009), Agarwal et al. (2009), Io Data Corporation (2002), Caskey (1994), Moore (May 27, 2001), Quester and Fox (2009), Peterson (2004), Federal Reserve Board (April 7, 2009), and Bachelder et al. (2008).

[a] The annual percentage rate (APR) is calculated as the percentage rate for the term of the loan (18 percent) multiplied by the number of terms in a year (365 days/14 days ≈ 26 terms). Note that this is calculated as a compounded rate but is not actually a compounded rate because the fee paid at the end of the term generally cannot be rolled over.

month before any interest accrues.

A major difference between payday loans and the other types of loans listed in Table 1 is that payday loans are arguably least collateralized and, therefore, subject lenders to the greatest loss of principal upon borrower default. Payday loans are clearly less collateralized than a pawn loan or a title loan because the latter two loans require the transfer of a claim on some asset that the lender evaluates at the time of the transaction. Payday loans are more similar to bank account overdraft/NSF fees and revolving credit card debt in that they have no direct recourse on any specific assets or on the borrower's job. However, payday loans do not have the same degree of repeated interaction as bank and credit card transactions.

The credit investigation for a payday loan consists primarily of verification of a bank account and a job. The payday lender has information on both and can use them to collect if the borrower defaults. However, this collection is costly because the payday lender's only method of obtaining repayment upon borrower refusal may be through a small-claims court proceeding. Banks and credit card companies can punish delinquent borrowers with decreased credit scores and with exclusion from other complementary services. Payday lenders have no widely adopted credit reporting system across lenders and across states.

Elliehausen (2009) documents that the largest class of costs for payday lenders is operating expenses. He notes that most of these costs occur when an application is taken or a loan is extended. "Consequently, operating expense is greater relative to loan size for small loans than for large loans. This characteristic of loan costs produces the result that break-even interest rates are higher for small loans than for large loans." These fixed loan processing costs will play a central role in the proposed theory in Section 3.

Title loans are somewhat less risky than payday loans because the lender has a lien on the title of an asset that can be repossessed and sold if the borrower defaults. Quester and Fox (2009) reported that the average title loan in Missouri in 2001 was $350. Both Quester and Fox (2009) and Peterson (2004) reported the average title loan interest rate to be around 250% APR.

The pawn lender is the most collateralized in that the collateral for the loan is kept on site at the pawn shop, and and ownership of the collateral is permanently transferred to the lender in the case of borrower default. The pawn shop is probably both the oldest form of short-term lending as well as the industry with the worst public image.[3] However, the pawn form of short-term lending is also the most straightforward loan contract treated in this paper. It involves a customer bringing in a piece of collateral, the pawnbroker predicting the value at which he thinks he can sell the object quickly, the pawnbroker offering a loan to the customer of some fraction of the value of the collateral, and the customer giving the pawnbroker the right to sell the collateral if the customer does not repay the loan in a given period of time.

The average pawn loan is currently $80, as reported by the National Pawnbrokers Association.[4] This is in line with Caskey (1994, pp. 44-45) who reports that the average pawnshop loan size in 1990 was between $50 and $70. The average loan amount for the publicly traded pawnbroker Cash America International, Inc. (NYSE:

[3]In the Mosiac Law of the Old Testament (see James, ed (2000, Exodus ch. 22, vv. 25-27)), which conservative estimates date to 1290 B.C., Moses prohibits the Israelites from making loans among themselves based on collateral such as clothing. Whelan (1979, p. 1) states that the "pawnshop in China dates from the last quarter of the fifth century A.D.... (A.D. 479-502)."

[4]This number is reported in the *Pawn Shops Today: the national voice of the pawn industry* website at www.pawnshopstoday.com.

CSH) in 1990 was \$67.50.[5] Caskey (1994, p. 42) notes that the "loan to collateral ratio varies over time and across pawnshops, but a lone of about 50 percent of the resale value of the collateral is common." The typical loan maturity term is between one and three months.

The largest items in the cost structure of pawnshops are their inventory cost and selling cost. Pawnshops are also required to report to the local police each item they take as loan collateral, which property the police can seize if they find it to be stolen. However, as evidenced by the State of Oklahoma reporting that police seized only 0.1 percent of pawned goods as stolen, Caskey (1994, p. 38) estimates that police seizure of pawnshop property accounts for only a small cost to pawnbrokers.

In a survey of pawnshops in Florida, Iowa, and South Dakota where pawnshop fees are unregulated, Caskey (1994, p. 39) found that most pawnshops "were charging between 18 and 28 percent a month for a loan of \$50." Converting those monthly rates into annual rates, Caskey found that the typical pawnshop loan APR was 240 percent in 1994. Caskey (1994, p. 41) estimates that only between 10 and 30 percent of pawnshop borrowers do not repay their loans and collect their collateral. Moore (May 27, 2001) quotes an owner of a pawnshop in Cleveland, Ohio, giving an estimate that 80 percent of his customers did not have bank accounts.

3 Theoretical Model

The theoretical model of this section is a life-cycle model in which overlapping generations of rational-expectations consumers live for three periods, have stochastic endowments of income in each period, and make borrowing and saving decisions each period between one-period and two-period borrowing and savings technologies. The suppliers of these borrowing and savings technologies have an exogenous large endowment of equity that they are willing to lend out at profit-maximizing rates. The lending firms are also characterized by a fixed processing cost for each borrower to

[5] Per shop amount of loans made and renewed \$863,058 divided by the per shop number of loans made and renewed 12,786 equals \$67.50. See Caskey (1994, Table 3.2).

whom they make a loan, regardless of loan size or loan duration. The demand side of this model is based on the standard life-cycle endowment economy first proposed by Samuelson (1958). The difference here is the addition of multiple term-lengths of assets.

The key results of the loan demand side of the theory are that the amount that households want to borrow and the term for which they want to borrow are both dependent on interest rates and incomes. On the supply side, this fixed loan processing costs model generates a competitive equilibrium in which interest rates are lower for longer-term loans and are lower for larger loan amounts. These are some of the key predictions of the model that are suggested by the aggregate data in Table 1 and that we want to test with the more detailed Utah data and the more sophisticated empirical model of Section 5.

3.1 Households

Households in this model live for three periods and have stochastic endowments of income in the last two periods of life. In every new period, a measure 1/3 of new households is born. In the first period of life, they choose consumption $c_{1,t}$ and a borrowing portfolio of either a one period asset $b_{2,1,t+1}$ or a two period bond $b_{3,2,t+2}$. A negative b indicates borrowing, the first subscript on the assets indicates age, the second subscript indicates how many periods until maturity, and the last subscript indicates the period in which the bond matures.

In the second period of life, each household chooses second-period consumption $c_{2,t+1}$ and the amount of another one-period bond to borrow $b_{3,1,t+2}$. And in the last period, the households simply consume all their income and pay off their loans. In each period t, each household of age s receives an endowment of income $e_{s,t}$, such that the expected values of $e_{2,t}$ and $e_{3,t}$ are sufficiently high to insure that the households borrow in the first period of life. Also, each age-s household faces a budget constraint

each period.

$$c_{1,t} + b_{2,1,t+1} + b_{3,2,t+2} = e_{1,t} \quad \forall t \tag{3.1}$$

$$c_{2,t} + b_{3,1,t+1} = e_{2,t} + (1 + r_{1,t})b_{2,1,t} \quad \forall t \tag{3.2}$$

$$c_{3,t} = e_{3,t} + (1 + r_{1,t})b_{3,1,t} + (1 + r_{2,t})b_{3,2,t} \quad \forall t \tag{3.3}$$

The household's set of decisions over its three-period lifetime is then to choose asset allocations $b_{2,1,t+1}$, $b_{3,2,t+2}$, and $b_{3,1,t+1}$ in order to maximize expected lifetime utility, subject to three age-specific budget constraints.

$$\max_{b_{2,1,t+1}, b_{3,2,t+2}, b_{3,1,t+1}} u(c_{1,t}) + \beta E_t\left[u(c_{2,t+1})\right] + \beta^2 E_t\left[u(c_{3,t+2})\right] \tag{3.4}$$

$$\text{s.t.} \quad c_{1,t} + b_{2,1,t+1} + b_{3,2,t+2} = e_{1,t} \tag{3.1}$$

$$\text{and} \quad c_{2,t+1} + b_{3,1,t+2} = e_{2,t+1} + (1 + r_{1,t+1})b_{2,1,t+1} \tag{3.5}$$

$$\text{and} \quad c_{3,t+2} = e_{3,t+2} + (1 + r_{1,t+2})b_{3,1,t+2} + (1 + r_{2,t+2})b_{3,2,t+2} \tag{3.6}$$

Let the period utility of consumption be the log function $u(c_{s,t}) = \log(c_{s,t})$. Then the equilibrium is solved by backward induction from the last period of life to the first period of life for each household. In the last period, utility is maximized by consuming all available resources after debts are paid or interest is earned.

$$c_{3,t+2} = e_{3,t+2} + (1 + r_{1,t+2})b_{3,1,t+2} + (1 + r_{2,t+2})b_{3,2,t+2} \tag{3.6}$$

In the second period of life, the household chooses between consumption $c_{2,t+1}$ and a one-period asset $b_{3,1,t+1}$.

$$\max_{b_{3,1,t+2}} u(c_{2,t+1}) + \beta E_{t+1}\left[u(c_{3,t+2})\right] \tag{3.7}$$

$$\text{s.t} \quad c_{2,t+1} + b_{3,1,t+2} = e_{2,t+1} + (1 + r_{1,t+1})b_{2,1,t+1} \tag{3.5}$$

$$\text{and} \quad c_{3,t+2} = e_{3,t+2} + (1 + r_{1,t+2})b_{3,1,t+2} + (1 + r_{2,t+2})b_{3,2,t+2} \tag{3.6}$$

The solution to (3.7) is characterized by the following Euler equation,

$$\frac{1}{e_{2,t+1} + (1 + r_{1,t+1})b_{2,1,t+1} - b_{3,1,t+2}} = ... \\ \beta E_{t+1}\left[\frac{1 + r_{1,t+2}}{e_{3,t+2} + (1 + r_{1,t+2})b_{3,1,t+2} + (1 + r_{2,t+2})b_{3,2,t+2}}\right] \tag{3.8}$$

Because the only uncertainty is over the household endowment of income $e_{3,t+2}$, the interest rates that the firms charge each period in the next period $r_{1,t+2}$ and $r_{2,t+2}$ are known with perfect foresight. One characteristic of the demand for borrowing in the second period of life is that it is negatively correlated with the endowment of income in the second period. The amount of borrowing is also a function of the interest rates on the one- and two-period bonds.

The solution to the household's problem in the first period of life is to choose allocations between period-1 consumption $c_{1,t}$ and either borrowing or lending in the two different maturity assets $b_{2,1,t+1}$ and $b_{3,2,t+2}$. This problem is characterized by equations (3.1), (3.4), (3.5), (3.6), and (3.8). The solutions for the demand for assets $b_{2,1,t+1}$ and $b_{3,2,t+2}$, as well as the demand for the one-period asset $b_{3,1,t+2}$ in the second period of life characterized in (3.8), can each be written as functions of each other as well as the exogenous parameters,

$$b_{2,1,t+1} = f\left(b_{3,1,t+2}b_{3,2,t+2}, \mathbf{Z}_t\right) \tag{3.9}$$

$$b_{3,1,t+2} = f\left(b_{2,1,t+1}b_{3,2,t+2}, \mathbf{Z}_{t+1}\right) \tag{3.10}$$

$$b_{3,2,t+2} = f\left(b_{2,1,t+1}b_{3,1,t+2}, \mathbf{Z}_t\right) \tag{3.11}$$

where $\mathbf{Z}_t$ is a vector of exogenous variables to the household $\{e_{1,t}, r_{1,t+1}, r_{1,t+2}, r_{2,t+2}\}$. Again, the choice of the amount of each asset is a function of interest rates and incomes. Wendner (2004) proves existence and uniqueness of the steady-state of this class of model.

3.2 Lenders

Lenders have an exogenous and large amount of equity that they are willing to lend to the market. I assume that the amount of this equity is determined outside of the market in which the households in Section 3.1 operate. I also assume that these lenders are the only option for the households.

Let a continuum of identical perfectly competitive lenders choose the quantity of one-period loans to each type $b_{2,1,t+1}$ and $b_{3,1,t+1}$ to make and the quantity of two-period loans $b_{3,2,t+2}$ to make in order to maximize profits. The profits from each type of one-period loan and the profits from a two-period loan, assuming that $b_{2,1,t+1}, b_{3,1,t+1}, b_{3,2,t+1} < 0$, are given by the following equations,

$$\pi_{2,1,t+1} = (\nu - r_{1,t+1})b_{2,1,t+1} - \phi \tag{3.12}$$

$$\pi_{3,1,t+1} = (\nu - r_{1,t+1})b_{3,1,t+1} - \phi \tag{3.13}$$

$$\pi_{3,2,t+1} = (\nu - r_{2,t+1})b_{3,2,t+1} - \phi \tag{3.14}$$

where ν is the constant marginal cost of each unit of any type of loan made and ϕ is the one-time fixed cost of initiating any type of loan of any amount. In a competitive equilibrium, the lenders will only lend when the interest rate is greater than the marginal cost $r_{1,t+1} > \nu$, and free entry will force profits to zero. Thus the optimal amount of loans of each type that each lender will supply is

$$b_{2,1,t+1} = b_{3,1,t+1} = \frac{\phi}{\nu - r_{1,t+1}} \quad \forall t \tag{3.15}$$

$$b_{3,2,t+1} = \frac{\phi}{\nu - r_{2,t+1}} \quad \forall t. \tag{3.16}$$

From both (3.15) and (3.16), it is clear that the higher the amount of the loan, the lower the interest rate necessary to achieve the zero-profit condition. Put differently, higher loan amounts should be associated with lower interest rates in the face of a fixed processing cost.

Also note that the interest rate on the two-period loan $r_{2,t+1}$ is not in the same

terms as the one-period interest rate $r_{1,t+1}$. The per-period interest rate on the two-period loan $\tilde{r}_{2,t+1}$ takes the following form:

$$\tilde{r}_{2,t+1} = (1 + r_{2,t+1})^{1/2} - 1 \tag{3.17}$$

Solving (3.17) for $r_{2,t+1}$, and substituting the expression into (3.16) gives the optimal two-period loan supply in terms of amounts and interest rates that are comparable to the one-period loan supply amounts and interest rates in (3.15).

$$b_{3,2,t+1} = \frac{\phi}{\nu - (1 + \tilde{r}_{2,t+1})^2 + 1} \quad \forall t \tag{3.18}$$

Comparing (3.18) and (3.15) for an equal loan amount, the longer-term interest rate can be lower than the short-term interest rate $\tilde{r}_{2,t+1} < r_{1,t+1}$ because the longer-term interest rate can spread the fixed processing cost over a longer time period. In summary, loans with a longer term for a given amount should have lower interest rates, and loans for larger amounts with a given interest rate should have lower interest rates.

4 Data

The data in this study come from three sources. The first is from a comprehensive survey of Utah payday, title, and pawn lenders that was conducted during 2011 collecting store-level data from 2010. We also matched the survey data by zip code with socioeconomic data from both the 2010 U.S. Census and the Internal Revenue Service's Compliance Data Warehouse Individual Return Transaction File for 2009 and 2010.

4.1 Survey Data

We surveyed all of the payday, title, and pawn lenders in Utah between February and August of 2011, requesting store-level annual average data from 2010. The Utah

Department of Financial Institutions (DFI) is the primary regulator of payday and title lenders in the state. DFI maintains a list of all the registered payday and title lenders in the state, along with their contact information and the addresses of each of their physical stores.[6] We obtained the list of Utah pawn lenders from the Utah Department of Commerce, Division of Consumer Protection (DCP), which is the primary regulator of the Utah pawn industry.[7]

With the complete list of all the Utah payday, title, and pawn lenders from DFI and DCP, our survey approach was to send each lender (excluding internet lending) an initial e-mail describing the project and the data that we wanted them to provide. We attached a survey-instructions document to the initial e-mail as well as a nondisclosure agreement to guarantee the privacy of the proprietary store-level data that we were requesting.[8] After sending the initial e-mail, we followed up with at least four phone calls before determining a store to be a nonresponse. Table 2 shows the response rates for the three different lender types.

Table 2: Response rates by lender type from survey

Industry	Total stores	Participated	Response rate
Payday	285	147	51.6%
Title	204	102	50.0%
Pawn	153	10	6.5%
Total[a]	452	156	34.5%

* All Utah short-term consumer lenders (payday, title, pawn) were contacted between February and August 2011.
[a] The "Total" row is not the sum of the industry rows because some lenders offered lending products in more than one of the above three lender types.

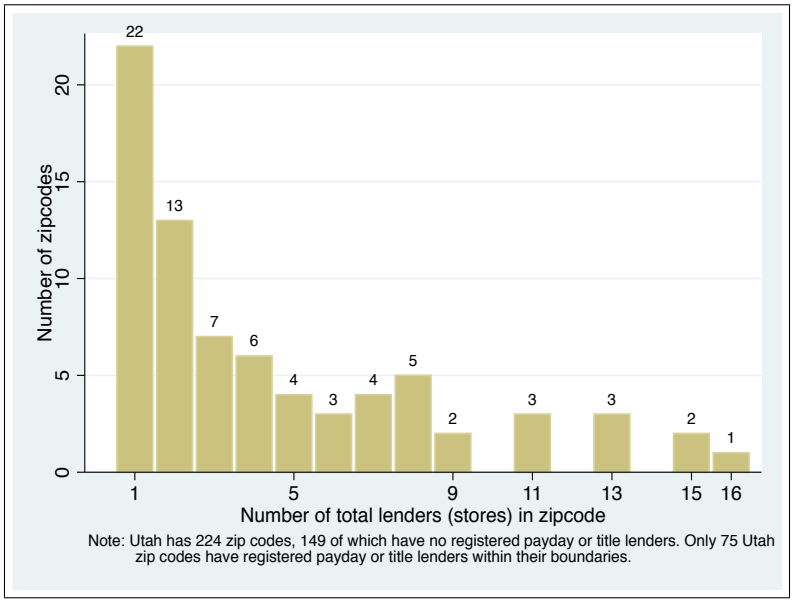
Response rates of more than 50 percent for both Utah payday and title lenders are far above the industry standard for store-level consumer lending data, and this constitutes an extremely representative sample. However, we were only able to get

[6] http://www.dfi.utah.gov/.
[7] http://consumerprotection.utah.gov/.
[8] The Technical Appendix (available upon request) contains a copy of the initial e-mail that we sent to each lender, the survey instructions that were attached to the initial e-mail, and the nondisclosure agreement.

participation from about 7 percent of Utah pawn lenders. Taken together, our survey collected data on about 35 percent of all Utah store locations offering either payday, title, or pawn loans. However, because the response rate is so low for the pawn lenders, we exclude them from the remaining analyses in the paper and focus on payday and title lenders.

Figures 1 and 2 provide evidence of how geographically representative our data sample is. Figure 1 presents a histogram of the number of Utah payday and title lenders within each Utah zip code for zip codes with at least one lender. The average number of payday or title lenders in a Utah zip code is 4.5, with two zip codes having 16 payday and title lenders and 22 zip codes having only 1 lender store. Note that there are 149 Utah zip codes that have no registered payday or title lenders.

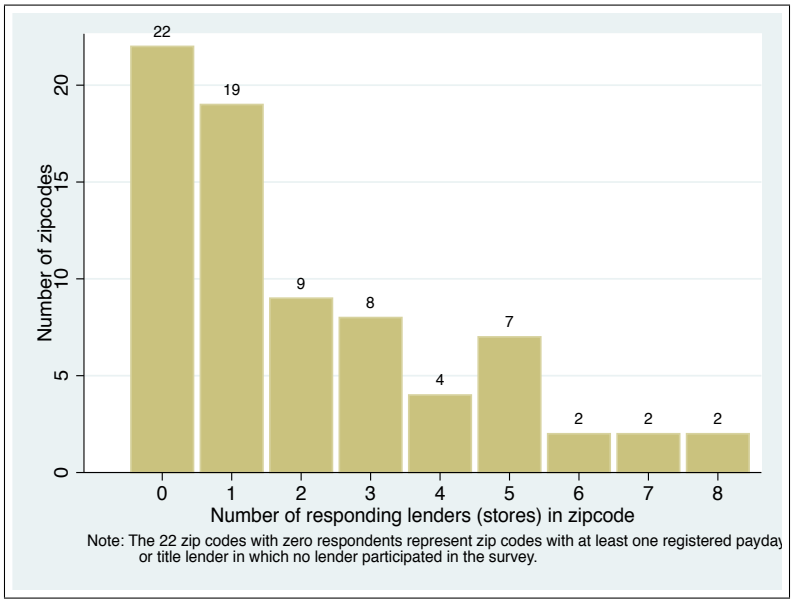
Figure 1: Histogram of number of payday and title lenders in each Utah zip code in 2010 (335 stores)



If Figure 1 presents the distribution of lenders across zip codes, Figure 2 represents the distribution of lenders who responded to the survey by zip code. The average number of payday or title lenders who participated in the survey in a given Utah zip code is 2.1 if we include the 23 zip codes that had lenders but from which none responded. Looking only at zip codes with at least one survey respondent, the average

number of respondents per zip code is 3.0 with two zip codes having 8 and 9 responding stores, respectively, and 19 zip codes having only 1 respondent lender. Of the 23 zip codes with at least one registered lender and in which we did not succeed in getting any survey participant, the average number of lenders in those zip codes was 1.8, with 96 percent of those having 4 or fewer registered lenders, and 83 percent having 2 or fewer lenders. The zip codes in which we received no survey responses had few lenders.

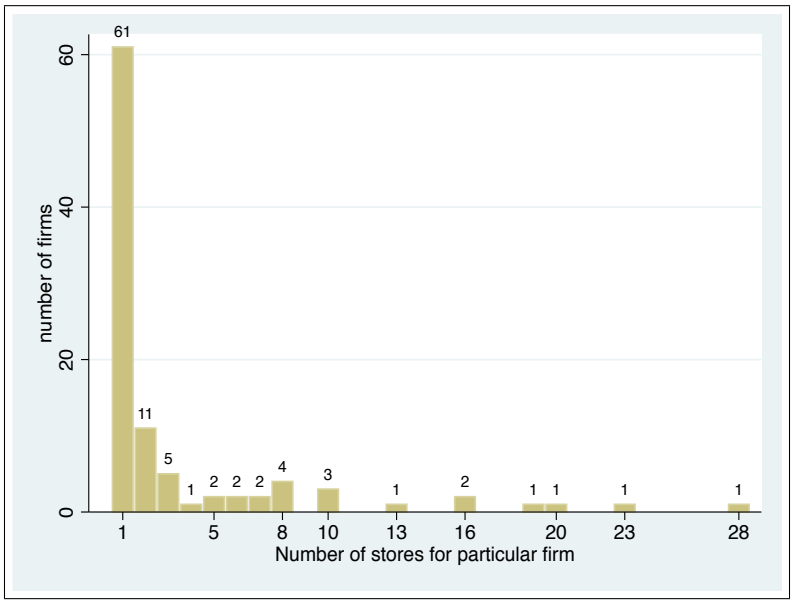
Figure 2: Histogram of number of payday and title lenders that participated in the survey in each Utah zip code in 2010 (154 stores)



Although the geographic distribution of survey participants is fairly representative, the sample distribution with regard to firm size is less so. Some stores are one of many stores owned by the same firm. Other lenders are standalone "mom and pop" stores. Figure 3 shows a histogram of the number of stores for each Utah lender firm in 2010. The average number of stores per payday and title lender firm is 3.4, with 61 of the 98 firms (62 percent) being single-store firms and with 10 of the firms (10 percent) having at least 10 stores. The same shape of histogram results if one controls for lender type.

Figure 4 shows the histogram of the number of stores for each Utah payday and

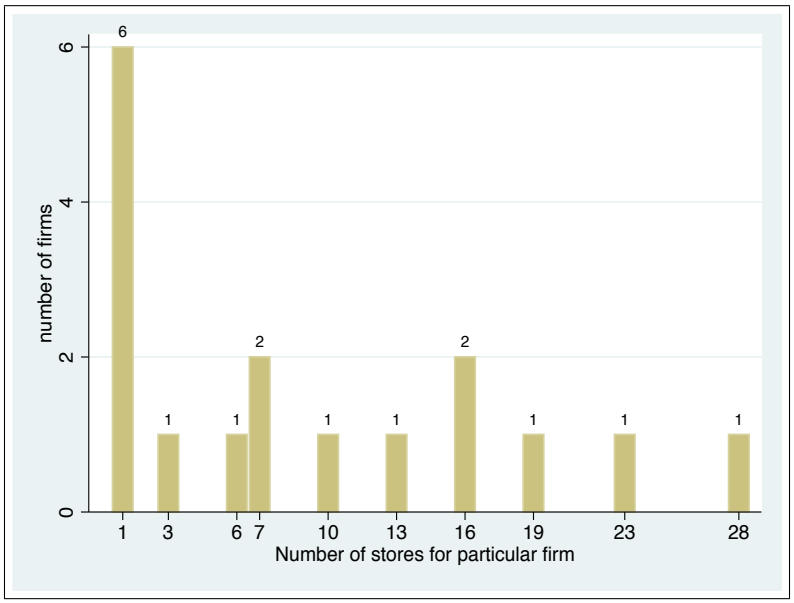
Figure 3: Histogram of number of Utah payday and title lender stores for each firm in 2010 (98 firms, 335 stores)



title lender firm that participated in the survey. At the large-firm end of the distribution, 7 out of 10 of the firms with 10 or more stores participated in our survey. However, only 6 out of the 61 single-store lenders participated. Of those 6 single-store firms, 5 were exclusively payday lenders and 1 was exclusively a title lender. The average number of stores per respondent firm is 9.1 stores. Our survey oversamples the larger firms.

Table 3 presents the descriptive statistics of the survey response data by industry. We collected five statistics from each type of lender. We asked each lender to report the average interest rate in APR terms charged to all of their borrowers in 2010. This variable is an implied interest rate calculation because it includes fees charged on the loans. We also asked for the average principal amount of each loan and the average explicit term (duration) for each loan issued in 2010. The fourth statistic we requested was a soft definition of a default rate, defined as the percent of loans during 2010 that were not paid back in full by the explicit end of the loan term defined on the original contract. The last statistic we requested from payday and title lenders

Figure 4: Histogram of number of Utah payday and title lender stores for each respondent firm in 2010 (17 firms, 154 stores)



was the total principal lent during 2010.[9]

The first thing to note is that the average interest rates among Utah payday lenders (493%) and title lenders (268%) from the survey match closely to the U.S. averages from the literature reported in Table 1. Another evidence of the quality of the survey data is that the standard deviations on the interest rates were not too large for the payday and title lending industries. However, the average interest rate in the pawn industry is significantly lower than the interest rates reported in Caskey (1994). One explanation might be that the industry has substantially changed in the last 10 years. But it is also likely that the numbers from the survey are not representative of the broader Utah pawn industry due to the low response rate among pawn lenders. For this reason, I do not include the pawn data in the analyses that follow.

The survey data showed that the average payday loan in Utah in 2010 was $409.50 and the average loan term was about two-and-a-half weeks. The average title loan was $921.49 for an average loan term of nearly six months. It is worth noting that the standard deviation of the title loan amount is very large. This is mostly due

[9]The Technical Appendix (available upon request) includes a copy of the survey instruction sheet that was given to each lender and describes the data that we were requesting.

Table 3: Descriptive statistics of lender characteristics by industry: 2010

Payday Lenders (147 stores[a])					
Statistics	Avg. interest rate (APR)	Avg. loan amount	Avg. loan term (days)	Default rate	Total principal lent[b]
Average	492.6%	$410	16.7	0.14	$1,019,344
Median	519.3%	$407	14.4	0.12	$623,372
Std. dev.	64.6%	$91	7.9	0.09	$1,181,052
Maximum	617.1%	$598	95.0	0.39	$7,494,657
Minimum	354.4%	$209	10.7	0.01	$19,109

Title Lenders (102 stores[a])					
Statistics	Avg. interest rate (APR)	Avg. loan amount	Avg. loan term (days)	Default rate	Total principal lent[b]
Average	268.6%	$921	175.9	0.17	$229,508
Median	292.0%	$733	205.6	0.12	$73,629
Std. dev.	37.5%	$974	63.0	0.14	$457,317
Maximum	304.2%	$10,000	365.0	0.51	$2,471,438
Minimum	120.0%	$236	49.0	0.00	$3,526

Pawn Lenders (10 stores[a])					
Statistics	Avg. interest rate (APR)	Avg. loan amount	Avg. loan term (days)	Default rate	Total principal lent[b]
Average	118.4%	$107	70.8	0.39	$855,113
Median	107.8%	$105	65.6	0.41	$800,946
Std. dev.	45.3%	$17	19.8	0.08	$389,808
Maximum	240.0%	$144	110.0	0.51	$1,573,442
Minimum	76.7%	$87	45.0	0.25	$200,000

[*] All Utah short-term consumer lenders were contacted between February and August 2011.

[a] The number of stores represents the number of lender locations that provided data for this variable.

[b] Total principal lent represents the total amount of principal lent throughout the year 2010 for each particular loan type.

to the outlier firm in the survey data whose reported average title loan amount was $10,000. The median title loan amount is nearly $200 less than the average. The default rates of 14 percent and 17 percent, respectively, in 2010 in the Utah payday and title industries are also an important characteristic to incorporate into a study of the determinants of interest rates.

The last column in Table 3 describes the reported average total principal lent in 2010 by each store among each lender type. The average principal lent by payday lending store locations in 2010 was just over $1 million per store, while the average principal lent by title lending stores was just over $229,500. Because the sample for payday and title lenders has such a high response rate and covers so many of the zip codes in which lenders are located, I can use these data to estimate the total market size of the Utah payday and title industries with a high degree of confidence.

The estimated market size of the Utah payday lending industry in 2010 was a total principal lent of $280.4 million, and the estimated market size of the Utah title lending industry in 2010 was a total principal lent of $34.7 million.[10] Compare these numbers to the size of Utah's more traditional revolving and nonrevolving credit markets of $6.4 billion and $10.8 billion, respectively, as reported in Summers and Kroes (2009).

In addition to the survey data obtained from the Utah payday and title lenders, we used the comprehensive address lists of each Utah lender store location from DFI and DCP to create six different market concentration variables for each store—both respondents and nonrespondents. Table 4 gives the descriptive statistics of these measures of market concentration for the stores that participated in the survey.

[10]Because I have socioeconomic and market concentration data on all lenders, including those who did not respond to the survey, I run a regression of total principal lent in 2010 on the socioeconomic and market concentration variables for the survey respondents. Then I use the estimated coefficients to impute the total principal lent for the nonrespondents. The estimates of total market size are the sums of the survey responses of total principal lent and the imputed values.

Table 4: Descriptive statistics of market concentration variables (154 observations)

Variables	Mean	Std. Dev.	Min.	Max.
Number same-type lenders within 1 mile	4.0	2.1	1	9
Number same-type lenders within 2 miles	8.1	4.1	1	17
Number same-type lenders within 3 miles	13.1	7.1	1	30
Number same-type lenders within 4 miles	18.7	11.3	1	45
Number same-type lenders within 5 miles	24.0	16.1	1	66
Number same-type lenders in zip code	6.8	3.8	1	14

4.2 Census Data

Because we collected no survey data on Utah borrowers, we use U.S. Census Bureau data from the area surrounding each store as proxies for borrower characteristics. For most of the demographic and socioeconomic variables in the bottom two panes of Table 5, we have zip-code-level data. However, the unemployment rate, median household income, percent change in median household income from 2009 to 2010, and percent of population over the age of 25 with a bachelor's degree or higher were only available at the city level. These numbers represent the descriptive statistics across Utah payday and title lenders.

The assumption in using Census data from the zip codes in which lenders are located as a proxy for borrower demand is that most payday borrowers live close to the lender from which they borrowed. This assumption is also present in Damar (2009), who also looked at the correlation between payday lender location and zip code demographics.

The percent Black variable from the Census represents the percentage of the population in each zip code that reported Black or African American as their race in any instance, including in conjunction with other race identifiers. The percent Hispanic variable is the analogous definition for Hispanic race. The percent of households with spouse present represents the percentage of households in a given zip code with a legally married spouse present. This excludes married couples that are separated.

Of particular note in Table 5 is that the unemployment rates in the cities where the lenders are located were more than two percentage points lower than the state

Table 5: Descriptive statistics of demographic and socioeconomic variables in geographic areas surrounding lenders, 2010 (221 observations)

	Across lenders represented in survey				
Variables	Mean	Std. Dev.	Min.	Max.	Utah
Median individual income (zip)[a]	$31,974	$6,575	$17,068	$52,972	$36,567
Median AGI (zip)[a]	$31,674	$6,452	$16,901	$51,879	$36,139
Pct. chg. in median individual income (zip)[a]	1.7%	1.5%	-2.3%	5.7%	2.4%
Pct. chg. in median AGI (zip)[a]	1.8%	1.5%	-2.6%	5.7%	2.3%
Number of individual tax returns (zip)[a]	15,145	4,846	4,500	26,942	3,034
Pct. chg. in number of individual tax returns (zip)[a]	-1.6%	1.6%	-6.3%	2.5%	0.7%
Median household income (city)[b]	$51,989	$11,407	$36,488	$90,743	$56,330
Pct. chg. median household income (city)[b]	-1.0%	2.2%	-6.7%	8.2%	
Unemployment rate (city)[b]	5.4%	1.2%	2.7%	9.1%	7.7%
Pct. with bachelor's degree or higher, age 25+ (city)[c]	29.2%	9.3%	10.8%	41.1%	29.4%
Population (zip)[d]	37,637	12,663	10,744	68,295	7,942
Median age, years (zip)[e]	29.4	2.8	22.7	38.2	29.2
Percent Black (zip)[e]	2.2%	1.3%	0.7%	5.6%	1.1%
Percent Hispanic (zip)[e]	17.1%	9.6%	3.6%	52.1%	13.0%
Pct. households with spouse present (zip)[e]	55.4%	12.6%	18.8%	77.7%	61.0%

[a] Median individual income, median adjusted gross income (AGI), and the number of individual tax returns data come from the IRS Individual Return Transaction File Compliance Data Warehouse for the year 2010. Percent change variables represent the change between 2009 and 2010.

[b] City-level unemployment rate and median household income come from 2008-2011 American Community Survey (ACS) three-year estimates of the U.S. Census Bureau. Percent change variable represents the change between 2009 and 2010.

[c] City-level percent of population age 25 and above with a bachelor's degree or higher come from 2006-2010 ACS five-year estimates of the U.S. Census Bureau.

[d] Population comes from 2010 ACS one-year estimates of the U.S. Census Bureau. The 2010 Utah average is based on a population of 2,763,885 and 348 zip codes. We do not use percent change here because it is between 2000 and 2010.

[e] Race and marital status data come from the 2010 ACS one-year estimates of the U.S. Census Bureau.

average, median income was close to state average, and education and age were nearly identical to the state averages. However, the percent of households with both husband and wife present was slightly less than the state average. Consistent with the findings of Damar (2009), Utah short-term consumer lenders are located in zip codes that have a larger percentage of minorities than the state average.

4.3 IRS Data

Essential to the empirical analysis in Section 5 is both a zip-code level measure of median income as well as percent change in income and percent change in population variables that are used as instruments for the two demand equations. The measure of household income from the Census Bureau is only at the city level, not zip-code level. And the percent change in population would have to be over the decade period from 2000 to 2010. For this reason, we use the U.S. Internal Revenue Service Compliance Data Warehouse Individual Return Transaction File tax return data aggregated by zip code.[11] These variables are reported in the top pane of Table 5.

The number of individual tax returns by zip code is a variable that is a proxy for population. We do not use this variable in the empirical analyses because the Census Bureau provides a good population variable by zip code. But we do use the percent change in tax returns between 2009 and 2010 as our proxy for the percent change in the population, which variable is one of our instruments for the demand equations. The other instrument we use for the demand equations is the percent change in median adjusted gross income (AGI) by zip code.

[11]The IRS zip-code-level tabulations data for the State of Utah presented in the top pane of Table 5 were provided by a U.S. Treasury employee from the Office of Tax Analysis. The median statistics use "smeared" data in which the 9 middle observations were averaged to protect confidential information of individual taxpayers.

5 Empirical Results

A linearized empirical version of the supply equation determining the interest rate is the following:

$$avgrt_i = \gamma_0 + \gamma_1 avgamt_i + \gamma_2 avgtrm_i + \gamma_3 defltrt_i + \gamma_4 mktconc_i + ... \\ \gamma_5 indTL_i + \sum_{j=6}^{J+5} \gamma_j \mathbf{X}_{i,j} + \mu_{s,i} \tag{5.1}$$

where $avgrt_i$ is the average interest rate (in APR terms), $avgamt_i$ is the average loan amount, $avgtrm_i$ is the average loan term, $defltrt_i$ is the default rate, and $mktconc_i$ is a measure of market concentration for store i in 2010. I also include an indicator variable for title lender, $indTL_i$, in order to control for industry fixed effects. The vector of J demographic and socioeconomic variables $\mathbf{X}_{i,j}$ in the summation term allow for lenders to vary their interest rates based on borrower characteristics. The null hypothesis from the theory is that the coefficients on these borrower characteristics variables should be zero. The last term $\mu_{s,i}$ is a supply specific error term.

The linear empirical demand equations are written in terms of loan amount and loan term. This is analogous to the two amounts of the loans of different maturities from the theoretical model in Section 3. The equilibrium functions for both types of bond are functions of income and the interest rate. The demand equations are the following:

$$avgamt_i = \alpha_0 + \alpha_1 avgrt_i + \alpha_2 indTL_i + \alpha_3 \%\Delta pop_i + \alpha_4 \%\Delta medinc_i ... \\ + \sum_{j=5}^{J+4} \alpha_j \mathbf{X}_{i,j} + \mu_{d1,i} \tag{5.2}$$

$$avgtrm_i = \beta_0 + \beta_1 avgrt_i + \beta_2 indTL_i + \alpha_3 \%\Delta pop_i + \alpha_4 \%\Delta medinc_i ... \\ + \sum_{j=5}^{J+4} \beta_j \mathbf{X}_{i,j} + \mu_{d2,i} \tag{5.3}$$

In order to consistently estimate the parameters of the one supply equation (5.1)

and two demand equations (5.2) and (5.3), I impose some necessary exclusion restrictions. As natural supply shifters, I assume that the default rate ($dfltrt_i$) and the measure of market concentration ($mktconc_i$) in (5.1) only affect the supply of loans and do not enter in either of the demand equations.

For the demand equations, I have assumed that the average loan amount $avgamt_i$ in equation (5.2) is not a function of the average loan term $avgtrm_i$. And I have assumed that the average loan term $avgtrm_i$ in equation (5.3) is not a function of the average loan amount $avgamt_i$. These exclusion restrictions are plausible because the equilibrium equations for the amounts of the different term loans from Section 3 were not functions of each other, but they were functions of the interest rates. These exclusion restrictions are also necessary for identifying the parameters of the model.

Lastly, I follow the approach of Calomiris and Pornrojnangkool (2009), who estimate a supply and demand system for the pricing of banking financial services. They use the percentage change in sales growth as a demand shifter for corporate demand for financing. In the context of this paper, I will use the percentage growth rate in the number of tax returns by zip code between 2009 and 2010 from the IRS data as a proxy for population growth $\%\Delta pop_i$ and the percentage growth rate in median adjusted gross income (AGI) $\%\Delta medinc_i$ as demand shifters. These two variables should capture increases in demand for payday and title loans and not affect the cost structure of the lending beyond the variables already controlled for in the three-equation system.

In an equilibrium in which markets clear and both the demand and supply equations must hold, the supply equation (5.1) and the two demand equations (5.2) and (5.3) can be reduced to functions of the title lender indicator variable, the J socioeconomic variables, and the instruments.

$$avgrt_i = f\Big(indTL_i, dfltrt_i, mktconc_i, \%\Delta pop_i, \%\Delta medinc_i, \{\mathbf{X}_{i,j}\}_{j=1}^{J}\Big) \tag{5.4}$$

$$avgamt_i = g\Big(indTL_i, dfltrt_i, mktconc_i, \%\Delta pop_i, \%\Delta medinc_i, \{\mathbf{X}_{i,j}\}_{j=1}^{J}\Big) \tag{5.5}$$

$$avgtrm_i = h\Big(indTL_i, dfltrt_i, mktconc_i, \%\Delta pop_i, \%\Delta medinc_i, \{\mathbf{X}_{i,j}\}_{j=1}^{J}\Big) \tag{5.6}$$

Table 6 presents the estimation of the equilibrium supply equation (5.4). All the estimated coefficients in Table 6, except two, include both α and β coefficients from the demand equations (5.2) and (5.3) as well as the γ coefficients from the supply equation (5.1). However, the estimated coefficients on the two instruments for the supply equation, $defltrt_i$ and $mktconc_i$, are the same γ coefficients as in the original supply equation (5.1).

Table 6 shows that the coefficients on the default rate and the degree of market concentration (number of same-type lenders within a 5-mile radius) are both statistically significant at the 5-percent level. Each new same-type lender that locates within a 5-mile radius reduces average interest rates by 0.7 percentage points. And for each percent increase in the default rate of borrowers, the average interest rate increases by 0.6 percentage points. These results confirm the standard competitive market results that more competition reduces prices and that higher cost structure and risk increase prices.

The market competition result is particularly interesting in that nearly every geographic area in Utah has zoning ordinances at either the city or county level that restrict the number of payday lenders that can locate in a given area. The market concentration result from Table 6 suggests that these zoning restrictions may be imposing costs on borrowers in those areas through increased short-term lending interest rates.

Table 7 presents the estimation of equations (5.1), (5.2), and (5.3) using instrumental variables simultaneous equations regression to control for the endogeneity of the average loan amount ($avgamt_i$), average loan term ($avgtrm_i$), and average interest rate ($avgrt_i$). As mentioned earlier, the default rate ($dfltrt_i$) and the market concentration variable ($mktconc_i$) for store i are two plausible supply shifters. And we use the percentage change in median adjusted gross income (AGI) and percentage change in the number of tax returns by zip code as demand shifters. The percentage change in the number of tax returns by zip code is a proxy for the percentage change in population by zip code. The three columns of estimates in Table 7 provide unbiased estimates of the γ, α, and β parameters from the empirical supply and demand

Table 6: OLS regression estimates of general equilibrium average interest rate equation, 2010 (221 observations)

	Dependent variable
Independent variables	Avg. interest rate (%)
Default rate	0.627**
	(0.314)
Number same type lenders within 5-mile radius	-0.713**
	(0.360)
Title lender indicator (=1 if title lender)	-227.972***
	(7.569)
Median total income, IRS ($000s, zip)	10.829*
	(5.681)
Median total income squared	-0.114
	(0.074)
Pct. change in median AGI, IRS (zip)	-2.780
	(2.585)
Pct. chg. in number of tax returns, IRS (zip)	-0.800
	(3.035)
Unemployment rate (city)	1.692
	(4.389)
Pct. with bach. deg. or higher (city)	0.399
	(0.586)
Population (000s, zip)	0.030
	(0.381)
Median age (years, zip)	-5.105**
	(2.152)
Percent Black (zip)	-3.474
	(7.121)
Percent Hispanic (zip)	0.440
	(0.775)
Pct. households with spouse present (zip)	-2.127**
	(0.834)
R-squared	0.825

* Significant at the 10-percent level.
** Significant at the 5-percent level.
*** Significant at the 1-percent level.

specifications.

The estimation of the empirical supply equation (5.1) in the first column of Table 7 is the focus of this paper. The first thing to note from Table 7 is the statistically significant nonlinear relationship between average interest rates and the median income of households in the area surrounding a lender. In particular, the inclusion of median total income squared produces a positive and significant coefficient on the linear term and a negative and significant coefficient on the squared term. This implies an inverse parabolic relationship between income and interest rates. That is, average interest rates on short-term consumer loans increase as incomes in surrounding areas increase, but at a decreasing rate and only up to a point. Beyond that critical income level, average interest rates decrease as surrounding incomes increase.

Setting the marginal effect of median total income on average interest rates to zero suggests that zip codes with median total income of $47,526 have the highest average interest rates.[12] The inverse parabolic form suggests that average interest rates are lower for both incomes greater than $47,526 and incomes less than $47,526. This finding is consistent with anecdotal evidence from large payday lenders that their best locations have neither incomes that are too low, nor incomes that are too high.

Note from the descriptive statistics in Table 5 that this optimal income level is significantly higher than the average income reported on tax returns both statewide in Utah and in the sample of zip codes included in the survey. This result provides evidence against the claim that short-term consumer lenders prey upon the poor because average interest rates actually decline as a function of income over all levels of income that are below the Utah average.

Another important result from the supply equation estimation in the first column of Table 7 is that neither education nor race has any statistically significant effect on the interest rates of short-term consumer lenders. This result provides evidence

[12] Using the estimated coefficients from the first column of Table 7, the marginal effect of an extra $1,000 of median income in a zip code on average interest rates is $14.52 - 2(0.15)medinc_i$. Setting that marginal effect to zero gives a median income of $47,526 that is associated with the highest interest rates.

Table 7: Simultaneous equations regression estimates of supply equation and two demand equations, 2010 (221 observations)

	Dependent variables		
Independent variables	Avg. interest rate (%)	Avg. loan amount ($)	Avg. loan term (days)
Avg. loan interest rate (APR)		-4.281**	0.173
		(1.900)	(0.268)
Avg. loan amount (dollars)	-0.135		
	(0.147)		
Avg. loan term (days)	0.486		
	(1.187)		
Default rate	0.431		
	(0.800)		
Number same type lenders within 5-mile radius	0.012		
	(0.603)		
Title lender indicator (=1 if title lender)	-240.764	-505.886	197.206***
	(173.437)	(424.236)	(59.741)
Median total income, IRS ($000s, zip)	14.521**	52.335	-6.626
	(7.092)	(37.135)	(5.229)
Median total income, squared	-0.153*	-0.543	0.072
	(0.087)	(0.451)	(0.064)
Pct. change in median AGI, IRS (zip)		4.436	-0.473
		(13.788)	(1.942)
Pct. chg. in number of tax returns, IRS (zip)		-19.170	-4.214**
		(14.929)	(2.102)
Unemployment rate (city)	5.220	2.343	-6.521**
	(4.939)	(23.160)	(3.261)
Pct. with bach. deg. or higher (city)	1.111	6.797**	0.042
	(0.854)	(3.240)	(0.456)
Population (000s, zip)	-0.114	-0.136	0.141
	(0.445)	(1.978)	(0.279)
Median age (years, zip)	-5.073*	-10.564	3.141
	(3.088)	(16.619)	(2.340)
Percent Black (zip)	-9.848	-50.002	1.556
	(9.705)	(38.380)	(5.405)
Percent Hispanic (zip)	0.750	4.051	-0.124
	(0.943)	(4.289)	(0.604)
Pct. households with spouse present (zip)	-1.682	-6.804	0.315
	(1.032)	(5.639)	(0.794)
R-squared	0.801	0.246	0.802

Note: Instruments for average amount and average term are the percent change in median AGI and the percent change in number of IRS returns between 2009 and 2010. Instruments for average interest rate are the default rate and market concentration. The IV estimation uses a simultaneous equation three-stage least squares approach.

* Significant at the 10-percent level.

** Significant at the 5-percent level.

*** Significant at the 1-percent level.

against the claim that short-term consumer lenders prey upon minorities and upon the poorly educated.

The one demographic variable that does have a statistically significant effect on average interest rates is median age. The estimated coefficient suggests that lenders in zip codes with an older population are associated with lower interest rates. A standard deviation of three years older median citizen would be associated with interest rates that are 15 percentage points lower—essentially a payday loan APR of 465% rather than 490%.

The last result to note in the supply equation in Table 7 is that we find no evidence that average interest rates decline with both average loan amount and average loan term, as suggested by the theory presented in Section 3.2 and by the aggregate industry data in Table 1. Both the coefficient on average loan amount and average loan term are statistically insignificant, although the point estimate on average loan amount has the predicted negative sign. The negative correlations between loan amount and interest rates and loan term and interest rates go away when I control for loan type, demographics, and both the supply and demand relationships. This could be because the market for short-term loans segments on loan type rather than on interest rates. Or it could also mean that the data did not have enough observations to measure the relationship with statistical significance. We take this as weak and mixed evidence for the fixed processing cost model of supply from Section 3.2.

In the demand equation estimations in the second and third columns of Table 7 the average interest rate has a strong negative effect on loan amount but not on loan term. On the other hand, the title lender indicator is associated with longer duration loans of more than six months longer than payday loans, but the effect on average loan amount is not statistically significant. Higher unemployment rates are associated with shorter duration loans, and more educated borrowers are associated with larger loan amounts. But, similar to the supply estimation, race has no statistically significant effect on demand for loan amounts or loan durations.

6 Conclusion

This study provides an analysis of the short-term consumer lending industry at a level of detail that has not been seen before. I provide a description of high-response-rate store-level survey data of Utah payday and title lenders for the year 2010. One benefit of the survey data is the ability to estimate the respective size of each industry in that year. The conclusion is that the Utah payday and title lending industries are an order of magnitude smaller than their more traditional consumer lending counterparts.

From the analysis of the determinants of short-term consumer lending interest rates, I find that lenders' interest rates decline with market concentration and increase with default rates. That is, more competition reduces prices, and more risk and cost increases prices.

I also find evidence that short-term consumer lenders do not prey on the poor, on minorities, or on the poorly educated. In the supply equation estimation, neither race nor education has any statistically significant effect on average interest rates. In addition, I find a statistically significant inverse parabolic relationship between median income and average interest rates. In particular, average interest rates decline with income over all income levels up to a high threshold of about $47,000. This finding is consistent with anecdotal evidence from payday lenders that they prefer to locate in areas with average incomes that are not too low and not too high.

One assumption of this paper was the exogeneity of the location of lenders. A goal for future work is to use these data to explain why lenders locate where they do. Obtaining panel data on the industry would help in being able to identify trends in lender entry and exit. In addition, a panel dimension to the data might allow for more accurate estimation of the full supply equation, rather than just the equilibrium interest rate equation.

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