

Access to Payday Loans, Food Insecurity, and Participation in the Supplemental Nutrition Assistance Program

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ABSTRACT

Using the 2005-2011 December supplements of the Current Population Surveys, as well as county- and state-level indicators from various sources, this study examines how access to payday loans affects household food insecurity and participation in SNAP. Instrumental variable regressions and geographic border identification are used to overcome potential endogenous treatment issues. Findings from this study suggest that, controlling for household characteristics, county food environment, state-specific intercepts and yearly variations, access to local payday loans by traveling to a neighboring state can result in 2-4 percentage point increases in the likelihood of food insecurity but has little direct effect on SNAP participation. On the other hand, whether or how the number of payday lenders affects food insecurity and SNAP participation in the given area is highly sensitive to model specifications and choice of instruments.

KEYWORDS

food insecurity, SNAP, payday lending

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INTRODUCTION

Despite continuous expansion of federal food assistance programs, food insecurity and hunger continue to affect many Americans. In 2011, 15% of American households did not have consistent access to food necessary to maintain healthy lifestyles. Economic theory suggests that households' asset holdings and ability to borrow can provide protection from food insecurity during times of income instability.

Evidence suggests that lack of emergency cash savings, asset poverty, and risk of insolvency are positively associated with food insecurity (Chang, Chatterjee, & Kim, 2012; Guo, 2011). Liquidity constraint increases hunger at all income levels, and the effect is strongest among poor households and those with incomes slightly above the Supplemental Nutrition Assistance Program (SNAP) eligibility threshold (Chang et al., 2012). This implies food assistance programs are being used by some households as an alternative to saving and borrowing. Also, financial management skills are associated with food security (Gundersen & Garasky, 2012).

Payday loans are unsecured short-term loans with expensive fees and high rates of interest. Although payday lenders may seem to provide an alternative outlet for financially-disadvantaged individuals to resolve temporary financial issues, the vast majority of users borrow repetitively for recurring expenses such as rent, food, or utilities, likely resulting in greater financial hardship than their initial situation that necessitated the loan (Bourke, Horowitz, & Roche, 2012). Access to payday loans, in fact, aggravates consumption hardship, and families

in payday loan prohibiting states are more likely to cut meals if they live in counties that border a permissive state (Melzer, 2011).

While there are indications that payday loan access can harm food security and result in the increased likelihood to participate in food assistance programs, the literature is sparse on the topic. Using the 2005-2011 Current Population Surveys, this study examines how access to payday loans affects household food insecurity and participation in SNAP. When households' actual borrowing through payday lending service is not directly observable, coefficients on access to payday lending can be interpreted "as reduced form estimates of the impact of borrowing where geographic access serves as an instrumental variable for borrowing" (Melzer, 2011, p. 520). Because fifteen U.S. states have banned payday loans and several others have instated interest rate caps sometime during the last few decades, resulting policy differences by state and year provide natural experiment for our study.

This study finds that residents of the states where payday lending is banned experience 2-4 percentage points greater likelihood of food insecurity if they live close to the border to a state that allows payday lending. However, their access to payday lenders in neighboring states does not increase the likelihood of food assistance program participation. Within the states that allow payday lending, the geographic density of payday lending businesses in the local areas is positively correlated with food insecurity and program participation, but identification of the causal effect is highly sensitive to the choice of instrumental variables.

REVIEW OF LITERATURE

Household Food Insecurity

Assessing the extent of food insecurity has been a policy priority of the U.S. Department of Agriculture (USDA) since 1995. Food insecurity is defined as interruptions of "consistent,

dependable access to enough food for active, healthy living” (Coleman-Jensen, Nord, Andrews, & Carlson, 2012, p. 2) sometime during the year due to shortage in money and other resources. In 2011, it was estimated that 14.9% of American households experienced food insecurity, and 5.7% had to cut the amount of food intake at times or had disrupted eating patterns (Coleman-Jensen et al., 2012). Food insecurity rates have increased in America since the 1990s, which is viewed as being due in part to recession and financial crisis (Andrews & Nord, 2009; LeBlanc, Kuhn, & Blaylock, 2005).

Food insecurity is associated with obesity in both children and adults and other negative health outcomes such as hypertension, hyperlipidemia, diabetes, and metabolic syndrome (Parker, Widome, Nettleton, & Pereira, n.d.; Ramsey, Giskes, Turrell, & Gallegos, 2010; Seligman, Laraia, & Kushel, 2009). Specifically, childhood food insecurity is associated with poor academic performance as early as kindergarten (Winicki & Jemison, 2008). A 2005 study found that an increase in BMI and a decline in social skills as well as poor test scores were associated with food insecurity in elementary school students (Jyoti, Frongillo, & Jones, 2005). The mental health of children is also directly affected by food insecurity. Slopen et al. (2010) found that children residing in food insecure households were nearly twice as likely to internalize and externalize problems.

SNAP

The Supplemental Nutrition Assistance Program (SNAP), formerly known as food stamps, is the largest federal nutrition assistance program used to combat household food insecurity. In 2012, nearly 47 million low-income Americans, or 22.5 million households, received monthly SNAP benefits. Seventy-two percent of these participants resided in houses with children (Tiehen & Ver Ploeg, 2012). This is the highest participation rate to date. SNAP

participation rate has steadily increased in the past decade primarily due to changes in policies and the declining economy (Zedlewski & Rader, 2005). In 2010, SNAP benefits became one-tenth of all food-at-home spending (Wilde, 2013).

Known determinants of food stamp participation include food stamp policies such as generosity of benefit, and macro-economic conditions such as unemployment rate and food prices (Hernandez & Ziol-Guest, 2009; Huang, Huffman, & Tegene, 2012). While low-income status of a household is one of the most important program eligibility criteria, eligibility threshold is supposed to include examination of asset holdings.

In the fiscal year 2012, \$81 billion was spent on SNAP. This amount is expected to increase in 2013 (FitzGerald, Holcombe, & Dahl, 2012). As SNAP participation increases, it becomes an increasing financial burden on the federal government. It will be important to understand whether other policies have potential to relieve this burden.

Financial Assets and Debts

Whereas the majority of studies indicated low and unstable income was the strong predictor of food insecurity and SNAP participation, some pointed out that household assets and debts also mattered (Chang et al., 2012; Guo, 2011). Research suggested that low-income households that have more assets relative to debt are better able to cope with unforeseen expenditures or financial difficulties than households that are in financially ill-prepared (Guo, 2011; Mills et al., 2000). It has also been found that ownership of particular types of assets such as home, vehicle, savings, and risky assets determines food insecurity (Gundersen & Gruber, 1999; Olson, Rauschenbach, Frongillo, Jr., & Kendall, 1996). Growth of alternative financial services and consumer credit targeted for low-income families in the past decades may have

relieved low-income households from liquidity constraints but may also have put them under heavy debt burden and greater hardship (Fellowes and Mabanta 2007).

Payday Loans

Payday loans are unsecured short-term loans that are usually accompanied by expensive fees and high rates of interest. As of 2010, nearly 12 million Americans used payday loans. Annually, \$7.4 billion is spent at 20,000 payday loan locations. These loans are intended to be used for emergencies such as unexpected medical bills or car repairs, but as a recent national survey discovered, 69% of payday loan users use the loans for recurring expenses such as rent, food, or utilities. State regulatory data show that on average, payday loan customers borrow \$375 from lenders eight times a year, and spend nearly \$520 in interest (Bourke et al., 2012).

Demographics of payday loan users include those earning less than \$40,000 annually, those without a college degree, renters, and African Americans (Bourke et al., 2012; Stegman, 2007). While it may seem as though payday lenders are providing an outlet for lower income individuals to solve temporary financial issues, many propose that such businesses practice predatory lending in which they prey on those with expensive debt that is unlikely to be resolved quickly. Repetitive borrowing is common among payday loan customers. Seventy-six percent of loans are borrowed within two weeks of a previous payday loan's due date, and, on average, borrowers are indebted for five months of the year (Bourke et al., 2012).

Currently, fifteen states have banned the use of payday loans including Arizona, Arkansas, Connecticut, Georgia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Vermont, West Virginia, and the District of Columbia. These states have instated small loan interest rate caps of 36% or less. Many of these states have enforced such laws as recently as 2011. However, other states such as New York and

Pennsylvania have never allowed the entrance of payday lenders because their usury laws were in place in 1976 and 1974, respectively. Payday loans stores were not popular until 1990 (Skiba, 2007).

States that allow rate caps of approximately 10% of the borrowed principal and still permit loans or restrict the number of loans a borrower can engage in per year are considered hybrid states. These states include Florida, Virginia, Rhode Island, Minnesota, Colorado, Oregon, and Washington. Payday lending storefronts are not as abundant in these states as permissive states, but they are used and the per-store loan volume is high (Bourke et al., 2012).

Permissive states allow initial fees of 15% of the borrowed principal or higher. The 14 day Annual Percentage Rates (APRs) in these states range from 390% to 1980%. Some states such as Nevada and South Dakota have no limit on the amount of money that can borrow, the maximum loan term, or the 14 day APR. Payday loan stores are abundant in these states where nearly half of Americans live.

Gap in the Literature

Whereas local food environment such as adverse market and policy circumstances was identified as a cause for food insecurity (Bartfeld & Dunifon, 2006), little is known regarding whether local financial service environment also matters. The first of its kind, a 2011 study by Melzer used geographical differences in the availability of payday loans to estimate the effect of payday loan access on delays in needed health care, bills payment, paying for food and telephone service, and moving out of one's home.

On average, the amount of payday lending locations was twenty percent higher in zip codes that bordered payday loan-prohibiting states, and this effect was stronger when the bordering counties in the prohibiting states contained a high rate of low-income households

(Melzer, 2011). In contrast, payday loan location had no effect on households that were not likely borrowers based on income. Melzer's findings suggest that payday lenders intentionally locate on these state borders to attract low-income individuals who are more likely to seek their services. This quick access increases the incidence of difficulty paying bills by 25% and delays medical care in those families. Overall, hardships for families increased when payday lenders were located along state borders of a newly payday loan prohibiting state. These families experience a 1.1% increase in likelihood to cut meals than families who do not live in bordering counties and are not considered low-income. Melzer's findings indicate that payday loan access is detrimental to finances and food adequacy among low-income households.

DATA

The primary source of our data comes from December supplements of the Current Population Surveys (CPS) collected by the U.S. Census Bureau. In December every year a cross sectional sample of approximately 54,000 U.S. households and individuals are surveyed focusing on severity of food insecurity. We use 2005-2011 CPS because most payday bans went into effect after 2004. (See Appendix Table 1 for state payday bans in different years.) We reduced the sample to household reference persons, whose household incomes did not exceed 185% of the poverty threshold in the given year because most food insecurity questions were not asked if household incomes exceeded it. Because a number of key variables regarding payday lending and food environment were identified at county levels, we also had to exclude observations whose county of residence was unknown, which was the majority in the CPS, leaving 26,791 households for final analysis.

While the December CPS provides data on food insecurity status as well as basic demographic information about the household, it does not include any information about

households' loan use or access. It neither includes information on local environment related to food access. We found several other sources of state- or county-level data for this lacking information, matched to our sample households. The sources and use of these data are described under respective empirical strategies.

Dependent Variables

This study looks at two dependent variables: food insecurity and SNAP participation. The USDA ERS developed the core food security survey module, which has been adopted by several nation-wide household surveys including the CPS. The module comprised 18 statements that illustrated conditions and behaviors characterizing difficulty meeting basic food needs of family members (Coleman-Jensen et al., 2012). Survey respondents were asked whether they experienced any of these situations during the last 12 months. Based on the number of affirmative responses, each household was categorized into one of four food security levels: high food security, marginal food security, low food security, and very low food security. Following the convention in the food insecurity literature, as well as the USDA classification, this study uses a binary variable of “food insecure” to equal 1 if the household experiences either low food security or very low food security, and 0 otherwise.

“Food insecure” means that the household reported experiencing at least three of the conditions and behaviors characterizing hunger and food insufficiency sometime during the past year. Binary measures of food insecurity may yield more straightforward interpretations than a continuous or ordered scale measure given that most official government statistics cite the rate of food insecurity rather than severity of it. Whereas “food insecure” includes low and very low food security, we also look at “very food insecure” representing very low food security (i.e., at

least give of the conditions and behaviors characterizing hunger and food insufficiency during the past 12 months.)

The CPS December supplement also included a question “In the past 12 months, since December of last year, did you or anyone in this household get SNAP program or food stamp benefits?” This study uses a dummy variable representing SNAP participation created based on this item.

EMPIRICAL STRATEGY

The inherent difficulty in assessing how availability of or access to payday lending influences household food insecurity is that provision of payday lending services may not be exogenous. Both the business location decisions of payday lenders and policy choices of payday bans may have been influenced by demand-side factors such as local demographics and economic conditions of the place and year (Melzer, 2011), which are also important determinants of food security. For this reason, using the number of payday lenders in the area of residence or legislation in the given state as measures of availability may cause biased estimates of causal effects.

To handle this issue, we divide the sample into two groups based on the payday ban status: those who live in a state and year where payday lending is allowed, and those who live in a state and year where it is banned. A state×year matrix of payday ban status, which we assembled based on state legal statutes, were merged to our CPS sample based on state of residence and year of survey. For the sample in payday lending state and year, we use the number of lenders as the key explanatory variable, instrumented by supply-side factors to identify causal effects. For the sample in payday banning state and year, we examine the effect

of living close to the border to another state that allows payday lending. Detailed strategies are as follows.

The Effect of the Number of Payday Lenders

When the state allows payday lending, high availability of payday lenders in the local area may put a greater number of borrowers with poor financial literacy under high interest rates, therefore making them suffer more consumption hardships such as food insecurity. However, the number of payday lenders would be endogenous because the number of payday lending businesses may be a response to certain borrower characteristics, which may also be positively associated with the probability of food insecurity. In order to obtain estimates of causal effects of the number of payday lenders, we needed to find determinants of the location of payday lenders that did not appear to be direct determinants of food insecurity and SNAP participation.

A few existing studies looked at the determinants of payday lender locations. Burkey and Simkins (2004) used data from North Carolina and found that payday lenders tended to locate in urban areas characterized by high concentration of minority and younger populations, population with low levels of education, and those who were married homeowners. While these local demographics are also predictors of general economic vulnerability that directly affects food security and therefore cannot serve as instruments in our study, the Burkey and Simkins study also found the number of banks in the area as well as local inequality index were both positive correlates. Wheatley (2010) conducted a very similar study using data from post-Katrina Mississippi, and contradicted Burkey and Simkins by showing that the number of banks did not matter and that local Gini index was a significant negative predictor.

Another study that used FDIC data on the locations of alternative financial service providers such as payday lenders and check cashers found that, in addition to age, race,

education, and income, household credit scores in the county was a strong predictor of the number of the alternative financial service providers in the county (Prager, 2009). There were more payday lenders and check cashers in the counties that had a greater percentage of population with low or mediocre credit scores controlling for demographics.

In our study, we consider the number of banks and Gini index of the county as instruments. We believe the number of banks represents the supply-side factor, and that there was no evidence that local Gini index was correlated with food insecurity or SNAP participation. We use county-level data for the numbers of payday lenders and banks per 1,000 persons, which have been compiled based on the data from various state authorities by Graves and Peterson (2008). Gini index by county was obtained from Census Bureau's American Community Survey for 2005-2010.

As incidence of food insecurity varies by state and year (Coleman-Jensen et al., 2012), we estimate the regression models with state and year fixed effects as:

$$y_{icst}^* = \beta \cdot NPD_{cst} + X_{icst}\gamma + W_{cst}\mu + \delta_s + \theta_t + u_{icst}$$

$$NPD_{cst} = X_{cst}\Pi_1 + Z_{cst}\Pi_2 + v_{cst}$$

where i, c, s, t indexes individuals, county, state, and year, respectively. The dependent variable y^* is a latent continuous variable of food insecurity or participation in SNAP. The variable NPD is the number of payday lenders per 1,000 county population, X is a vector of demographic and socioeconomic characteristics known to be associated with food insecurity, and W is a vector of county-level controls. The vector Z is additional instruments, such as the number of banks and county Gini. The equation for NPD_{jst} is written in reduced form. The regression residuals follow $(u_{ijst}, v_{jst}) \sim N(0, \Sigma)$ with covariance normalized to one. Coefficients β and γ and fixed effect

terms δ_s and θ_t are structural parameters, and Π_1 and Π_2 are reduced-form parameters. Whereas the latent variable y is unobservable, we observe:

$$y_{ijst} = \begin{cases} 0 & \text{if } y_{icst}^* < 0 \\ 1 & \text{if } y_{icst}^* \geq 0 \end{cases}$$

The model is estimated by maximum likelihood Probit for the sub-sample of households who live in state where payday lending is allowed in the survey year. The vector X included age, gender, race, Hispanic origin, marital status, education, number and age of children, employment status, homeownership, log income, and urban-rural dummies. Because literature indicates that local food availability and price may affect food insecurity and food assistance program participation (Bartfeld & Dunifon, 2006; Bitler & Haider, 2011), we also include county-level variables that characterize local food environment as additional controls. Specifically we use the number of grocery stores per 1,000 county population as well as the county price of low-fat milk relative to the national average from the county-level Food environment Atlas Data made available by the Economic Research Service of the U.S. Department of Agriculture, which we matched to our CPS sample based on county of residence and survey year as appropriate. If the number of payday lenders increases food insecurity and SNAP participation, we expect β to be positive.

Payday Access in Border Counties

Another way to avoid endogeneity bias in identifying the effect of payday lending may be to test whether the households living in payday banning states but in the county that shares a border with a payday state are more likely to suffer from food insecurity or participate in food assistance programs than households who have no access to payday lending either in their state or neighboring states. Using the bordering state characteristics as a measure of access avoids the problem of nonrandom assignment, which in our study is the access to payday lending (Melzer,

2011). This method is endorsed by the existing finding that individuals who live close to the border to a payday allowing state are likely to travel across the border to access the service (Graves & Peterson, 2008). Therefore, for the sub-sample of households who live in a payday banning state in the survey year, we estimate the model:

$$y_{ijst}^* = \beta \cdot PDBorder_{jst} + X_{ics}\gamma + W_{cst}\mu + \delta_s + \theta_t + u_{icst}$$

where *PDBorder* is a dummy variable, which equals 1 if the household's county is within 25 miles of a border to a payday state, and 0 if not. The vectors *X* and *W* are household- and county-level controls, respectively. The state and year fixed effects δ_s and θ_t are also included because rates of food insecurity and SNAP participation vary by state and year. Parameters are obtained by maximum likelihood Logit regressions.

Several data sources were used to create the variable *PDBorder*. First, we identify counties that are within 25 miles of state borders using the State Border Data Set developed by Holmes (1998), which provides the geographic border identification as well as shortest distance between the county center to state borders. This border county indicator as well as the FIPS code of the state that it borders is merged to our main sample based on the county of residence in the given year. Then, we match this household-level border information with the author-assembled payday ban status data to determine whether any of the county's neighboring states allowed payday lending at the time of survey. The variable *PDBorder* is set to equal 1 if any of the states within 25 miles of the county of the household's residence allow payday lending, and 0 otherwise. We expect β to be positive if being able to travel to a payday state easily increases food insecurity and SNAP participation.

Table 1 lists all variables used in this study and their definitions. Table 2 shows the descriptive statistics for the sample. Approximately 30% of the sample was food insecure, and

22% reported receiving SNAP benefits during the past year. The incidence of food insecurity is higher than for the government statistics, mainly because our sample excludes those with incomes above 185% of the poverty line. Seventy nine percent of the sample lived in a state where payday lending was allowed at the time of survey. Of 5,208 households that lived in payday banning states, 44% lived in a county that borders a payday state within 25 miles. Of 21,583 households that lived in payday allowing states, there was one payday lender location on average per 10,000 persons. In general, the demographics of our sample over-represents minority, those who were less educated, less likely to be married, and poorer than the Census estimates of overall U.S. population, again due to our exclusion of upper-income households.

RESULTS

Tables 3 and 4 report the effects of the number of payday lenders on food insecurity and SNAP participation, respectively, for the sub-sample of households that lived in states where payday lending was legal during the survey year. Tables 5 and 6 report how bordering a payday state can influence food insecurity and SNAP participation among households in payday banning states. All estimates are marginal effects at the mean, adjusted for survey weights.

Effects of the Number of Payday Lenders

The first column of Table 3 shows the marginal effects from an uninstrumented Logit regression. Among those in states where payday lending is allowed, an incremental increase in number of payday lenders per 10,000 county residents is associated with 3.0 percentage point increase in incidence of food insecurity. Columns 2-4 show Probit marginal effects of the number of payday lenders when the number of banks and county inequality index were used as instrumental variables. The estimates suggest that an additional payday lender was found to increase the incidence of food insecurity by as much as 54.5 percentage points, and incidence of

very low food security by 92.6 percentage points. Because payday lenders usually refuse to offer loans to those with no incomes, we reduced the sample to those with annual incomes greater than \$5,000 and re-estimated the regression. Still, an additional payday lender in the county per 10,000 county population would result in 47.5 percentage point increase in food insecurity. We are surprised by this overwhelmingly high estimate. Although Wald tests of exogeneity were negative and significant, we wonder if the instruments, especially the county inequality index, were strongly correlated with food insecurity also, resulting in the upward bias in the estimates of causal effects of payday lenders. Columns 5-7 report marginal effects of the number of payday lenders when only the number of banks was used as the instrument. The result is that an additional payday lender would not significantly increase food insecurity, except that it may increase the incidence of very low food security by 55.8 percentage points. Rho estimates from columns 5-7 were not significant, leading to skepticism about the number of banks as an appropriate instrument.

SNAP participation regressions also show similar results. Logit regression without instruments (the first column of Table 4) shows that an additional payday lender per 10,000 county residents is associated with an increase in SNAP participation by 3.3 percentage points. We suspect this number may be an overestimation of the causal effect of payday lending, but when we actually use instrumental variables to identify the causal effect, the assessed marginal effect becomes much greater: a 95-111 percentage point increase. These estimates remained consistent when the sample was reduced to those with annual incomes greater than \$5,000. Unlike Table 3, tests for rho were strongly significant in all five models, regardless of how many instruments were used. However, it is still puzzling why instrumental variables yield greater coefficients for the number of payday lenders than when no instrument was used, contrary to our

conjecture that the number of payday lenders may partially reflect ‘undesirable’ qualities of borrowers.

Effects of Payday Borders

Table 5 reports marginal effects from weighted Logit regressions for the sub-sample of households that lived in a payday banning state in the survey year. If a household lived in a county that was located within 25 miles to a payday loan permissive state, it was 3.3 percentage points more likely to be food insecure and 2.0 percentage points more likely to experience very low food security compared to other households that did not live close to a payday state. When the sample is reduced to the households with annual incomes greater than \$5,000, the effect is stronger. Living close to the payday border increases the incidence of food insecurity by 4.1 percentage points.

Table 6 reports the payday border effects on SNAP participation. Interestingly, the coefficients were positive but not statistically significant, meaning that proximity to a payday lending state border does not significantly increase participation in the food assistance program. This result was consistent when the sample was reduced to those with annual income greater than \$5,000.

DISCUSSION

This study finds that, controlling for household characteristics, county food environment, state-specific intercepts, and yearly variations, access to local payday loans through traveling to a neighboring state can result in a 2-4% increase in the likelihood of food insecurity but has little direct effect on SNAP participation. These are slightly higher estimates compared to a previous study (Melzer, 2011) that used a similar method but less elaborate measurements of food insecurity and samples from fewer states (13 focal states). On the other hand, whether or how

geographic density of payday lenders may affect food insecurity and SNAP participation in the given area was highly sensitive to the choice of instrumental variables. There were strong indications that the geographic density of payday lenders is correlated with food insecurity and SNAP participation, which further needs to be tested for correct causal links. These findings add useful insights for market regulations on alternative financial service providers as a potentially viable and less costly policy alternative to food assistance and other welfare programs.

The study has several limitations. First, instrumental variables used in this study were either weak or inappropriate, yielding results that were difficult to interpret. Better instruments need to be identified such as entry barriers that are specific to financial service markets. Second, county as the geographic unit may have been too broad. Especially for counties that are geographically large, the proximity measured from the county center may have been a poor indicator of access. Smaller geographic units such as zip code areas or Census tracts may be used instead in the future study. Third, border counties may have unique characteristics that make them different from counties that do not share borders with another state, regardless of whether the state they border allows payday lending or not. Fourth, this study does not observe actual use of alternative financial services such as payday loans by households, which might be a more direct way of testing the effect of payday loan transactions on food insecurity. Instead, we focused on the effect of availability of such services. While our approach may offer more readily applicable policy implications, a study that directly assesses how households' payday loan use affects consumption hardship such as food insecurity might complement the findings from this study.

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Table 1: Variable Description

Variable	Definition
Food Insecure	=1 if household reported experiencing at least 3 out of 10-18 conditions characterizing hunger and food insufficiency sometime during the past 12 months; 0 otherwise
Very food insecure	=1 if household reported experiencing at least 5 out of 10-18 conditions characterizing hunger and food insufficiency sometime during the past 12 months; 0 otherwise
Receive SNAP	=1 if household received SNAP or food stamp benefits during the past 12 months; 0 otherwise
Payday state	=1 if household lives in a state that allows payday lending; 0 otherwise
Borders payday state	=1 if household lives in a county for which the county center is within 25 miles to a payday allowing state; 0 otherwise (for Payday state=0 only)
Number of payday lenders	Number of payday lenders in the county per 10,000 residents (for Payday state=1 only)
Age	Respondent's age
Female	=1 if respondent is female; 0 otherwise
Race: White	=1 if respondent is of white race; 0 otherwise
Race: Black	=1 if respondent is of black race; 0 otherwise
Race: Other	=1 if respondent is of race other than white or black; 0 otherwise
Hispanic	=1 if respondent is of Hispanic origin; 0 otherwise
Marital: Married	=1 if respondent is married; 0 otherwise
Marital: Widowed	=1 if respondent is widowed; 0 otherwise
Marital: Divorced	=1 if respondent is divorced or separated; 0 otherwise
Marital: Never married	=1 if respondent is never married; 0 otherwise
Years of education	Respondent's years of education
Child under 6	1=Presence of own children under 6 in the household; 0 otherwise
Number of children	Number of own children in the household
Employment: Employed	=1 if respondent is employed; 0 otherwise
Employment: Retired	=1 if respondent is retired; 0 otherwise
Employment: Not employed	=1 if respondent is unemployed or not in the labor force (but not retired); 0 otherwise
Homeowner	=1 if primary living quarters are owned or being bought; 0 otherwise
Family income (\$1,000)	Combined income of all family members during the 12 months, in thousand US dollars
ln(income)	Natural log of Family income in thousand US dollars
Geographic: Principal city	=1 if household is located in a principal city; 0 otherwise
Geographic: Metropolitan	=1 if household is located in a metropolitan county but not a principal city; 0 otherwise
Geographic: Nonmetropolitan	=1 if household is located in a nonmetropolitan county; 0 otherwise
Region: Northeast	=1 if region is Northeast; 0 otherwise

Variable	Definition
Region: Midwest	=1 if region is Midwest; 0 otherwise
Region: South	=1 if region is South; 0 otherwise
Region: West	=1 if region is West; 0 otherwise
Grocery stores per 1,000 persons	Number of grocery stores in the county per 1,000 county population
Relative milk price	Price of low-fat milk in the county relative to national average
Year	Year of survey
Gini	County Gini coefficient averaged over 2005-2009
Number of banks	Number of banks in the county per 10,000 residents

Table 2: Descriptive Statistics

Variable	Mean (SD)		
	All (N=26,791)	Payday state=0 (N=5,208)	Payday state=1 (N=21,583)
Food Insecure	0.295 (0.456)	0.289 (0.453)	0.298 (0.457)
Receive Food Stamp	0.222 (0.416)	0.259 (0.438)	0.214 (0.410)
Payday state	0.787 (0.409)		
Borders a payday state		0.440 (0.496)	
Number of payday lenders			1.094 (0.567)
Age	48.36 (18.90)	50.12 (18.98)	47.82 (18.86)
Female	0.579 (0.494)	0.606 (0.489)	0.571 (0.495)
Race: White	0.744 (0.436)	0.671 (0.470)	0.767 (0.423)
Race: Black	0.181 (0.385)	0.254 (0.435)	0.159 (0.366)
Race: Other	0.074 (0.262)	0.075 (0.264)	0.074 (0.262)
Hispanic	0.277 (0.448)	0.218 (0.413)	0.296 (0.457)
Marital: Married	0.371 (0.483)	0.342 (0.474)	0.379 (0.485)
Marital: Widowed	0.132 (0.339)	0.148 (0.355)	0.127 (0.333)
Marital: Divorced	0.218 (0.413)	0.203 (0.403)	0.223 (0.417)
Marital: Never married	0.278 (0.448)	0.307 (0.461)	0.271 (0.444)
Years of education	11.883 (3.068)	11.956 (2.997)	11.865 (3.090)
Child under 6	0.189 (0.391)	0.168 (0.373)	0.195 (0.397)
Number of children	0.784 (1.221)	0.724 (1.175)	0.803 (1.236)
Employment: Employed	0.461 (0.498)	0.423 (0.494)	0.472 (0.499)
Employment: Retired	0.218 (0.413)	0.238 (0.426)	0.212 (0.409)
Employment: Not employed	0.321 (0.467)	0.339 (0.473)	0.316 (0.465)
Homeowner	0.431 (0.495)	0.373 (0.484)	0.446 (0.497)
Family income (\$1,000)	19.463 (12.432)	18.761 (12.395)	19.681 (12.438)
Geographic: Principal city	0.406 (0.491)	0.474 (0.499)	0.396 (0.489)
Geographic: Metropolitan	0.562 (0.496)	0.469 (0.499)	0.580 (0.494)
Geographic: Nonmetropolitan	0.032 (0.176)	0.057 (0.232)	0.024 (0.153)
Region: Northeast	0.177 (0.381)	0.781 (0.413)	0.000 (0.000)
Region: Midwest	0.158 (0.365)	0.000 (0.000)	0.207 (0.405)
Region: South	0.316 (0.465)	0.177 (0.382)	0.349 (0.477)
Region: West	0.349 (0.477)	0.041 (0.199)	0.445 (0.497)
Grocery stores per 1,000 persons	0.219 (0.133)	0.358 (0.221)	0.181 (0.050)
Relative milk price	1.022 (0.168)	1.143 (0.209)	0.985 (0.137)
Year	2007.8 (2.0)	2008.2 (2.0)	2007.8 (2.0)

Notes: Data come from 2005-2011 CPS December Supplements. The sample consists of households who had incomes no greater than 185% of poverty. Means and standard deviations are adjusted with survey weights.

Table 3: The effect of the number of payday lenders on food insecurity among households in payday allowing states

	(1) Food insecure (Logit)	(2) Food insecure	(3) Very food insecure	(4) Food insecure, if income > \$5,000
Number of payday lenders	0.030 (0.012)*	0.545 (0.196)**	0.926 (0.227)***	0.475 (0.204)*
Age	-0.001 (0.000)*	-0.003 (0.001)*	-0.001 (0.001)	-0.004 (0.001)***
Female	0.004 (0.008)	0.008 (0.023)	-0.025 (0.027)	0.006 (0.024)
Race: White (omitted)				
Race: Black	0.088 (0.012)***	0.246 (0.033)***	0.122 (0.040)**	0.235 (0.035)***
Race: Other	-0.012 (0.014)	-0.020 (0.044)	-0.062 (0.054)	-0.009 (0.046)
Hispanic	0.024 (0.010)*	0.075 (0.030)*	-0.050 (0.038)	0.067 (0.031)*
Marital: Married	-0.052 (0.010)***	-0.152 (0.030)***	-0.160 (0.036)***	-0.111 (0.031)***
Marital: Divorced/widowed (omitted)				
Marital: Never married	-0.063 (0.010)***	-0.191 (0.034)***	-0.197 (0.041)***	-0.180 (0.035)***
Years of education	-0.008 (0.001)***	-0.021 (0.004)***	-0.005 (0.005)	-0.017 (0.004)***
Child under 6	-0.039 (0.011)***	-0.115 (0.035)**	-0.223 (0.044)***	-0.124 (0.036)**
Number of children	0.035 (0.004)***	0.105 (0.012)***	0.028 (0.014)*	0.111 (0.012)***
Employment: Employed (omitted)				
Employment: Retired	-0.154 (0.011)***	-0.481 (0.043)***	-0.405 (0.053)***	-0.451 (0.044)***
Employment: Not employed	0.087 (0.008)***	0.254 (0.025)***	0.233 (0.030)***	0.263 (0.026)***
Homeowner	-0.068 (0.008)***	-0.210 (0.024)***	-0.229 (0.031)***	-0.180 (0.025)***
Ln (income)	-0.045 (0.005)***	-0.138 (0.015)***	-0.142 (0.018)***	-0.273 (0.024)***
Geographic: Principal city	-0.009 (0.008)	-0.022 (0.025)	0.004 (0.030)	-0.019 (0.026)
Geographic: Metropolitan	0.022 (0.026)	0.041 (0.079)	0.059 (0.102)	
Geographic: Nonmetro (omitted)				-0.002 (0.084)
Grocery stores per 1,000 persons	0.070 (0.119)	0.543 (0.389)	0.044 (0.484)	0.594 (0.400)
Relative milk price	-0.051 (0.106)	0.176 (0.344)	-0.261 (0.433)	0.169 (0.361)
Predicted probability	0.276	-0.581	-1.233	-0.607
Year fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Instrumental Variables	None	Number of banks Gini	Number of banks Gini	Number of banks Gini
Rho	N/A	-0.136 (0.058)*	-0.256 (0.068)***	-0.119 (0.061)*
N	21,583	21,583	21,583	19,785

Notes: Data come from 2005-2011 CPS December Supplements. The sample consists of households who had incomes no greater than 185% of poverty. Marginal effects (dy/dx) and standard errors at the mean from weighted probit regressions with instrumental variables are reported, unless otherwise noted. For dummy variables, the marginal effect is for the change of dummy variables from 0 to 1. *** p<.001, ** p<.01, * p<.05, # p<.10

Table 3 (Continued)	(5) Food insecure	(6) Very food insecure	(7) Food insecure, if income > \$5,000
Number of payday lenders	0.169 (0.254)	0.558 (0.308)#	0.096 (0.251)
Age	-0.003 (0.001)**	-0.001 (0.001)	-0.005 (0.001)***
Female	0.010 (0.023)	-0.024 (0.028)	0.008 (0.024)
Race: White (omitted)			
Race: Black	0.256 (0.033)***	0.131 (0.040)**	0.243 (0.035)***
Race: Other	-0.031 (0.044)	-0.073 (0.054)	-0.020 (0.046)
Hispanic	0.074 (0.030)*	-0.058 (0.038)	0.065 (0.031)*
Marital: Married	-0.152 (0.030)***	-0.165 (0.037)***	-0.110 (0.031)***
Marital: Divorced/widowed (omitted)			
Marital: Never married	-0.194 (0.034)***	-0.204 (0.041)***	-0.181 (0.035)***
Years of education	-0.023 (0.004)***	-0.007 (0.005)	-0.018 (0.004)***
Child under 6	-0.124 (0.035)***	-0.234 (0.045)***	-0.133 (0.036)***
Number of children	0.107 (0.012)***	0.029 (0.014)*	0.113 (0.012)***
Employment: Employed (omitted)			
Employment: Retired	-0.489 (0.042)***	-0.420 (0.053)***	-0.458 (0.044)***
Employment: Not employed	0.259 (0.024)***	0.238 (0.030)***	0.266 (0.025)***
Homeowner	-0.208 (0.024)***	-0.228 (0.031)***	-0.176 (0.026)***
Ln (income)	-0.139 (0.015)***	-0.146 (0.018)***	-0.274 (0.024)***
Geographic: Principal city	-0.024 (0.025)	0.001 (0.030)	-0.019 (0.026)
Geographic: Metropolitan	0.065 (0.076)	0.065 (0.097)	
Geographic: Nonmetro (omitted)			0.038 (0.080)
Grocery stores per 1,000 persons	0.315 (0.396)	-0.233 (0.497)	0.383 (0.403)
Relative milk price	-0.113 (0.359)	-0.531 (0.453)	-0.130 (0.373)
Predicted probability	-0.584	-1.261	-0.609
Year fixed effects	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes
Instrumental Variables	Number of banks	Number of banks	Number of banks
Rho	-0.024 (0.075)	-0.144 (0.094)#	-0.006 (0.074)
N	21,583	21,583	19,785

Notes: Data come from 2005-2011 CPS December Supplements. The sample consists of households who had incomes no greater than 185% of poverty. Marginal effects (dy/dx) and standard errors at the mean from weighted probit regressions with instrumental variables are reported, unless otherwise noted. For dummy variables, the marginal effect is for the change of dummy variables from 0 to 1. *** p<.001, ** p<.01, * p<.05, # p<.10

Table 4: The effect of the number of payday lenders on SNAP participation among households in payday allowing states

	(1) SNAP participation (Logit)	(2) SNAP participation	(3) SNAP participation, if income > \$5,000	(4) SNAP participation	(5) SNAP participation, if income > \$5,000
Number of payday lenders	0.033 (0.010)**	0.951 (0.216)***	0.949 (0.223)***	1.115 (0.272)***	1.020 (0.273)***
Age	0.000 (0.000)	0.002 (0.001)#	-0.001 (0.001)	0.002 (0.001)#	-0.001 (0.001)
Female	0.026 (0.006)***	0.104 (0.027)***	0.086 (0.028)**	0.101 (0.027)***	0.084 (0.028)**
Race: White (omitted)					
Race: Black	0.090 (0.011)***	0.319 (0.037)***	0.289 (0.039)***	0.315 (0.038)***	0.289 (0.040)***
Race: Other	0.004 (0.013)	0.041 (0.053)	0.080 (0.055)	0.044 (0.052)	0.084 (0.055)
Hispanic	0.029 (0.009)**	0.127 (0.037)**	0.138 (0.038)***	0.127 (0.036)***	0.136 (0.038)***
Marital: Married	-0.077 (0.008)***	-0.305 (0.036)***	-0.241 (0.037)***	-0.300 (0.036)***	-0.240 (0.037)***
Marital: Divorced/widowed (omitted)					
Marital: Never married	-0.022 (0.008)**	-0.074 (0.038)*	-0.050 (0.040)	-0.074 (0.037)*	-0.052 (0.039)
Years of education	-0.011 (0.001)***	-0.042 (0.005)***	-0.038 (0.005)***	-0.042 (0.005)***	-0.038 (0.005)***
Child under 6	0.078 (0.011)***	0.305 (0.038)***	0.264 (0.040)***	0.304 (0.037)***	0.264 (0.039)***
Number of children	0.056 (0.003)***	0.225 (0.014)***	0.230 (0.015)***	0.221 (0.014)***	0.229 (0.015)***
Employment: Employed (omitted)					
Employment: Retired	-0.035 (0.011)**	-0.141 (0.050)**	-0.127 (0.052)*	-0.138 (0.049)**	-0.125 (0.051)*
Employment: Not employed	0.131 (0.008)***	0.481 (0.029)***	0.482 (0.030)***	0.473 (0.030)***	0.479 (0.031)***
Homeowner	-0.082 (0.007)***	-0.331 (0.029)***	-0.269 (0.031)***	-0.332 (0.029)***	-0.271 (0.030)***
Ln (income)	-0.072 (0.004)***	-0.294 (0.018)***	-0.546 (0.031)***	-0.291 (0.019)***	-0.545 (0.032)***
Geographic: Principal city	-0.004 (0.007)	-0.015 (0.029)	-0.018 (0.031)	-0.024 (0.029)	-0.026 (0.030)
Geographic: Metropolitan					
Geographic: Nonmetro (omitted)	0.037 (0.022)#	0.139 (0.083)#	0.093 (0.088)	0.138 (0.080)#	0.093 (0.085)
Grocery stores per 1,000 persons	-0.185 (0.096)#	-0.163 (0.440)	0.025 (0.453)	-0.010 (0.468)	0.109 (0.470)
Relative milk price	0.234 (0.088)**	1.484 (0.395)***	1.431 (0.414)**	1.566 (0.406)***	1.455 (0.423)**
Predicted probability	0.160	-0.937	-0.986	-0.920	-0.977
Year fixed effects	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes
Instrumental Variables	None	Number of banks	Number of banks	Number of banks	Number of banks
		Gini	Gini		
Rho	N/A	-0.241 (0.064)***	-0.246 (0.065)***	-0.290 (0.080)**	-0.266 (0.080)**
N	21,583	21,583	19,785	21,583	19,785

Notes: Data come from 2005-2011 CPS December Supplements. The sample consists of households who had incomes no greater than 185% of poverty. Marginal effects (dy/dx) and standard errors at the mean from weighted probit regressions with instrumental variables are reported, unless otherwise noted. For dummy variables, the marginal effect is for the change of dummy variables from 0 to 1. *** p<.001, ** p<.01, * p<.05, # p<.10

Table 5: Payday Border Effects on Food Insecurity among households in payday banning states

	Food insecure	Very food insecure	Food insecure, if income > \$5,000
Borders payday state	0.033 (0.018)#	0.020 (0.011)#	0.041 (0.018)*
Age	-0.002 (0.001)**	0.000 (0.000)	-0.002 (0.001)***
Female	0.017 (0.015)	0.007 (0.009)	0.011 (0.015)
Race: White	0.063 (0.020)**	0.023 (0.012)#	0.044 (0.021)*
Race: Black (omitted)			
Race: Other	-0.018 (0.028)	-0.035 (0.015)*	-0.026 (0.029)
Hispanic	0.050 (0.021)*	0.012 (0.013)	0.034 (0.021)
Marital: Married	-0.070 (0.019)***	-0.055 (0.011)***	-0.056 (0.020)**
Marital: Divorced/widowed (omitted)			
Marital: Never married	-0.053 (0.020)**	-0.025 (0.011)*	-0.048 (0.020)*
Years of education	-0.009 (0.003)**	-0.001 (0.002)	-0.005 (0.003)#
Child under 6	-0.040 (0.022)#	-0.026 (0.012)*	-0.045 (0.022)*
Number of children	0.027 (0.008)**	0.009 (0.005)#	0.028 (0.008)**
Employment: Employed (omitted)			
Employment: Retired	-0.139 (0.021)***	-0.075 (0.012)***	-0.141 (0.022)***
Employment: Not employed	0.062 (0.017)***	0.034 (0.011)**	0.056 (0.017)**
Homeowner	-0.070 (0.016)***	-0.020 (0.011)#	-0.067 (0.017)***
Ln (income)	-0.042 (0.010)***	-0.021 (0.006)***	-0.089 (0.015)***
Geographic: Principal city	-0.044 (0.036)	-0.032 (0.021)	-0.040 (0.036)
Geographic: Metropolitan	0.002 (0.036)	-0.025 (0.020)	0.005 (0.035)
Geographic: Nonmetro (omitted)			
Grocery stores per 1,000 persons	0.071 (0.102)	0.009 (0.059)	0.064 (0.105)
Relative milk price	-0.171 (0.080)*	-0.094 (0.047)*	-0.163 (0.081)*
Predicted Probability	0.265	0.094	0.254
Year fixed effects	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes
N	5,208	5,208	4,715

Notes: Data come from 2005-2011 CPS December Supplements. The sample consists of households who had incomes no greater than 185% of poverty. Marginal effects (dy/dx) and standard errors at the mean from weighted logit regressions are reported. For dummy variables, the marginal effect is for the change of dummy variables from 0 to 1. *** p<.001, ** p<.01, * p<.05, # p<.10

Table 6: Payday Border Effects on SNAP Participation among households in payday banning states

	SNAP participation	SNAP participation, if income > \$5,000
Borders payday state	0.021 (0.017)	0.004 (0.017)
Age	0.002 (0.001)***	0.001 (0.001)
Female	0.053 (0.014)***	0.048 (0.014)**
Race: White	0.101 (0.020)***	0.076 (0.020)***
Race: Black (omitted)		
Race: Other	-0.051 (0.024)*	-0.047 (0.023)*
Hispanic	0.042 (0.021)*	0.026 (0.020)
Marital: Married	-0.066 (0.019)***	-0.043 (0.019)*
Marital: Divorced/widowed (omitted)		
Marital: Never married	0.036 (0.019)#	0.049 (0.020)*
Years of education	-0.012 (0.002)***	-0.007 (0.002)**
Child under 6	0.058 (0.025)*	0.033 (0.024)
Number of children	0.071 (0.008)***	0.072 (0.009)***
Employment: Employed (omitted)		
Employment: Retired	-0.043 (0.024)#	-0.029 (0.024)
Employment: Not employed	0.168 (0.018)***	0.154 (0.019)***
Homeowner	-0.130 (0.015)***	-0.110 (0.015)***
Ln (income)	-0.084 (0.010)***	-0.165 (0.015)***
Geographic: Principal city	-0.069 (0.033)*	-0.046 (0.031)
Geographic: Metropolitan	-0.099 (0.032)**	-0.082 (0.030)**
Geographic: Nonmetro (omitted)		
Grocery stores per 1,000 persons	0.042 (0.103)	-0.007 (0.103)
Relative milk price	-0.110 (0.084)	-0.023 (0.083)
Predicted probability	0.200	0.181
Year fixed effects	Yes	Yes
State fixed effects	Yes	Yes
N	5,208	4,715

Notes: Data come from 2005-2011 CPS December Supplements. The sample consists of households who had incomes no greater than 185% of poverty. Marginal effects (dy/dx) and standard errors at the mean from weighted logit regressions are reported. For dummy variables, the marginal effect is for the change of dummy variables from 0 to 1. *** p<.001, ** p<.01, * p<.05, # p<.10

Appendix Table 1
 State payday bans

Years	Payday lending outlawed in:	Payday lending allowed in:
2004	GA, NY, PA, VT	47 states
2005	GA, ME , NC , NY, PA, VT	45 states
2006	GA, ME, NC, NJ , NY, PA, VT	44 states
2007	GA, ME, NC, NJ, NY, PA, VT, WV	43 states
2008	GA, ME, NC, NJ, NY, PA, VT, WV, DC	42 states
2009	CT , GA, ME, MD , NH , NC, NJ, NY, PA, VT, WV, DC	39 states
2010	AZ , CT, GA, ME, MD, NH, NC, NJ, NY, PA, VT, WV, DC	38 states
2011	AR , AZ, CT, GA, ME, MD, MA , NH, NC, NJ, NY, PA, VT, WV, DC	36 states