

Minimum Wages and Consumer Credit: Do Lenders and Borrowers Respond to Changing Policy?

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Abstract

This paper examines how state-level minimum wage changes affect the decisions of lenders and low-income borrowers, who tend to have little savings and liquidity. Using data derived from direct mailings of credit offers and credit reports, we broadly find that when minimum wages rise, access to credit expands for lower-income households, who in turn, use more credit. In particular, lower-income households receive more credit card offers, and with improved terms. We also find increases in the number of credit cards and auto loans held by low-skill borrowers, and overall increases in credit scores and reductions in payment delinquency. A small fraction of these new loans prove to be unaffordable; there is a small increase in early payment delinquency among the new auto borrowers. Overall, our results suggest that, net of any employment effects, minimum wage policy has spillover effects on credit markets by increasing access to credit among lower income households.

Keywords: consumer debt, minimum wages, credit limit, delinquency

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1. Introduction

Proponents of minimum wage legislation point to its potential to lift households out of poverty, reduce inequality, and stimulate the economy by increasing aggregate consumption. Opponents tend to focus on potential adverse employment effects, which on aggregate could offset any gains to specific workers. This tension has been the focus of a long literature in labor economics which has attempted to measure the employment and earnings effects of minimum wages.² But earnings are only one piece of a household's financial circumstances, and to date, there has been a relative paucity of research on how minimum wages affect a household's financial experiences more generally.³ This paper asks whether policy-induced changes to household income, which could be positive for some households and negative for others, alter lenders' credit offers and how households use and manage debt.

Debt can be useful for smoothing in the face of negative expenditure shocks. For low income households, who tend to hold few liquid assets, an unexpected auto repair or health shock may cost more than their current budget constraint permits and require debt financing. Access to credit markets can also facilitate investments which help low income households climb the economic ladder. Borrowing for educational expenses or lumpy durable goods like a vehicle can increase job opportunities.⁴ But unless debt payments are managed well by borrowers, large debt-service burdens may increase future hardship, especially among individuals with low financial literacy, self-control or forecasting difficulties (Laibson 1997; Lusardi and Tufano, 2015; Melzer, 2011; Dobridge 2016). Otherwise, there is a potential for a cycle of debt that can prevent a household from being able to manage their cash flow. These problems can

² The important contributions to this literature are too numerous to adequately cite here. For reviews of the literature, see Card and Krueger, 1995; Doucouliagos and Stanley, 2009; Neumark and Wascher, 2008; or Wolfson and Belman, 2014.

³ Aaronson, Agarwal and French (2015) is an exception. They study the consumption and debt response to changes in minimum wages.

⁴ There is a substantial literature indicating that vehicle ownership can increase job opportunities and facilitate stable employment among the poor. See, for example, Baum (2009).

also have far-reaching implications beyond credit markets, since credit scores are often used to screen employment and rental applications.

Minimum wage workers are particularly likely to be credit constrained: data from the Survey of Consumer Finances (SCF) indicate that households with a minimum wage worker are 40 percent more likely to be credit constrained than the average SCF household. Even those with access to credit tend to face lower credit limits and higher interest rates. Minimum wage workers also tend to hold few liquid assets: the median household with a minimum wage worker has under \$2,000 in financial assets, while the median household overall has over 10 times that amount in liquid savings. With little savings and access to formal credit markets, minimum wage workers are vulnerable to negative expenditure shocks, and 23 percent of households with a minimum wage worker reported that their spending exceeded their income in the past year. To make up the gap, families may need to turn to high cost alternatives to formal credit, such as payday loans, which have very high interest rates and can damage the borrowers' ability to manage their finances in the future (Melzer, 2011; Dobridge, 2016). Indeed, households with a minimum wage worker in the SCF are twice as likely to use a payday loan as the average household. Increasing minimum wages may spillover effects in credit markets that influence how low-income families borrow.

This paper examines how minimum wages impact minimum wage workers' use of consumer credit. Conceptually, minimum wages will affect household interactions with credit markets via their effects on household income. There is considerable evidence that increases in minimum wages increase earnings for minimum wage workers who remain employed.⁵ However, some empirical studies find evidence of disemployment effects among low-skill individuals; whether positive earnings effects outweigh any disemployment effects is still under debate.⁶ Regardless of the net earnings and

⁵ Belman and Wolfson (2014) provide a review of the research on wage and earnings effects. They conclude there is evidence of positive earnings effect for a substantial majority of minimum wage workers. They also find evidence for spillover effects on higher-wage workers.

⁶ Card and Krueger (1995), Wolfson and Belman (2014) and Doucouliagos and Stanley (2009) review the research and conclude that moderate increase in the minimum wage lead to little to no declines in unemployment. Wolfson and Belman (2014) note that even where there is evidence of negative employment effects, those effects are

employment effects, we expect minimum wages to influence households' experiences with debt through their impact on household income, which will vary by household.

Changes in income associated with changes in the minimum wage may affect households' ability to qualify for credit, since income is a key component of loan underwriting. Thus, any positive (negative) effects on household income could lead to more (less) credit being offered to low income households, and subsequently, more (less) borrowing.⁷ Aaronson, Agarwal and French (2012) find that increases in minimum wages lead to increases in spending which are larger than associated increases in income among households with minimum wage workers. They find that this extra spending is financed with debt, and that most of this increase in spending and debt consists of new vehicle purchases. These findings are consistent with net positive effects of minimum wages on income and, hence, minimum wage workers' ability to qualify for new credit.

Changes in household income associated with changes in the minimum wage can also affect the household budget constraint. For low income households with existing debt, increases (decreases) in income associated with changes in minimum wages could make debt payments more (less) affordable by relaxing (tightening) households' budget constraints. Agarwal, Liu, and Souleles (2007) examine the impact of the 2001 tax rebate on consumers' interactions with credit cards. They find that consumers save some of their tax rebate by paying down credit card debt, thereby increasing future liquidity. Agarwal and Qian (2014) find similar results when examining an unanticipated income shock in Singapore. In an analysis of the 2008 tax rebate, Sahn, Shapiro, and Slemrod (2010) find that over half of households reported that the rebates led them to mostly pay off debt, rather than increase spending or saving. All of

moderate in size and that a very substantial majority of bound workers experience earnings benefits. In contrast, in Neumark and Wascher's (2008) review of the literature, they conclude that minimum wages reduce employment opportunities for low-skilled workers and because of the reduction in employment, higher minimum wages reduce earnings among low-skilled workers. Note that many of the important contributions in this literature have focused on teenage workers. We will exclude teenagers from our analyses because they are underrepresented in our data.⁷ Our analyses will focus on unsolicited credit offers, so we will consider both real and perceived changes in income as possible mechanisms.

these income shocks, however, are temporary, so it is not obvious whether changes in minimum wages, which are permanent increases in income, would have similar effects.

We test these hypotheses empirically by examining the impact of changes in state-level minimum wage legislation on consumer credit outcomes using two distinct sources of data. First, we examine whether low income households are offered more or better terms of credit after minimum wages rise in their state by examining data derived from monthly direct mailings. Our identification strategy is a generalized difference-in-differences model, which exploits state-level changes in minimum wages over time (controlling for state and time fixed effects, census division-year effects, and state time trends), and compares the impact of changing minimum wages on workers who are most likely to be affected by the legislation (those with household incomes low enough to be consistent with minimum wage earnings) and workers who are likely to be unaffected by the legislation (those with higher earnings). We find that when minimum wages rise, minimum wage households (but not higher wage households) receive more credit card offers, and among the credit card offers received, the offers have higher credit limits and better terms.

Next, we assess whether increases in state-level minimum wages change households' usage of credit and payment behavior, including the number and amount of loans, delinquency, and credit limits. We conduct this exercise using administrative panel data derived from credit reports. We estimate individual fixed effects models, where the independent variable of interest is state-level minimum wages. Because these data do not include household income, we instead use very-local (census block-group) demographic characteristics to identify likely low-skill workers (in particular, the fraction of the census-block which has low levels of education) and focus our analyses on those individuals. We find that within-person changes in the state minimum wage leads to more borrowing, as captured by an increase in the number of credit cards and auto loans, and an increase in credit card limits. There is also a reduction in delinquency, suggesting affected workers use some of their income to pay down existing debts. In the

medium-run, we find that, overall, borrowers who took out new loans stay current on those loans. The exception is auto loans, where we see a slight increase in delinquency on new loans.

Our results indicate that changes in minimum wage policy affect the decisions of borrowers and lenders in consumer credit markets. Understanding how low income households fare in credit markets has implications for the intersection of social programs and financial stability; and the recent subprime mortgage crisis serves as a reminder of the potential impact of low income households experiences with debt on overall financial stability. Similar to Hsu, Matsa and Melzer (2015), who find that unemployment insurance improves credit market outcomes, our results suggest that the benefits of social insurance programs can extend beyond simply providing income support, and that cost-benefit analyses of such programs should consider other financial outcomes. Recent examinations of credit access among lower-income households has tended to focus on high-cost payday loan borrowing, and generally finds that payday loan access reduces welfare among low to moderate income households because of sizable debt payment burdens (Melzer, 2011; Dobridge, 2016). In contrast, we find that improving access to formal credit through income support reduces delinquency, even among new borrowers.

One of the goals of minimum wage legislation is to keep working families out of poverty. We find evidence that this income support program reduces delinquency and increases future liquidity for affected borrowers. This additional liquidity can better equip families to weather economic shocks. Establishing a good credit record and improving one's credit scores can also increase families' ability to borrow in the future, potentially allowing for entry into auto or home ownership, which improve household balance sheet positions and allow for further wealth-building (Herbert, McCue and Sanchez-Moyano, 2013).

2. Background

2.1 Financial Characteristics of Minimum Wage Workers

To begin our analysis we begin by describing how the financial lives of households with minimum wage workers compare to the average household in the United States. This analysis relies on data from the Survey of Consumer Finances (SCF), a triennial survey of household wealth conducted by the Federal Reserve Board. The SCF is widely considered the gold standard of household wealth surveys. We focus on the 2001- 2013 surveys.

To identify households with minimum wage workers in the SCF, we assign households with annual wage income between 60 and 120 percent of the state minimum wage as minimum wage workers (where we convert annual wage income to hourly income by assuming full-time workers status).⁸ For households with two or more workers, we double the thresholds (that is, between 120 and 240 percent of the minimum wage) to allow for multiple minimum wage workers. We exclude teenagers from our analysis because they are rarely heads of households, and because they will be excluded from the rest of our analyses due to their underrepresentation in the credit reporting and credit offer data.

Table 1 describes the data, where the first column describes all households in the SCF and the second column describes the subset of households identified as having a minimum wage worker according to the procedure above. We focus on medians for all dollar values and means for binary variables since we are interested in comparisons between minimum wage households and the typical, or median, household.⁹

⁸ Aaronson et al (2015) also assign hourly wages between 60 and 120 percent of the minimum wage as minimum wage workers.

⁹ The SCF sampling methodology is designed to cover the very top of the income and wealth distribution, which skews means. See Bricker et al. (2014) for more on the SCF.

Table 1 indicates that minimum wage worker households have substantially less income and wealth than the typical household: Median net worth among minimum wage households in 2001-2013 was \$12,964, compared to \$103,960 among the typical household. Minimum wage households were also slightly less likely to own a home or automobile. The second panel of table 1 describes household interactions with credit markets. Minimum wage households carry less debt (\$5,516 versus \$25,000), and are less likely to have a credit card, auto loan or mortgage. Conditional on having a credit card, minimum wage households have lower credit limits (\$7,800 versus \$15,000) and face higher interest rates.

The final panel of table 1 describes various measures of financial distress. We see that minimum wage workers are more likely to have their spending exceed their income, and are more likely to have been turned down for credit, and are more likely to be credit constrained (defined as either having been turned down for credit or discouraged from borrowing because he thought we would be turned down). Minimum wage households are also more likely to be late on payments and are less likely to report they could borrow \$3000 from a family member or friend. Finally, we see that 23 percent of minimum wage households are unbanked (no checking account).

2.2 Minimum Wage Legislation

Minimum wage legislation in the United States has a long history, dating back to the early 1900s. While originally adopted by states, the first federal minimum wage was enacted in 1938 with the Fair Labor Standards Act (FLSA). Since then, the federal minimum wage has grown periodically (though not always at pace with inflation), and various states have adopted minimum wages above the federal level. In this paper, we use monthly state-level minimum wage data from Neumark, Salas and Wascher (2014), which we update through 2015 using Economic Policy Institute's Minimum Wage Tracker¹⁰. Table 2 highlights the various state-level changes in the minimum wage during the time period we study in this paper, 1999-2015. There is considerable cross-sectional variation in the minimum wage across states and

¹⁰ The Minimum Wage Tracker can be accessed online at <http://www.epi.org/minimum-wage-tracker/>.

over time during this period, ranging from \$5.15 to \$10.50. The most recent change in the federal minimum wage became effective July 2009, increasing from \$6.55 to \$7.25.

3. Data and Empirical Methods

3.1 Credit Offers

Data on credit offers come from direct mail advertising data from 1999 to 2015 compiled by Mintel Comperemedia. Mintel collects data from a sample of about 1,000 households each month, surveying household demographic and income characteristics in addition to compiling information from all mail credit and sales, including credit card, mortgage, auto, student loan, and unsecured loan offers received by the household during the month. The data also include the terms of credit for credit card and mortgage offers, including interest rates, credit limits and whether a credit card is a rewards card and has an annual fee. . For ease of interpretation, our main analyses will focus on types of offers which are typically underwritten using income (at least to some extent), that is, credit cards, auto loans, unsecured loans, and mortgages. We will also examine the terms of credit card offers, the most popular type of mailing in the data. Since the data include a measure of household income and household size, as well as the state of residence, we are able to identify likely minimum wage workers as was done in the SCF data. To be precise, we identify minimum wage workers as those whose household income is below 120 percent of the state minimum wage (for a single-person household) or 240 percent of the state minimum wage (for a multiple-person household). Our analysis using this dataset will also control for households' race/ethnicity, the age of the household head, and the level of education of the household head. Table 3 summarizes minimum wage workers in the Mintel data.

For the credit card offer data, we estimate ordinary least squares regressions of the following form:

$$\begin{aligned}
y_{ist} = & \beta_1 \ln(\text{minwage}_{s,t-3}) * \text{minwageworker}_{it} \\
& + \beta_2 \ln(\text{minwage}_{s,t-3}) + \beta_3 \text{minwageworker}_{it} + X_{it} + \text{unemp rate}_{st} + \gamma_s + \gamma_{dt} \\
& + \gamma_s * t + \varepsilon_{it}
\end{aligned}$$

Where y_{ist} is the credit offer outcome of interest for individual i in state s in month t .

$\ln(\text{minwage}_{s,t-3})$ is the minimum wage in state s in month $t-3$ (one quarter prior). $\text{minwageworker}_{it}$ is the indicator for whether or not the household is identified to have a minimum wage worker. X_{it} is a vector of demographic characteristics of the household (education, race/ethnicity, and age group), γ_s is a vector of state fixed effects, γ_{dt} is a vector of Census-division-month fixed effects, $\gamma_s * t$ is a vector of state-specific time trends. Standard errors are adjusted for clustering at the state-level.

In these regressions, the coefficient of interest is β_1 which captures the conditional effect of changes in the state-level minimum wage on credit offers to minimum wage workers. This coefficient indicates how a change in the minimum wage affects the credit offers received by households who are most likely to be affected by changes in policy because of their incomes. β_2 captures the conditional main effect of changes in state-level minimum wages on the credit offers net of minimum wage worker status, all else held constant. We interpret this as the effect of changes in minimum wages on workers who are less likely to be affected by changes in policy. This coefficient will capture any changes in credit availability associated with minimum wage policy that are not related to changes in specific workers (perceived) credit-worthiness, such as changes in the general economic environment. The level term $\text{minwageworker}_{it}$ captures the level correlation between minimum wage worker status and credit offers. We include the main effect of minimum wage status to facilitate a causal interpretation of β_1 , but do not assign a causal interpretation to the coefficient on the main effect since the level correlation between credit offers and borrower type could be determined by a host of different factors, such as average credit scores or whether the type of borrower is more likely to be a homeowner.

We are interested in identifying the causal relationship between state-level minimum wages and credit offers to minimum wage workers. As such, it is important that we control for time-varying state-level economic conditions that might affect credit offers. Thus, our analysis also include the state-month unemployment rate ($unemp\ rate_{st}$). These data come from the Bureau of Labor Statistics (BLS) local area unemployment statistics. Our analyses also importantly include state and month fixed effects (γ_s and γ_t), so that the estimate relationship between minimum wages and credit offers is not confounded by time-invariant differences in credit offers to states with higher or lower minimum wages or national trends in minimum wage levels and credit availability. The inclusion of state-specific time trends and Census division-month fixed effects addresses the possibility of spatial heterogeneity in minimum wage policy adoption, as suggested by Allegretto, et al. (2011). The inclusion of these variables allows us to control for the possibility that minimum wage changes are correlated with trends in credit availability within states or geographic areas over times.

Before we turn to our analysis, we offer a note on interpretation. Our preferred interpretation of the analyses in the Mintel data is that they represent unsolicited credit offers, and as such, provide a unique opportunity in which to study the availability of credit over time for populations of interest. But it is notable that not all forms of credit are advertised through the mail and the data provide only a glimpse of the full range of credit products that may available to a person. For example, a key form of credit of interest in this analysis, auto loan financing, is somewhat rare in the data: the median respondent receives no auto loan offers in any given month (and even the 90th percentile has no offers). This is likely because the number of households considering buying and/or refinancing a car at a given point in time may be small due to the infrequency of such transactions, making these types of mail campaigns less profitable than say, credit card advertisements.¹¹ This suggests an analysis of credit offers by mail may *understate*

¹¹ Auto *sales* advertising is slightly more common in the data than auto *loan* advertising. It is worth noting that auto sales advertising frequently mentions financing options for “qualified borrowers,” but since this would tell us nothing about the availability of credit to the particular household receiving the ad, we limit our analyses specifically to auto loan offers.

any credit supply effects of minimum wage policy. At the same time, mail offers often include ranges, maximum borrowing limits, or minimum interest rates, which are dependent on further underwriting. This suggests our analyses might *overstate* the amount of credit households could actual receive. For these reasons, we will supplement our analysis with an investigation into household borrowing patterns, in order to gauge whether and how these offers translate into credit usage, and to more fully capture the full range credit products that may be available to a household.

3.2 Borrowing and Payment Behavior

Data on borrowing and payment behavior come from the Federal Reserve Bank of New York Consumer Credit Panel/Equifax (CCP/Equifax) data.¹² The CCP/Equifax is an individual-level panel dataset of consumer credit reports, obtained from one of the three main credit bureaus in the United States. The data have been collected quarterly since 1999 and consist of a five percent random sample of all U.S. consumers with credit histories. The data include detailed information drawn from credit reports, such as the amounts borrowed on various accounts, credit limits, payment status, the Equifax risk score (a type of credit score), as well as the sample member’s age and location of residence (down to the Census block). Note that by design this dataset only includes individuals who have credit reports. As such, teenagers are underrepresented in our data and excluded from our analyses, despite their historical prominence in the minimum wage literature.

For the credit report data, we estimate individual fixed effects models of the following form:

$$y_{ist} = \beta \ln(\text{minwage}_{s,t-k}) + \text{age}_{it} + \text{unemp rate}_{st} + X_{ct} + \gamma_s + \gamma_t + \gamma_i + \varepsilon_{it}$$

¹² Additional information about the dataset, including sampling and methodology, can be found in Lee and van der Klaauw (2010) at www.newyorkfed.org/microeconomics/ccp.html.

Where y_{ist} is the credit outcome of interest for individual i in state s in quarter t . $\ln(\text{minwage}_{s,t-k})$ is the minimum wage in state s in quarter $t-k$, where $k=1$ (one quarter prior) or $k=4$ (one year prior). age_{it} is vector of dummies for the age group of person i , X_{ct} is a vector of Census-block/block-group characteristics (education, race/ethnicity, sex and median income), γ_s is a vector of state fixed effects, γ_t is a vector of quarter fixed effects, and γ_i is a vector of person fixed effects. Standard errors are adjusted for clustering at the person-level to allow for the panel structure of the data. In these regressions, the coefficient of interest β can be interpreted as the effect of within-person changes in the state-level minimum wage on the credit market outcomes of interest.

Our main outcomes of interest are measures of borrower usage of consumer credit and payment behavior on various types of consumer credit, including auto loans, credit cards, and mortgages. We focus on two measure of credit usage: the number of loans/trades in each category and credit limits on consumer credit cards. For a picture of overall creditworthiness, we examine the borrower's credit risk, as captured by the Equifax risk score, a type of credit score. This measure is a composite measure of creditworthiness used by lenders in underwriting, and is determined by payment behavior, credit utilization and length of credit history. We also examine overall payment behavior on any of the four types of loans described above using an indicator for delinquency, defined as being 60 or more days past due.¹³ We do not highlight analysis of debt balances themselves because balances in the CCP/Equifax vary by type of debt in their meaning and interpretation. Credit cards, for example, are recorded at an arbitrary point in the billing cycle and thus conflate credit card spending and debt. In the CCP/Equifax, borrowers who use cards for convenience only, paying off their bill in full every month, and borrowers with large revolving balances are indistinguishable.

¹³ The data also indicate if accounts are 30 or more days past due, but not all lenders report this type of delinquency so we focus on the more common 60 or more days past due.

Since we are interested both in what individuals do immediately after we observe a change in the minimum wage, as well as whether borrowers who take out new loans are able to manage this new debt, we look at both short-run and medium-run outcomes. We define short-run as one quarter lagged minimum wages ($minwage_{s,t-1}$) and we define medium run as four-quarter lagged minimum wages ($minwage_{s,t-4}$). We can then interpret these coefficients as changes in behavior the following quarter and the following year after a change in the minimum wage. In the medium-run analyses, we look separately at borrowers who took out any new debt in the past year in each category (as well as overall) and those who did not. This allows us to directly examine whether borrowers who took out any new debt after the minimum wage change were better or worse off one year later.

While the CCP/Equifax has very rich debt information, it includes limited demographic characteristics; only the individual's age and location of residence are available.¹⁴ To overcome this limitation, we proxy for the demographic characteristics of the sample member by merging to the data information on the demographic and economic characteristics of the individual's census block of residence (X_{ct}), tabulated from the 2000 Census. We use information on the race, ethnicity, sex, median income (by age group) and educational attainment of the census block/block-group's inhabitants. We use these variables as control variables in our analyses.

Because the CCP/Equifax does not have borrower income, we cannot directly observe whether an individual's income is consistent with working in a minimum wage job as we can in the Mintel and SCF data. Instead, we focus our analyses on borrowers who live in a census-block group with a relatively high fraction of low-skill workers, defined as more than 50 percent of the census-block having below a high school education.¹⁵ We interpret this as indicative of a high probability that the borrower himself is a low-

¹⁴ Federal law prohibits lenders from discriminating applications on the basis of race, ethnicity, marital status, national origin, religion, or receipt of public assistance, and these demographic characteristics are not included in the data.

¹⁵ The appendix also presents results using alternative cut-offs and different measures, including block-group median incomes, high school graduates.

skill worker, and more generally of living in a neighborhood where the cost-of-living is feasible for a low-skill (and typically lower income) borrower. In the appendix, we provide evidence that our measure performs well in predicting minimum wage borrower status in the SCF. However, because this prediction will necessarily be imperfect, we think of these analyses as akin to an “intent to treat” analysis, and the results are likely a lower bound on the causal effect for minimum-wage workers. That said, there is empirical evidence that changes in minimum wages also affect workers who make above-minimum wage incomes due to spillover effects.¹⁶ As such, even if our data allowed us to focus exclusively on minimum wage workers, such an analysis could miss out on important effects for borrowers with slightly higher incomes, who likely also live in the types of neighborhoods minimum wage borrowers live. Table 4 describes the CCP/Equifax data.

4. Results

4.1 Credit Offers

Table 5 presents the results of estimating equation (1) where the outcome is the number of offers received in each of the main loan types.¹⁷ This specification yields a point estimate on the interaction term between minimum wage worker status and the natural log of minimum wage (β_1) of 1.9406 for credit cards, -0.032 for auto loans, 0.1470 for other unsecured loans, and 0.0299 for mortgages. Of these, the results are statistically significant at the one percent level for credit cards and unsecured loans. This indicates that minimum wage workers receive more credit offers of these types when minimum wages rise. At the mean, these estimates imply that a \$1 increase in the minimum wage leads to a 6.6 percent increase in credit card offers and a 10.8 percent increase in unsecured loan offers.

¹⁶ See Belman and Wolfson (2014) for a review of literature.

¹⁷ The appendix includes specification where the outcome is alternatively a binary indicator of any offer received or the conditional number of offers, both of which provide similar results.

On the other hand, we see that the conditional main effect of the minimum wage is small and imprecisely estimated for all types of loans, indicating that offers received by higher-income households are unaffected by changes in the minimum wage. The coefficients on $minwageworker_{it}$ indicate that, on average, low-income households receive fewer offers than higher-income households for all types of loans except auto and mortgage loans (where the results are indistinguishable from zero), consistent with minimum wage households having relatively less credit available to them, as was observed in the SCF data. One possible explanation for the lack of a result on either interaction of level term for auto and mortgage loans is that these types of mailings do not target borrowers based on expected income, and instead target borrowers based on their current auto or mortgage loan, and whether they might benefit from an interest rate reduction and/or rising home values (in the case of a mortgage loan). Overall, the evidence in table 5 is consistent with higher minimum wages increasing the offers received precisely for the group affected by the minimum wage, with no effects on other groups.

Table 6 narrows in on the terms included in credit card offers received, including the credit limit and interest rates. Columns 1 and 2 displays the results where the outcome is the mean and maximum credit limit, respectively. The coefficient on the interaction term indicates that minimum wage households receive higher credit limit credit offers when minimum wages rise. Our estimates indicate that a one hundred percent rise in the minimum wages raises the mean credit limit by \$7,026, and the maximum credit limit by \$16,735 for minimum wage households. At the mean, this implies that a \$1 rise in the minimum wage increases credit limits and offers to minimum wage households by 2.6 percent and 4.9 percent, respectively. The conditional main effect of the minimum wage indicates there is no corresponding effect for higher income workers, and the level terms indicate that minimum wage households, on average, are offered lower credit limits on credit card offers.

Columns 3-4 of table 6 display results for interest rates. For comparability, we focus on cards that offer neither rewards nor annual fees. We do so because interest rates often differ on these dimensions,

and any changes in the mix of offers would complicate such an analysis.¹⁸ Column 3 displays the results for the purchase APR and column 4 displays the results for the default APR. Purchase APR is the standard APR offered on purchases. Default APR is the interest rate that is later applied in the event that the borrower misses any payments. Interestingly, we see that on average, lower income households are offered lower purchase APRs and higher default APRs. This is consistent with Ru and Schoar (2016), who find that credit card-issuers target less-sophisticated (less educated) customers with more steeply back-loaded fees (lower introductory and purchase interest rates, and higher default interest rates, late fees and over-limit fees). However, we see that when minimum wages rise, minimum wage households are offered slightly higher purchase APRs and lower default APRs, making their offers more similar to those received by higher income households. As in previous specifications, there is no effect of a change in minimum wages on higher income households.

Taken together, we find unambiguous evidence that minimum wage workers receive more offers, higher credit limit credit card offers, and offer terms more similar to higher income workers when minimum wages rise, and we find no corresponding effects among higher income households. Since these offers are unsolicited, we interpret these results as direct evidence of increase in credit supply to low income households in response to changes in minimum wage policies.

4.2 Credit Usage and Borrowing

Table 7 presents results estimating equation (2), where in columns 1-3 the outcome is the number of trades/loans the borrower has in each of the following categories: credit cards, auto loans, and mortgages. In these specifications, the independent variable of interest is the one-quarter lagged minimum wage. Recall that this specification narrows in on individuals who live on census block-groups with a relatively high fraction of low-skill workers and include individual fixed effects. Thus, the coefficient on

¹⁸ The appendix includes results on the mix of offers received as well as interest rates on other types of cards. Note that minimum wage workers do receive more of these types of offers when minimum wages rise.

the minimum wage can be interpreted as the effect of within-person changes in the state-level minimum wage on within-person changes in the number of trades/loans in each category among likely low-skill borrowers. The results presented in table 7 columns 1-3 indicate that a one hundred percent change in the minimum wage leads to: 0.103 more credit cards and 0.043 more auto loans, both of which are statistically significant at the one percent level.¹⁹ At the mean, these effects imply that a \$1 increase in the minimum wage leads to a 0.8 percent more credit cards and 1.5 percent more auto loans. This indicates that the increased availability of credit documented in section 4.1 indeed translates into increased borrowing among likely minimum wage workers.

Column 4-5 of table 7 displays credit limits on credit cards, defined as both the total limit across all credit cards and the average limit per card. Both indicate an increase in credit card limits, with a \$2,366 increase in total credit available and a \$496 increase in credit available per card. Evaluated at the mean, these coefficients imply that a \$1 increase in the minimum wage increases credit limits on consumer credit cards by 1.4 percent per card, and 2.2 percent overall, which is about half the size of the effects found for offers in section 4.

4.3 Short Run Payment Behavior

The top panel of table 8 presents the results of estimating equation (2) where the dependent variables measure a borrower's payment behavior, including overall credit risk and delinquency.²⁰ Again, we focus only on likely low-skill workers, and the panel fixed effects design implies coefficients can be interpreted as within-persons changes in payment status or credit risk.

Column 1 displays the results for credit scores, indicating a one hundred percent increase in the minimum wage leads to an 8 point increase in credit scores; at the mean, this implies a \$1 increase in the

¹⁹ Aaronson et al (2015) also find that increase in the minimum wage lead to more auto debt.

²⁰ Results in the appendix also present results for the fraction of total balances by type which are current or past due. Results are very similar.

minimum wage increase credit scores by 0.17 percent. Credit scores are heavily influenced by payment behavior, and indeed, column 2, which displays results for delinquency on any account, indicates a one hundred percent increase in minimum wages reduces the probability of being delinquent by 5.37 percentage points. At the mean, this indicates that a \$1 increase in the minimum wage reduces delinquency rates by 5 percent. Taken together, these results imply increases in minimum wages lead to increased debt service payments among households in lower-skill Census blocks.

Columns 3-5 of the top panel of table 8 displays results for delinquency by type of debt. This indicates that the decline in delinquency can be attributed to changes in delinquency on credit cards, where a one hundred percent increase in minimum wages reduces the probability of being delinquent by 8.31 percentage points. At the mean, this implies that a \$1 increase in minimum wages reduces credit card delinquency by 7.2 percent. The fact that the reduction in overall delinquency is driven by credit cards is not surprising; becoming current on a credit card only requires that the borrower make the minimum payment, typically around 2-4 percent of the total balance during this time period. Aaronson, et al (2014) found that a \$1 minimum wage hike increases household income by about \$250 per quarter, which would just about cover the \$90 minimum monthly credit card payment, on average, required for borrowers found in our sample.

4.4 Medium Run Payment Behavior

The bottom two panels of table 8 presents results from estimating equation (2), where the outcomes of interest are again measures of payment behavior, including credit risk and delinquency. In this specifications, the independent variable of interest is one-year lagged minimum wages, so that the results can be interpreted as the effect of within-person changes in the minimum wage on within-person changes in payment behavior one year after the minimum wage change among likely low-skill borrowers. Because we are interested in whether borrowers who opened new trades/loans were able to manage those trades, we estimate the model separately for borrowers who had no new trades/loans in the category of

interest (or overall) between $t-4$ (when the minimum wage is measured) and t and those who did have new trades.

The middle panel of table 5 displays results for borrowers without any new trades/loans (either overall or of a particular type). In this case, there is no demonstrable effect on credit scores, but overall delinquency declines by 3.1 percentage points. As in the short run, this is driven by a reduction in credit card delinquency, of about 7.7 percentage points. There is no statistically significant change in delinquency on any other type of debt. This suggests the change in credit scores observed in the overall specification is driven by borrowers opening new accounts (credit usage is another key component in credit scoring).

The bottom panel of table 8 displays results for borrower who had new trades/loans. As in the short run, there is a statistically significant increase in credit scores, as well as a decline in overall delinquency. When looking by loan type, we see that borrowers with new credit cards were 5.3 percentage points less likely to be delinquent on a credit card. This coefficient implies that a \$1 increase in the minimum wage reduces delinquency by 9 percent among borrowers with new credit card accounts. One possible explanation for the relatively larger effect on delinquency for borrowers with new credit cards than those with no new cards is the possibility that these borrowers are using a balance transfer option.

Among the other types of loans, we see that among borrowers who opened new auto loans there is an increase in delinquency, on the order of 4.2 percentage points. At the mean, this indicates that a \$1 increase in minimum wages increases delinquency among new auto borrowers by 8.4 percent, implying that borrowers opening new auto loans had problems making timely payments.²¹ Given the modest increase in the average number of auto loan in response to minimum wage hikes, these elevated

²¹ While Aaronson, et al. (2012) do not find an increase in delinquency, the subprime auto loan market has expanded substantially since 2008, the end of their analysis period.

delinquency rates apply to a relatively small group of borrowers. Recall that table 7 indicated a 1.5 percent increase in auto borrowing, thus, this estimate implies that a \$1 rise in the minimum wages increases overall auto loan delinquency by 0.13 percent.

4.5 Robustness Checks

We conduct a number of robustness checks to better understand the sensitivity and generalizability of our results. First, we repeat our borrowing and payment behavior analyses using census blocks with higher concentrations of residents with college educations. We consider this a quasi-placebo test, since these blocks contain fewer residents who would be affected by a changing minimum wage. These results are displayed in table 9. Unlike the analysis on borrowers on blocks with a high concentration of low-skill workers, the top panel of table 9 indicates that for borrowers on more highly educated census blocks, increases in minimum wages are not associated with any measurable increase in the number of credit cards, auto loans, or mortgages, or credit limits on credit cards held by a borrower. If anything, there is a slight *decline* in credit card and auto borrowing, though the effects are modest. Likewise, the middle and bottom panel of table 6 indicate that minimum wage increases are associated with no significant changes in credit scores or payment behavior, either in the short run or the medium run.

5. Conclusion

Borrowing is critical for smoothing shocks, particularly for low-income households who often have little flexibility in their budgets to cover spikes in expenditures. Changes in minimum wages produce modest changes in income, which may be positive for some but negative for others, and in this paper we investigate how these policy changes influence how household interact with credit markets.

Using a unique dataset of credit offers, we find that that lenders broadly increase credit supply to low-income households when the minimum wage increases. For example, low-income households receive

more offers for credit cards, with terms that more closely align with those generally offered to higher-income households. They are also offered higher credit limits when minimum wages are increased, with no corresponding change in the number or characteristics of offers to higher-income households. This expanded supply could be a response to either realized changes in income, or perceived changes expected by the lender.

This expanded access to credit may not necessarily be welfare improving for low-income borrowers, particularly if borrowers are subsequently unable to manage their debt. Using a large, high-frequency panel dataset of credit histories, we find that minimum wage borrowers experience increases in their credit scores and decreases in payment delinquency, both in the short run and medium run, following an increase in the minimum wage. These results hold both for borrowers who take on new debt following the increase in the minimum wage, as well as borrowers who do not. New auto loans, however, are an exception—those who recently opened a new auto loan experience higher delinquency rates in the medium run, though this is a relatively small group of people. We find that borrowers who did not take out new debt tend to pay down their existing debt when minimum wages are raised.

Minimum wage legislation is generally touted as a way to lift households out of poverty by increasing earnings. Our results show that, regardless of the net effect on income or employment, changes in minimum wages expand access to credit, and that affected families appear to manage any changes in debt with few adverse effects on their credit profile. While we do find some evidence of adverse outcomes for a small pool of new auto borrowers who appear to have entered into loans that were not affordable, for the vast majority of new credit card and auto borrowers, payments appear to be manageable (at least in the short and medium run). Given the importance of debt in smoothing shocks and financing lumpy investments, particularly for low-income families, our results suggest that minimum wages may affect a household's financial situation not only through changes in income, but also through increases in liquidity and credit.

6. References

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7. Tables and Figures

Table 1: Financial Characteristics of Households

	All Households	Households with Minimum Wage Worker
<i><u>Cash Flows and Assets</u></i>		
Total Income	\$50,727	\$23,537
Wage Income	\$34,639	\$15,218
Net Worth	\$103,990	\$12,964
Total Assets	\$196,851	\$27,221
Total Financial Assets	\$22,046	\$1,970
Total Checking/Savings Assets	\$2,639	\$657
Owens an auto*	0.86	0.80
Owens a home*	0.68	0.44
<i><u>Interactions with Credit Markets</u></i>		
Total Debt	\$25,000	\$5,516
Debt to Income Ratio	0.51	0.22
Has a credit card*	0.72	0.51
Credit Card Limit	\$15,000	\$7,800
Credit Card Interest Rate	13.99	14.9
Has an auto loan*	0.32	0.25
Has a mortgage*	0.43	0.24
Has a student loan*	0.16	0.18
<i><u>Measures of Financial Distress</u></i>		
Spending Greater than Income*	0.18	0.23
Turned Down for Credit*	0.20	0.24
Credit Constrained*	0.28	0.39
Late on Payments*	0.17	0.21
Late on Payments 2 Months or More*	0.07	0.10
Used a Payday Loan*	0.02	0.04
Able to borrow \$3000 from Family or Friends*	0.66	0.53
Unbanked*	0.10	0.23

Notes: Described above are data from the 2001-2013 Survey of Consumer Finances. Minimum wage workers identified as 60-120% of state minimum wage in wage income as full time worker. Variables expressed medians, unless noted. * indicates variable expressed as mean.

Table 2: State Minimum Wage Legislation 2000-2014

State	Year(s) Minimum Wage Increased (above Federal)
AK	2003, 2010
AZ	2007, 2008, 2009, 2011, 2012, 2013
AR	2007
CA	2001, 2002, 2007, 2008
CO	2007, 2008, 2009, 2011, 2012, 2013
CT	2001, 2002, 2003, 2004, 2006, 2007, 2010
DE	2007, 2008
FL	2007, 2008, 2009
HI	2002, 2003, 2007
IL	2004, 2005, 2006, 2008, 2009, 2010, 2011
IA	2008
ME	2002, 2003, 2005, 2006, 2008, 2009, 2010
MD	2007
MA	2001, 2007, 2008
MI	2007, 2008, 2009
MO	2007, 2008, 2009, 2013
MT	2007, 2008, 2009, 2011, 2012, 2013
NV	2007, 2008, 2009, 2010, 2011
NH	2008, 2009
NJ	2006, 2007
NM	2008, 2009
NY	2005, 2006, 2007
NC	2007
OH	2007, 2008, 2009, 2011, 2012, 2013
OR	2003, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013
PA	2007, 2008
RI	2001, 2004, 2013
VT	2001, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013
WA	2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013
WV	2007, 2008, 2009
WI	2006, 2007
DC	2005, 2006, 2007, 2009, 2010

Table 3: Summary Statistics Mintel Data

	Mean	SD
<i><u>Number of Offers</u></i>		
Credit cards	1.674	2.767
First Mortgage	0.066	0.379
Auto Loan	0.035	0.207
Education Loan	0.012	0.226
Home Equity Loan	0.039	0.233
Other Unsecured Loan	0.147	0.511
<i><u>Credit Card Offer Characteristics</u></i>		
Mean Credit Limit	28974	32026
Max Credit Limit	34762	37007
Purchase APR	14.33	5.23
Default APR	27.27	3.63
<i><u>Demographics</u></i>		
High School Dropout	0.329	0.469
High School	0.413	0.492
Some College	0.166	0.372
Bachelors	0.075	0.263
Post Graduate	0.018	0.133
White (Non-Hispanic)	0.757	0.429
Black(Non-Hispanic)	0.111	0.315
Hispanic	0.136	0.343
Household Income	9655	4436

Notes: Source is Mintel Comperemedia. Sample is households identified as having income consistent with a minimum wage worker.

Table 4: Summary Statistics for CCP/Equifax Data

	<u>Mean</u>	<u>SD</u>
<u><i>Number of Trades</i></u>		
Credit Cards	1.79	2.10
Student Loans	0.41	1.51
Auto Loans	0.40	0.63
Mortgages	0.30	0.56
<u><i>Delinquent (60 Days Past Due)*</i></u>		
Any Loan	0.15	0.36
Credit Cards	0.16	0.37
Student Loans	0.18	0.39
Auto Loans	0.09	0.29
Mortgages	0.05	0.22
<u><i>Total Balances*</i></u>		
Credit Cards	4686.2	10173.9
Credit Card (Average Per Card)	1635.1	3447.5
Student Loans	18831.1	26855.0
Auto Loans	4850.3	10924.9
Mortgages	155125.6	157656.9
<u><i>Payments*</i></u>		
Credit Cards	247.8	5847.5
Credit Card (Average per Card)	90.7	2507.3
Auto Loans	163.9	704.7
Mortgages	1338.8	5581.2
Equifax Risk Score	645.4	106.0
Total Credit Card Limit	14819.3	24305.2
Average Credit Card Limit	4874.8	7823.5

Notes: Source is CCP/Equifax. Sample is borrowers on Census blocks where greater than 50 percent of population is high school dropout. *indicates conditional on having type of loan.

Table 5: Minimum Wages and Credit Offers Received

	Credit Cards	Auto Loans	Other Unsecured Loans	Mortgages
Ln(MinWage _{t-3})*Min Wage Household	1.9406*** (0.2940)	-0.0032 (0.0136)	0.1470*** (0.0320)	0.0299 (0.1009)
Ln(MinWage _{t-3})	-0.0163 (0.3441)	-0.0252 (0.0178)	0.0093 (0.0272)	0.1391 (0.1930)
MinWageHousehold	-5.6015*** (0.5080)	-0.0229 (0.0264)	-0.3354*** (0.0552)	-0.2532 (0.1714)
N	445201	445201	445201	445201

Notes: Data source is Mintel Comperemedia. Displayed are coefficients and standard errors (in parentheses) obtained from estimating equation (1). Min Wage Household defined as reported income consistent with one or two minimum wage full time workers, as described in text. Controls include age-group, sex, race/ethnic group, education group, state, and Census division-month fixed effects, state-specific time trends, and state-month unemployment rates. Standard errors adjusted to allow for clustering at state-level. *p=0.05, **p=0.01, ***p=0.001.

Table 6: Minimum Wages and Credit Card Offer Terms

	Mean Credit Limit	Max Credit Limit	Purchase APR	Default APR
Ln(MinWage _{t-3})*Min Wage Household	7026.37** (2190.23)	16735.29*** (3611.43)	1.9774*** (0.5041)	-0.8326** (0.2736)
Ln(MinWage _{t-3})	-447.0389 (1548.24)	827.1249 (2936.19)	-0.2734 (0.3863)	0.2508 (0.2091)
MinWageHousehold	-16048.27*** (3999.89)	-41410.55*** (6207.60)	-2.6094** (0.8844)	1.6560** (0.4828)
N	172560	172560	162214	116656

Notes: Data source is Mintel Comperemedia. Displayed are coefficients and standard errors (in parentheses) obtained from estimating equation (1). Min Wage Household defined as reported income consistent with one or two minimum wage full time workers, as described in text. Controls include age-group, sex, race/ethnic group, education group, state, and Census division-month fixed effects, state-specific time trends, and state-month unemployment rates. Standard errors adjusted to allow for clustering at state-level. *p=0.05, **p=0.01, ***p=0.001.

Table 7: Minimum Wages and Borrowing Behavior: Number of Loans by Type and Credit Card Limits

	<u>Credit Card</u>	<u>Auto</u>	<u>Mortgage</u>	<u>Total CC Limit</u>	<u>Average CC Limit</u>
Ln(Min Wage _{t-1})	0.1053*** (0.0308)	0.0432*** (0.0107)	-0.0075 (0.0080)	2366.69*** (380.667)	496.21*** (94.906)
N	7165003	7165003	7165003	4389696	4389696
N (Individuals)	167671	167671	167671	134970	134970

Notes: Data source is CCP/Equifax. Displayed are coefficients and standard errors (in parentheses) obtained from estimating equation (2). Controls includes individual, age-group, state, and quarter fixed effects, demographic and economic characteristics of census-block-group, state-year unemployment rates. Sample is limited to individuals who have ever resided in Census block-group where more than 50 percent of population has less than a high school degree. Standard errors adjusted to allow for clustering at person-level. *p=0.05, **p=0.01, ***p=0.001.

Table 8: Short and Medium Run Payment Behavior

	Credit Score	Delinquent?	Delinquency by Type of Debt		
			Credit Card	Auto Loan	Mortgage
<u>Short Run</u>					
Ln(Min Wage _{t-1})	8.141*** (1.3248)	-0.0537*** (0.0067)	-0.014 (0.0188)	-0.0039 (0.0101)	-0.016 (0.0085)
N	5849519	7165003	697107	2138400	1475884
N (Individuals)	160238	167671	36452	93881	51375
<u>Medium Run, No New Trades</u>					
Ln(Min Wage _{t-4})	0.6113 (1.5045)	-0.0316*** (0.0084)	-0.0296 (0.0203)	0.0002 (0.0114)	0.0157 (0.0087)
N					
N (Individuals)					
<u>Medium Run, New Trades</u>					
Ln(Min Wage _{t-4})	5.9534*** (1.2483)	-0.0371*** (0.0066)	-0.043 (0.0267)	0.0419** (0.0145)	0.0063 (0.0169)
N	5523350	6589111	241855	571190	248159
N (Individuals)	154231	167668	32874	87642	47321

Notes: Data Source is CCP/Equifax. Displayed are coefficients and standard errors (in parentheses) obtained from estimating equation (2). Controls includes individual, age-group, state, and quarter fixed effects, demographic and economic characteristics of census-block-group, state-year unemployment rates. Sample is limited to individuals who have ever resided in Census block-group where more than 50 percent of population has less than a high school degree. Standard errors adjusted to allow for clustering at person-level. *p=0.05, **p=0.01, ***p=0.001.

Table 9: Minimum Wages and Borrowing and Payment Behavior for Highly-skilled Borrowers

	Credit Cards	Auto Loans	Mortgages	Total CC Limit	Average CC Limit
Ln(Min Wage _{t-1})	-0.0148 (0.0363)	-0.0307** (0.0117)	-0.0349** (0.0120)	584.33 (630.76)	55.57 (183.62)
N	3555612	3555612	3555612	3118781	3118781
N (Individuals)	71798	71798	71798	69090	69090

<i>Short Run</i>	<u>Delinquency by Type of Debt</u>				
	Credit Score	Delinquent?	Credit Card	Auto Loan	Mortgage
Ln(Min Wage _{t-1})	0.4609 (1.2400)	-0.0006 (0.0042)	-0.0013 (0.0040)	0.0055 (0.0047)	0.0021 (0.0032)
N	2971319	3555612	3118781	912426	1355418
N (Individuals)	70740	71798	69090	41205	39975

<i>Medium Run</i>	<u>Delinquency by Type of Debt</u>				
	Credit Score	Delinquent?	Credit Card	Auto Loan	Mortgage
Ln(Min Wage _{t-4})	1.4004 (1.0851)	-0.0042 (0.0040)	-0.0045 (0.0038)	0.0004 (0.0045)	0.0025 (0.0031)
N	2885571	3340690	2948408	883202	1308091
N (Individuals)	69308	71795	68786	40720	39696

Notes: Data Source is CCP/Equifax. Displayed are coefficients and standard errors (in parentheses) obtained from estimating equation (2). Controls includes individual, age-group, state, and quarter fixed effects, demographic and economic characteristics of census-block-group, state-year unemployment rates. Sample is limited to individuals who have ever resided in Census block-group where more than 75 percent of population has a Bachelors degree or more. Standard errors adjusted to allow for clustering at person-level. *p=0.05, **p=0.01, ***p=0.001