Consumer Protection Laws in Auto Lending

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ABSTRACT

We examine how consumer protection laws affect the terms and outcomes of auto loans. We find that dealers strategically adjust contracts such that similar borrowers face the same monthly payments in states with and without interest rate limits, and default rates are similar across states where lenders can seek deficiency payments. Monthly payments and default rates are higher where post-default wage garnishment is prohibited. Consistent with moral hazard, default rates are lower when borrowers cannot discharge their debt through bankruptcy. We show that wage garnishment restrictions benefit borrowers who default, while those who pay in full face higher loan costs.

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Auto loans are a prevalent and substantial liability on households' balance sheets. More than 85% of U.S. households have a vehicle and, in 2016, more than one-third of households held vehicle-related debt (Bricker et al., 2017). Moreover, the size of this debt is increasing: vehicle loan balances in the U.S. totalled $717 billion in 2008 and over $1.2 trillion in 2019 (Zabritski, 2019). As households' auto-related and other liabilities grow, policy makers grapple with not only the long-term consequences of increased indebtedness (Yilmazer and DeVaney, 2005), but also the role of regulators in the credit market. Consumer protection takes many forms, including usury laws that set the maximum interest rate that can be charged to a borrower and wage garnishment prohibitions that limit lenders' ability to recover loan deficiencies after a borrower defaults.

Using novel loan-level data, we examine loan terms and borrower outcomes in auto financing and highlight the distributional consequences of usury and wage garnishment laws. Interest in usury laws is not new; indeed, they have been the subject of longstanding debate (Blitz and Long, 1965). Although usury laws may act as price ceilings that limit the financing of capital-intensive projects and interfere with households' ability to smooth income shocks, they aim to reduce opportunism due to unequal bargaining power or information asymmetries (Glaeser and Scheinkman, 1998; Drysdale and Keest, 1999). Wage garnishment also involves trade-offs. Lenders' ability to collect outstanding loan balances may discourage default and reduce the price of credit for all borrowers; however, wage garnishment after default makes it more difficult for borrowers to recover from financial hardship (Chatterjee and Gordon, 2012; Livshits, MacGee and Tertilt, 2007).

One of the historical objectives of usury laws was to protect individual borrowers from lenders with market power (Blitz and Long, 1965), and recent growth in the market for risky "subprime" loans has drawn attention again to the debate over protections for potentially vulnerable consumers. Given the prevalence of vehicle ownership in the U.S., the market for auto loans to high-risk borrowers is thick: roughly 27% and 50% of buyers in the new and used vehicle markets, respectively, are classified as non-prime, subprime, and deep subprime (Zabritski, 2019).[1] As such, understanding how consumer protection laws—specifically, usury and wage garnishment laws—shape loan terms and outcomes in the auto financing market is important for assessing existing or proposed regulations.

[1]High-risk borrowers can be non-prime (FICO 601–660), subprime (FICO 501–600), or deep subprime (FICO $\leq$ 500) (Zabritski, 2019). In this study, we describe all of these higher-risk borrower types as simply "subprime".

Usury limits set an upper bound on the interest rate that lenders can charge on consumer loans and vary according to state law. If the usury law simply acted as a price ceiling, as is often assumed, then credit rationing would reduce the availability of credit to the riskiest borrowers (Peterson, 1983).[2] However, creative lenders may adjust other dimensions of the loan to serve these high-risk borrowers (Schwartz, 1977; Hynes and Posner, 2002). Even if a usury law caps the interest rate, a dealership may offer a loan with the same monthly payments and maturity by increasing the vehicle price and principal amount. For example, a borrower faces the same $294 payment for 60 months with either a loan of $10,000 at 25% or a loan of $11,078 at 20%.[3]

Whereas usury laws directly affect the terms at loan origination, other consumer protection laws affect the recovery process in the event that the borrower defaults on the obligation. Specifically, state-level wage garnishment laws regulate the process by which creditors can recover outstanding debt directly from borrowers' income. Eight U.S. states explicitly prohibit post-judgment wage garnishment or otherwise severely restrict its use.[4] In states that allow wage garnishment, lenders' collection activities target only borrowers who have defaulted. In states that prohibit wage garnishment, lenders must account *ex ante* for default (Livshits, MacGee and Tertilt, 2007) and, as a result, loans may be more costly for *all* borrowers. That is, laws intended to protect defaulting borrowers may impose additional costs on non-defaulting ones.

In this paper, we investigate the impact of usury and wage garnishment laws on loan terms and consumer outcomes in the auto financing market. Our analysis relies on cross-sectional variation in usury and wage garnishment laws.[5] First, using a rich panel of individual auto loan data, we document the characteristics of loans issued in the presence (or absence) of usury and wage garnishment laws.[6] We then use data on defaults and collections to explore how usury and wage

[2]If frictions in the credit market were zero, a consumer could substitute retail-originated credit for other financing, and an auto loan-specific interest rate limit would have little impact on the consumer's total indebtedness (Peterson, 1983). In practice, non-trivial frictions prevent consumers from substituting perfectly across credit markets.

[3]Dealers could also adjust the term length in response to an interest rate cap; however, loan term lengths beyond the mechanical life of the vehicle may create moral hazard problems. Consistent with this insight, loan length is increasing with vehicle reliability: over the last decade, the average term of loans for used vehicles increased from 59 to 65 months (Zabritski, 2019).

[4]Similarly, nine US states prohibit a lender from pursuing a homeowner's other assets if he or she defaults on a mortgage and a foreclosure sale does not cover the outstanding debt (Ghent and Kudlyak, 2011). Thus, our study may provide insight into outcomes in other credit markets with non-recourse loans.

[5]With one exception, states have not adjusted interest rate caps in recent history, making any within-state, across-time analysis infeasible. Arkansas permanently raised its interest rate cap in 2011; unfortunately, our data include only a very small number of observations in Arkansas prior to the law change.

[6]Some of the empirical regularities around loan origination in states with and without usury laws were shown in Melzer and Schroeder (2017) using aggregate loan data from January 2011 to August 2013. We are not aware of any

garnishment laws shape loan outcomes, and we consider the distributional consequences of these laws across customer types. Importantly, usury and wage garnishment laws do not appear to vary systematically across states; for example, there is little correlation between usury limits and states' political climate[7] and no obvious geographic pattern (see Figure 1).[8]

Our analysis focuses on autos purchased through indirect financing, which accounts for approximately 80% of auto loans by volume (Cohen, 2012). In contrast to the direct channel whereby buyers secure financing through their own bank or an automaker's financing division, indirect financing is negotiated between the auto dealer and the buyer and then sold at auction to financial companies who service the loan over time. The novel data that we examine come from a large indirect-financing firm that purchases loan contracts that originate at dealerships and include all loans that were purchased by the firm between the early 1990s and 2019. We were provided the data under a nondisclosure agreement that restricts us from identifying the lender. To further protect the firm's identity, we cannot disclose the exact year that it entered the auto financing industry. This agreement places no constraints on the conclusions of our analysis.

The U.S. market for personal vehicle financing is highly fragmented with 65,000 lenders. Lenders vary in size; in 2013, the largest lender had approximately 5.8% market share by volume and the ten largest had 37.7% of the market (Baines and Courchane, 2014). We expect that our data provider is similar to other large indirect lenders.[9] However, our loan-level data do differ from the aggregate data studied previously in the literature, including the three-year panel of Experian Autocount

existing study examining the relation between usury laws and auto loan outcomes or the impact of wage garnishment laws in auto financing.

[7]We regressed a state-level indicator for the presence of a usury limit on measures of political ideology from Pew Research Center, available online at https://www.pewforum.org/religious-landscape-study/compare/political-ideology/by/state/) and found no evidence that usury laws are systematically related to state politics.

[8]Both legal scholars and economists have studied the evolution of U.S. usury laws. In their study of nineteenth century financial regulations, Benmelech and Moskowitz (2010) conclude that usury laws were motivated by private interests, acting as anti-competitive policies to restrict entry to benefit incumbent firms. That is, variation in historical usury limits did not reflect differences in the financial or political strength of a state's population of underserved borrowers. Glaeser and Scheinkman (1998) propose a model in which usury laws act as a means of social insurance and, examining regional variation in usury limits in 1950, find empirical support for the hypotheses that usury laws are more likely when income inequality is high and growth rates are low. Usury laws changed considerably with innovations in the finance sector in the 1960s. In a regression of current usury limits on 1950 usury limits, we find no statistically significant relation between historical and current rates.

[9]A comprehensive comparison of lenders is limited by the availability of firm-level data in the industry. One dimension on which we can compare firms is their exposure to risk. Using data in a publicly available report (`https://finsight.com/sector/Auto/Subprime%20Loan?products=ABS&regions=USOA`), we compare our data provider's ABS structure to other subprime auto lenders and find that large players in the market are acquiring and securitizing similar loans. Summary measures of our data provider's ABS structure, along with other details in the text, would allow a careful reader to identify the firm. We have elected to include loan and location-related details and describe the lender's risk profile in only these sweeping terms.

data used in Melzer and Schroeder (2017). Specifically, our data are at the individual loan level and include borrower and vehicle characteristics, sale price, down payment, loan terms, service and insurance contracts, and dealer information. The detailed data allow for analysis that has been previously precluded by data limitations; for example, in contrast to analyses using Experian data, we can account directly for down payments. In Section 2, we discuss the advantages of studying a nearly 30-year panel of individual loans, where inclusion in the data is not contingent on the loan being formally reported to a credit bureau. The completeness of the loan records are also noteworthy; critical to our research question, the data used in our analysis include detailed outcome measures of loan repayment, delinquencies, defaults, repossessions, and collections.

Our empirical analysis first examines whether usury limits affect loan terms or, relatedly, high-risk borrowers' access to credit. We find that, after accounting for borrowers' creditworthiness, usury laws are associated with lower interest rates and higher initial principal balances for risky borrowers. That is, dealers in states with usury limits adjust the initial loan balance such that borrowers face the same monthly payments as similar borrowers in states without a usury law. Consistent with the finding that dealers strategically adjust loan terms to serve high-risk borrowers in states with usury limits, we find little evidence that these price ceilings are associated with widespread credit rationing. In contrast, we find that state laws that prohibit wage garnishment after default are associated with higher monthly payments.

We next ask whether usury limits and wage garnishment restrictions are associated with different loan outcomes. We find that default rates do not vary with usury law when lenders can seek deficiency payments through wage garnishment; however, default rates are higher where wage garnishment is prohibited. Although we cannot observe individuals' incentives directly, we find evidence suggesting that moral hazard is a plausible and empirically relevant explanation—we find that consumers who can discharge their auto debt through Chapter 7 bankruptcy, and therefore face weaker incentives to avoid delinquencies, default more frequently.

Our work contributes several new insights to both academic and policy discussions of financial regulations. First, using loan level data, we find no evidence that usury laws result in strict credit rationing. Indeed, dealers' strategic response to usury limits effectively circumvents the price ceiling to extend credit to high-risk borrowers who might otherwise be underserved. The welfare implication is notable—access to auto financing and other forms of credit is particularly valuable in

the U.S., where vehicle ownership is often critical in terms of employment opportunities and mobility (Gurley and Bruce, 2005; Baum, 2009; Gautier and Zenou, 2010). Second, we identify important distributional consequences of wage garnishment laws. Specifically, when wage garnishment laws limit lenders' *ex post* ability collect from delinquent borrowers, lenders appear to *ex ante* adjust prices for all borrowers. Together, the results highlight the heterogeneous welfare implications of common financial regulations.

We focus on one liability on households' balance sheets; however, in aggregate, household debt has been shown to drive broad macroeconomic phenomena. During the Great Recession, record-high levels of household debt contributed to a drop in aggregate consumption (Mian, Rao and Sufi, 2013), leading to a decline in firms' production and demand for labor (Mian and Sufi, 2011, 2014; Eggertsson and Krugman, 2012; Guerrieri and Lorenzoni, 2017). Even without a global financial crisis, greater access to consumer credit and heavier household debt burdens may lead to losses in aggregate welfare (Campbell and Hercowitz, 2009). While our research approach is micro in nature, our results on how regulation affects households' access to credit, monthly debt burden, and debt-related outcomes may inform broad economic debate.

The remainder of the paper is organized as follows. In Section 1, we provide a brief overview of indirect auto financing and usury laws in the United States. In Section 2, we describe novel data on individual auto loans. In Section 3, we examine differences in loan terms in states with and without usury laws, as well as the relation between loan terms and wage garnishment laws. In Section 4, we compare loan outcomes across states and describe borrowers' remaining debt obligations after default. In Section 5, we examine borrowers' prior bankruptcies to assess whether moral hazard explains, at least in part, the differences in loan outcomes across wage garnishment regimes, and we estimate borrowers' total loan costs. We conclude in Section 6 by discussing the broader context for our results.

1 Vehicle sales, financing and usury laws in the United States

1.1 Indirect auto financing

Lenders in the auto market use credit scores, as well as other applicant and loan characteristics, to assess borrowers' creditworthiness. Regardless of the riskiness of the potential borrower, the

indirect auto financing and sales process involves several steps (c.f. Baines and Courchane, 2014). The first steps are common to all vehicle purchases: After finding a suitable vehicle, the consumer and the dealer agree upon a price for the vehicle and any additional services. When relevant, they also negotiate the value of a vehicle trade-in.

With indirect financing, the dealer sells the auto loan to a third-party lender immediately after completing the sales transaction.[10] To facilitate this process, the dealer submits the borrower's credit application to multiple financial institutions at the time of purchase, typically through the online portal used throughout the industry. After a preliminary review of the financing terms, potential lenders submit their bid for the loan, and the dealer accepts the highest bid. The dealer then completes the transaction with their customer, and the buyer drives the vehicle off the lot. Over the next several days, the lender completes the due diligence process on the loan to verify, for example, the borrower's employment. If the borrower passes this final screening, the loan is acquired by the lender and the dealer is paid. If the verification process fails to confirm the details in the loan application, the loan is renegotiated and sold to a lender at a discount reflecting its higher risk.[11]

1.2 Loan default and vehicle recovery process

Lenders retain the property rights to vehicles that are purchased on credit until the loan has been paid in full. The specific rights and obligations of lenders and borrowers, including what happens in the event of default, are governed by state law.[12] Some states allow a borrower who misses a payment to remedy the default through partial payment. In other states, when the borrower defaults, the lender can accelerate the loan by requiring immediate repayment in full.

When a borrower defaults, the lender attempts to recover the lost value of the loan. First, the lender tries to repossess the physical asset through a process governed by state law. In some states, the lender may repossess the vehicle at any time after default without prior notice; other states require the lender to formally notify the borrower.[13] Once it has recovered the vehicle, the lender

[10] Our data provider purchases loans in the indirect financing market. As such, we cannot examine the outcomes of loans obtained through direct financing at buyers' own banks or automakers' financing arms.
[11] The dealer may seek recourse directly from consumers who submit fraudulent applications; however, in practice, this happens only rarely.
[12] The 1978 Federal Fair Debt Collection Practices Act does not apply to auto loans.
[13] On average, the repossession process takes 37 days (Zabritski, 2013).

must sell the vehicle at a commercially reasonable price, usually at a public auction. If the vehicle sells for more than the outstanding loan amount net the recovery cost, then the borrower receives the balance. If there is an outstanding loan amount even after the sale of the repossessed vehicle, then the lender can sue the borrower for the remaining balance. If the lender wins a judgment against the borrower, it can attempt to collect additional funds from the borrower. The collections process is governed by the law in the state in which the borrower resides; for example, in forty-two states, lenders can garnish borrowers' wages to cover the outstanding loan balance.

1.3 Usury laws

Figure 1 maps U.S. states by their maximum allowable interest rate for an auto loan. Since state usury limits may vary by model year and vehicle value, the map depicts the interest rate limits for a two-year-old vehicle with a price of $18,100. A dashed outline indicates states with variable interest rate limits.

Where they exist, usury laws affect interest rates for the highest risk borrowers—individuals whose weak credit history would otherwise result in an even higher rate. One possibility is that the price ceiling leads to credit rationing, with especially risky borrowers unable to secure a loan at the capped rate. Figure 2 presents two histograms that suggest that the market still serves high-risk borrowers, despite usury laws that cap the price of credit. Figure 2.a presents two distributions for Arizona, which does not have a usury limit; Figure 2.b presents two distributions for Colorado, where the usury limit is 21% on auto loans. In both cases, the shaded histogram represents the distribution of borrowers' predicted interest rate, a measure of creditworthiness described in detail in Section 3.1, and the unshaded histogram represents the distribution of actual interest rates in the data.

The distributions of predicted interest rates in Colorado and Arizona are similar: in both states, the market serves borrowers with a range of credit profiles. However, the distributions of actual interest rates are very different across states: In Arizona, the distributions of predicted and actual interest rates have a similar range and shape; in Colorado, actual interest rates are capped at the usury limit. Notably, there is a substantial mass at the usury limit in Colorado, suggesting that at least some high-risk borrowers in the state are able to secure loans at a lower rate. Although we do not have formal measures of access and rationing, the rate ceiling does not appear to push all

high-risk borrowers out of the market.[14]

Instead of rationing credit, dealers and lenders may serve higher-risk borrowers by adjusting other loan terms to compensate for the lower interest rate (Schwartz, 1977; Hynes and Posner, 2002; Melzer and Schroeder, 2017). More specifically, in the presence of a binding interest rate limit, a dealer may offer a loan for the same vehicle with the same down payment, monthly payment and maturity by increasing the price and principal amount.[15] One consequence is that, at any given point during the life of the loan, high-risk borrowers with capped interest rates have higher loan balances than their otherwise-similar counterparts with unrestricted interest rates.

2 Data

To explore the role of consumer protection laws in auto financing, we examine loan terms and outcomes. The loan data come from a large automotive indirect-finance company and include all loans that were purchased by the firm in thirty-eight states between the early 1990s and 2019.[16] In total, we observe key features of 291,629 loans that were originated at 4,413 dealerships located in 2,069 U.S. ZIP codes (Table 1, Panel A). Variables are defined in Appendix Table A1.

The breadth and detail of our data distinguish our study from previous work using aggregate Experian Autocount data, including Melzer and Schroeder (2017). More specifically, we observe loan characteristics (e.g., purchase price and down payment) that are typically unavailable in aggregate data. For example, Experian does not measure down payments and sale prices, limiting the construction of measures of collateral (Melzer and Schroeder, 2017). In contrast, we can specifically account for borrowers' down payment when assessing whether whether high-risk borrowers pay more in the presence of usury limits. We also observe the price at which each loan is sold by the dealer to the lender, a value that may capture some otherwise unobservable loan or borrower attributes. The representativeness of our data is also different: Experian data include only loans reported to its credit bureau; yet, many dealers in the seller financing market do not report loans

[14] Appendix Figure A1 mirrors Figure 2 for all loans in the U.S. Although state-level differences in the maximum interest rate make the interpretation of Figure A1 less stark, the patterns are consistent with usury laws that limit price without dramatically reducing borrowers' access to credit.

[15] Dealers cannot skirt usury laws by offering lease agreements instead of loans because lease contracts include an implied interest rate which is also subject to usury laws.

[16] The raw data include approximately 320,000 loans from 43 states. We exclude loans with very incomplete origination data, as well as loans from five states with fewer than 100 observations each.

to credit bureaus (Melzer and Schroeder, 2017). Because they were acquired directly from a lender, our data are not contingent on reporting to formal credit agencies.

2.1 Buyers, vehicles and loan terms

Panel B of Table 1 presents the mean and standard deviation of the buyer, loan and vehicle characteristics that were observable to the dealer at the time of origination. The first set of columns describe all loans; the second and third sets of columns describe loans originated in states without and with usury laws, respectively. The final column reports the p-values for two-sided t-tests comparing the means in states with and without usury laws. Although simple comparisons cannot support causal claims, the summary statistics in Table 3 are consistent with the hypothesis that, facing similar borrower types, dealers in states with interest rate caps offer similar monthly payments to their counterparts in states without interest rate restrictions by strategically adjusting principal balances.

At the time of loan origination, borrowers in states with and without usury laws have similar financial characteristics. An average borrower in our sample has a weak credit profile with a credit score of 532, and credit scores are similar across states with and without usury limits ($p = 0.26$). Approximately one-third of borrowers in the sample have declared bankruptcy (either Chapter 7 or Chapter 13) in the seven years prior to the loan origination, and the bankruptcy rates do not vary by usury regime ($p = 0.57$ and $p = 0.14$, respectively). Only a small fraction of borrowers are homeowners (on average, 6.1%), and homeownership is similar across states with and without usury laws ($p = 0.27$). On average, borrowers in states without usury limits earn a monthly gross income of \$4,312, and the average monthly income is \$209 or 5% higher in states with usury limits ($p = 0.03$).

Vehicles purchased are similar across states in terms of age and mileage ($p = 0.71$ and $p = 84$, respectively). In our sample, an average vehicle is approximately 2.6 years old with just less than 39,000 miles on its odometer. Vehicles in states with usury laws have a book value of \$13,246, and the book value of vehicles financed is \$765 or 6% higher in states with usury limits ($p = 0.09$). Vehicles in states without usury laws are slightly less reliable than those in states with a usury limit, although the difference is only 1.8 points on a 100-point scale ($p = 0.08$).[17]

[17] Consumer Report's reliability measure, which scores expected maintenance and repairs between 0 and 100, is based

Borrowers may bring assets—either cash, a trade-in, or both—to the dealership to secure the financing for their vehicle purchase. For approximately 5% of the loans in our sample, borrowers traded in a vehicle with negative equity. Approximately 81% of these underwater borrowers also made a cash down payment. In most cases, the cash only partially offset the negative equity; on average, these borrowers were \$3,120 underwater on their trade-ins and brought \$1,263 in cash. The remaining negative equity is rolled into the new loan. Differences in the net contribution of underwater borrowers across usury regimes could have explained differences in the principal balances; however, this is not the case. There is no statistical difference in underwater borrowers' negative equity or down payments across states with and without usury limits.

Borrowers who were not underwater on their existing auto loan made down payments—either cash or trade-ins—of \$1,033. Borrowers in states with usury limits made lower down payments, on average, than those in states without interest rate caps ($p < 0.01$). All else equal, a lower down payment leads to a higher principal balance, a potentially confounding effect for our main hypothesis that dealers strategically adjust principal amounts in the face of usury limits. Importantly, we control for borrowers' down payments in our regression framework and still observe a difference in principal amounts across regimes.[18] An average subprime borrower is underwater on the loan at the time of origination; the average loan-to-value ratio (1.3) is similar in states with and without usury limits ($p = 0.21$)

As expected, average interest rates are also different by usury regime—average interest rates are roughly one percentage point lower when the state imposes a rate cap, relative to states without the restriction ($p < 0.01$). Consistent with dealers strategically adjusting in response to usury limits, loans in states with usury limits involve substantially higher initial principal amounts. Initial principal averages \$16,723 in states without usury limits and is \$1,176 or 7% higher in states with interest rate caps ($p = 0.05$). In principle, dealers could also adjust term length. However, the life of the loan is constrained by the mechanical life of the vehicle, and loan length varies little across the industry—if loan payments extended far beyond the vehicle's useful life, the lender would be more vulnerable to the borrower's moral hazard. The average loan term length in our sample aligns

on survey of more than 640,000 vehicles (Consumer Reports, 2017).

[18]Because they cannot observe trade-ins or cash payments, Melzer and Schroeder (2017) note that they cannot address the possibility that differences in net down payment explain the differences in principal amounts. Our results suggest that differences in down payments are not confounding their results.

with industry averages of approximately six years (Zabritski, 2019). We find only a small statistical difference in loan length between usury regimes—the average term of loans in states with usury limits are 1.9 months or 2.8% longer than the average in states without the limit ($p = 0.04$). To ensure that this small difference does not confound our analysis of other dimensions of the loan, we account for loan length in our regression framework.

Borrowers in our data pay approximately $400 per month for their auto loans and, consistent with existing evidence that borrowers target specific payments when seeking credit (Argyle, Nadauld and Palmer, 2019), monthly payments are similar across usury regimes ($p = 0.13$). However, the payment-to-income ratio is slightly higher in states without the usury limit ($p < 0.01$). The subprime borrowers in our sample spend roughly 10% of their monthly income on their auto loan.

Other features of the loan are described in Panel B of Table 1, including the days to fund the loan, the discount from the face value in the sale of the loan to the lender, and the purchase of insurance and service contracts. Borrowers in states with usury limits are more likely to buy gap insurance ($p = 0.03$) and, conditional on purchasing life and disability insurance, choose higher coverage levels ($p = 0.07$). Loans in states with and without usury laws are similar in terms of their remaining characteristics.

2.2 Loan outcomes

Panel C of Table 1 presents the mean and standard deviation of several measures of loan outcomes. As in Panel B, the summary statistics describe all loans and, separately, loans in states without and with usury laws.

Approximately 25% of all loans end in default after an average of 30 payments. Default rates and timing are similar across states with and without usury laws ($p = 0.60$ and $p = 0.22$, respectively). An average borrower owes roughly $12,650 at default, and the lender recovers $3,400 through the repossession and resale of the vehicle. In our data, 92% of vehicles designated for repossession are successfully recovered and sold at auction; 8% of vehicles cannot be recovered and resold due to accidents or theft. The resale value of repossessed vehicles is similar in states with and without usury laws ($p = 0.21$). However, proceeds from collections are higher in states without usury limits ($p = 0.07$), likely because some states with interest rate caps also limit post-default collections through wage garnishment.

While the summary statistics in Panel C suggest that defaults do not vary systematically with usury laws, this simple comparison does not account for differences in vehicle characteristics, the timing of origination, and other complicating factors. In Section 3, we control for detailed characteristics of the transactions and examine differences in loan terms and outcomes in states with and without usury laws.

2.3 Consumer protection laws

3 Usury laws and loan characteristics

The consumers in our sample purchase a bundle of products from the dealer: financing, maintenance packages, insurance and, of course, the vehicle itself. Consistent with evidence that auto dealers increase their profit margins by pricing over a bundle of goods (Busse and Silva-Risso, 2010), dealers can adjust the vehicle-financing bundle in the face of binding usury limits: when usury laws cap the interest rate that can be offered to a risky borrower, a profit-maximizing dealer can offset a lower interest rate with a higher vehicle sale price.

3.1 Interest rates and a measure of creditworthiness

One empirical challenge is to distinguish loans that are affected by a usury law from loans that are unaffected by the law. State-level indicators for usury limits are insufficient, since the caps do not bind for loans to relatively low-risk buyers who are offered low interest rates. Ideally, we would observe the interest rate that would have been offered to each high-risk borrower in the absence of the usury limit. In practice, however, we observe only the *actual* interest rate on each loan. As such, our analysis requires that we estimate borrowers' counterfactual interest rate—i.e., what they would have paid in the absence of a rate cap. For a borrower with a strong credit history for whom a usury limit has little relevance, the actual and counterfactual interest rates should be equal. In contrast, in the presence of a binding interest rate limit, the actual rate should be lower than the counterfactual rate.

To construct the counterfactual interest rate, we generate a predicted interest rate for each loan in the data. Specifically, we regress the interest rate of loans in states without usury laws against many of the borrower- and loan-specific characteristics in Table 1, as well as month-year

fixed effects to account for differences in common economic conditions over time. We then use the coefficient estimates to predict an interest rate for all loans in the data and interpret this predicted value as a composite measure of a borrower's riskiness.[19] The coefficient estimates that generate the predicted values are reported in Appendix Table A2.

Using data on past borrowers, lenders construct similar consumer credit models to predict the creditworthiness of new applicants (Thomas, Oliver and Hand, 2005). As would be the case for lenders predicting loan performance, our measure reflects only information that is available at the time of the loan application.[20] The model does not uncover any causal relationships and has purely predictive objectives; to that end, with an R^2 of 51%, its predictive power is strong. One assumption underlying our predicted interest rate measure is that lenders in states with and without usury laws consider similar factors in assessing buyers' riskiness—that is, we assume that the coefficient estimates in Appendix Table A2 are valid out-of-sample weights.

We can assess the strength of our composite measure of borrower riskiness out-of-sample (i.e., in states with usury limits) by comparing the predicted and actual interest rates of loans that are below the legal limit. Figure 3 plots the actual and predicted interest rates separately for loans in states with and without usury limits. For relatively low-risk borrowers, the actual and predicted rates are similar. As described in Section 1.3, usury limits vary by state: the most restrictive states cap interest rates on vehicle loans at 17% and the overall average, weighted by the volume of loans in our data, is approximately 20%. In Figure 3, when the predicted interest rate is below 18% and usury limits are unlikely to bind, the actual interest rate falls near the 45° line under both usury conditions.

Figure 3 also supports the claim that usury limits bind for high-interest rate loans. Whereas actual and predicted interest rates are similar in states without usury laws, the actual rates offered to higher-risk borrowers are lower than the predicted rates in states with a usury limit. In the figure, when the predicted interest rate is above 18%, the actual interest rate falls near the 45° line in states without a usury limit and substantially below the 45° line in states with a usury limit. Interpreting predicted interest rate as a measure of borrowers' creditworthiness, the pattern

[19] For loans in states with usury limits, the predicted interest rate may also be framed as a measure of treatment intensity which is correlated with the likelihood that a loan is subject to the interest rate cap.

[20] Our results are similar if we generate a predicted interest rate only from data on borrowers, not their proposed loans. This robustness suggests that our findings are not driven, for example, by differences in the vehicles purchased in states with and without usury laws.

in Figure 3 suggests that the interest rates offered to high-risk borrowers are indeed capped in states with usury limits.

The histograms in Figure 2 corroborate the claim that usury laws effectively cap interest rates. Figure 2.a presents two distributions for Arizona, a state which does not have a usury limit; Figure 2.b presents the same distributions for Colorado, where the usury limit is 21% on auto loans. The shaded histograms of the predicted interest rate measure are similar in the two panels, suggesting that Arizona and Colorado borrowers are similar in terms of creditworthiness. However, the striking difference in the distributions of actual interest rates across the two states is consistent with the claim that Colorado's usury law caps effectively caps the rate faced by high-risk borrowers.[21]

Regression analysis controls for other factors that might affect borrowers' interest rate and provides further evidence that usury laws are associated with lower rates for high-risk borrowers. Our regression specification accounts for the fact that usury limits should not bind for all borrowers: Borrowers with strong credit should face an actual interest rate equal to their predicted interest rate in all states, whereas borrowers with weak credit should be offered an actual interest rate that is lower than their predicted interest rate in states with a usury limit.[22] As such, we allow the relation between the predicted and actual interest rate to vary with borrowers' predicted creditworthiness.

Specifically, in the sample of individual loans, we estimate:

$$\begin{aligned} APR_{ist} &= \beta_1\Big(\widehat{APR}_{ist} \times 1[\widehat{APR}_{ist} \leq 0]\Big) + \beta_2\Big(\widehat{APR}_{ist} \times 1[\widehat{APR}_{ist} > 0]\Big) \\ &\quad + \beta_3 Usury_s + \beta_4\Big(\widehat{APR}_{ist} \times 1[\widehat{APR}_{ist} \leq 0] \times Usury_s\Big) \\ &\quad + \beta_5\Big(\widehat{APR}_{ist} \times 1[\widehat{APR}_{ist} > 0] \times Usury_s\Big) + \mathbf{\Omega}_t + \varepsilon_{ist}, \end{aligned} \tag{1}$$

where APR is the interest rate for loan i originating in state s in month t; $\widehat{APR}_{ist}$ is the demeaned measure of the borrower's creditworthiness generated using loan and individual characteristics (i.e., the predicted interest rate, described above); $1[\widehat{APR}_{ist} \leq 0]$ is an indicator for relatively low-

[21] As discussed in Section 1.3, the substantial mass at Colorado's usury limit suggests that the law is not leading to a strict rationing of credit; instead, at least some high-risk borrowers are able to secure loans at a rate that is lower than we predict, given their characteristics.

[22] We use the terms "weaker credit", "stronger credit", "higher risk" and "lower risk" to describe borrowers in our data relative to each other. According to Experian (`https://www.experian.com/blogs/ask-experian/what-is-the-average-credit-score-in-the-u-s/`), the average FICO score in the U.S. ranged from 690 to 703 between 2012 and 2019. More than 99% of borrowers in our data have credit scores below 690, making even some of our "lower risk" borrowers substantially riskier than the average U.S. borrower.

risk borrowers with strong credit (i.e., borrowers with below-average predicted interest rates); $1[\widehat{APR}_{ist} > 0]$ is an indicator for relatively high-risk borrowers with weak credit (i.e., borrowers with above average predicted interest rates); and $Usury_s$ is an indicator for whether a maximum interest rate is set by state law. The specification includes month-year fixed effects, $\mathbf{\Omega}$, to account for changes in aggregate economic conditions over time.

Least-squares estimation with a generated regressor yields consistent coefficient estimates, but inconsistent standard errors that lead to an over-rejection of the null hypothesis, even in large samples (Murphy and Topel, 2002). Without a correction, the covariance matrix of the second-stage regression includes the noise induced by the first-stage estimates. To account for the inclusion of a generated regressor—in our case, borrowers' predicted creditworthiness, $\widehat{APR}_{ist}$—we employ an algorithm that includes both the regression generating the predicted variable and the regression of interest in every bootstrapped sample. The standard errors reported in the tables, clustered at the state level to account for correlation across loans originated in the same state over time, are obtained through 1,000 replications of the bootstrapping procedure. In the text and tables, we report p-values that assume that the corrected errors are normally distributed.

To ease interpretation, we demean the measure of creditworthiness, the predicted interest rate, using the sample mean. In Eq. (1), with $\widehat{APR}_{ist}$ demeaned, β_2 captures the relation between the actual and predicted interest rates for a high-risk borrower in states without usury limits, and β_5 captures how that relation changes for a similar borrower in a state with a usury limit. For borrowers of average creditworthiness ($\widehat{APR}_{ist}$=0), the difference between their interest rate in states with and without usury limits is β_3 percentage points.

Table 2 reports the regression results from estimating Eq. (1), and the regression analysis supports the conclusions drawn from Figure 3.[23] The coefficient estimates on the predicted interest rate measures for borrowers in states without usury laws are close to 1 (β_1 and β_2 are statistically indistinguishable from one with $p < 0.23$ and $p < 0.29$, respectively), consistent with the fact that data from states without usury laws were used to generate the prediction.

The interest rates faced by borrowers in states with usury limits are lower and less sensitive to changes in borrowers' creditworthiness, relative to similar borrowers in states without an interest

[23]The coefficient estimates on the predicted interest rate measures and their interactions with the usury law indicator are not sensitive to the inclusion of more demanding geographic controls, such as state- or county-level fixed effects.

rate cap. The coefficient estimate on the interaction of the usury indicator and the predicted interest rate for higher-risk borrowers is negative and statistically significant ($\beta_5, p < 0.01$). The coefficient estimate on the interaction of the usury indicator and the predicted interest rate for lower-risk borrowers is also negative, but significantly lower—we reject the equality of β_4 and β_5 with $p < 0.01$. That is, within states with usury laws, an interest rate limit differentially impacts high-risk borrowers.

Together, the coefficient estimates in Table 2 bolster the validity of our measure of creditworthiness and suggest that, when required by law, usury limits effectively cap the interest rates faced by high-risk borrowers.

3.2 Monthly payments

Consumers may use simple heuristics to evaluate complex or multi-dimensional financial products (Benartzi and Thaler, 2007). In the auto financing context, a buyer might simplify a loan into a linear function of down payment and monthly payment, without considering the overall obligation (Herrmann and Wricke, 1998). Indeed, the monthly payment amount is a salient loan term that is often used to market auto financing, and monthly payment targeting is prevalent for borrowers of all levels of creditworthiness (Argyle, Nadauld and Palmer, 2019). Since household savings declines with income (Huggett and Ventura, 2000), low income borrowers may be particularly vulnerable to unanticipated liquidity shocks and, as a result, may be especially sensitive to their monthly debt burden (Attanasio, Koujianou Goldberg and Kyriazidou, 2008; Karlan and Zinman, 2008).

Using aggregate data, Melzer and Schroeder (2017) examine the relation between monthly payments and usury laws. Regressing monthly payments against the predicted probability that the usury law binds, they find that the borrowers would pay \$87–113 more each month if their loans were subject an interest rate cap. Our analysis of monthly payments begins with a specification that includes an indicator that pools all states with usury limits, and we extend the discussion to examine other state-level consumer protection laws.

Figure 4 plots monthly loans payments and our measure of creditworthiness separately for states with and without usury limits. Similar borrowers face similar payments across usury regimes. In Figure 4, the markers representing payments in states with and without usury limits lie nearly on top of each other at all levels of borrower creditworthiness.

We also examine whether monthly payments are different in states with usury laws using a regression framework. Using the sample of individual loans, we estimate Eq. (1) with monthly payment as the dependent variable. In column 1 of Table 3, we report coefficient estimates and bootstrapped standard errors that account for the inclusion of a generated regressor. Consistent with high-risk borrowers generally having less access to credit, monthly payments decline with borrowers' riskiness for both above- and below-average borrowers—the coefficient estimates on predicted interest rate measures without the usury interaction are negative and statistically significant ($p < 0.01$ in both cases). However, the indicator for the presence of a usury limit and its interactions with the predicted interest rate measures are not statistically significant at conventional levels. That is, consistent with previous findings that monthly payment targeting is prevalent in auto lending (Argyle, Nadauld and Palmer, 2019), we find no evidence that monthly payments vary systematically with states' usury laws.[24]

Our results on monthly payments are different from Melzer and Schroeder (2017), who find that risky borrowers face higher payments in states with usury laws. Those authors postulate that differences in monthly payments across states may be driven by a lack of competition among sellers in certain regions.[25] We add to this discussion by raising another possible explanation for the difference in payments in Melzer and Schroeder (2017): loan terms and outcomes may vary systematically with wage garnishment laws that limit lenders' ability to collect deficiency payments if the borrower defaults on the loan.

3.3 Wage garnishment

To assess the impact of wage garnishment, consider two borrowers of the same creditworthiness who live, respectively, in states that permit and prohibit wage garnishment. The wage garnishment restriction reduces the funds that can be collected from the borrower after default.[26] Now consider

[24] In principal, borrowers could reduce their monthly payments by making larger down payments. While data availability limits Melzer and Schroeder (2017) from observing down payments, we specifically account for down payment by including down payment as a regressor in the specification predicting borrowers' creditworthiness.

[25] Although competition in banking has been previously studied (*cf.* Gande, Puri and Saunders, 1999; Ho and Ishii, 2011; Crawford, Pavanini and Schivardi, 2018; Dick, 2007; Cohen and Mazzeo, 2007; Degryse and Ongena, 2008; Melzer and Morgan, 2015; Montes, 2014), we are not aware of studies documenting differences in the competitiveness of subprime auto lending across states.

[26] If the restriction on wage garnishment is effective, collections on deficiency payments should be lower in states that prohibit direct garnishment. Appendix Figure A2 plots the percent of the vehicle value that is recovered through collections separately for states with and without wage garnishment restrictions and shows that deficiency payments are substantially lower in states that prohibit wage garnishment.

a lender who transacts in both states.[27] This lender would be indifferent between the two loans only if it could collect more in (pre-default) payments in the state that prohibits wage garnishment. That is, after accounting for credit risk and vehicle value, monthly payments in states that prohibit wage garnishment should be systematically higher than payments in states that allow collections after default (Livshits, MacGee and Tertilt, 2007).[28]

Figure 5 plots monthly payments and predicted interest rate separately for states without usury limits, states with usury limits that allow wage garnishment, and states with usury limits that prohibit wage garnishment. The pattern is striking. When wage garnishment is allowed, monthly payments are similar in states with and without usury limits. However, loans in states that prohibit wage garnishment are associated with substantially higher monthly payments for higher- and lower-risk borrowers.[29]

To examine the role of wage garnishment, we augment an earlier specification to estimate:

$$\begin{aligned} Payment_{ist} &= \beta_1\Big(\widehat{APR}_{ist} \times 1[\widehat{APR}_{ist} \leq 0]\Big) + \beta_2\Big(\widehat{APR}_{ist} \times 1[\widehat{APR}_{ist} > 0]\Big) \\ &\quad + \beta_3 Usury_s + \beta_4\Big(\widehat{APR}_{ist} \times 1[\widehat{APR}_{ist} \leq 0] \times Usury_s\Big) \\ &\quad + \beta_5\Big(\widehat{APR}_{ist} \times 1[\widehat{APR}_{ist} > 0] \times Usury_s\Big) \\ &\quad + \beta_6 NoWG_s + \beta_7\Big(\widehat{APR}_{ist} \times 1[\widehat{APR}_{ist} \leq 0] \times NoWG_s\Big) \\ &\quad + \beta_8\Big(\widehat{APR}_{ist} \times 1[\widehat{APR}_{ist} > 0] \times NoWG_s\Big) + \mathbf{\Omega}_t + \varepsilon_{ist}, \end{aligned} \tag{2}$$

where $NoWG$ is an indicator for whether state s prohibits lenders from collecting deficiency payments through wage garnishment. We report coefficient estimates, as well as standard errors that account for the inclusion of a generated regressor, in Table 3.

Consistent with riskiness limiting consumers' access to credit, monthly payments are decreasing with predicted interest rate for both high- and low-risk borrowers. Reported in column 2 of Table 3, the coefficient estimates on both of the predicted interest rate measures are negative and large in

[27] Many subprime lenders, including our data provider, operate in multiple states.

[28] In practice, a lender's calculus is further complicated by the relation between payment size and default, as well as concerns about moral hazard. The fact that borrowers facing higher monthly payments are more likely to default may lead to lower payment size and, when the lender has little recourse after default, borrowers may differentially degrade the vehicle and make it less valuable after repossession.

[29] States that prohibit wage garnishment have among the most restrictive interest rate limits in the country. Nevertheless, stringent usury limits alone are unlikely to be responsible for differences in monthly payments. Dealers offer low-risk borrowers interest rates below the limit and, as we show below, dealers in states with usury limits strategically adjust the principal amount offered to high-risk borrowers whose rates are capped by law.

magnitude ($p < 0.01$).

The interaction terms allow us to assess the relation between usury and wage garnishment limits and monthly payments. Compared to identical borrowers in states that restrict neither interest rate nor wage garnishment, many high-risk borrowers face roughly equal monthly payments in states with usury limits and higher monthly payments in states that also restrict wage garnishment. For example, a borrower with a predicted interest rate of 22%—approximately 2.5% above the mean, at the 90th percentile of the distribution of creditworthiness—faces payments that are roughly equal in states with and without usury laws. The same borrower would pay an additional 12$ per month or 3% of an average payment of $405 in a state that also prohibits wage garnishment.

Usury and wage garnishment laws affect high- and low-risk borrowers differently. Our results show that low-risk borrowers in states that limit interest rates may face, if anything, slightly lower payments than their peers in other states; however, low-risk borrowers face *higher* monthly payments in states that also prohibit wage garnishment. For example, a borrower with a predicted interest rate below the mean would face payments that are at least $26 higher or nearly 6.5% more in a state that prohibit wage garnishment. These higher payments may reflect, at least in part, the asymmetric information in the market: If lenders are unable to recover deficiencies on the loan through post-default collections, they may account for the *possibility* of future default and unrecoverable losses by increasing monthly payments for all borrowers, including the *ex ante* low-risk ones.

3.4 Principal

In the presence of a binding interest rate limit, a dealer can offer a similar schedule of monthly payments on a given vehicle only by adjusting the loan's starting principal. As discussed above, the prohibition of wage garnishment will also lead to higher principal balances if lenders increase monthly payments in response to a restriction on post-default collection. In the following section, we account for individual borrower and vehicle attributes and find that usury and wage garnishment restrictions are indeed associated with higher principal balances; using aggregate data, Melzer and Schroeder (2017) draw a similar conclusion about usury laws.

Figure 6 plots the initial amount financed against the predicted interest rate separately by usury and wage garnishment laws. As expected, across all states, the initial loan principal decreases with

the predicted interest rate—less creditworthy borrowers have less access to financing. When wage garnishment is permitted, the average amount financed per loan appears similar in states with and without usury laws; however, after controlling for other factors in the regression analysis, we actually observe a difference among high-risk borrowers. Loans' initial principal balances appear to be substantially higher in states that prohibit wage garnishment, relative to initial balances in states that allow wage garnishment; this difference is also confirmed in the regression framework.[30]

We re-estimate Eq. (1) and (2) with the loan's initial principal as the dependent variable and report the coefficient estimates in columns 3 and 4 of Table 3. Column 3 distinguishes only states with and without usury limits. Consistent with the patterns in Figure 6, higher-risk borrowers secure smaller loans in all states. The coefficient estimate on the predicted interest rate variables are relatively large and negative ($p < 0.01$ for both). The coefficient estimates on the interactions with the usury indicator are also statistically significant ($p < 0.10$ and $p < 0.05$ for low- and high-risk borrowers, respectively). Borrowers with predicted interest rates above the mean may face higher initial loan balances in states with a usury limit than identical borrowers in states without an interest rate cap. Conversely, borrowers with predicted interest rates below the mean may face lower principal amounts in states with usury limits. While these results are suggestive, the specification does not distinguish between states with usury laws that permit wage garnishment and states that limit both interest rates and post-default collections.

In column 4, we report the results of our most saturated regression that includes an indicator for states that prohibit wage garnishment and its interactions with predicted interest rate measures. As in column 3, total principal decreases with creditworthiness ($p < 0.01$ for both high- and low-risk borrowers). Now, however, principal balances are not significantly different for low-risk borrowers and only high-risk borrowers face higher principal balances in states with usury limits than in states without interest rate caps ($p < 0.01$).

The observation that risky borrowers face higher principal balances in states with usury limits is consistent with the results in Melzer and Schroeder (2017). In contrast to Melzer and Schroeder (2017), who do not observe buyers' down payment and cannot rule out the possibility that the

[30]Higher balances may reflect higher prices or an expansion in borrowers' access to credit. Although we cannot disentangle these directly, we can proxy for the availability of credit using vehicle characteristics and find that similar borrowers have larger loans in states that prohibit wage garnishment than in states that allow it, even after accounting for vehicle characteristics.

increase in the loan-to-value ratio is driven by lower down payments in states with usury limits, we observe down payments. In fact, differences in down payment cannot explain the observed differences in initial principal balances; if anything, down payments in states with usury laws are *higher* than down payments in states without usury laws (Table 1, $p = 0.11$).

In states in which wage garnishment is prohibited—a subset of states with usury laws—the initial amount financed is larger for all borrowers. In column 4 of Table 3, the coefficient estimate on the uninteracted indicator for states that prohibit wage garnishment is large and positive ($p < 0.01$). Unlike usury limits that affect borrowers with weak credit, wage garnishment restrictions are associated with higher principal balances for both high- and low-risk borrowers. The magnitude of the difference is economically meaningful: interpreting the coefficient estimate, in a state that prohibits wage garnishment, 8.9% of an average borrower's initial principal balance is the premium associated with the restriction.

Our analysis of loan-level data adds richness to the existing literature on auto lending. State-level heterogeneity in consumer protection laws allows us to identify new facts about the setting. In the analysis described above, we account for borrower and vehicle characteristics to identify the relation between usury and wage garnishment restrictions on monthly payments and initial principal. We next investigate whether these consumer protection laws are associated with different loan outcomes, particularly default. While differences in default or collections rates have business implications for lenders, they also have substantial economic effects for individual borrowers.

4 Loan outcomes

In this section, we compare loan outcomes across states with and without usury laws and wage garnishment prohibitions. Our loan-level data include an indicator for default, as well as information on the timing of the delinquency, the value of the vehicle at default, and collections.

Approximately 85,000 loans in our data are still active at the end of the sample period. We exclude these loans from our analysis of loan outcomes and restrict our sample to loans that could have been paid in full by the contracted monthly payments.[31] In practice, this means that we examine only loans whose original term ended prior to 2019. Even with this restriction, we observe

[31] Including loans that are still being paid off by borrowers would understate the default rate.

the outcomes of over 205,000 loans.

Our analysis of collections activities in Section 4.2 requires us to further restrict our sample to loans that terminated in default before 2018. Although deficiency payments can continue for many years after default, in practice, only 2.3% of borrowers in our sample make payments three years after defaulting and only 0.3% of borrowers make payments five years after defaulting. As a result, restricting the sample to loans with defaults before 2018 censors few, if any, post-default payments.

4.1 Default

Borrowers default on their loan when they fail to submit a timely monthly payment. Figure 7 plots the percent of loans that default and borrowers' predicted interest rate. Examining only states in which wages can be garnished, the relation between creditworthiness and default is similar for loans in states with and without usury laws: the lowest risk borrowers' default rate is less than 15%, whereas the highest risk borrowers' default rate is more than 35%. The difference between borrowers' default behavior in states with and without wage garnishment is also evident in Figure 7. For every level of creditworthiness, borrowers in states that prohibit wage garnishment default more frequently than similar borrowers in other states.

To examine the relation between default and consumer protection laws, we re-estimate Eq. (1) and (2) with an indicator for whether the loan ended in default as the dependent variable. We report the coefficient estimates and bootstrapped standard errors in columns 1 and 2 of Table 4.

Higher-risk borrowers are more likely to default on their loans. In both specifications, the coefficient estimates are negative for above- and below-the-mean predicted interest rate measures ($p < 0.01$ in all cases). None of the coefficient estimates on the usury-related variables are statistically significant, suggesting that usury limits are not associated with a different default rate. Wage garnishment, however, is associated with higher default rates for both high- and low-risk borrowers. The coefficient estimate on the uninteracted indicator for states that prohibit wage garnishment is positive and large ($p < 0.05$). Using results from column 2, we can interpret the magnitude of the coefficient estimate on the wage garnishment indicator in terms of an equivalent change in our measure of creditworthiness. Living in a state with wage garnishment restrictions is associated with the same increase in the default rate—nearly 10 percentage points—as a 2.2- to 3.3-standard deviation increase in the predicted interest rate measure. The difference in default rate appears

to affect all borrowers in states that prohibit wage garnishment; the coefficients estimates for the interactions of the wage garnishment indicator and measures of creditworthiness are small and not statistically significant.

As discussed in Section 3.3, we find that borrowers in states that prohibit wage garnishment face higher monthly payments than similar individuals in other states. Facing higher payments, those borrowers default more than their counterparts, consistent with earlier findings that higher monthly payments are associated with a higher probability of default loans (Agarwal, Ambrose and Chomsisengphet, 2008).

Borrowers may also vary in the timing of their defaults. Column 3 of Table 4 reports coefficient estimates from Eq. (2) with the number of payments (i.e. months) before default as the dependent variable, examining only loans that ended in default. In all states, higher-risk borrowers default on their loans earlier than lower-risk borrowers. A borrower whose predicted interest rate is one standard deviation above the mean would make nearly 2–3 fewer payments than the average borrower before defaulting on their obligation ($p < 0.01$). However, we find little systematic difference in the timing of borrowers' defaults across states with usury and wage garnishment restrictions.

Of course, the defaults and their timing are net outcomes of borrowers' delinquency and extensions granted by the lender. Borrowers who are protected from wage garnishment may default more frequently because they face weaker incentives to make timely payments or face short-term liquidity constraints because of the systematically higher monthly payments. On the other hand, lenders with no recourse through wage garnishment may respond to these regulatory restrictions by offering loan extensions and modifications. In practice, collecting a few extra payments may be more profitable than immediately repossessing the vehicle with no prospect of additional transfers from the borrower.

To examine whether lenders respond to delinquencies differently in states that prohibit wage garnishment, we plot the number of days by which a loan was extended after a missed payment and the predicted interest rate in Figure 8. Column 4 of Table 4 reports the coefficient estimates from Eq. (2) with the days of loan extension as the dependent variable. Loan extensions are longer for less creditworthy borrowers, and the relation is particularly strong among lower-risk borrowers ($p < 0.01$). Even longer extensions may be given to low-risk borrowers in states with usury laws ($p < 0.05$).

The longest extension are granted to borrowers in states with wage garnishment restrictions. On average, borrowers in states that prohibit wage garnishment are granted more than six extra days to pay ($p < 0.10$). This finding is consistent with lenders attempting to recoup funds through extensions when their ability to collect on loan deficiencies after default is limited.[32] It also suggests that the default rate in states that prohibit wage garnishment would be even higher than the observed rate, if lenders were not giving borrowers' additional allowance to remedy their delinquencies.

4.2 Outstanding debt

Although default rates are uncorrelated with states' usury laws, borrowers in states that prohibit wage garnishment face higher monthly payments and are more likely to default. Default is a discrete event; however, borrowers who default with higher principal balances may face more adverse consequences. In the following section, we examine the principal balance at default, collections activities, and the net cost of default to the lender.

In Section 1.3, we describe lenders' strategic response to usury limits. Facing a binding interest rate cap, lenders increase the principal amount to keep high-risk borrowers' monthly payments equal to what their payments would be without the usury limit. That is, after accounting for loan length, vehicle characteristics and borrower creditworthiness, loans to high-risk borrowers that are subject to usury limits have lower interest rates and higher initial principal amounts than loans in states without usury laws. As a result, at any given point, high-risk borrowers facing the maximum interest rate owe more to their lender than a similar borrower in a states without a usury limit.

Figure 9 plots loan balances at the time of default and borrowers' predicted interest rate. Column 1 of Table 5 reports the results from re-estimating Eq. (2) on the sample of loans that ended in default, with the loan's principal balance at default as the dependent variable. Because higher-risk borrowers take out smaller loans, the principal balancing owing at default is decreasing with borrowers' predicted interest rate; the coefficient estimates on both of the predicted interest rate measures are negative ($p < 0.01$).

Borrowers whose interest rate is capped by the usury law start with higher principal balances

[32] Formal modifications are rare in practice; less than 1% of the loans on our sample have been modified. However, in untabulated results, we find that loan modifications are more common in states that prohibit wage garnishment.

and, as we find above, default very slightly later than their peers in other states. As such, we would expect their principal balance at default to be similar or slightly smaller than similar borrowers in other states. The coefficient estimate on the uninteracted indicator for states with a usury limit is negative ($p < 0.01$), whereas the coefficient estimate on its interaction with the predicted interest of high-risk borrowers is positive ($p < 0.05$). Interpreting the magnitudes of the coefficients, we find that high-risk borrowers with predicted interest rates above 22% would owe more after defaulting in a state with a usury limit than similar borrowers in a state without an interest rate cap. For example, conditional on defaulting, a borrower with a predicted interest rate of 25% leaves an additional $705 of unpaid principal in a state with an interest rate limit, relative to a similar borrower in a state without the limit.[33]

Wage garnishment is associated with higher principal balances at default for all borrowers, relative to similar borrowers in other states. The coefficient estimate on the uninteracted indicator for states that prohibit wage garnishment is large and positive ($p < 0.10$). That is, despite their relatively large monthly payments, these borrowers start with higher principal amounts at the start of their loan and default with higher balances.

Of course, lenders can recoup some of the loan deficiency at default through costly recovery efforts, such as the repossession and sale of the vehicle. If the repossession and sale of the vehicle does not cover the outstanding debt, lenders can attempt to recover the deficiency through direct communication with the borrower or, where permitted, through court-ordered wage garnishment. As discussed above, we limit our analysis of collections to loans that terminated prior to 2018.

Columns 2 and 3 of Table 5 report coefficient estimates from estimating Eq. (2) with the net proceeds from the repossession and re-sale of the vehicle and the funds recovered through collections as the dependent variables, respectively. The amount recovered by the lender through the repossession and sale of the vehicle is decreasing with high-risk borrowers' predicted interest rate ($p < 0.01$). Comparing states with and without usury and wage garnishment restrictions, we find no significant difference in the amount recovered through the sale of the repossessed vehicle.

Collections from the borrower does not vary with the presence of a usury limit; however, collections are substantially lower where lenders cannot seek compensation through wage garnishment; the coefficient estimate on the uninteracted indicator for states that prohibit wage garnishment is

[33] Using coefficient estimates from Table 5, column 1: $223.62 \times (25 - -19.5) - 525.22 = \$704.69$

large and negative (column 3, $p < 0.01$). On average, lenders in states that prohibit wage garnishment collect approximately $2,500 less than they would on a similar loan in a state with weaker restrictions.

Column 4 of Table 5 re-estimates Eq. (2) with the final balance owed by borrowers who default (i.e. the principal balance minus the amount recovered through repossession and collections). Across all levels of creditworthiness, borrowers' net balance is decreasing in their predicted interest rate ($p < 0.01$). After the repossession of the vehicle and collections efforts, final balances vary little across usury regimes; however, lenders face large balance deficits from defaults in states that prohibit wage garnishment. After repossession and collections, deficits are $2,800 higher in states that prohibit wage garnishment ($p < 0.01$).

5 Discussion

5.1 Wage garnishment and moral hazard

In Section 4.1, we present evidence that, for every level of creditworthiness, borrowers in states that permit wage garnishment default more frequently than their peers in other states. In this section, we consider one possible explanations: moral hazard. Moral hazard suggests that borrowers respond to the reduced incentives to make timely payments—by making default less costly, the prohibition on wage garnishment may induce more delinquencies.

Although we cannot identify the determinants of the impact of wage garnishment directly, an analysis of borrowers' behavior in a similar setting suggests that moral hazard may be at least partly responsible for the higher default rates in states that prohibit wage garnishment. To understand the relevance of moral hazard in our setting, we consider the relation between prior bankruptcies, which make default more costly by limiting borrowers' ability to discharge the debt, and borrowers' propensity to default. A borrower's prior bankruptcy is observable at the time of loan issuance and, as a consequence, should be "priced into" the original loan terms. Nevertheless, our results show that the differential pricing is not sufficient to erase the relation between prior bankruptcy and default.

Our data include information about borrowers' creditworthiness at the time of purchase, as well as several indicators of borrowers' financial history. More specifically, our data include an indicator

for whether a borrower had previously declared bankruptcy and, if so, the bankruptcy type. Chapter 7 bankruptcy allows the borrower to discharge most unsecured debt but, importantly, prohibits the individual from filing another bankruptcy claim for eight years.[34] Since vehicles loans are recourse loans, borrowers' ability to discharge their debt in bankruptcy court protects the borrower and adversely impacts the lender, and borrowers' inability to discharge their debt adversely affects borrowers while leaving recourse for the lender.

We plot loan default rates of borrowers and the measure of borrowers' creditworthiness by borrowers' prior bankruptcy status, separating states by usury law: Figures 11.a and 11.b plot the default rate for borrowers in states without and with usury laws, respectively.[35] Both panels show that buyers with a prior Chapter 7 bankruptcy are less likely to default than similar borrowers without a bankruptcy filing in the last eight years. This pattern is consistent with the claim that a recent Chapter 7 bankruptcy limits borrowers' ability to discharge the auto debt, making default especially costly. Borrowers *without* a recent bankruptcy may engage in behavior that is consistent with moral hazard: by claiming Chapter 7 bankruptcy, these borrowers are able to renege on their full obligation to the lender.

To simplify the exposition, we limit our regression analysis to loans from states that have neither usury limits nor restrictions on wage garnishment.[36] We examine the role of borrowers' prior bankruptcy by estimating the following equation:

$$\begin{aligned} Default_{ist} &= \beta_1\Big(\widehat{APR}_{ist} \times 1[\widehat{APR}_{ist} \leq 0]\Big) + \beta_2\Big(\widehat{APR}_{ist} \times 1[\widehat{APR}_{ist} > 0]\Big) \\ &\quad + \beta_3 PastBK_i + \beta_4\Big(\widehat{APR}_{ist} \times 1[\widehat{APR}_{ist} \leq 0] \times PastBK_i\Big) \\ &\quad + \beta_5\Big(\widehat{APR}_{ist} \times 1[\widehat{APR}_{ist} > 0] \times PastBK_i\Big) + \mathbf{\Omega}_t + \varepsilon_{ist}, \end{aligned} \tag{3}$$

where *PastBK* is an indicator for whether loan i's borrower filed a Chapter 7 bankruptcy in the

[34] Chapter 13 establishes a repayment plan for the borrower and, compared to Chapter 7 bankruptcy, offers more flexibility in terms of the timing of a second filing.

[35] Plotting separately the loan outcomes for (1) borrowers with and without prior bankruptcies in (2) states with and without usury laws that (3) permit or prohibit wage garnishment provides only a very messy visualization of the patterns in the data.

[36] Whereas we have no *a priori* hypothesis about the interactive effect of a borrower's ability to declare bankruptcy and a state's usury limit, a law prohibiting wage garnishment restricts a lender's ability to recover funds owed by the borrower after default and may limit the additional impact of bankruptcy protection. Estimating a regression with the full set of predicted interest rate-, usury-, wage garnishment- and bankruptcy-related interactions yields results that are similar to those in the simplified framework that we report, but are considerably harder to interpret concisely.

eight years prior to loan origination.

Table 6 reports the results from estimating Eq. (3). Consistent with the findings in Section 4.1, the likelihood of default is increasing with borrowers' riskiness. The coefficient estimate on the uninteracted predicted rate measures are positive ($p < 0.01$) and similar in magnitude to the estimates reported in Table 4.

An average borrower who declared a Chapter 7 bankruptcy in the eight years prior to loan origination is less likely to default on their auto loan; the coefficient estimate on the indicator for a prior bankruptcy is large and negative ($p < 0.01$). In our data, 28% of borrowers have a prior Chapter 7 bankruptcy, and borrowers with predicted interest rates above and below the mean declare bankruptcy at similar rates ($p = 0.88$). Nevertheless, relatively low-risk borrowers—those with predicted interest rates below the mean—with a prior bankruptcy are especially unlikely to default on their vehicle loans. The coefficient estimate on the interaction of the indicator for bankruptcy and the predicted interest rate measure for low-risk borrowers is positive ($p < 0.01$). A borrower whose predicted interest rate is 2 percentage points below the mean (i.e. $\widehat{APR}_{ist} = -2$) and has previously filed for bankruptcy is 8 percentage points less likely to default than a similar borrower without a history of bankruptcy.

Recent bankruptcy limits borrowers' ability to discharge their debt through a second bankruptcy filing. Conversely, borrower who have not recently declared bankruptcy have the *option* to file for Chapter 7 protection against the collection of outstanding debt in the event that they default on an underwater vehicle loan. Wage garnishment laws provide borrowers with similar protections from post-default collections. Evidence that borrowers who cannot discharge their debt due to a prior bankruptcy default less frequently lends credence to the claim that wage garnishment protection leads to more defaults by reducing the cost of delinquencies.[37] Important caveats remain, however. First, we cannot observe moral hazard directly in the setting with wage garnishment and can only infer its role indirectly through the relationship between prior bankruptcy and default. Second, in the current analysis, we cannot compare the importance of moral hazard against other possible

[37]Borrowers with a prior bankruptcy also likely carry less total debt than their counterparts without a bankruptcy, and they may be less likely to default because of their lower debt burden. To account for this potentially confounding variable, we re-estimate Eq. (3) with borrowers' debt-to-income ratio as an additional regressor. The coefficient estimate on the debt-to-income variable is small with a large standard error ($p = 0.78$), and the other coefficient estimates are very similar in magnitude, statistical significance and interpretation to the regression presented in Table 6. That is, we find no evidence that the negative correlation between prior bankruptcy and default is because borrowers have reduced their overall debt through bankruptcy.

explanations, including the role of short-term liquidity constraints. Instead, we present suggestive evidence that increased moral hazard is a plausible consequence of laws protecting borrowers from wage garnishment.

5.2 Total cost loans

Loan-level data allows us to account for many borrowing costs: we observe borrowers' down payments, monthly payments, and other fees paid over the life of the loan. Of course, borrowers may incur additional costs that are not reported in the data, especially in the event of a default. For example, consumers who default may face especially high interest rates on future loans or may be unable to secure additional credit. The benefits of vehicle ownership are also difficult to assess. For example, individuals may rely on their vehicle to commute to current or prospective workplaces. Depreciation over the life of the loan provides one market-based measure of the value derived from vehicle ownership; however, unmeasured benefits of ownership, including preferences for flexibility, safety and social status, complicate any formal cost-benefit analysis. As such, a comprehensive welfare analysis is beyond the scope of our current study. Instead, we consider the total cost of the loan to borrowers under different usury and wage garnishment laws.

Figures 12.a and 12.b plot the total costs paid by the borrower and their predicted interest rate by usury law, wage garnishment law, and whether the loan terminated in default. To avoid the confounding fact that loans in states that prohibit wage garnishment involve larger monthly payments (see Section 3.3), we first examine loans costs in only states that permit wage garnishment but differ in terms of usury laws. In Figure 12.a, the total cost of loans that are paid in full are similar in states with and without usury limits. This is consistent with earlier evidence that dealers adjust loan terms when interest rates are limited by law; although the amount paid in interest and principal is different for higher-risk borrowers in states with and without usury limits, total payments are equal. As expected, in states that permit wage garnishment, loans that end in default are more costly than loans than that are paid in full—defaulting borrowers may be subject to additional fees associated with late-payments and collections.

In Figure 12.b, we limit our sample to states with usury laws and compare total loan costs by the presence or absence of wage garnishment restrictions. As in Figure 12.a, for all levels of creditworthiness, loans that end in default in states that allow wage garnishment are more

costly than loans that are paid in full. However, in states with wage garnishment prohibitions, the total cost of loans that end in default appears lower than the total cost for loans that are paid in full. Of course, we do not expect the actual total costs to be lower for defaulting borrowers after accounting for all costs—otherwise, in states that protect borrowers from wage garnishment, there would be very strong incentives for borrowers to default. Instead, in states that prohibit wage garnishment, the gap between the *observed* costs to borrowers facing different loan outcomes gives us an estimate of the lower-bound on the *unobserved* costs of default. Assuming that these unobserved costs are similar across states, defaulting borrowers who are protected from collections through wage garnishment appear to be substantially better off than defaulting borrowers who face the possibility of wage garnishment. Notably, when they pay off the loan without defaulting, borrowers in states that prohibit wage garnishment are *worse* off that their counterparts in other states.[38]

The contrasting results in Figures 12.a and 12.b likely reflect, at least in part, asymmetric information in the market. In states that allow wage garnishment, lenders can recover deficiencies after the default—these collections are costly for borrowers who default and are irrelevant for borrowers who make payments on schedule. In contrast, in states that prohibit wage garnishment, lenders account for the *possibility* of future default by increasing monthly payments for *all* borrowers. In short, whereas lenders in states that allow wage garnishment can distinguish between good and bad borrowers *ex post*, lenders in states that prohibit wage garnishment increase principal and payments to account for the *ex ante* mix of borrower types.

5.3 Borrower mobility

Borrowers' mobility may also affect total loan costs. Any interest rate limit is determined by the location of the dealership, whereas limits on collections depend on borrowers' residence. As such, borrowers who reside outside of the state in which they purchased their vehicle—either because they shopped across a border or because they relocated permanently—may face (or avoid) different loan costs.

Although borrowers and their vehicles are mobile, there appears to be few opportunities to

[38] In an unreported analysis, we draw similar conclusions when we estimate a lower bound on the benefits derived from vehicle use by calculating the difference between a vehicle's book value at purchase and its value at loan termination.

lower loan costs by buying across state lines. Our sample includes 3,666 loans that were originated at a dealership in a state with a different wage garnishment law than in the borrower's home state. This small sub-sample allows us to consider whether borrowers benefit from cross-border shopping. A borrower who resides and buys in a state that permits wage garnishment face average total loan costs of roughly $19,715. Borrowers who reside in a state that prohibits wage garnishment appear to pay a premium associated with the expected restriction on post-default collections, regardless of the law in the state of purchase. After accounting for buyer characteristics, these borrowers pay $720–$990 more than their peers living and buying in states without the restriction ($p < 0.01$).[39] The highest cost is faced by borrowers who purchase in a state that prohibits wage garnishment and reside in a state that permits it. They appear to pay upfront for the restriction on collections *and* are subject to wage garnishment in their home state. After accounting for borrower characteristics, these borrowers face an average total costs that is nearly $2,500 higher ($p < 0.01$) than than buyers who did not buy out-of-state.

6 Conclusion

Using data on individual auto loans, we examine the relation between consumer protection laws—interest rate and wage garnishment restrictions—and loan terms and outcomes. We find that dealers strategically adjust the initial loan balance such that similar borrowers face the same monthly payments in states with and without usury laws; however, borrowers in states that prohibit wage garnishment face higher initial balances and monthly payments. By reducing the funds that can be collected from borrowers after default, the restriction pushes lenders to collect more in (pre-default) payments. The shift in the timing of cash flow to the lender has consequences for borrowers. Examining loan outcomes, we find that default rates do not vary with usury law when lenders can seek deficiency payments through wage garnishment; however, default rates are higher where wage garnishment is prohibited, perhaps due to moral hazard.

Usury limits and wage garnishment laws impose restrictions on some dimensions of indirect

[39] In an unreported regression, we estimate this difference by regressing the total loan cost against indicators for the wage garnishment regime in the state of purchase and the borrower's residence and their interaction, as well as the measures of the borrower's creditworthiness. Although predicted interest rate measure reflects common observable credit scoring factors such as income and FICO score, it is possible that consumers who cross state lines are riskier in ways that we cannot observe.

auto financing market. While lenders may adjust interest rate or principal to compensate for the legal restrictions on contract terms, our evidence suggests that some borrowers may be worse off. In particular, relative to borrowers in states that permit wage garnishment, borrowers in states that prohibit wage garnishment are more likely to default, and the consequences of default are significant. Because of its long-lasting impact on individuals' formal credit scores, auto loan default and repossession can reduce borrowers access to other forms of consumer credit. Moreover, there is an established link between auto ownership and employment (c.f. Raphael et al., 2001), and the loss of the vehicle may reduce borrowers' employment prospects in both the short and long run.

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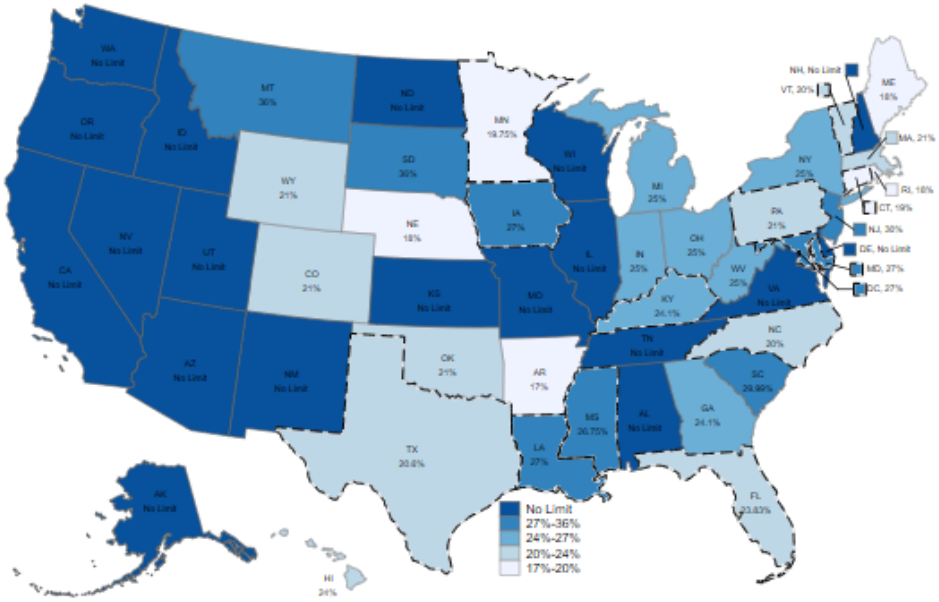
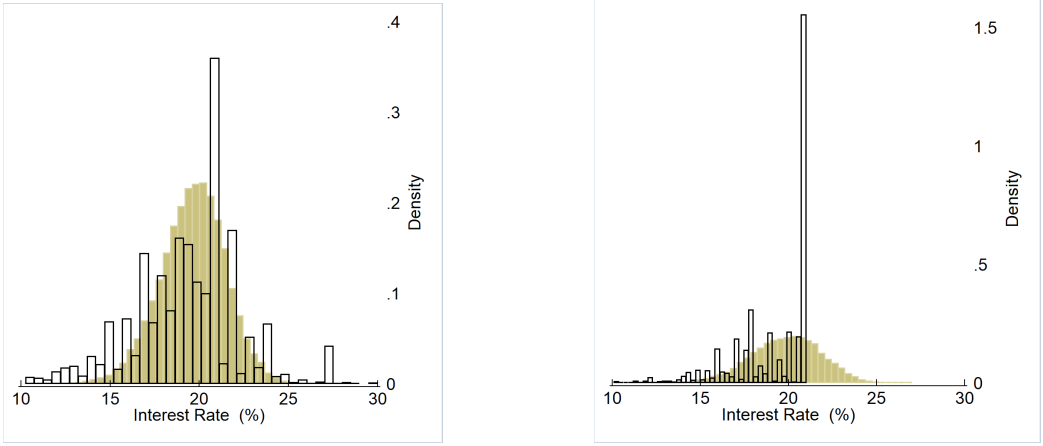


Figure 1. This map categorizes states in the contiguous U.S. by the maximum allowable interest rate on auto loans for a two-year-old vehicle with a price of $18,000. The intensity of the color indicates the level of the maximum rate. States with a dashed outline have maximum rates that vary by vehicle model year and value.



(a) Arizona **(b)** Colorado

Figure 2. These figures present histograms of actual and predicted interest rates, denoted in %. Figure (a) depicts the distributions for Arizona, which does not have a usury limit; Figure (b) depicts the distributions for Colorado, where the usury limit is 21% on auto loans. The shaded histogram is the distribution of borrowers' predicted interest rate. Predicted interest rates for all loans are generated using coefficient estimates from a regression of the actual interest rate of loans in states without usury limits against the borrower- and loan-specific characteristics in Table 1 and month-year fixed effects; this measure of creditworthiness is described in Section 3.1. The unshaded histogram depicts the distribution of the interest rate that borrowers actually paid.

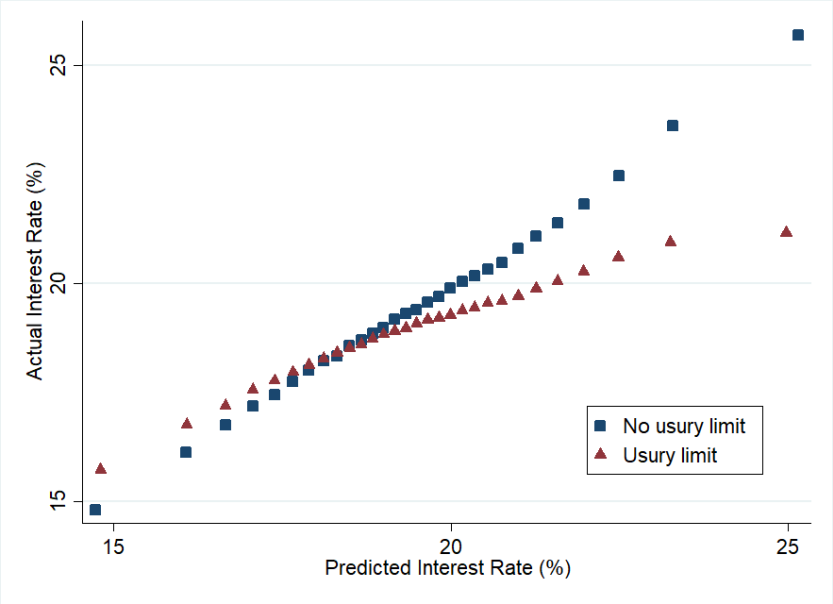


Figure 3. This figure presents a binned scatter plot of actual and predicted interest rates (%), separating states with and without usury limits. Predicted interest rates are described in Section 3.1. States without usury limits are plotted as blue squares; states with usury limits are plotted as red triangles.

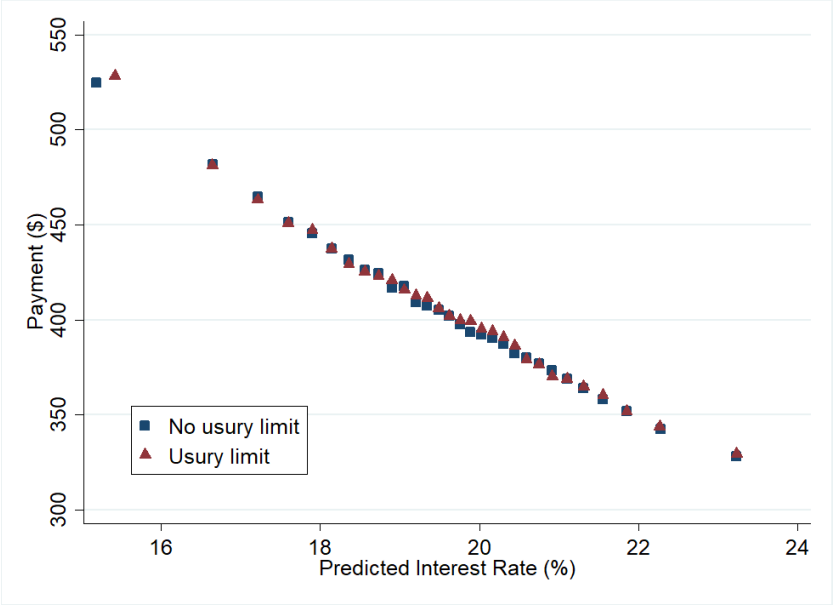


Figure 4. This figure presents a binned scatter plot of monthly loan payments ($) and predicted interest rate (%), separating states with and without usury limits. The scatter plot accounts for month-year fixed effects. Predicted interest rates are described in Section 3.1. States without usury limits are plotted as blue squares; states with usury limits are plotted as red triangles.

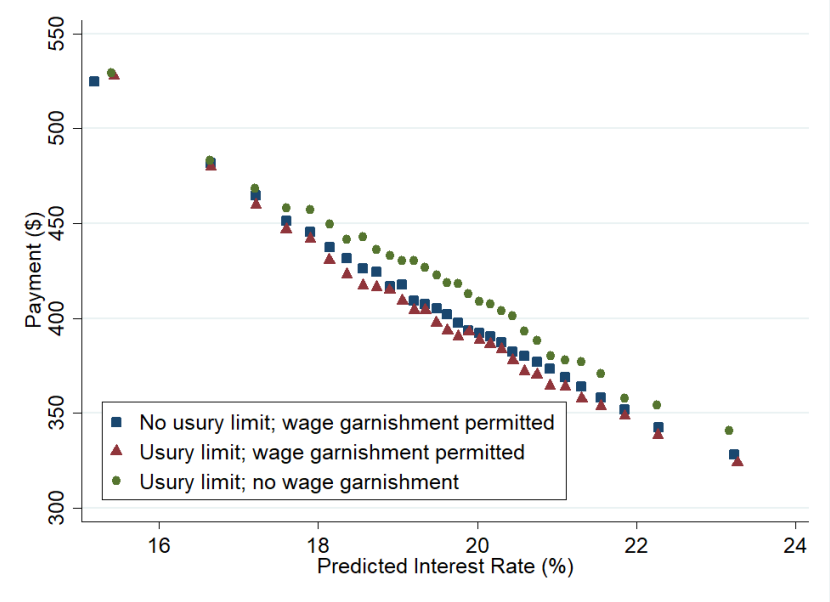


Figure 5. This figure presents a binned scatter plot of monthly loan payments ($) and predicted interest rate (%), separating states with and without usury limit that allow wage garnishment and states with usury limits that prohibit wage garnishment. The scatter plot accounts for month-year fixed effects. Predicted interest rates are described in Section 3.1. States without usury limits are plotted as blue squares; states with usury limits that allow wage garnishment are plotted as red triangles; states with usury limits that prohibit wage garnishment are plotted as green circles.

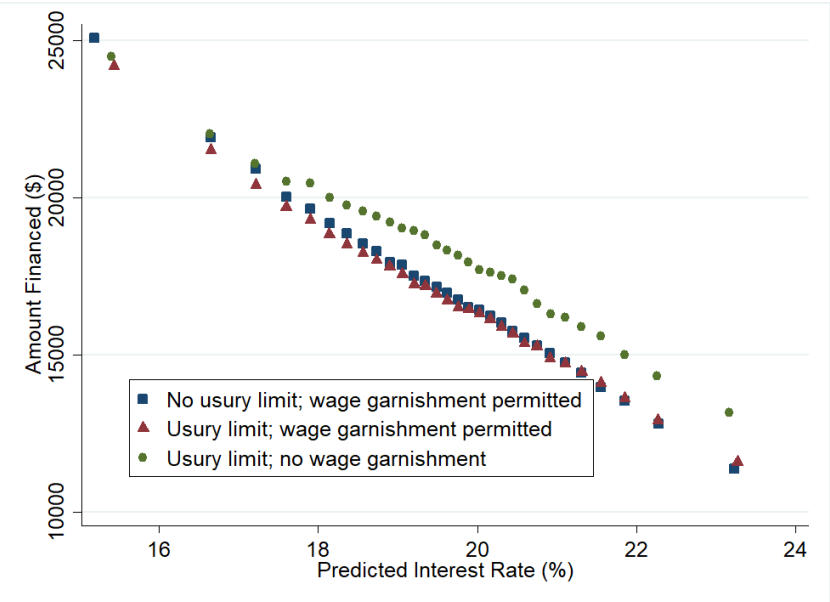


Figure 6. This figure presents a binned scatter plot of the total amount financed ($) and predicted interest rate (%), separating states with and without usury limits that allow wage garnishment and states with usury limits that prohibit wage garnishment. The scatter plot accounts for month-year fixed effects. Predicted interest rates are described in Section 3.1. States without usury limits are plotted as blue squares; states with usury limits that allow wage garnishment are plotted as red triangles; states with usury limits that prohibit wage garnishment are plotted as green circles.

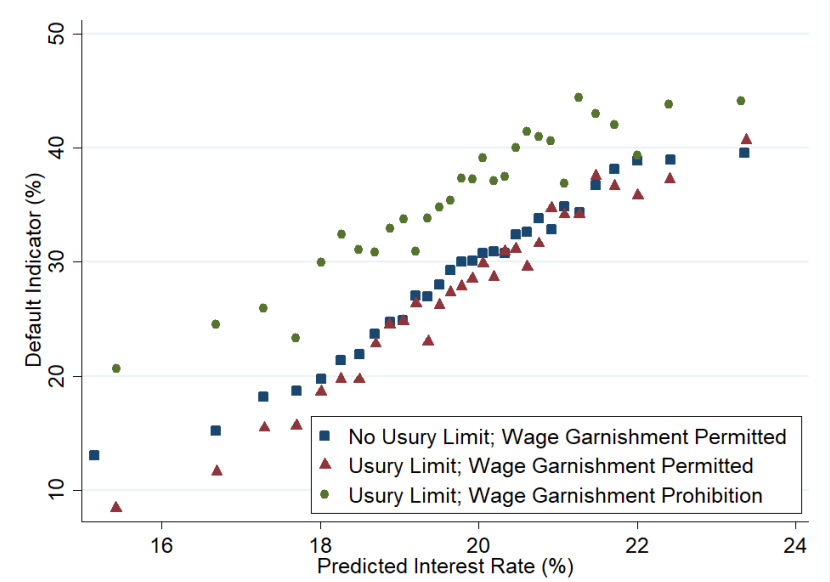


Figure 7. This figure presents a binned scatter plot of the percent of loans that default and predicted interest rate (%), separating states with and without usury limits that allow wage garnishment and states with usury limits that prohibit wage garnishment. The scatter plot accounts for month-year fixed effects. Predicted interest rates are described in Section 3.1. States without usury limits are plotted as blue squares; states with usury limits that allow wage garnishment are plotted as red triangles; states with usury limits that prohibit wage garnishment are plotted as green circles.

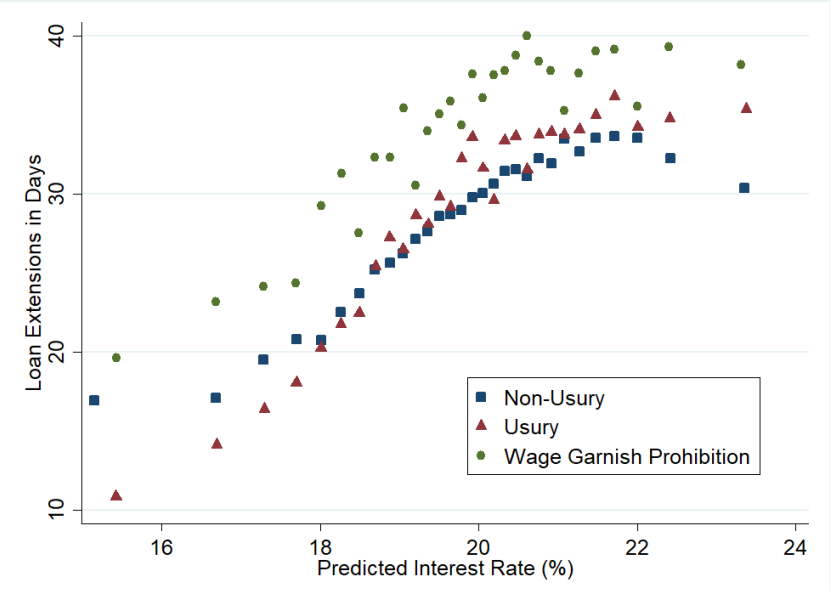


Figure 8. This figure presents a binned scatter plot of the number of days that a loan was extended after a missed payment and predicted interest rate (%), separating states with and without usury limits that allow wage garnishment and states with usury limits that prohibit wage garnishment. The scatter plot accounts for month-year fixed effects. Predicted interest rates are described in Section 3.1. States without usury limits are plotted as blue squares; states with usury limits that allow wage garnishment are plotted as red triangles; states with usury limits that prohibit wage garnishment are plotted as green circles.

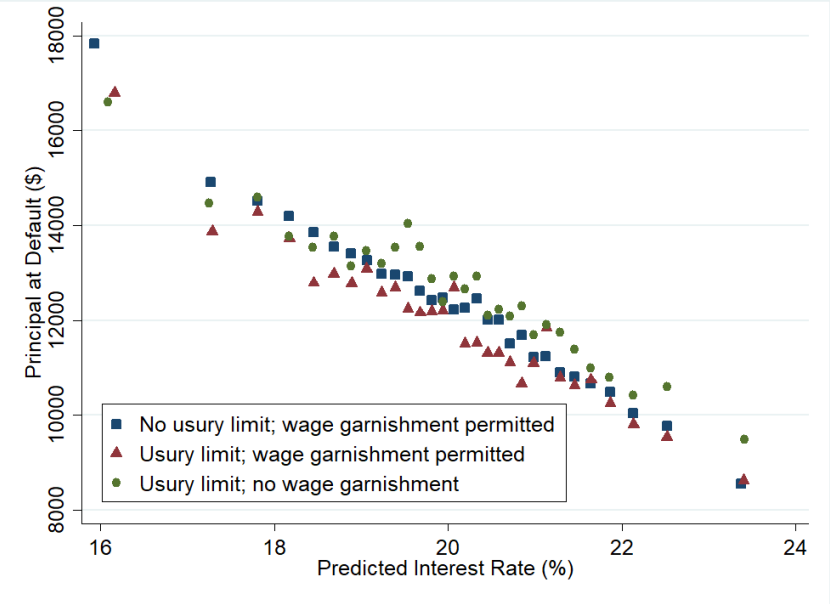


Figure 9. This figure presents a binned scatter plot of the loan balance at the time of default ($) and predicted interest rate (%), separating states with and without usury limits that allow wage garnishment and states with usury limits that prohibit wage garnishment. The scatter plot accounts for month-year fixed effects. Predicted interest rates are described in Section 3.1. States without usury limits are plotted as blue squares; states with usury limits that allow wage garnishment are plotted as red triangles; states with usury limits that prohibit wage garnishment are plotted as green circles.

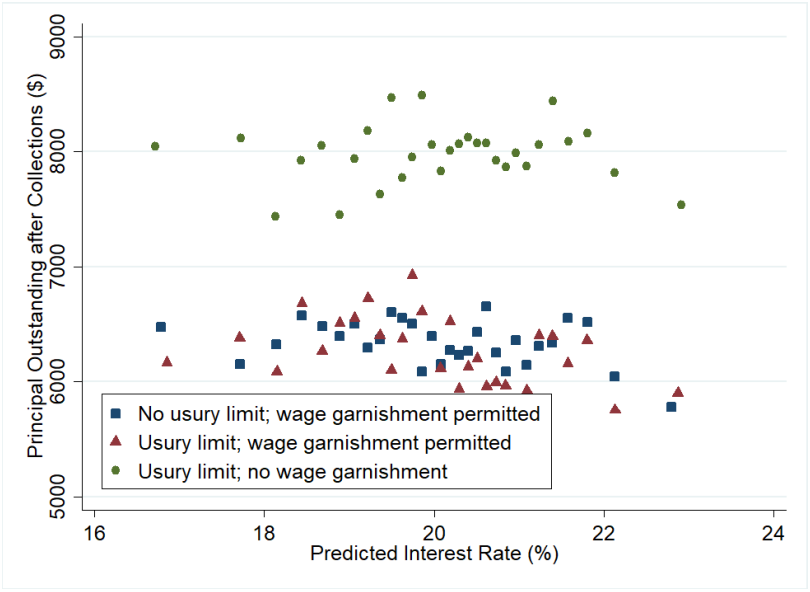
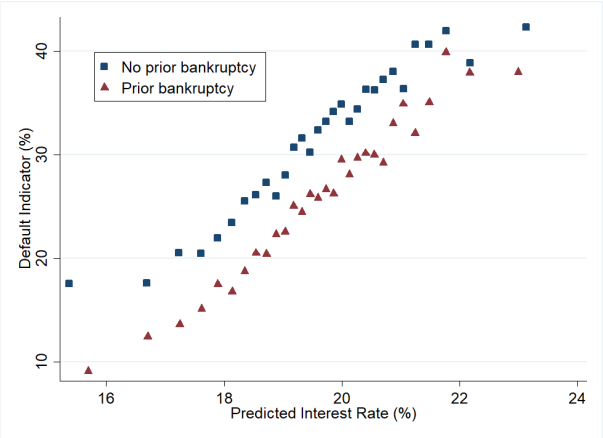
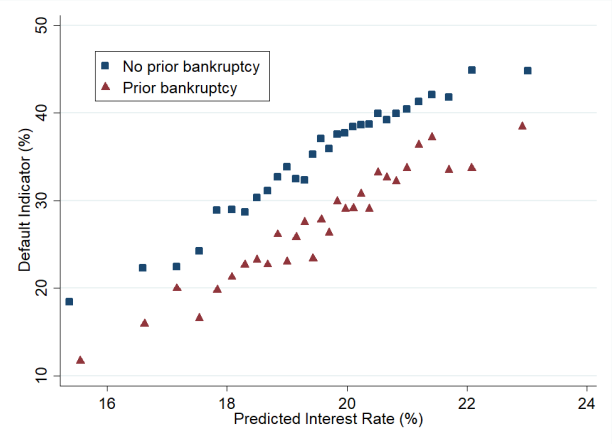


Figure 10. This figure presents a binned scatter plot of the outstanding loan balance after the sale of the repossessed vehicle and other collections ($) and predicted interest rate (%), separating states with and without usury limits that allow wage garnishment and states with usury limits that prohibit wage garnishment. The scatter plot accounts for month-year fixed effects and vehicle book value. Predicted interest rates are described in Section 3.1. States without usury limits are plotted as blue squares; states with usury limits that allow wage garnishment are plotted as red triangles; states with usury limits that prohibit wage garnishment are plotted as green circles.

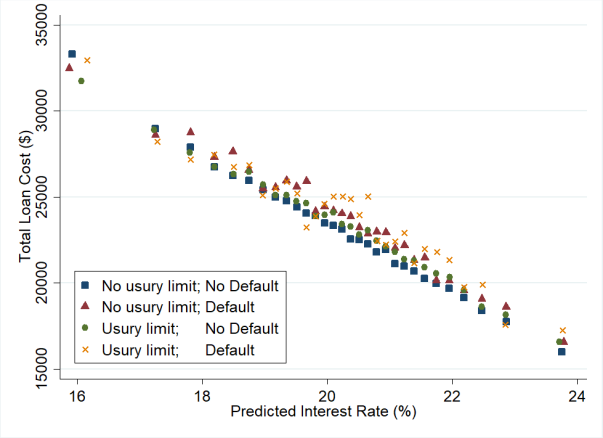


(a) States without usury limits

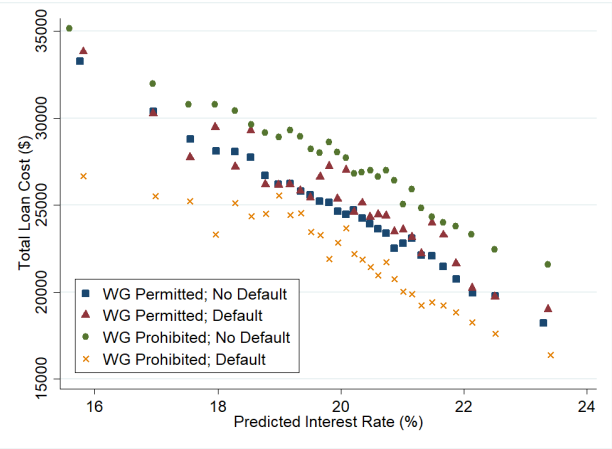


(b) States with usury limits

Figure 11. These figures present a binned scatter plot of the percent of loans that default and predicted interest rate (%) in states without and with usury limits, respectively, separating borrowers who have discharged debt through Chapter 7 bankruptcy in the previous seven years and those who have not. Panel (a) includes only loans in states without usury limits; Panel (b) includes only loans in states with usury limits. The scatter plot accounts for month-year fixed effects and borrowers' debt-to-income ratio. Predicted interest rates are described in Section 3.1. Borrowers with a prior bankruptcy are plotted as red triangles; borrowers without a prior bankruptcy are plotted as blue squares.



(a) States that allow wage garnishment



(b) States with usury limits

Figure 12. These figures present binned scatter plots of the total loan costs paid by the borrower and predicted interest rate (%). Panel (a) includes only loans in states allow wage garnishment and plots the data by usury law and loan outcome; Panel (b) includes only loans in states with usury limits and plots the data by wage garnishment law and loan outcome. Total loan cost is the sum of all fees at origination, monthly payments, and deficiency payments in the event of default. The scatter plot accounts for month fixed effects. Predicted interest rates are described in Section 3.1. Loans that were paid in full or ended in default in states that permit wage garnishment are plotted as blue squares and red triangles, respectively; loans that were paid in full or ended in default in states that prohibit wage garnishment are plotted as green circles and orange Xs, respectively.

Table 1. Summary Statistics

Panel A. Auto loans

Number of auto loans	291,629
Number of dealerships	4,413
Number of ZIP codes	2,069

Panel B. Buyer, loan, and vehicle characteristics

	All loans		Loans from states without usury laws		Loans from states with usury laws		p-value: with vs. without usury limit
	N = 291,629		N = 181,690		N = 109,939		
	Mean	SD	Mean	SD	Mean	SD	
Buyer							
Credit score	532	51	533	53	530	49	0.26
Prior Chapter 7 bankruptcy (%)	27.7	44.7	28.9	45.3	25.7	43.7	0.57
Prior Chapter 13 bankruptcy (%)	8.5	27.9	6.7	25.0	11.4	31.8	0.14
Homeownership (%)	6.1	23.9	5.4	22.7	7.2	25.8	0.27
Monthly income ($)	4,399	1,922	4,312	1,868	4,521	1,990	0.03
Vehicle							
Age (years)	2.6	1.9	2.6	1.9	2.5	1.8	0.71
Book value ($)	13,534	4,345	13,246	4,430	14,011	4,158	0.09
Mileage	38,625	21,932	38,755	22,305	38,410	21,300	0.84
Reliability rating	52.0	15.2	51.3	14.7	53.1	15.8	0.08
Loan							
Negative equity on trade-in (%)	5.3	22.3	5.7	23.3	4.5	20.7	0.22
Negative equity on trade-in	3,120	2,241	3,126	2,295	3,108	2,121	0.22
Down payment ($ cond. on neg equity)	1,263	1,491	1,088	1,392	944	1,219	0.15
Down payment ($ cond. on non-neg equity)	1,033	1,331	1,367	1,530	1,105	1,392	<0.01
Down payment ($, cash and/or positive equity)	1,045	1,341	1,103	1,402	951	1,227	0.13
Initial principal ($)	17,166	4,838	16,723	5,020	17,899	4,425	0.05
Loan to value	1.3	0.2	1.3	0.2	1.3	0.2	0.21
APR (%)	19.3	2.9	19.7	3.2	18.8	2.1	<0.01
Term (months)	67.6	7.3	66.9	8.0	68.8	5.8	0.04
Monthly payment ($)	405	111	399	111	414	111	0.13
Payment-to-income (%)	10.5	8.2	10.6	9.1	10.2	6.8	<0.01
Days to fund loan	11.2	7.6	11.1	7.5	11.2	7.6	0.91
Loan discount to lender ($)	315	672	288	637	359	723	0.41

Table 1. Summary Statistics – *continued*

	All loans		Loans from states without usury laws		Loans from states with usury laws		p-value
Panel B: Buyer, loan, and vehicle characteristics							
Additional products ($ conditional on purchase)							
Gap insurance (%)	46.0	49.8	43.7	49.6	49.9	50.0	0.03
Gap insurance ($)	549	172	581	157	503	182	0.12
Life & disability insurance purchased (%)	3.7	18.8	4.5	20.8	2.2	14.7	0.28
Life & disability insurance insurance ($)	844	605	807	589	970	641	0.07
Service contract purchased (%)	45.0	49.7	43.4	49.6	47.6	49.9	0.35
Service contract ($)	1,593	507	1,553	515	1,654	490	0.19
Panel C: Loan outcomes							
Default (%)	24.8	43.2	24.2	42.8	25.7	43.7	0.60
Loan extensions (conditional, days)	56.6	52.7	54.2	52.4	60.5	52.9	0.10
Age of loan at default (conditional, months)	30.5	17.4	29.7	17.2	31.1	17.5	0.22
Loan balance at default (conditional, $)	12,649	5,959	12,420	5,942	13,008	5,967	0.21
Resale value net recovery cost (conditional, $)	3,403	3,607	3,323	3,578	3,526	3,649	0.21
Proceeds from collection (conditional, $)	1,425	3,130	1,645	3,329	1,087	2,764	0.07

This table reports summary statistics for the sample of 291,629 auto loans extended by 4,337 dealerships between 1995 and 2019. Means, standard deviations, and p-values of the difference in means, adjusted for clustering at the state level, are reported. Panel A describes the main sample, Panel B summarizes borrower, loan and vehicle characteristics, and Panel C summarizes loan outcomes for all states, states without usury laws and states with usury laws. Data were provided by an indirect auto financing firm, except the reliability rating obtained from Consumer Reports. Information on borrowers' income is available for 256,063 loans; information on the vehicle reliability rating is available for 266,600 loans; information on service contracts is available for 131,096 loans; information on gap insurance and life & disability insurance is available for 134,188 and 10,659 loans, respectively. Values in Panel C are conditional on the borrower defaulting on the loan.

Table 2. Actual and predicted interest rates

Dependent variable: Actual interest rate (%)	
Predicted APR × 1[Predicted APR ≤ 0]	0.923***
	(0.064)
Predicted APR × 1[Predicted APR > 0]	1.089***
	(0.084)
State with usury law	-0.186
	(0.201)
State with usury law × Predicted APR	-0.289**
× 1[Predicted APR ≤ 0]	(0.132)
State with usury law × Predicted APR	-0.642***
× 1[Predicted APR > 0]	(0.089)
R^2	0.48
N	291,627

This table summarizes results from the regression of the actual loan interest rate on the predicted interest rate measures, an indicator for states with usury laws and their interactions. Predicted interest rates for all loans are generated using coefficient estimates from a regression that is described in Section 3.1 and reported in Appendix Table A2. To generate the two predicted interest measures, the predicted value is demeaned by the sample mean and interacted with indicators for the demeaned measure being positive or negative. Regressions include fixed effects for the month-year of origination. Standard errors, clustered at the state level and reported in parentheses, are obtained through 1,000 replications of a bootstrapping procedure that accounts for the generated regressor. To report significance, we assume that the corrected errors are normally distributed. * and *** indicate statistical significance at the 10% and 1% levels, respectively.

Table 3. Loan terms, usury limits, and wage garnishment restrictions

Dependent variable:	Monthly payment ($)		Initial Principal ($)	
	(1)	(2)	(3)	(4)
Predicted APR × 1[Predicted APR ≤ 0]	-27.189***	-27.244***	-1,729.477***	-1,733.972***
	(2.267)	(2.254)	(67.069)	(66.918)
Predicted APR × 1[Predicted APR > 0]	-21.633***	-21.571***	-1,539.293***	-1,536.457***
	(1.746)	(1.752)	(125.445)	(126.382)
State with usury law	0.821	-8.331*	345.207	-267.569
	(7.497)	(4.298)	(446.618)	(217.229)
State with usury law × Predicted APR	0.975	-1.094	255.663*	125.469
× 1[Predicted APR ≤ 0]	(2.273)	(2.156)	(133.497)	(117.528)
State with usury law × Predicted APR	0.974	2.879	160.171**	221.341***
× 1[Predicted APR > 0]	(2.123)	(1.846)	(74.130)	(48.859)
State prohibiting wage garnishment		26.564**		1,755.027***
		(12.757)		(665.869)
State prohibiting wage garnishment		5.995		369.660
× Predicted APR × 1[Predicted APR ≤ 0]		(4.045)		(244.785)
State prohibiting wage garnishment		-5.547*		-138.019
× Predicted APR × 1[Predicted APR > 0]		(3.042)		(139.465)
R^2	0.23	0.23	0.51	0.51
N	291,627	291,627	291,627	291,627

This table summarizes results from regressions of monthly payment (columns 1 and 2) or initial loan principal (columns 3 and 4) on the predicted interest rate measures, an indicator for states with usury laws, an indicator for states prohibiting wage garnishment, and their interactions. Predicted interest rates for all loans are generated using coefficient estimates from a regression that is described in Section 3.1 and reported in Appendix Table A2. To generate the two predicted interest measures, the predicted value is demeaned by the sample mean and interacted with indicators for the demeaned measure being positive or negative. Regressions include fixed effects for the month-year of origination. Standard errors, clustered at the state level and reported in parentheses, are obtained through 1,000 replications of a bootstrapping procedure that accounts for the generated regressor. To report significance, we assume that the corrected errors are normally distributed. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 4. Defaults, usury limits, and wage garnishment restrictions

Dependent variable:	Default		Payments before default	Days of Loan Extension
	(1)	(2)	(3)	(4)
Predicted APR × 1[Predicted APR ≤ 0]	0.043***	0.043***	-0.022	3.967***
	(0.008)	(0.008)	(0.258)	(0.775)
Predicted APR × 1[Predicted APR > 0]	0.026***	0.027***	-1.486***	0.783***
	(0.003)	(0.003)	(0.130)	(0.208)
State with usury law	0.023	-0.017	0.942*	1.350
	(0.036)	(0.033)	(0.521)	(3.021)
State with usury law × Predicted APR × 1[Predicted APR ≤ 0]	0.003	0.007	-0.009	1.446**
	(0.005)	(0.008)	(0.326)	(0.654)
State with usury law × Predicted APR × 1[Predicted APR > 0]	0.001	0.008	0.021	0.548
	(0.006)	(0.006)	(0.278)	(0.562)
State prohibiting wage garnishment		0.098***	-0.023	6.115*
		(0.037)	(0.933)	(3.267)
State prohibiting wage garnishment × Predicted APR × 1[Predicted APR ≤ 0]		-0.005	0.442	-0.754
		(0.010)	(0.522)	(0.780)
State prohibiting wage garnishment × Predicted APR × 1[Predicted APR > 0]		-0.012	0.139	-1.090
		(0.010)	(0.470)	(1.085)
R^2	0.05	0.05	0.06	0.07
N	205,698	205,698	60,302	205,698

This table summarizes results from regressions of an indicator for default (columns 1 and 2), the number of payments made before default (column 3), and the length of loan extensions (column 4) on predicted interest rate measures, an indicator for states with usury laws, an indicator for states prohibiting wage garnishment, and their interactions. The sample in columns 3 is restricted to only loans that terminated in default. Predicted interest rates for all loans are generated using coefficient estimates from a regression that is described in Section 3.1 and reported in Appendix Table A2. To generate the two predicted interest measures, the predicted value is demeaned by the sample mean and interacted with indicators for the demeaned measure being positive or negative. Regressions include fixed effects for the month-year of origination. Standard errors, clustered at the state level and reported in parentheses, are obtained through 1,000 replications of a bootstrapping procedure that accounts for the generated regressor. To report significance, we assume that the corrected errors are normally distributed. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 5. Outstanding debt, usury limits, and wage garnishment restrictions

Dependent variable:	Principal balance at default ($) (1)	Net proceeds from repossession ($) (2)	Collections ($) (3)	Balance net recovery and collections ($) (4)
Predicted APR × 1[Predicted APR ≤ 0]	-1,374.572***	-793.712***	38.233	-565.051***
	(152.407)	(109.729)	(42.052)	(40.160)
Predicted APR × 1[Predicted APR > 0]	-1,303.310***	-534.829***	-155.526***	-419.624***
	(64.585)	(31.284)	(38.243)	(32.901)
State with usury law	-535.630***	-110.203	136.124	61.728
	(175.887)	(180.544)	(252.784)	(688.561)
State with usury law × Predicted APR	165.242	76.710	32.251	341.578
× 1[Predicted APR ≤ 0]	(212.021)	(162.216)	(216.664)	(367.510)
State with usury law × Predicted APR	216.204**	82.275	0.374	12.917
× 1[Predicted APR > 0]	(88.812)	(67.054)	(69.496)	(125.423)
State prohibiting wage garnishment	805.346*	318.637	-2,146.338***	2,800.060***
	(412.966)	(205.789)	(240.721)	(819.437)
State prohibiting wage garnishment	259.468	148.307	-59.949	-113.831
× Predicted APR × 1[Predicted APR ≤ 0]	(482.665)	(288.935)	(212.844)	(431.158)
State prohibiting wage garnishment	-63.711	-65.425	83.481	7.084
× Predicted APR × 1[Predicted APR > 0]	(161.213)	(63.787)	(64.994)	(144.756)
R^2	0.20	0.10	0.06	0.14
N	60,300	58,339	34,583	34,573

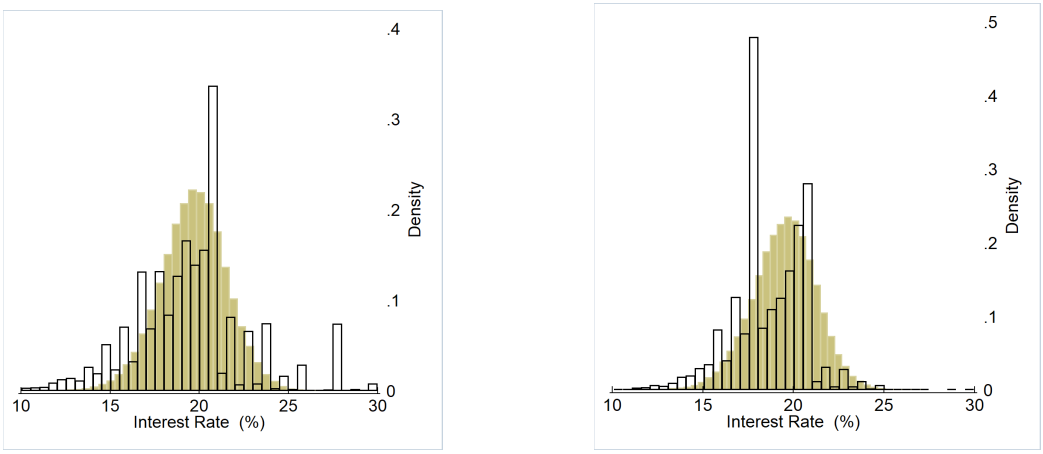
This table summarizes results from regressions of the loan balance at default (column 1), the funds recovered through vehicle repossession (column 2), funds recovered through collections (column 3) and the net balance outstanding after repossession and collections (column 4) on predicted interest rate measures, indicators for states with usury laws and wage garnishment prohibitions, and their interactions. The sample is restricted to only loans that terminated in default. Predicted interest rates for all loans are generated using coefficient estimates from a regression that is described in Section 3.1 and reported in Appendix Table A2. To generate the two predicted interest measures, the predicted value is demeaned by the sample mean and interacted with indicators for the demeaned measure being positive or negative. Regressions include fixed effects for the month-year of origination. Standard errors, clustered at the state level and reported in parentheses, are obtained through 1,000 replications of a bootstrapping procedure that accounts for the generated regressor. To report significance, we assume that the corrected errors are normally distributed. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 6. Default and Chapter 7 bankruptcy

Dependent variable: Default	
Predicted APR × 1[Predicted APR ≤ 0]	0.044***
	(0.008)
Predicted APR × 1[Predicted APR > 0]	0.028***
	(0.002)
Borrower with prior Chapter 7 bankruptcy	-0.062***
	(0.012)
Borrower with prior Chapter 7 bankruptcy	0.010**
× Predicted APR × 1[Predicted APR ≤ 0]	(0.004)
Borrower with prior Chapter 7 bankruptcy	0.005
× Predicted APR × 1[Predicted APR > 0]	(0.005)
R^2	0.06
N	133,888

This table summarizes results from the regression of an indicator for default on predicted interest rate measures, an indicator for whether the borrower has a prior Chapter 7 bankruptcy and their interaction. The sample is restricted to only loans in states with neither usury limits nor wage garnishment restrictions. Predicted interest rates for all loans are generated using coefficient estimates from a regression that is described in Section 3.1 and reported in Appendix Table A2. To generate the two predicted interest measures, the predicted value is demeaned by the sample mean and interacted with indicators for the demeaned measure being positive or negative. Regressions include fixed effects for the month-year of origination. Standard errors, clustered at the state level and reported in parentheses, are obtained through 1,000 replications of a bootstrapping procedure that accounts for the generated regressor. To report significance, we assume that the corrected errors are normally distributed. *** indicates statistical significance at the 1% levels.

Appendix



(a) No Usury Law **(b)** Usury Law

Figure A1. These figures present histograms of actual and predicted interest rates, denoted in %. Panel (a) depicts the distributions for states which do not have usury limits; Panel (b) depicts the distributions for states with usury limits. The shaded histogram is the distribution of borrowers' predicted interest rates, described in Section 3.1. The unshaded histogram depicts the distribution of the interest rates that borrowers actually paid. The distribution of predicted interest rate is roughly similar across states with and without usury limits; however, the mass points in the distribution of actual interest rate are different. In states without usury laws, the mass points in the distribution of actual interest rate falls to the right of the mass of predicted interest rate. This suggests that some borrowers accept loans that are priced higher than their credit history and characteristics would predict. For states with usury limits, the mass points in the distribution of actual interest rate fall to the left of the mass of predicted interest rate. This suggests that some borrowers are securing loans at lower rates than their credit history and characteristics would predict.

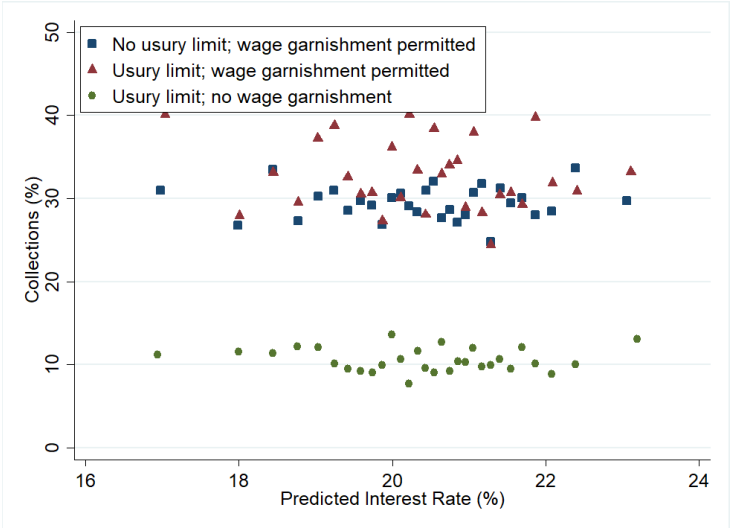


Figure A2. This figure presents a binned scatter plot of amount recovered through collections (% and predicted interest rate (%), separating states with and without usury limits that allow wage garnishment and states with usury limits that prohibit wage garnishment. The scatter plot accounts for month-year fixed effects and vehicle book value. Predicted interest rates are described in Section 3.1. States without usury limits are plotted as blue squares; states with usury limits that allow wage garnishment are plotted as red triangles; states with usury limits that prohibit wage garnishment are plotted as green circles.

Table A1. Variable definitions

Variable names	Definition
Buyer	
Credit score	Mean of borrower's credit scores from all queried credit-reporting agencies. For joint applications, this includes scores for both borrowers. Assigned a value of 0 if no credit score is available.
Prior Chapter 7 bankruptcy	Indicator for a Chapter 7 bankruptcy in the seven years prior to the loan application.
Prior Chapter 13 bankruptcy	Indicator for a Chapter 13 bankruptcy in the seven years prior to the loan application.
Homeownership	Indicator for borrower's homeownership status at origination.
Monthly income	Borrower's gross monthly income as calculated during loan underwriting, measured in $.
Loan	
Down payment	Total down payment (cash + equity), measured in $.
Negative equity on trade-in (Ind)	Indicator for negative equity on the trade-in vehicle.
Negative equity on trade-in	Negative equity on trade-in vehicle, measured in $.
Initial principal	Original amount financed, measured in $.
APR (actual interest rate)	Original interest rate, measured in %.
Terms	Original term of the contract, measured in months.
Monthly payment	Monthly payment, measured in $.
Payment-to-income	Monthly payment / gross monthly income, denoted as %.
Days to fund loan	Days between loan origination by the dealer and loan purchase by the lender.
Gap insurance (Ind)	Indicator for the purchase of guaranteed auto protection (GAP) insurance policy.
Gap insurance	Amount financed for GAP insurance policy, measured in $.
Life & disability insurance (Ind)	Indicator for the purchase of credit, life and disability insurance policy.
Life & disability insurance insurance	Amount financed for credit, life and disability insurance policy, measured in $.
Service contract (Ind)	Indicator for the purchase of service contract.
Service contract	Amount financed for the purchase of service contract, measured in $.
Loan discount to lender	Total of discount and fees charged to the dealer by the lender during the loan purchase, measured in $.
Vehicle	
Age	Vehicle age, measured in years.
Book value	Vehicle book value, measured in $.
Mileage	Odometer reading at purchase, measured in miles.
Reliability rating	Score reflecting the expected vehicle maintenance and repair costs, where 0 is the least reliable vehicle and 100 is the most reliable vehicle. In practice, vehicles score between 26 and 80.

Table A1. Variable definitions– *continued*

Variable names	Definition
Loan outcomes	
Loan extension	Allowance offered to borrowers during which they can remedy the delinquency to avoid formal default and repossession, measured in days.
Default	Indicator for termination of the loan due to default (i.e. failure to make payments).
Age of loan at default	Months between origination and loan termination due to default (i.e. the number of payments made on the loan).
Loan balance at default	Outstanding loan balance at default calculated as the initial amount financed minus the payments made against the loan, measured in $.
Sale or scrap net recovery cost	Proceeds from vehicle liquidation minus the costs of recovery and resale, measured in $.
Proceeds from collection	Funds recovered through collections (e.g. wage garnishment), measured in $.

This table reports definitions for the variables used in the analysis. Data were obtained from an indirect auto financing firm, except the reliability rating from Consumer Reports.

Table A2. Predicting borrowers' interest rate

Dependent variable: Actual interest rate (%)	
Loan discount to lender	0.00089***
	(0.00001)
Chapter 7 bankruptcy (Ind)	-0.79421***
	(0.01340)
Chapter 13 bankruptcy (Ind)	-1.09019***
	(0.02245)
Days to fund loan	0.01139***
	(0.00072)
Credit score	-0.01973***
	(0.00011)
Monthly income	0.09838***
	(0.01797)
Income missing (Ind)	0.48531**
	(0.24134)
Homeownership (Ind)	-1.00338***
	(0.02371)
Loan term length	-0.07162***
	(0.00105)
Vehicle book value	-0.00021***
	(0.00000)
Vehicle reliability rating	-0.01137***
	(0.00040)
Vehicle reliability rating missing (Ind)	-0.49368***
	(0.02681)
Loan-to-value ratio	-0.70667***
	(0.04099)
Vehicle mileage	-0.00001***
	(0.00000)
Vehicle age	-0.04713***
	(0.00423)
Down payment	0.00012***
	(0.00000)
Negative equity	0.00006***
	(0.00001)
Negative equity missing (Ind)	-0.11455***
	(0.03798)
Life insurance purchased (Ind)	-0.00028***
	(0.00003)
Service contract purchased (Ind)	-0.00004***
	(0.00001)
Gap insurance purchased (Ind)	0.00006***
	(0.00002)
R^2	0.51
N	181,690

This table summarizes results from the regression of the actual loan interest rate on borrower and vehicle characteristics, described in Table 1 and defined in Table A1, using only loans from states without usury limits. The regression includes fixed effects for the month-year of loan origination. Standard errors are reported in parentheses.