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To securitize or to price credit risk?*

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Abstract

We evaluate if lenders price or securitize mortgages to mitigate credit risk. Exploiting exogenous variation in regional credit risk created by differences in foreclosure law along US state borders, we find that financial institutions respond to the law in heterogeneous ways. In the agency market where Government Sponsored Enterprises (GSEs) provide implicit loan guarantees, lenders transfer credit risk using securitization and do not price credit risk into mortgage contracts. In the non-agency market, where there is no such guarantee, lenders increase interest rates as they are unable to shift credit risk to loan purchasers. The results inform the debate about the design of loan guarantees, the common interest rate policy, and show that underpricing regional credit risk leads to an increase in the GSEs' debt holdings by $79.5 billion per annum, exposing taxpayers to preventable losses in the housing market.

JEL-Codes: G21, G28, K11.

Keywords: loan pricing, securitization, credit risk, GSEs.

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1 Introduction

How do lenders manage credit risk? Where insurance markets are incomplete (Bhutta and Keys, 2018; Kahn and Kay, 2019; Ahnert and Kuncl, 2020), a financial institution can protect itself against credit risk using loan pricing and securitization (Parlour and Winton, 2013). While a vast literature documents the determinants of securitization (Pennacchi, 1988; Gorton and Pennacchi, 1995; Loutskina and Strahan, 2009; Loutskina, 2011; Han et al., 2015), much less is known about when and to what extent lenders choose securitization as a credit risk management device over risk based pricing. Understanding this phenomenon has implications for the design of securitization markets that curb excessive risk taking by lenders, and avoids preventable losses in the housing market for taxpayers.

In this paper, we study how financial intermediaries manage credit risk in the US mortgage market. We conjecture that lenders offset credit risk differently depending on the Government Sponsored Enterprises' (GSEs) presence. The GSEs absorb the credit risk of the loans they purchase and their constant interest rate policy (CIRP) prevents mortgage contract rates from incorporating regional factors that systematically influence credit risk (Hurst et al., 2016).[1] Lenders therefore cannot use pricing to manage region-specific credit risk but instead exploit the GSEs' implicit federal guarantee by securitizing loans at higher rates to pass credit risk to the GSEs. In the non-agency market, where no such policies exist and secondary market participants also have loss avoidance incentives, lenders adjust interest rates to reflect the greater credit risk rather than use securitization.

[1] The GSEs' pricing policy allows interest rates to incorporate a borrower's leverage, creditworthiness, and other characteristics but excludes factors that systematically affect regional credit risk. Hurst et al. (2016) show GSE loans' interest rates do not vary with historic mortgage default rates in a region despite default being predictable and serially correlated through time. Recourse laws, bankruptcy laws, and concentration of lenders that influence regional credit risk also have no effect on GSE interest rates.

To formulate answers to these questions we exploit a specific source of regional credit risk: foreclosure law. There exist predictable *ex ante* differences in credit risk according to a property's location. While mortgage default is costly to lenders across locations, credit risk is systematically higher in states that regulate the foreclosure process using Judicial Review (JR) compared to Power of Sale (PS) law because borrowers have greater incentives to default, and lenders incur higher administrative and legal costs during foreclosure (Gerardi et al., 2013; Demiroglu et al., 2014). We hypothesize that lenders respond to JR law in heterogeneous ways across markets. Because of the GSEs' implicit guarantees and CIRP, lenders securitize agency loans more frequently. In the non-agency market where the GSEs are absent, lenders price credit risk by setting higher interest rates.

We evaluate these predictions using a regression discontinuity (RD) design that exploits exogenous variation in foreclosure law along US state borders. We find evidence that such incentives are operative and economically important. Despite systematically higher *ex ante* credit risk on the JR side of the state border, agency interest rates are equal across locations. However, JR law increases the probability that an agency loan is securitized by 5.3% increase relative to the control group. Among non-agency loans we find that JR law provokes a significant 8 basis points increase in interest rates (a 1.7% increase relative to the control group), but has no effect on securitization.

Further tests using subsamples of the data reinforce the mechanisms. Lenders' reactions to JR law are more pronounced among loans with greater credit risk. Diagnostic checks show that socioeconomic conditions as well as loan, lender, and borrower characteristics are observationally equivalent within the treatment and control groups. The data also show that neither lenders nor borrowers manipulate treatment status. Our findings are therefore unlikely to be attributable to omitted variables.

Our research is important for four reasons. First, it illustrates the costs of failing to price regional credit risk due to the GSEs' implicit federal guarantee and CIRP. Underpricing regional credit risk leads to more and riskier mortgage originations, higher leverage in the financial sector, and increases the GSEs' debt holdings. We calculate that JR law adds approximately \$79.5 billion to the GSEs' debt holdings each year.[2] In addition, taxpayers bear additional costs of default through their GSE holdings. The net effects of the CIRP likely exceed the values we calculate because the policy prevents pricing of any factor that systematically affects local credit risk. In contrast, in the non-agency market where securitizers are privately capitalized and the CIRP is absent, the credit risk of JR law is priced into mortgage contracts. We therefore contribute to the recent debate on phasing out the GSEs by providing empirical insights on an issue that has received mainly theoretical attention (Elenev et al., 2016; Gete and Zecchetto, 2018).[3]

Second, the absence of risk-based pricing in the agency market has distributional implications. GSE-eligible borrowers in JR states with higher credit risk face lower borrowing costs than if the credit risk is priced into interest rates. Our estimates imply an interest rate subsidy of approximately 8 basis points across the lifetime of the loan. For the average fixed rate 30 year loan, this equates to a one-time \$6,300 reallocation from borrowers in PS states to a JR state borrower. In the aggregate this is equivalent to a \$4 billion subsidy per year.

Third, our results highlight potential legal reforms that may eliminate the distorting effects of JR law on credit markets. JR law contributes to credit risk by

[2] Approximately 600,000 mortgages are originated each year in PS states with a mean loan amount of \$250,000. The local average treatment effect implies JR law increases securitization by 5.3% implying the GSEs purchase mortgages worth approximately \$79.5 billion (5.3% $\times$ \$250,000 $\times$ 600,000) because of the law and the credit default risk it exposes lenders to.

[3] Recent legislative initiatives such as the Corker-Warner 2013 and Johnson-Crapo 2014 Senate bills have proposed radical reforms including eliminating the GSEs' CIRP. A key objective of these efforts is to reduce the GSEs' debt holdings and lower taxpayers' mortgage market costs.

amplifying lenders' legal costs during the foreclosure process, and by prolonging the duration of the process. As borrowers cease making mortgage payments during foreclosure, their returns to default are greater the longer the process endures. We find securitization and interest rates respond to both channels, but the timeline effect is relatively more important. JR law therefore influences credit risk by creating moral hazard and provoking strategic default by borrowers. Initiatives that speed up court procedures and shorten the foreclosure process may help resolve credit risk in the mortgage market.

Finally, our findings inform recent changes in the design of securitization markets in the European Union (EU). In 2019, the Securitization Regulation introduced the simple, transparent, and standardized (STS) label for securitizations across EU member states. STS certification indicates a security's underlying assets are safe and grants originators capital relief. However, the STS criteria do not differentiate where loans are originated despite observable differences in credit risk between countries. This raises the possibility that originators and sponsors may exploit STS labels to pass credit risk to third parties without adequate compensation for the riskiness of the underlying assets, and create incentives to originate riskier loans.

Our work relates to two strands of literature. Prior research on the determinants of securitization highlights the importance of deposit funding costs (Pennacchi, 1988; Gorton and Pennacchi, 1995; Loutskina and Strahan, 2009), and corporate tax rates (Han et al., 2015). Loutskina (2011) shows securitization enables banks to convert illiquid loans into liquid funds which improves their lending ability. Purnanandam (2010) and Keys et al. (2010, 2012) show a consequence of securitization is weaker screening and monitoring incentives for financial intermediaries. Our findings compl-ment this literature by providing evidence of another securitization mechanism: mitigation of credit risk arising from the external legal and regulatory environments. Moreover, we find that in markets where the GSEs do not operate, credit risk is

accurately priced and lenders do not strategically unload risky debt to third parties. Whereas this pattern exists for banks, it is stronger for non-banks, consistent with the literature on the differences in business models and risk taking behavior of banks and non-banks (Loutskina and Demyanyk, 2016; Buchak et al., 2018).

A separate area of research documents the effects of foreclosure law on credit supply. Pence (2006) finds JR law causes a reduction in mortgage loan amounts. Dagher and Sun (2016) extend Pence's work by examining whether foreclosure law influences the probability of being granted a mortgage. Our paper complements these studies by illustrating that the effects of JR law extend beyond credit supply responses. In contrast to these articles, we provide novel evidence on the pricing and securitization effects of foreclosure law and examine these outcomes in the agency and non-agency markets. Our results suggest that limiting credit supply does not fully mitigate the costs of JR law to lenders, and that lenders use pricing and securitization as complementary devices, albeit to different extents across markets.

The paper proceeds as follows. Section 2 provides institutional background and Section 3 describes the data set. We outline the identification strategy, discuss the empirical results, and robustness tests in Sections 4, 5 and 6, respectively. Section 7 draws conclusions.

2 Institutional Details

2.1 Judicial Review, Default and Foreclosure Costs

Foreclosure law governs the process through which creditors attempt to recover the outstanding balance on a loan following mortgage default. Typically, this entails repossessing the delinquent property. 23 states regulate this process using JR law whereas the remaining 27 states and the District of Columbia use PS law. JR

foreclosure proceeds under the supervision of a court and mandates that lenders present evidence of default and the value of the outstanding debt. A judge then issues a ruling detailing what notices must be provided and oversees the procedure. In contrast, upon default lenders in PS states can immediately begin liquidation of the property by issuing a power-of-sale handled by a trustee (Ghent, 2014).

[Insert Figure 1] [Insert Figure 2]

Part of the credit risk that JR law creates stems from a higher financial burden on lenders compared to PS law in case of default. Each step of the process requires judicial approval meaning the foreclosure process is more protracted. Figure 1 shows that for the median state the timeline is between 80-90 days longer in JR states, although the duration can be substantially longer.

Owing to the greater legal burden, lenders in JR states incur substantially higher legal expenses through attorney and court fees. Moreover, during the foreclosure process the lender bears property taxes, hazard insurance, other indirect costs, and receives no mortgage payments (Clauretie and Herzog, 1990; Schill, 1991; Gerardi et al., 2013). Delinquent borrowers typically do not make investments to maintain the property because they do not expect to capture the returns to those investments, resulting in lower re-sale values (Melzer, 2017). These costs are increasing in the foreclosure timeline. Figure 2 shows that the median cost of foreclosing a property is approximately $6,400 in JR states versus $4,000 in PS states. However, in many JR states lenders' foreclosure costs exceed $10,000 per property.

JR law also contributes to credit risk by increasing borrowers' strategic default incentives. As delinquent borrowers cease making mortgage payments, they effectively live in the property for free during the foreclosure period (Seiler et al., 2012). The returns to default therefore depend on the foreclosure timeline such that borrowers have greater default incentives in JR states (Gerardi et al., 2013). Indeed, Demiroglu

et al. (2014) show the probability of mortgage default is 40% higher in JR compared to PS states. Consistent with this finding, Appendix Figure A1 shows a higher rate of mortgage default in JR relative to PS states in every year since 2000. Appendix Table A1 provides econometric estimates showing JR law raises the probability that a borrower defaults and increases lenders' costs of default by 65%.

2.2 The Securitization Market

The secondary market for mortgage loans is divided into two distinct segments: the agency and non-agency markets. In the agency market, the GSEs' provide purchase guarantees for loans that conform to their underwriting criteria to ensure liquidity in the lending industry. The pricing of GSE-eligible loans largely follows a set of criteria specified by the GSEs. Indeed most mortgage originators use software (such as Fannie Mae's Desktop Underwriter and Freddie Mac's Loan Prospector programs) provided by the GSEs when issuing mortgages to evaluate if the loan will conform to the GSEs' underwriting criteria. In this market, interest rates incorporate a borrower's creditworthiness, leverage, and some other characteristics. However, the CIRP prevents lenders from incorporating factors that influence credit risk across regions into interest rates (Hurst et al., 2016).

The non-agency market consists of loans that are ineligible for sale to a GSE, such as jumbo and subprime mortgages. Private institutions such as banks, hedge funds, and insurance companies are the main buyers of non-agency loans. Non-GSE securitization entails contracting frictions between originators and purchasers because purchasers must evaluate the credit risk they face when buying a loan. Private purchasers also have loss avoidance incentives because, unlike the GSEs, they do not benefit from implicit federal guarantees for financial obligations.

3 Data

The data set contains loan-level information from the 2018 vintage of the Home Mortgage Disclosure Act (HMDA) database. We focus exclusively on this year because previous editions did not contain interest rate data, leverage, and other information. The HMDA data contain approximately 95% of mortgage applications in the US. Each observation corresponds to a unique mortgage loan and provides information on the characteristics of the loan, borrower, and lender at the point of application. For example, the loan type (purchase, refinance, home improvement), the borrower's characteristics (ethnicity, gender, income, co-applicant status), the originating financial institution, the interest rate, loan amount, term to maturity, the loan-to-value (LTV) ratio, the debt-to-income (DTI) ratio, the loan-to-income (LTI) ratio, the lender's decision on the application (acceptance or rejection), the census tract where the property is located, property type (single- or multi-family), whether the loan is subsequently securitized, and if it is eligible for sale to a GSE.[4] Non-GSE-eligible loans include jumbo and subprime loans.

3.1 Sampling

To sharpen identification, we restrict the sample to observations within a 10 mile distance of the border between states that use different types of foreclosure law. We also include only observations of conventional single-family home purchases to ensure a homogeneous unit of observation.[5] The sample contains loans originated

[4]The GSEs specify underwriting criteria a loan must meet to be GSE eligible. For example, the loan amount must be less than the county conforming loan limit, and for manually underwritten loans the maximum debt-to-income ratio is 36% of the borrower's stable monthly income (the threshold can be up to 45% if the borrower meets the credit score and reserve requirements stipulated in the Eligibility Matrix).

[5]There are no observations of refinancing, home improvement, or unconventional loans in the data set. Among GSE-eligible loans the data set includes only loans eligible for sale to Fannie Mae or Freddie Mac because Ginnie Mae, a separate GSE, purchases unconventional loans insured by the

by banks and non-banks. As securitization is only possible following acceptance of a loan, we exclude rejected loan applications. These screens leave a sample of 327,549 GSE-eligible loan observations. The non-GSE-eligible sample contains 135,181 observations.[6]

3.2 Dependent Variables

We construct separate securitization variables for GSE-eligible and non-GSE-eligible loans. As GSE-eligible loans can be sold to both the GSEs and private purchasers, we have three securitization indicators. *GSE Sec* is a dummy variable equal to 1 if a GSE-eligible loan is sold to a GSE, 0 otherwise. *Private Sec* is a dummy variable equal to 1 if a GSE-eligible loan is sold to a private buyer, 0 otherwise. *Sec* is a dummy variable equal to 1 if a GSE-eligible loan is securitized irrespective of whether the buyer is a GSE or a private institution, 0 otherwise. We mainly focus on the *GSE Sec* variable as literature shows the GSEs dominate this market and influence all market participants. We later complement our main findings with an analysis of overall securitization and private securitization among GSE eligible loans.

Non-GSE-eligible loans may only be sold to private institutions. For non-GSE-eligible loans, *NSec* equals 1 if the loan is securitized, 0 otherwise.

[Insert Table 1]

The other key dependent variable is *IR*, the loan's interest rate at the point of origination. We construct *IR* separately for GSE-eligible and non-GSE-eligible loans. Table 1 shows that 70% of GSE eligible loans are securitized with 43% sold to a GSE

Veterans Association and the Federal Housing Administration. We exclude these observations on the grounds that they are unconventional loans.

[6] Appendix Table A2 illustrates the geographical spread of the observations in the data set. While some state borders contain more observations than others, there are typically thousands of observations in each state pair. It is therefore unlikely our findings are due to idiosyncrasies of a limited number of states.

and 27% to a private buyer. 36% of non-GSE-eligible loans are securitized. The rate of securitization in the data set is comparable to other recent studies (Bhutta, 2009; Buchak et al., 2018). The mean interest rate on GSE-eligible and non-GSE-eligible loans is 4.69% and 5.33%, respectively.

3.3 Explanatory Variables

The key explanatory variable is a dummy variable that captures the type of foreclosure law used in the state where the property is located. We read the citations to foreclosure law in each state's constitution to ascertain which processes are available. Next, we retrieve data from foreclosure auction listings on Realtytrac.com, Ghent (2014), and interview attorneys to confirm our classification. Appendix C provides this data. Figure 3 shows the type of law used in each state. We construct a JR dummy variable that equals 1 if a property is in a JR state, 0 for PS states.

[Insert Figure 3]

As our empirical strategy relies on an RD design, we construct the assignment variable using the distance between the midpoint of the property's census tract and the nearest JR-PS border coordinate.[7] Following convention in the literature, the assignment variable takes a negative value for observations in the control group (PS states) and positive values for observations in the treatment group (JR states).

We merge the loan-level data with several additional variables from other sources. To capture other characteristics of state law, we generate dummy variables for whether a state allows right of redemption, deficiency judgments (Ghent and Kudlyak, 2011), the annual state homestead and non-homestead bankruptcy exemptions levels, and retrieve a single-family home zoning restrictiveness index from Calder (2017).

[7] As census tracts are geographically small, the census tract midpoint is an accurate approximation of the property's location.

We incorporate county-level information on the unemployment rate (Bureau of Economic Analysis), the share of the population living in poverty (US Census), the delinquency rate on automobile and credit card loans (NY Fed and CFPB), crime rates (US Census), the share of the population with a college degree (US Census), the average FICO score of borrowers at the point of origination, and the rate of successful renegotiation on delinquent loans (SFLD).[8] We approximate competition in the local mortgage market using a county-level Herfindahl-Hirschman Index (HHI).[9] The FHFA provides census tract-level data on arrangement fees (the ratio of arrangement fees to loan amount). We measure access to credit using the number of lender branches per 1,000 population in each census tract. To capture credit demand we use the number of mortgage applications per 1,000 population in each census tract. We calculate the census tract-level mortgage refinancing rate as the ratio of mortgage refinancing applications to total applications.

Finally, each HMDA loan provides an identifier for the originating institution that is also present in Condition and Income Reports provided by the Federal Deposit Insurance Corporation (FDIC). We therefore merge in bank-level data from this source for the loans in the data set that are originated by banks.[10] This allows us to incorporate information on the bank's size (the natural logarithm of assets), net interest income ratio, Z-score, capital ratio, cost of deposits (the ratio of deposit interest expenses to deposit liabilities), and an out of state dummy variable that equals 1 if a loan is originated by a bank headquartered in state s to a borrower outside state s, 0 otherwise.[11] Table 1 provides a list of the variables in the data

[8]The renegotiation rate is the percentage of mortgages that default and successfully renegotiate terms with the securitizer.

[9]We calculate the HHI index using lenders' market shares where market share is the ratio of the total value of mortgage loans originated by lender l relative to the total value of mortgage loans originated by all institutions in the county. The HHI then is calculated as the sum of the squares of the market shares of all financial institutions in each county.

[10]Non-deposit taking lenders that are present in the HMDA data do not appear in Call Reports.

[11]The Z-score is calculated using the equation: $Z_l = (ROA_l + ETA_l)/ROASD_l$ where ROA_l,

set, summary statistics, and the source. Appendix B provides the definition of each variable.

4 Identification Strategy and Diagnostic Tests

Our econometric strategy utilizes a parametric RD design. We estimate

$$y_{ilrs} = \alpha + \beta JR_s + \gamma f(X_{ilrs}) + \varphi W_{ilrs} + \delta_r + \delta_l + \varepsilon_{ilrs}, \tag{1}$$

where y_{ilrs} is a dependent variable (either interest rates or a securitization indicator) for loan i originated by lender l in region r of state s; JR_s defines treatment status and is equal to 1 if a property is in a JR state, 0 for PS states; $f(X_{ilrs})$ contains first-order polynomial expressions of the assignment variable and an interaction between JR_s and the assignment variable; W_{ilrs} is a vector of control variables; ε_{ilrs} is the error term.

Equation (1) includes region fixed effects, δ_r. We define a region as an area 20 miles long by 10 miles wide that overlaps the threshold. As an example, Figure 4 illustrates the regions along a section of the Arkansas-Louisiana border. The region fixed effects eliminate local and aggregate unobserved heterogeneity and also sharpen identification. Specifically, the local average treatment effect (LATE) is computed by comparing outcomes to the left and right of the threshold within the same region. As the source of identification is confined to small, economically homogeneous areas at the same point in time, omitted variables are unlikely to drive our inferences. Focusing on regions close to the border is similar to the approach in Pence (2006) who considers MSAs that overlap state borders.

ETA_l, and $ROASD_l$ are return on assets, the ratio of equity to total assets, and the standard deviation of returns on assets over the four quarters of 2018 for bank l, respectively.

[Insert Figure 4]

We also include lender fixed effects, δ_l. These capture all lender specific factors such as risk preferences, managerial quality, or business models that may impact securitization and pricing decisions. Lender fixed effects also purge cross-sectional regulatory differences. For example, non-depository institutions (non-banks) are regulated at the state level whereas domestic banks with national charters and foreign banks are regulated by the OCC, while state chartered banks are supervised by the state regulator in conjunction with the FDIC or Federal Reserve.

4.1 Exogeneity

Critical to our identification strategy is the exogeneity of foreclosure law. Ghent (2014) reports that foreclosure law is exogenous with respect to contemporary economic conditions and lenders' behavior because most states' foreclosure law was determined by idiosyncratic factors during the pre-Civil War period. For example, the original 13 states inherited JR law from England. PS law developed during the early eighteenth century in response to British lenders asking courts to agree to a sale-in-lieu of foreclosure. As the laws governing foreclosure were determined in case law they have largely endured to the present day. This is because once there is precedent, the law rarely changes substantially. Indeed, Ghent (2014) is explicit in her assessment, stating,

"Given the extremely early date at which I find that foreclosure procedures were established, it is safe to treat differences in some state mortgage laws, at least at present, as exogenous, which may provide economists with a useful instrument for studying the effect of differences in creditor rights."

Other recent papers that treat foreclosure law as exogenous with respect to lender behavior and contemporary economic matters include Pence (2006), Gerardi et al.

(2013), and Mian et al. (2015).

4.2 Diagnostic Checks

While treatment status is exogenous in equation (1), the validity of our econometric strategy rests upon two identifying assumptions. First, all other pre-determined factors that affect securitization and interest rates must be continuous functions across the threshold. If this assumption is violated, estimates of β will capture both the effect of JR law as well as the discontinuous factor leading to biased estimates.

Following convention in the literature, Table 2 presents t-tests that inspect whether the balanced covariates assumption holds in our data. Panel A of Table 2 examines socioeconomic factors that are common irrespective of loan type between the JR and PS regions. We find no significant differences in macroeconomic conditions (per capita income and unemployment), state tax rates, urbanization, the incidence of poverty, ethnic composition, and educational attainment. Housing markets are strongly similar on either side of the threshold in terms of house prices, the share of the housing stock that is rented, and zoning regulations. The rate of renegotiation on delinquent mortgages and the rate of default on other types of debt are also insignificantly different. The characteristics of financial intermediaries operating in the regions are highly similar. For example, non-banks originate an equal share of mortgages in JR and PS regions while banks have similar capital ratios and Z-scores. There is no significant difference in the share of loans originated by banks to borrowers outside their headquarter state.

Panel B in Table 2 presents results for a number of variables related to the GSE-eligible loan sample. We find no significant differences between the treatment and control groups in terms of applicant income, gender and ethnic composition of borrowers, LTV and DTI ratios, term to maturity, mortgage insurance, and FICO

scores. While we have somewhat fewer variables available for non-GSE-eligible loans, Panel C of Table 2 shows no significant differences in the characteristics of these loans either side of the threshold.

[Insert Table 2] [Insert Table 3] [Insert Figure 5]

The second assumption is that neither borrowers nor lenders have precise control over treatment status (Lee, 2008). This assumption is likely to hold because housing availability and budget constraints prevent borrowers from perfectly choosing where they live. We inspect this assumption using McCrary (2008)'s test for strategic manipulation by estimating whether the density of mortgage applications and lender branches per 1,000 population are continuous functions of the threshold. Manipulation by borrowers (lenders) would be consistent with a higher application (lender) density within JR (PS) states. We estimate the equation

$$y_c = \alpha + \beta JR_c + \gamma X_c + \delta_r + \varepsilon_c, \tag{2}$$

where y_c is either the number of mortgage applications or lenders per 1,000 population within census tract c; JR_c is equal to 1 if an observation is from a JR state, 0 otherwise; X_c is a vector of control variables; δ_r are region fixed effects; ε_c is the error term.[12]

The results of this test are presented in Table 3. We find no evidence of strategic manipulation by either borrowers or lenders. Estimates of β are statistically insignificant throughout columns 1 to 6 of Table 3, irrespective of whether we include control variables, or estimate equation (2) parametrically or non-parametrically. Panel A of Figure 5 presents corresponding graphical evidence showing the density of loan applications is continuous across the threshold.

[12] We conduct these tests at the census tract level because we require information on the rate of applications or the density of lenders.

To further inspect whether borrowers manipulate treatment status we examine net migration flows between US counties. Manipulation would be consistent with significant inflows into JR counties. In column 7 of Table 3 we find no significant differences in net migration to JR counties relative to PS counties. Another danger is that borrowers try harder to obtain GSE-eligible status in JR states. However, Panel B of Figure 5 shows no discontinuity in the GSE-eligible share of loan applications at the threshold. The corresponding econometric test in column 8 of Table 3 shows no significant effects.

5 Empirical Analysis

We begin by examining securitization and pricing patterns in the raw data at the JR-PS threshold using non-parametric methods. Following Lee and Lemieux (2010) we calculate the optimal bin width to be 0.4 miles, group the loan-level data into bins, and fit local regression functions to the data on the left and right of the threshold.[13]

[Insert Figure 6]

Figure 6 shows that JR law elicits heterogeneous securitization and pricing responses across markets. Consistent with our hypotheses, we find in the GSE-eligible market JR law causes a jump in the GSE securitization rate (Panel A) but not in interest rates (Panel B), consistent with the CIRP preventing lenders from pricing the credit risk of JR law into mortgage contracts. In the non-agency market, JR law has no effect on securitization (Panel C) but increases interest rates (Panel D).

[13] The results are similar when we fit the local polynomial regressions using half and twice the optimal bandwidth.

5.1 Securitization and Pricing Results

To pin down precise estimates of the LATE we turn to regression analysis. Column 1 of Table 4 presents linear regression estimates of equation (1) using *GSE Sec* as the dependent variable. The LATE is estimated to be 0.0217 and is statistically significant at the 1% level. This implies that JR law causes a 5.3% increase in the probability that a mortgage loan is securitized, relative to the counterfactual.[14]

[Insert Table 4]

Among the control variables, we find securitization to be significantly negatively correlated with applicant income and minority status. The probability of securitization is significantly higher for high LTV loans and in areas with more lenders per capita. Gender is an insignificant determinant of securitization. The assignment variable, and its interaction with the JR indicator are statistically insignificant, consistent with the relatively flat local regression functions shown in Panel A of Figure 6.[15]

To ensure the findings are not a product of the linear probability model, we estimate equation (1) using a logit model. The logit estimates in column 2 of Table 4 are similar to before.

The effects of JR law on securitization of non-GSE-eligible loans are quite different. In columns 3 and 4 of Table 4 the JR law coefficient is insignificant, irrespective of whether we estimate equation (1) using an OLS or logit model.

Lenders could also mitigate the credit risk of JR law by charging higher interest rates. In the remainder of Table 4, we investigate whether JR law elicits pricing

[14] To calculate the treatment effect relative to the counterfactual we compare the LATE to the mean rate of securitization within the control group which is 41%. Hence, (0.0217/0.41)*100 = 5.3%.

[15] Appendix Table A6 shows that JR law has a similar effect on securitization of loans eligible for sale to Ginnie Mae.

effects across the two markets. We implement this test using the loan's interest rate as the dependent variable in equation (1). Column 5 of the table reports estimates using the GSE-eligible sample. Consistent with the patterns in the raw data, the JR coefficient is insignificant. In contrast, in the non-GSE-eligible market JR law provokes significant pricing responses. The LATE in column 6 of Table 4 indicates the law causes interest rates to jump by 0.0823 percentage points (8.23 basis points) at the threshold. This is equivalent to a 1.7% increase relative to the counterfactual.[16]

Residential mortgage backed securities (RMBS) provide another window into the pricing effects of JR law. Intuitively, yields at issue on RMBS should be an increasing function of the deal's exposure to JR law as investors demand a premium to hold a security with credit risk. To preserve space, details on the RMBS data set and results are provided in Appendix E.2. Table A8 reports estimates that relate a security's initial yield to the JR share of the deal value. The table shows a one percentage point increase in the JR share of the deal is associated with a 0.08 percentage point increase in the yield.

Together the evidence shows that in the GSE-eligible market the CIRP prevents lenders from pricing credit risk due to JR law, which induces lenders to use securitization to transfer credit risk to the GSEs. In the non-GSE-eligible market, purchasers demand a premium for holding securities that have exposure to JR law. As private purchasers also have incentives to minimize the costs of JR law, lenders cannot use securitization to unload credit risk. Rather, informed parties adjust interest rates to reflect the costs of JR law.

We conduct sensitivity checks to ensure our findings are not due to methodological

[16]Table A7 shows the findings are highly similar using data from the period 2000 to 2017. We focus on 2018 because earlier HMDA vintages did not include information on interest rates or other important loan characteristics. The 2000 to 2017 sample therefore relies on information drawn from multiple data sources.

considerations. Appendix Table A9 reports estimates from models with higher order polynomial expressions of the assignment variable. Table A10 presents results using 5 and 2.5 mile bandwidths. In both tables the findings are similar to our baseline estimates.

5.2 Private Securitization in the Agency Market

Lenders also have the option to sell GSE-eligible loans to private buyers. Unlike the GSEs, private buyers provide no purchase guarantees but lenders' pricing decisions remain constrained by the CIRP. JR law therefore has potentially different effects on private loan sales within the GSE-eligible market. We first ask how JR law affects the likelihood that GSE-eligible loans are securitized, irrespective of the buyer's identity. In column 1 of Panel A in Table A11 JR law causes a 2.0% increase in the probability of securitization, and the coefficient is significant at the 10% level. The smaller LATE compared to the baseline result is consistent with the findings in column 2 of Panel A showing JR law significantly decreases the probability that a lender sells a GSE-eligible loan to a private institution.

A negative relationship between private securitization and JR law in the agency market is consistent with our earlier results. The CIRP governs the pricing of GSE-eligible loans regardless of whether a loan is subsequently securitized or the buyer's identity. When purchasing a GSE-eligible JR loan, private institutions assume the credit risk of JR law without compensation through higher interest rates. Private institutions are thus less willing to purchase a GSE-eligible loan if the property is located in a JR state.[17]

[17] The negative relationship could be attributable to a higher probability that lenders successfully renegotiate terms with delinquent borrowers (Agarwal et al., 2011). Column 3 of Panel A in Table A11 shows this is not the case. Panel B in Table A11 shows our findings for securitization in the GSE-eligible market are robust to using a multinomial logit estimator. Lenders may hold ex ante information on whether a loan will be sold and the type of buyer. JR status could, in principle, therefore lead to higher interest rates on GSE-eligible loans where a lender wishes

5.3 Credit Risk Mechanism

Underpinning our tests is the hypothesis that JR law amplifies credit risk. We therefore conduct sub-sample analyses to validate this mechanism. Intuitively, the effects of JR law should be more pronounced within samples comprising riskier borrowers where JR law has the largest effect on borrowers' default incentives.

[Insert Table 5]

Panel A of Table 5 reports estimates of equation (1) for GSE-eligible securitization. One would anticipate relatively larger LATEs among low versus high income borrowers. Credit risk increases with the DTI ratio as borrowers are more susceptible to shocks that compromise their ability to meet mortgage payments. Similarly, loans to borrowers with co-applicants are potentially less prone to default because multiple income streams help smooth negative economic shocks. Consistent with these conjectures, the estimates in columns 1 to 6 of Table 5 show the LATE is larger for loans with income below relative to above the mean, for high relative to low DTI loans, and for loans to sole relative to co-applicants.

In the remainder of Panel A, we split the sample based on socioeconomic conditions in the area where the property is located. In columns 7 and 8 we find that the probability of securitization in response to JR law is substantially larger for loans originated to borrowers who live in high relative to low unemployment areas. We obtain similar results in columns 9 and 10 of the table when we split the sample based on the poverty rate.

Panels B and C of Table 5 repeats the subsample tests for GSE-eligible interest rates and non-GSE-eligible securitization, respectively. Consistent with the evidence

to make a loan attractive to a private buyer. Panel C of Table A11 refutes this conjecture. Irrespective of whether a loan is unsold (column 1) sold to a GSE (column 2) or private buyer (column 3), JR law has no effect on GSE-eligible interest rates. This is consistent with the CIRP preventing foreclosure law-based pricing of GSE-eligible loans.

in Table 4, the LATE is statistically insignificant in all cells. Finally, Panel D reports estimates for non-GSE-eligible interest rates. A consistent pattern emerges: the LATE of JR law on interest rates is consistently larger among the riskier subsamples.[18]

5.4 Which Channel Matters Most?

A key issue for policymakers is which margin of credit risk JR law influences. Does JR law raise lenders' legal costs during foreclosure, increase borrowers' default incentives, or both?

[Insert Table 6]

We therefore estimate equation (1) using the average state-level legal cost to lenders and foreclosure timeline as control variables. The identifying assumption in these tests is that legal costs and timelines vary exogenously. This appears plausible as both variables are functions of exogenous foreclosure law. To enable comparability of economic magnitudes we use standardized legal cost and timeline variables. Column 1 in Table 6 shows a standard deviation increase in lenders' legal costs of foreclosure leads to a 0.10% increase in the probability that a GSE-eligible loan is securitized, but the coefficient is insignificant. However, GSE-eligible securitization is more responsive to increasing the foreclosure timeline. The standardized timeline coefficient is equivalent to a 1.61% increase in the probability of securitization. In column 2 of Table 6 we find a standard deviation increase in legal costs raises non-GSE-eligible interests by 3.13% whereas increasing the foreclosure timeline by

[18] We also follow the approach used by Agarwal et al. (2012) to calculate the predicted probability of default for each loan. We then split the sample according to whether the probability of default lies above or below the mean. The results in Appendix Table A12 show that the JR coefficient is positive and statistically significant in both subsamples for GSE-eligible securitization and non-GSE-eligible interest rates. However, in both cases, the effect of JR law is more pronounced for loans with default probabilities above the mean.

a standard deviation leads to 7.93% higher interest rates. Both coefficients are significant at conventional levels.

Hence, while both aspects of JR law contribute to credit risk, the effect of the law on securitization and intereste rates is primarily transmitted through borrower moral hazard. JR law extends the foreclosure timeline which increases the returns to default. Initiatives that speed up court procedures and shorten the foreclosure process may help mitigate the distorting effects of JR law on credit markets.

6 Robustness Checks

In this section, we conduct sensitivity checks to rule out confounding factors.

6.1 Placebo Tests

A concern is that the relationship between the outcome variables and foreclosure law is discontinuous at the threshold due to jumps in other factors. Placebo tests provide insights into whether JR law drives the behavior we observe in the data. Specifically, in samples where foreclosure law is continuous across the threshold, we should not observe discontinuities in securitization or interest rates. We therefore estimate the equation

$$y_{ilrs} = \beta Placebo_s + \gamma f(D_{ilrs}) + \varphi W_{ilrs} + \delta_r + \delta_l + \varepsilon_{ilrs}, \tag{3}$$

where all variables are the same as in equation (1) except $Placebo_s$ which is a dummy variable equal to 1 on the right of the placebo threshold, 0 on the left of the placebo threshold; and D_{ilrs} contains the distance to the placebo threshold and an interaction between the placebo assignment variable and $Placebo_s$.

We first estimate equation (3) using observations within 10 miles of a placebo

threshold located 10 miles to the right of the actual threshold where JR law governs the foreclosure process on both sides. The results reported in Panel A of Table 7 show the placebo coefficient is statistically insignificant throughout all specifications. Neither the likelihood of securitization nor interest rates in the agency and non-agency markets are discontinuous at the placebo threshold. Next, we repeat the procedure using observations within 10 miles of a placebo threshold 10 miles to the left of the actual threshold, where PS law regulates the foreclosure process either side. In Panel B of Table 7 the placebo LATEs are again statistically insignificant.

[Insert Table 7]

To affirm our baseline estimates do not simply capture border effects, other aspects of the legal environment, or political economy considerations, we use samples drawn around the border between states that use the same foreclosure law. We randomly assign states to placebo treatment and placebo control status and estimate equation (3). Panel C (D) of Table 7 provides results from JR-JR (PS-PS) borders. The placebo coefficient estimate is again statistically insignificant.

If an omitted variable drives our main findings, the placebo LATEs should be similar in magnitude and statistical significance as the baseline estimates. Throughout Table 7 this is not the case. That securitization and interest rates only jump at the actual threshold where there exist discontinuities in the law governing foreclosure reinforces our argument that the effects we observe are not driven by observable or unobservable omitted variables.

6.2 The Legal Environment

Next, we ask whether other aspects of the state-level legal environment confound our inferences. For example, right of redemption (ROR) law allows borrowers to redeem

their property within 12 months of foreclosure, potentially amplifying lenders' costs. Lenders may pursue delinquent borrowers' future income to cover unpaid foreclosure debts using deficiency judgments. Prior research documents a link between mortgage default and bankruptcy exemptions (Lin, 2001).[19] Zoning restrictions may also influence lenders' choices (Gyourko et al., 2019).

[Insert Table 8]

We therefore append equation (1) with controls for whether a state has ROR law, allows deficiency judgments, homestead and nonhomestead exemptions, and the single-family home zoning restrictiveness index. Throughout Panels A and B of Table 8 our inferences endure.[20]

6.3 Lending Industry Conditions

Approximately half the loans in our sample are originated by banks with the remainder supplied by non-banks. Non-banks typically rely on short-term wholesale market funding and are thus more likely to securitize loans to ensure repayment (Loutskina

[19] Homestead exemptions are the most important bankruptcy exemption and evidence shows that mortgage default is more likely the more generous are homestead exemptions (Lin, 2001). Nonhomestead exemptions allow individuals to maintain wealth in other asset categories but tend to be set at low levels. For example, the mean homestead exemption across US states is $122,754 whereas the mean nonhomestead exemption (comprising automobile, other property (clothing, jewelry, and tools), and wildcard exemptions) is $19,685.

[20] Appendix Table A13 presents further legal robustness tests. We test the sensitivity of our findings to 1) excluding observations from Delaware and Pennsylvania which use *scire facias*, a creditor-friendly form of JR law (*scire facias* places the onus on the borrower to provide a reason why the lender should not be able to foreclose (Ghent, 2014). Despite its perceived creditor-friendly nature, *scire facias* is neither expedient nor cheap for lenders. Data from the Fannie Mae Single Family Loan database show the foreclosure timeline is longer and average foreclosure cost to lenders is higher in Delaware and Pennsylvania relative to other JR states (see Appendix Table A4).) 2) excluding Texas as it is the only state that limits the LTV ratio of mortgages to 80%, 3) excluding Louisiana from the sample on the grounds that it is the only Civil Law state, and 4) excluding Massachusetts which undertook reforms to speed up the foreclosure timeline during earlier years (Gerardi et al., 2013). Throughout Panels A and B of Table A13, the JR law coefficient remains robust despite these changes.

and Demyanyk, 2016; Buchak et al., 2018). To avoid that our findings reflect a higher concentration of different lender types either side of the threshold, we split the sample and estimate equation (1) using non-banks and banks separately. The results in Table 9 show that JR law has a positive and statistically significant effect on the probability of GSE securitization within both sub-samples. Both types of financial intermediary respond to JR law by setting significantly higher interest rates on non-GSE-eligible loans.

[Insert Table 9]

Next, we examine the sensitivity of our findings to conditions within the banking industry. Bank characteristics such as size, profitability, soundness, and capitalization may influence securitization and pricing decisions. Theory and evidence shows the cost of deposits affects how banks fund loans (Pennacchi, 1988; Gorton and Pennacchi, 1995; Loutskina and Strahan, 2009). In addition, banks may lend across state borders. If a state regulator is more lenient on out-of-state activities compared to lending at home (Ongena et al., 2013), this may pose a problem if the PS state is more often the home state and the regulator dislikes the OTD model at home. Banks are subject to different regulators depending on their charter. The estimates in columns 1 to 5 and 7 to 11 of Table A14 allay these concerns.[21]

Next, we check whether the nature of banks' business models drives our results. A concern is that banks operating originate-to-distribute (OTD) models are highly dependent on selling loans. If such institutions are disproportionately clustered on the JR side of the threshold, our estimates will conflate banks' business models with the effect of JR law. To address this concern we focus exclusively on banks that do not operate an OTD model, defined as banks that securitize less than 50% of the

[21] We must exclude the lender fixed effects from equation (1) to include the bank-level control variables.

mortgage loans they originate. The results in columns 6 and 12 of Table A14 are very similar to before.

6.4 Loan Quality

A natural question is whether the LATEs capture differences in the characteristics of borrowers or loans either side of the threshold. While the estimating equation already includes covariates to capture such factors, we add further controls for the LTI ratio, DTI ratio, term to maturity, house prices, the average FICO score, and share of borrowers with mortgage insurance in the county the property is located. Despite including these controls, in column 1 of Table 10 we continue to find JR law elicits a significant increase in the securitization of GSE-eligible loans. In column 2 of the table the JR law coefficient is insignificant when GSE-eligible interest rates is the dependent variable. Data constraints prevent us from including the FICO and mortgage insurance variables in the corresponding tests using non-GSE-eligible loans. However, in columns 3 and 4 of Table 10 our key findings are robust.

[Insert Table 10]

6.5 Miscellaneous Sensitivity Checks

We conduct additional robustness tests to rule out further threats to identification. For brevity we report the estimates in Appendix Table A15. We append equation (1) with controls for delinquency rates on auto and credit card loans to capture differences in the general riskiness of the population. In addition, we control for the renegotiation rate on delinquent mortgages to ensure the estimates do not capture potential differences in borrowers' propensity to self cure in JR states due to the longer foreclosure timeline. As lenders' profitability expectations are influenced by pre-payment risk and changes in interest rates we control for the refinancing rate and

whether a loan has an adjustable interest rate. Han et al. (2015) report evidence that tax rates can motivate securitization. The findings reported in Table A15 demonstrate our findings are stable despite adding these controls.

Finally, in Table A16 we sequentially focus on specific US regions to ensure local conditions do not drive our inferences. Panel A (B) of the table reports estimates using observations from the most (least) populous border regions. In Panels C to G of Table A16 we focus on samples drawn from within the Northeast, Midwest, West, and Southern states. Our findings remain remarkably stable. Only in the Western subsample are the LATEs insignificant, although this is mainly due to the small sample size.

7 Conclusions

We show that financial institutions manage credit risk stemming from JR law using securitization or loan pricing. In the agency market, lenders exhibit an excessive propensity to securitize loans to mitigate credit risk. This behavior stems from the GSEs' CIRP and implicit federal guarantees that create incentives for lenders to unload credit risk to the GSEs rather than price credit risk into mortgage contracts. In contrast, in the non-agency market lenders set higher interest rates to cover expected losses because secondary market participants also have loss avoidance incentives.

These findings have policy implications. Legislators have proposed changes to the GSEs' CIRP and purchase guarantees in the Corker-Warner 2013 and Johnson-Crapo 2014 Senate Bills. At heart, these efforts aim to reduce the GSEs' debt holdings and lower mortgage market costs to taxpayers. We show that lenders strategically transfer loans worth approximately $79.5 billion to the GSEs each year because of the credit risk JR law embodies. Ultimately, the GSEs absorb losses that accrue

on these loans, which happens more often compared to PS loans. Tackling these issues may involve reforming the GSEs' policies or introducing private capitalization. However, our findings demonstrate that policy interventions that speed up judicial procedures may help limit the credit risk JR law creates by resolving moral hazard among borrowers.

Second, after 4 million homes were improperly foreclosed during the US Foreclosure Crisis of 2010 to 2012, policy initiatives have sought to extend greater protections to borrowers including introducing JR law in all states. Our research illustrates such measures involve a trade-off. Protecting borrowers' rights imposes greater credit risk on lenders but for GSE-eligible loans the costs are borne by taxpayers.

Finally, the mechanism highlighted in this paper has implications for the design of any secondary market where risk transfer incentives exist. A notable example is the European Union's STS market. The 2019 Securitization Regulation aims to integrate European capital markets by assigning STS labels to deals where the underlying assets are safe and transparent. The STS label specifies a set of criteria assets must conform to but does not take into account the country in which the loans are originated despite observable differences in credit risk across European countries. This raises the possibility that STS deals are mispriced which creates moral hazard within lenders and exposes purchasers to losses.

The mechanisms we document are potentially present in all secondary markets for loan sales. Studying how lenders mitigate credit risk in these environments is an exciting avenue for future research.

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Tables

Table 1: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max	Observations	Source
Sec (GSE eligible)	0.7030	0.457	0	1	327,549	HMDA
GSE Sec (GSE eligible)	0.4261	0.4945	0	1	327,549	HMDA
Private Sec (GSE eligible)	0.2769	0.4475	0	1	327,549	HMDA
NSec (Non-GSE eligible)	0.3645	0.4813	0	1	135,181	HMDA
IR (GSE eligible)	4.6902	0.5264	2.74	7.17	327,549	HMDA
IR (NonGSE eligible)	5.3346	1.6238	2.99	10.94	135,181	HMDA
JR	0.3655	0.4814	0	1	462730	Appendix B
Assignment	-0.9802	4.9710	-9.9996	9.9988	462,730	Authors' calculation
GSE-eligible	0.7079	0.4547	0	1	462,730	HMDA
Loan amount (Ln)	11.966	0.8584	9.6158	13.48	462,730	HMDA
Applicant income	11.4431	0.6688	9.4727	13.2012	462,730	HMDA
LTV	80.4222	17.348	13.85	108.304	462,730	HMDA
Male	0.3094	0.4622	0	1	462,730	HMDA
Minority	0.2182	0.413	0	1	462,730	HMDA
Lenders per capita	0.0118	0.0176	0.0015	3.7453	462,730	Authors' calculation
LTI (%)	2.4494	1.1875	0.2047	5.3571	462,730	HMDA
Co-applicant	0.452	0.4977	0	1	462,730	HMDA
Applications per capita	17.5441	17.4988	0.091	263.4146	462,730	HMDA
House prices	12.4422	0.6654	10.4631	14.1696	462,730	HMDA
Renter occupied housing	33.2697	8.5376	14.8825	57.7217	462,730	US Census
Arrangement fee (%)	0.7465	0.663	0	3.594	462,730	FHFA
Loan term	337.787	62.9791	1	3630	462,730	HMDA
Mortgage insurance (%)	23.9387	0.5902	22.5827	26.0411	462,730	SFLD
DTI	34.8206	10.6332	10	70	462,730	HMDA

Table 1 Cont'd: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max	Observations	Source
FICO	719.888	5.1362	696.7042	728.4487	462,730	SFLD
Right of redemption	0.6315	0.4824	0	1	462,730	Ghent and Kudlyak (2011)
Deficiency judgment	0.9397	0.238	0	1	462,730	Ghent and Kudlyak (2011)
Homestead exemption	8.9519	0.2965	8.1047	9.4976	462,730	Corradin et al. (2016)
Nonhomestead exemption	10.4023	0.4223	8.6084	11.4164	462,730	Corradin et al. (2016)
Zoning index	25.9668	13.1808	1	50	462,730	Calder (2017)
Legal cost (USD)	4553.6113	1839.73	2214.9760	14810.0200	462,730	SFLD
Timeline (Days)	108.0522	68.5777	27	445	462,730	USFN
Renegotiation rate (%)	0.0318	0.0603	0	1.4706	462,730	SFLD
State corporate tax (%)	6.9004	1.6754	0	9.99	462,730	Tax Foundation
State personal tax (%)	5.405	2.5742	0	9.85	462,730	Tax Foundation
Auto delinquency (%)	4.361	1.3901	1.99	8.6	462,730	NY Fed
Credit card delinquency (%)	7.0107	1.0663	4.681	9.865	462,730	NY Fed
Adjustable rate loan	0.1194	0.3243	0	1	462,730	FHFA
HHI (Ln)	5.3931	1.0931	3.47	7.6561	462,730	Author's calculation
Nonbank	0.4761	0.4994	0	1	462,730	Authors' calculation
Bank size (Ln)	16.552	2.7622	12.0691	21.4844	271,326	FFIEC
Z-score (Ln)	3.2238	0.148	2.586	3.9566	271,326	FFIEC
Capital ratio (%)	10.6113	2.3442	6.5237	20.0808	271,326	FFIEC
NII ratio (%)	0.1982	0.1803	0	1.197	271,326	FFIEC
Cost of deposits (%)	0.8095	0.3416	0.1575	2.667	271,326	FFIEC
Out of state	0.6405	0.4799	0	1	462,730	HMDA
Unemployment rate (%)	5.307	3.3331	0	42.7	462,730	BEA
Per capita income (Ln)	10.448	0.3785	7.6183	11.954	462,730	BEA
Urban	0.9136	0.2809	0	1	462,730	US Census
Poverty rate	11.5689	4.9243	2.8	40.8	462,730	US Census
Black population (%)	6.6203	11.5987	0	71.4286	462,730	US Census
Hispanic population	5.1148	8.3035	0	60.6061	462,730	US Census
Violent crime rate (%)	0.4024	0.1569	0.124	1.2035	462,730	US Census
Degree (%)	36.5868	10.3375	11.5	63.7	462,730	US Census
Net migration	0.0002	0.1293	-19.1400	11.4890	462,730	US Census
Tract population (Ln)	8.4560	0.4631	2.3026	10.2832	462,730	HMDA
RMBS						

Notes: This table provides descriptive statistics for the variables used in the empirical analysis. Foreclosure cost is measured in thousands of US$ (defalted into 2016 prices). Lenders per capita and Applications per capita are measured per 1,000 population. 'Ln' denotes that a variable is measured in natural logarithms. 'Source' denotes the data provider. BEA denotes the Bureau of Economic Analysis. FDIC denotes the Federal Deposit Insurance Corporation. FFIEC denotes the Federal Financials Examination Council. FHFA denotes the Federal Housing Finance Agency. HMDA denotes the Home Mortgage Disclosure Act database. NY Fed denotes the Federal Reserve Bank of New York. SFLD denotes the Fannie Mae Single Family Loan database. USFN denotes the US Foreclosure Network.

Table 2: Balanced Covariates Tests

Variable	JR	PS	Difference	t-statistic
Panel A: Socioeconomic conditions				
Per capita income (Ln)	10.1621	10.1698	-0.0077	-0.65
Unemployment rate (%)	5.9861	5.8915	0.0945	0.85
State corporate tax rate (%)	6.3766	6.7363	-0.3597	-1.54
State personal tax rate (%)	5.3941	5.0042	0.3899	1.30
Urbanization (Dummy)	0.8135	0.8129	0.0006	0.04
Poverty rate (%)	12.0382	11.2174	0.8208	0.85
Black population (%)	5.8139	6.2382	-0.4243	-0.81
Hispanic population (%)	5.4885	5.5028	-0.0143	-0.87
Degree (%)	24.3441	25.0303	-0.6862	-1.15
House price index	11.8984	11.9149	-0.0165	-1.58
Refinancing loans (dummy)	0.3428	0.3369	0.0059	1.52
Renter occupied housing (%)	33.0129	33.2597	-0.2467	-1.32
Renegotiation rate (%)	0.0406	0.0446	-0.0040	-0.11
Auto delinquency rate (%)	4.3585	4.3365	0.0219	0.35
Credit card delinquency rate (%)	7.1241	7.1819	-0.05477	-1.06
Violent crime rate (%)	0.3927	0.4007	-0.0079	-1.41
HHI (Ln)	5.2247	5.2869	-0.0622	-1.16
Lenders per capita	0.0412	0.0436	-0.0024	-0.88
Non-bank share (Dummy)	0.4622	0.4663	-0.0041	-0.33
Z-score (Ln)	3.2234	3.2248	-0.0014	-0.63
Capital ratio (%)	10.6832	10.6253	0.0479	1.36
Out-of-state (dummy)	0.6499	0.6660	-0.0161	-1.24
Net migration	0.0002	0.0002	-0.0000	-0.02
Panel B: GSE-eligible loans				
Applicant income (Ln)	11.2292	11.2111	0.0181	1.25
Male applicant (Dummy)	0.3225	0.3206	0.0018	0.23
Minority applicant (Dummy)	0.1361	0.1419	-0.0058	-0.85
LTI ratio	2.0781	2.1138	-0.0357	-1.60
Term to maturity (months)	333.6731	331.5457	2.1275	1.61
DTI (%)	33.6859	33.6292	0.0657	0.54
LTV (%)	82.3933	82.0015	0.3918	1.32
FICO	717.9673	718.9237	-0.9563	-1.28
Arrangement fee (%)	0.9421	0.9521	-0.0100	-0.56
Mortgage insurance (%)	23.9395	24.0553	-0.1157	-1.26
Panel C: Non-GSE-eligible loans				
Applicant income (Ln)	11.2001	11.2044	-0.0043	-0.21
Male applicant (Dummy)	0.3289	0.3333	-0.0046	-0.48
Minority applicant (Dummy)	0.1792	0.1741	0.0051	0.57
LTI ratio	1.9559	1.9718	-0.0159	-0.56
Term to maturity (months)	296.7833	298.3452	-1.5619	-0.53
DTI (%)	34.4790	34.9616	-0.4826	-1.25
LTV (%)	79.4094	79.7503	-0.3409	-1.56

Notes: This table reports the results of t-tests for differences in the average level of each covariate between the JR and PS regions either side of the threshold. JR and PS denote the mean of each variable on the JR and PS side of the threshold, respectively. Difference is the difference between JR and PS. t-statistic is the t-statistic from a two-tailed test of the null hypothesis that Difference is equal to zero. Panel A reports estimates for socioeconomic variables that are common across mortgage market segments. Panel B reports estimates for GSE-eligible loans' variables. Panel C reports estimates for non-GSE-eligible loans' variables.

Table 3: Tests for Manipulation of Treatment Status

	1	2	3	4	5	6	7	8
Variable	Applications			Lenders			Net Migration	GSE-eligible
Estimator	PAR	PAR	NPAR	PAR	PAR	NPAR	PAR	PAR
JR	-0.2234	- 0.2091	-0.3520	- 0.0001	0.0001	0.0017	-0.0002	0.0053
	(-1.03)	(-1.02)	(-1.22)	(-1.01)	(0.28)	(0.72)	(-0.29)	(0.28)
Control Variables	No	Yes	No	No	Yes	No	No	No
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Observations	13,241	13,241	13,241	13,241	13,241	13,241	232,315	13,241
R^2	0.19	0.21	-	0.57	0.58	-	0.02	0.29

Notes: Columns 1 to 6 and 8 in this table reports estimates of equation (2). 'PAR' indicates that parametric estimation is used to estimate the equation. 'NPAR' indicates that non-parametric estimation is used to estimate the equation. Control variables include mean of applicant income, mean LTC ratio, share of minority applicants, share of male applicants in census tract c. Column 7 presents estimates of the equation $m_{cj} = \alpha + \beta JR_c + \varepsilon_{cj}$, where m_{cj} is the net flow of migrants per 1,000 population into county c from county j during year t; JR_c is a dummy variable equal to 1 if county c is in a JR state, 0 otherwise; ε_{cj} is the error term. The sample in column 7 contains information on bilateral net migration flows between each US county over 2013 to 2017 provided by the US Census Bureau. Standard errors are clustered at the state level and the corresponding t-statistic is reported in parentheses.

Table 4: Securitization and Pricing in the GSE and Non-GSE Markets

	1	2	3	4	5	6
Dependent variable	GSE Sec		NSec		IR	
Market:	GSE		Non-GSE		GSE	Non-GSE
Estimator	OLS	Logit	OLS	Logit	OLS	OLS
JR	0.0217***	0.1532***	-0.0052	-0.1023	0.0140	0.0823***
	(3.82)	(6.48)	(-1.55)	(-1.40)	(1.33)	(5.26)
Assignment	0.0010	0.0082***	0.0001	-0.0011	0.0010	0.0025
	(1.68)	(3.04)	(0.24)	(-0.18)	(0.68)	(1.39)
JR* Assignment	0.0011	0.0077*	-0.0002	-0.0004	-0.0022	0.0060
	(1.04)	(1.84)	(-0.31)	(-0.04)	(-1.18)	(1.41)
Applicant income	-0.0218***	-0.1689***	-0.0329***	-0.5872***	-0.0824***	-0.2196***
	(-4.24)	(-18.75)	(-6.16)	(-9.32)	(-8.97)	(-19.43)
LTV	0.0008***	0.0059***	0.0011***	0.0201***	0.0044***	0.0044***
	(3.91)	(18.99)	(5.09)	(5.74)	(14.54)	(5.95)
Lenders per capita	0.0008***	0.0066***	0.0002	0.0018	-0.0008***	-0.0033***
	(4.90)	(6.38)	(0.88)	(0.54)	(-2.98)	(-3.62)
Minority	-0.0125***	-0.0960***	-0.0024	-0.0560	-0.0127**	0.0389**
	(-3.58)	(-7.37)	(-0.85)	(-1.01)	(-2.34)	(2.16)
Male	0.0018	0.0155	0.0014	0.0358	-0.0048	0.0193***
	(0.85)	(1.39)	(0.82)	(0.99)	(-1.59)	(2.71)
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	327,549	327,549	135,181	135,181	327,549	135,181
R^2	0.49		0.80		0.29	0.64
Pseudo R^2		0.40		0.57		

Notes: This table presents parametric estimates of equation (1). In columns 1 and 2 the dependent variable is GSE Sec. In columns 3 and 4 the dependent variable is Sec. In columns 5 and 6 the dependent variable is interest rates. GSE (Non-GSE) indicates the sample includes GSE-eligible (non-GSE-eligible) loans. OLS (Logit) indicates that equation (1) is estimated using OLS (Logit). The sample includes all loans within 10 miles of the threshold. The R^2 statistic in columns 2 and 4 is the pseudo-R^2. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

Table 5: Subsample Tests

	1	2	3	4	5	6	7	8	9	10
Splitting variable	Income		DTI ratio		Coapplicant		Unemployment rate		Poverty rate	
Sample	$\geq$ mean	$<$ mean	$<$ mean	$\geq$ mean	Yes	No	$<$ mean	$\geq$ mean	$<$ mean	$\geq$ mean
Panel A: GSE securitization										
JR	0.0134**	0.0288***	0.0213***	0.0231***	0.0147**	0.0290***	0.0207***	0.0256**	0.0187*	0.0240***
	(2.44)	(4.23)	(3.86)	(3.60)	(2.48)	(4.41)	(3.23)	(2.13)	(1.79)	(2.89)
Control variables, Region FE, Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	159,683	167,866	129,622	197,927	172,749	154,800	218,622	108,927	167,825	159,724
R^2	0.51	0.50	0.51	0.49	0.50	0.50	0.50	0.50	0.50	0.50
LATE(%)	3.27	6.52	4.95	5.46	3.67	6.59	4.92	5.95	4.67	5.91
Panel B: GSE interest rates										
JR	0.0007	0.0176	0.0057	0.0105	0.0119	0.0079	0.0051	0.0303	0.0249	0.0161
	(1.58)	(1.46)	(1.47)	(1.33)	(1.22)	(1.21)	(1.17)	(1.35)	(1.11)	(1.45)
Control variables, Region FE, Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	159,683	167,866	129,622	197,927	172,749	154,800	218,622	108,927	167,825	159,724
R^2	0.26	0.26	0.28	0.24	0.24	0.27	0.24	0.28	0.25	0.26
Panel C: Non-GSE securitization										
JR	-0.0022	-0.0050	0.0014	-0.0053	-0.0037	-0.0056	-0.0085	0.0031	-0.0097	-0.0064
	(-0.62)	(-1.06)	(0.38)	(-1.38)	(-0.85)	(-1.41)	(-1.12)	(0.49)	(-1.60)	(-1.38)
Control variables, Region FE, Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	63,726	71,455	26,693	108,488	69,806	65,375	88,810	46,371	70,417	64,764
R^2	0.82	0.82	0.88	0.80	0.81	0.81	0.80	0.82	0.82	0.80
Panel D: Non-GSE interest rates										
JR	0.0824***	0.0840***	0.0810***	0.1042***	0.0736***	0.0915***	0.0861***	0.1683***	0.0808**	0.0816***
	(2.97)	(4.73)	(5.28)	(3.85)	(3.48)	(4.17)	(2.96)	(5.17)	(2.56)	(5.52)
Control variables, Region FE, Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	63,726	71,455	26,693	108,488	69,806	65,375	88,810	46,371	70,417	64,764
R^2	0.49	0.71	0.75	0.62	0.65	0.66	0.59	0.70	0.54	0.70
LATE(%)	1.67	1.82	1.52	1.96	1.28	1.75	1.66	2.99	1.43	1.69

Notes: This table presents parametric estimates of equation (1). In Panel A the dependent variable is GSE Sec. In Panels B and D the dependent variable is the interest rate variable. In Panel C the dependent variable is Sec. The sample in Panels A and B (C and D) contains GSE-eligible (non-GSE-eligible) loans. The sample includes all loans within 10 miles of the threshold. The control variables are the assignment variable, the JR-assignment interaction variable, applicant income, LTV, lenders per capita, minority, and male. Where the JR coefficient is statistically significant, LATE (%) is the local average treatment effect expressed in per cent relative to the mean value of the dependent variable within the control group. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

Table 6: Identifying Legal Cost and Timeline Effects

	1	2
Sample	GSE	Non-GSE
Dependent variable	GSE Sec	IR
Legal cost (Ln)	0.0010	0.0313*
	(0.27)	(1.81)
Timeline (Ln)	0.0161***	0.0793***
	(4.45)	(8.58)
Applicant Income	-0.0247***	-0.2157***
	(-4.77)	(-18.86)
LTV	0.0008***	0.0041***
	(3.95)	(5.25)
Lenders per capita	0.0007***	-0.0031***
	(3.99)	(-3.78)
Minority	-0.0119***	0.0388**
	(-3.16)	(2.36)
Male	0.0028	0.0185***
	(1.30)	(2.79)
Region FE	Yes	Yes
Lender FE	Yes	Yes
Observations	327,549	135,181
R^2	0.50	0.63

Notes: This table reports estimates of the equation $y_{ilrs} = \beta C_{ilrs} + \varphi W_{ilrs} + \delta_l + \delta_r + \varepsilon_{ilrs}$ where all variables are defined as in equation (1) except C_{ilrs} which contains the legal costs of foreclosing a mortgage to lenders and the foreclosure timeline. GSE (Non-GSE) indicates the sample includes GSE-eligible (non-GSE-eligible) loans. GSE Sec (IR) indicates the dependent variable is GSE Sec (interest rate). The sample includes loans within 10 miles of the threshold. Data on lenders' legal costs of is taken from the Fannie Mae Single Family Loan database. Data on the foreclosure timeline is taken from the US Foreclosure Network. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. **, and *** indicate statistical significance at the 5%, and 1% levels, respectively.

Table 7: Falsification Tests

	1	2	3	4
Sample	GSE		Non-GSE	
Dependent variable	GSE Sec	IR	NSec	IR
Panel A: +10 miles border				
Placebo	-0.0213	0.0368	-0.0351	-0.0127
	(-1.29)	(1.12)	(-1.38)	(-1.05)
Control variables	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes
Observations	186,829	186,829	47,156	47,156
R^2	0.02	0.01	0.01	0.01
Panel B: -10 miles border				
Placebo	0.0063	0.0729	-0.0479	0.0709
	(0.52)	(0.73)	(-0.22)	(1.22)
Control variables	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes
Observations	248,898	248,898	65,783	65,783
R^2	0.02	0.02	0.01	0.01
Panel C: JR-JR border				
Placebo	-0.0054	0.0154	0.0704	0.0511
	(-0.58)	(0.91)	(1.19)	(1.20)
Control variables	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes
Observations	228,623	228,623	61,694	61,694
R^2	0.11	0.13	0.19	0.19
Panel D: PS-PS border				
Placebo	-0.0096	0.0158	-0.0109	0.0870
	(-1.28)	(1.10)	(-1.09)	(0.06)
Control variables	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes
Observations	118,405	118,405	33,210	33,210
R^2	0.26	0.32	0.27	0.24

Notes: This table reports parametric estimates of equation (3). GSE (Non-GSE) indicates the sample includes GSE-eligible (non-GSE-eligible) loans. In column 1 (2) the dependent variable is GSE Sec (IR). In column 3 (4) the dependent variable is Sec (IR). In Panel A the sample includes observations within 10 miles of the placebo threshold located 10 miles to the right of the actual threshold (assignment variable = 10). In Panel B the sample includes observations within 10 miles of the placebo threshold located 10 miles to the left of the actual threshold (assignment variable = -10). In Panel C the sample includes observations within 10 miles of the border between states that both use JR law. In Panel D the sample includes observations within 10 miles of the border between states that both use PS law. The control variables are the assignment variable, the JR-assignment interaction variable, applicant income, LTV, lenders per capita, minority, and male. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses.

Table 8: Legal Environment Robustness Tests

	1	2	3	4	5	6	7	8
Dependent variable:	Securitization				Interest rates			
Panel A: GSE-eligible loans								
JR	0.0185**	0.0208***	0.0202***	0.0240***	0.0082	0.0096	0.0173	0.0134
	(2.36)	(3.53)	(3.51)	(4.29)	(0.79)	(0.85)	(1.20)	(1.36)
Right of redemption	0.0027				0.0158*			
	(0.24)				(1.88)			
Deficiency judgment		0.0094				0.0084		
		(1.10)				(0.43)		
Homestead exemption			0.0357				-0.0290	
			(1.32)				(-1.07)	
Nonhomestead exemption			0.0218				0.0285	
			(1.45)				(1.03)	
Zoning				-0.0009***				-0.0009**
				(-3.47)				(-2.31)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	327,549	327,549	327,549	327,549	327,549	327,549	327,549	327,549
R^2	0.51	0.51	0.51	0.51	0.24	0.24	0.24	0.24
Panel B: Non-GSE-eligible loans								
JR	-0.0083	-0.0062*	-0.0070	-0.0040	0.0846***	0.0838***	0.0827***	0.0771***
	(-1.51)	(-1.99)	(-1.28)	(-1.19)	(4.82)	(5.65)	(4.55)	(4.36)
Right of redemption	0.0017				-0.0051			
	(0.45)				(-0.28)			
Deficiency judgment		0.0150**				-0.0218		
		(2.15)				(-0.47)		
Homestead exemption			-0.0103				0.1519**	
			(-1.08)				(2.68)	
Nonhomestead exemption			-0.0015				0.0707	
			(-0.16)				(1.57)	
Zoning				-0.0003				0.0000
				(-1.65)				(0.03)
				(-0.02)				(-1.14)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	135,181	135,181	135,181	135,181	135,181	135,181	135,181	135,181
R^2	0.80	0.80	0.80	0.80	0.64	0.64	0.64	0.64

Notes: This table presents parametric estimates of equation (1). In Panel A (B) the sample contains GSE-eligible (non-GSE-eligible) loans. In columns 1 to 4 of Panel A (B) the dependent variable is GSE Sec (NSec). In columns 5 to 8 of both panels the dependent variable is IR. The sample includes all loans within 10 miles of the threshold. The control variables are the assignment variable, the JR-assignment interaction variable, applicant income, LTV, lenders per capita, minority, and male. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 9: Lending Industry Robustness Tests

	1	2	3	4	5	6	7	8
Financial intermediary	Non-Banks				Banks			
Sample	GSE		Non-GSE		GSE		Non-GSE	
Dependent variable	GSE sec	IR	NSec	IR	GSE sec	IR	NSec	IR
JR	0.0271***	0.0223	-0.0075	0.0716**	0.0118***	0.0080	-0.0050	0.0491***
	(3.41)	(1.28)	(-0.68)	(2.63)	(2.67)	(0.63)	(-0.78)	(3.17)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	No	No	No	Yes	Yes	Yes
Observations	165,521	165,521	53,913	53,913	162,028	162,028	81,268	81,268
R^2	0.56	0.19	0.42	0.60	0.47	0.25	0.48	0.50

Notes: This table presents parametric estimates of equation (1). In Panel A the sample contains GSE-eligible loans and the dependent variable is GSE Sec. In Panel B the sample contains non-GSE-eligible loans and the dependent variable is IR. The sample includes all loans within 10 miles of the threshold. The control variables are the assignment variable, the JR-assignment interaction variable, applicant income, LTV, lenders per capita, minority, and male. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

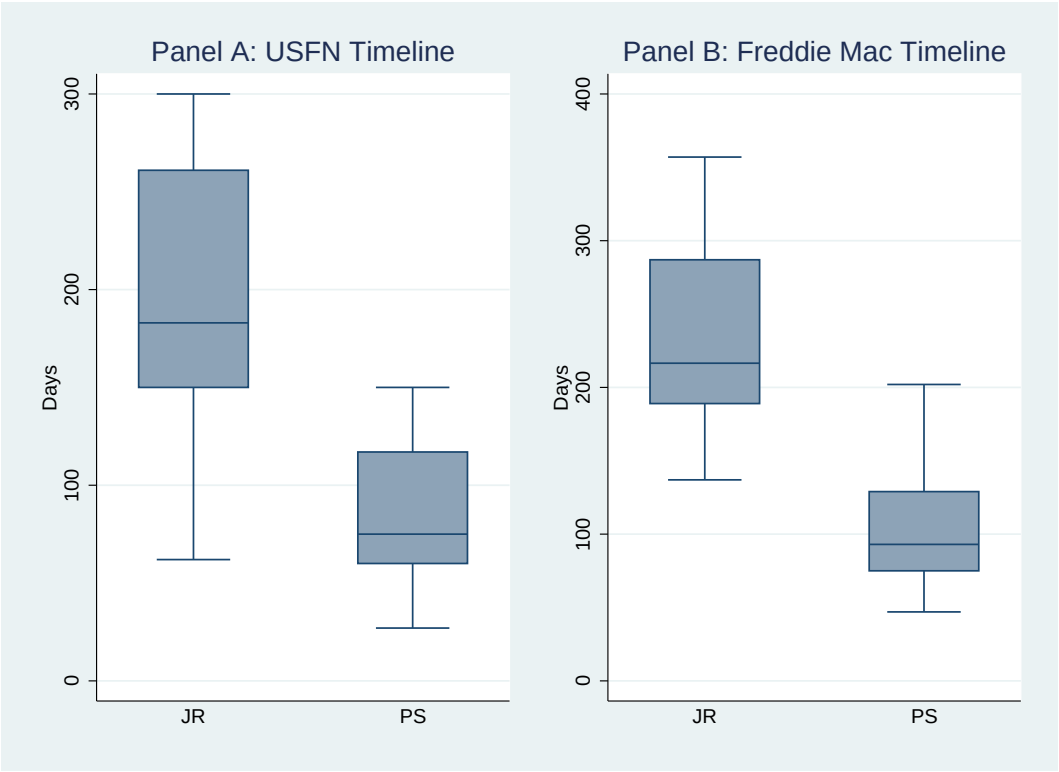
Table 10: Loan Quality and Loan characteristics

	1	2	3	4
Sample	GSE		Non-GSE	
Dependent variable	GSE Sec	IR	NSec	IR
JR	0.0172***	0.0135	-0.0080	0.0641***
	(2.81)	(1.56)	(-1.54)	(4.42)
LTI	0.0723***	-0.0356**	-0.0068*	-0.0740***
	(13.09)	(-2.41)	(-1.78)	(-5.03)
DTI	-0.0009***	0.0076***	-0.0022***	0.0076***
	(-4.31)	(20.67)	(-15.93)	(21.66)
Loan term	0.0496***	0.7019***	0.0951***	0.0267
	(3.67)	(19.42)	(4.20)	(0.61)
House price	-0.1842***	-0.2301***	0.0381***	-0.2899***
	(-17.21)	(-7.70)	(7.03)	(-9.41)
FICO	-1.1901**	-0.4892		
	(-2.68)	(-0.63)		
Mortgage Insurance	-0.0321***	-0.0050		
	(-4.67)	(-0.58)		
Control varaibles	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Border FE	Yes	Yes	Yes	Yes
Observations	327,549	327,549	135,181	135,181
R^2	0.52	0.32	0.58	0.59

Notes: This table reports parametric estimates of equation (1) with further control variables that capture loan quality. GSE (Non-GSE) indicates the sample includes GSE-eligible (non-GSE-eligible) loans. In column 1 (2) the dependent variable is GSE Sec (IR). In column 3 (4) the dependent variable is Sec (IR). The sample includes all loans within 10 miles of the threshold. The control variables are the assignment variable, the JR-assignment interaction variable, applicant income, LTV, lenders per capita, minority, and male. Data limitations mean we do not have information for the variables FICO and mortgage insurance for non-GSE-eligible loans. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

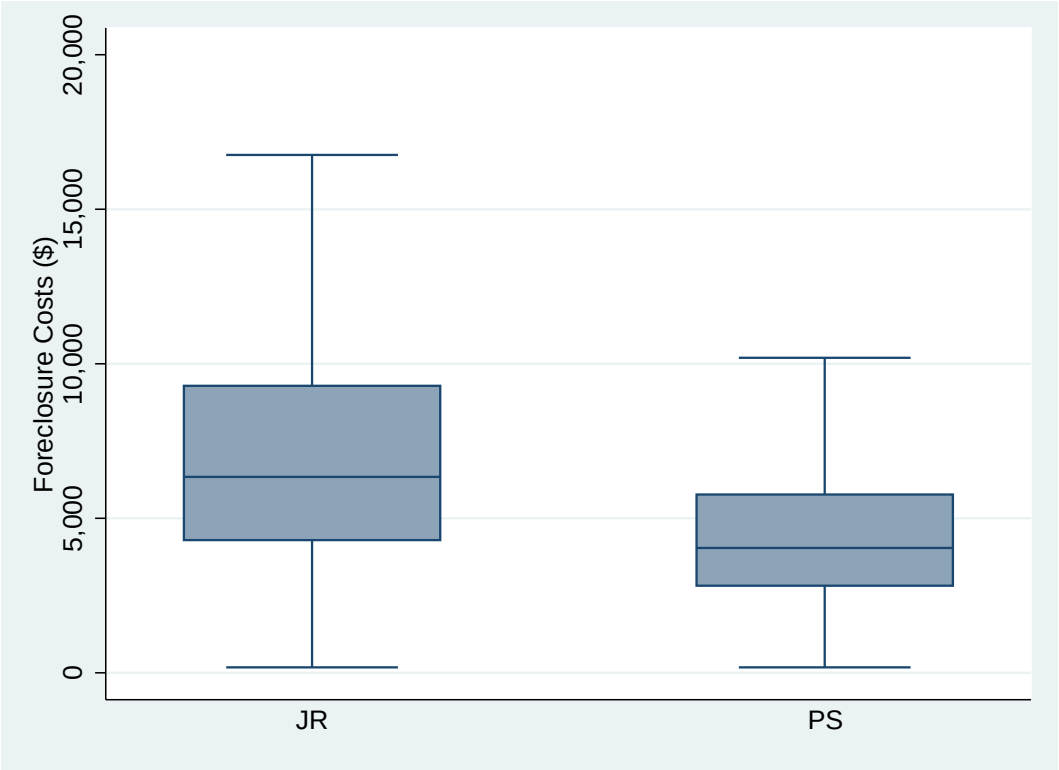
Figures

Figure 1: Foreclosure Timelines



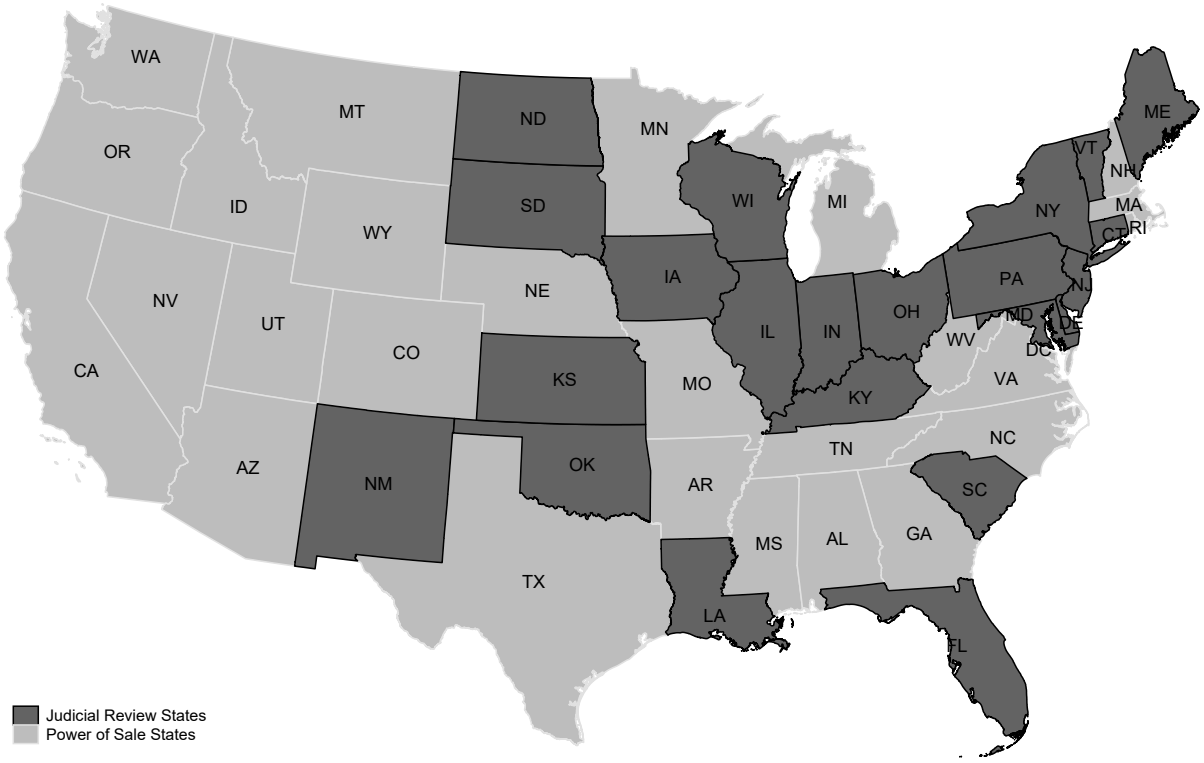
Notes: This figure presents the mean and range of the foreclosure timeline across states. Panel A uses data from the US Foreclosure Network which provides an estimate of the number of days it takes to foreclose a property based on state regulations. That is, the values do not include process delays. Panel B uses data provided by Freddie Mac through the National Mortgage Servicers' Reference Dictionary.

Figure 2: Foreclosure Laws and Foreclosure Costs



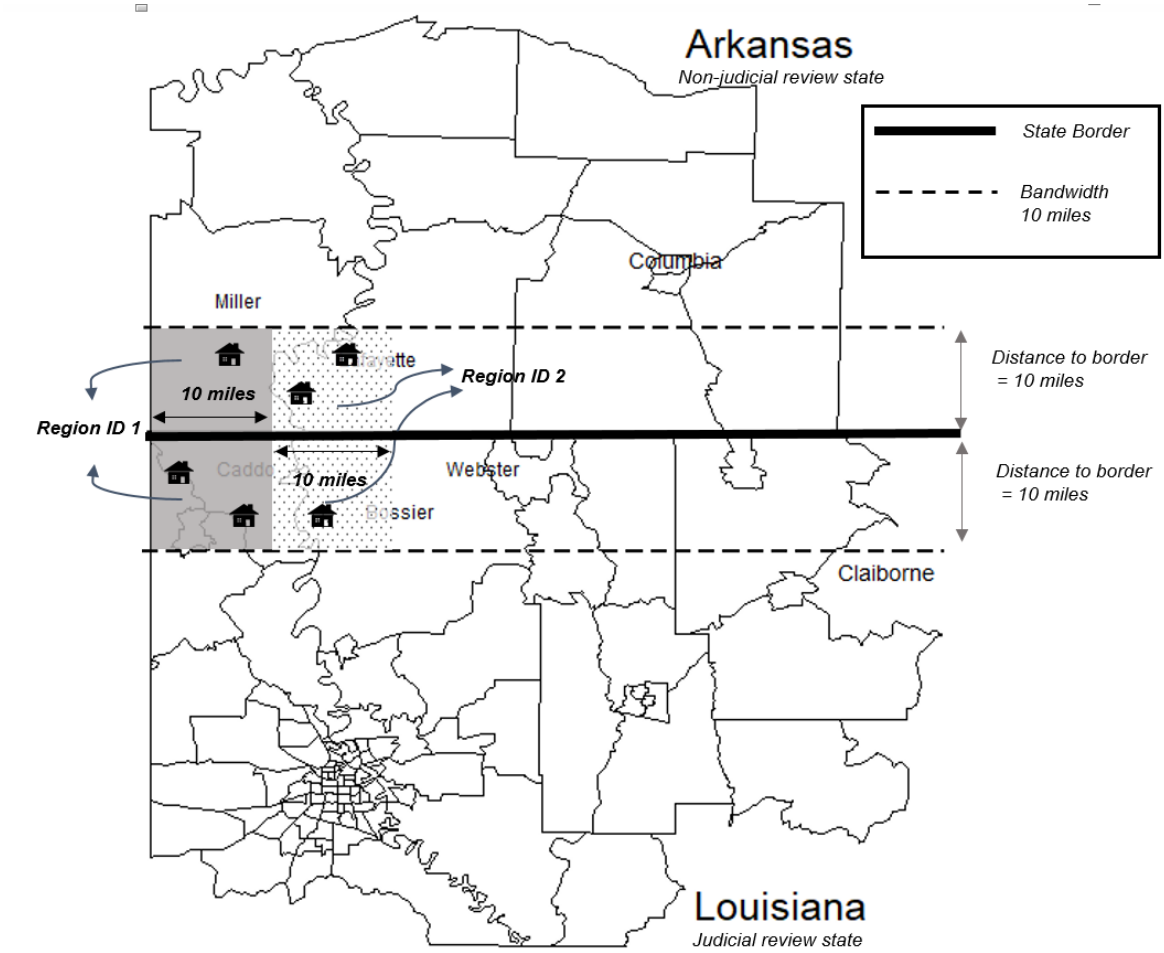
Notes: This figure presents the mean and range of foreclosure costs in thousands of 2016 US$ incurred by lenders in JR and PS states. Information on foreclosure costs is taken from the Fannie Mae Single Family Loan database.

Figure 3: Foreclosure Laws in each State



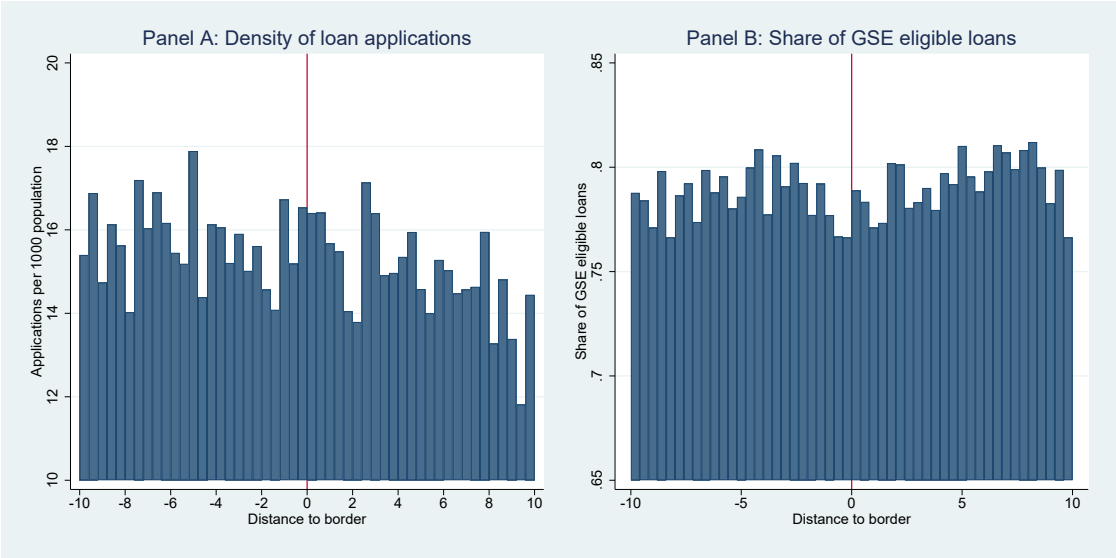
Notes: This figure reports the type of foreclosure law used in each of the contiguous US states. See Appendix B for the reasons behind each state's legal classification. Alaska uses PS law. Hawaii used PS law until 2011 but has used JR law since 2011.

Figure 4: Region Fixed Effects



Notes: This figure provides an illustration of the region fixed effects we use in equation (1). The map plots census tracts along a section of the Arkansas-Louisiana border. The sample includes only loans made to purchase single-family homes that lie within 10 miles of the border (threshold). We define regions as arbitrary geographical areas that span the border and measure 10 miles wide by 20 miles long. Each region is assigned an identifier (for example, Region ID 1 and Region ID 2).

Figure 5: Manipulation Checks



Notes: Panel A shows the number of loan applications per 1,000 population in each 0.4 mile wide bin within 10 miles of the threshold. Panel B illustrates the share of applications that are for GSE-eligible loans in each 0.4 mile wide bin within 10 miles of the threshold.

Figure 6: Regression Discontinuity Plots at the Threshold

Notes: This figure shows non-parametric RD estimates of how securitization and interest rates are influenced by JR law at the threshold during the sample period. Distance to border is the distance between the midpoint of each 0.4 mile wide bin and the nearest JR-PS border coordinate. Distance to border = 0 defines the border (threshold) between JR and PS states. A negative (positive) distance to border value indicates an observation is from the control group (treatment) group. We calculate the optimal bin width following Lee and Lemieux (2010). We then calculate $\bar{s}_j$, the mean of either the securitization variables or *IR* within bin j using all mortgage applications within that bin. Next, we plot $\bar{s}_j$ against its midpoint. We fit local regression functions either side of the threshold using a rectangular kernel. In Panel A the sample contains GSE-eligible observations and the dependent variable is GSE Sec. In Panel B the sample contains GSE-eligible observations and the dependent variable is IR. In Panel C the sample contains non-GSE-eligible observations and the dependent variable is Sec. In Panel D the sample contains non-GSE-eligible observations and the dependent variable is IR.

Online Appendix - For Online Publication Only

A: The Effect of JR Law on Mortgage Default and Lenders' Costs of Default

To formally inspect whether JR law raises credit risk by increasing the probability and cost of mortgage default to lenders, we use loan-level information provided by the Fannie Mae Single Family Loan database between 2000 and 2017 to estimate the equation

$$y_{ilst} = \alpha + \beta JR_s + \gamma X_{ilst} + \delta_l + \delta_t + \varepsilon_{ilst}, \tag{4}$$

where y_{ilst} is either the foreclosure cost (in logarithms) incurred by lender l on mortgage loan i in state s at time t, or mortgage default (a binary dummy variable); JR_s is a dummy equal to 1 if state s uses JR law, 0 otherwise; X_{ilst} is a vector of controls; δ_l and δ_t denote lender and year fixed effects, respectively; ε_{ilst} is the error term.

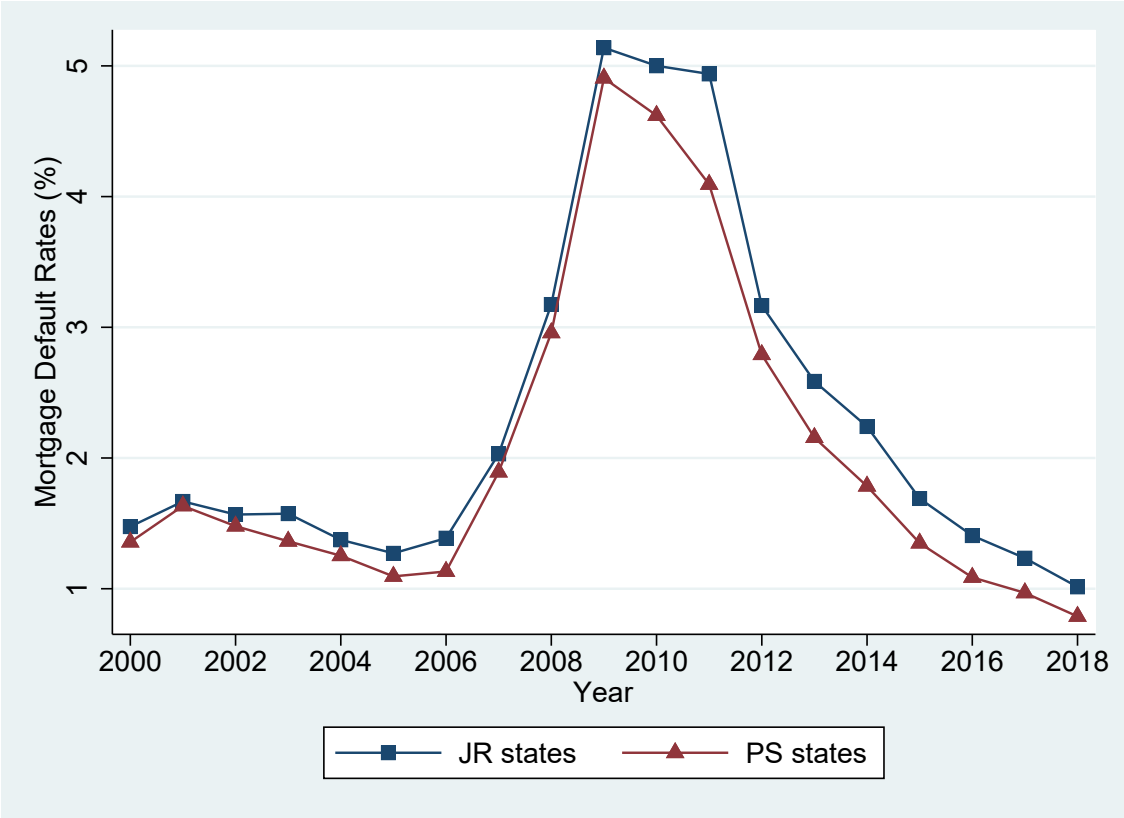
Table A1 presents the estimates. The unconditional specification in column 1 shows JR law imposes 65% higher costs on lenders, relative to PS law. Column 2 shows that this result remains economically and statistically significant when we control for the DTI ratio, term to maturity, local house prices and per capita income. Next, we test whether the rate of mortgage default is related to foreclosure law. Consistent with previous evidence (Gerardi et al., 2013; Demiroglu et al., 2014; Mian et al., 2015), columns 3 and 4 of Table A1 show that the probability of default is significantly higher in JR states. Economically, the size of this effect is substantial. Column 4 shows the probability of default is 0.23% higher in JR relative to PS states. Considering the mean default rate in the sample is 0.78%, this equates to a 29% increase.

Table A1: Probability of Default and Foreclosure Costs

	1	2	3	4
Dependent variable	Cost	Cost	Default	Default
JR	0.5033***	0.5223***	0.0021***	0.0028***
	(14.85)	(13.54)	(15.91)	(21.87)
Per capita income		0.0031		-0.0065***
		(0.04)		(-44.68)
DTI ratio		0.0187		0.0014***
		(0.86)		(10.79)
Term to maturity		-0.0127		0.0002***
		(-0.76)		(8.63)
House price index		0.3258**		0.0113***
		(2.42)		(43.79)
Lender FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	17,091	17,091	2,182,591	2,182,591
R^2	0.05	0.05	0.01	0.01

Notes: This table presents estimates of the equation (4). Cost includes legal costs, associated taxes, property maintenance cost after foreclosing and miscellaneous costs. The sample in columns 1 and 2 use only observations where default has occurred. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. ** and *** indicate statistical significance at the 5% and 1% levels, respectively.

Figure A1: Mortgage Default Rates



Notes: This figure shows the mean rate of mortgage default, defined as the share of mortgages that are at least 90 days late, in JR and PS states between 2000 and 2018.

Figure A1 illustrates the mean mortgage default rate in JR and PS states between 2000 and 2018.

B: Geographical Spread of the Data and Variable Description

B.1: Geographical Spread of the Data

Table A2: Observations in Each Border Pair

Pair	Obs	Pair	Obs	Pair	Obs	Pair	Obs
FL-AL	10,570	MS-LA	11,659	OK-MO	524	VA-KY	961
GA-FL	18,448	ND-MN	3,136	RI-CT	7,037	VA-MD	47,318
KS-CO	48	ND-MT	312	RI-NY	174	VT-MA	918
LA-AR	1,515	NE-IA	10,706	SC-GA	16,571	VT-NH	3,955
MA-CT	15,973	NE-KS	340	SC-NC	54,926	WI-MI	4,570
MD-DC	14,394	NH-ME	9,215	SD-MN	804	WI-MN	47,833
MI-IN	14,424	NM-AZ	90	SD-MT	10	WV-KY	965
MN-IA	2,194	NM-CO	378	SD-NE	774	WV-MD	3,632
MO-IA	846	NY-MA	5,245	TN-KY	16,274	WV-OH	7,174
MO-IL	26,593	OH-MI	43,644	TX-LA	5,024	WV-PA	13,653
MO-KS	24,765	OK-AR	5,811	TX-NM	3,493	WY-SD	964
MO-KY	221	OK-CO	3	TX-OK	4,673		

Notes: This table reports the number of observations in each border pair in our sample. Pair denotes the bordering states. Obs denotes number of observations.

B.2: Variable Definitions

Variable Definitions

Sec (GSE-eligible): a dummy variable equal to 1 if a GSE-eligible loan is securitized, 0 otherwise.

GSE Sec (GSE-eligible): a dummy variable equal to 1 if a GSE-eligible loan is securitized through sale to Fannie Mae or Freddie Mac, 0 otherwise.

Private Sec (GSE-eligible): a dummy variable equal to 1 if a GSE-eligible loan is securitized through sale to a private securitizer, 0 otherwise.

NSec (Non-GSE-eligible): a dummy variable equal to 1 if a non-GSE-eligible loan is securitized, 0 otherwise.

IR (GSE-eligible): the interest rate on a GSE-eligible loan.

IR (Non-GSE-eligible): the interest rate on a non-GSE-eligible loan.

JR: a dummy variable equal to 1 if loan i is on a property located in a Judicial Review state, 0 if the property is located in a Power of Sale state.

Assignment: the distance in miles between the midpoint of the census tract that loan i is located and the nearest JR-PS border coordinate.

GSE-eligible: a dummy variable equal to 1 if loan i is eligible for sale to Fannie Mae or Freddie Mac, 0 otherwise.

Loan amount: the origination amount on loan i.

Applicant income: the annual income of the borrower on loan i.

LTV: the loan-to-income ratio on loan i.

Male: a dummy variable equal to 1 if the applicant on loan i is male, 0 otherwise.

Minority: a dummy variable equal to 1 if the applicant on loan i is from an ethnic minority, 0 otherwise.

Lenders per capita: the number of lenders per 1,000 population in the census tract where loan i is located.

LTI ratio: the ratio of the loan amount to applicant income on loan i.

Co-applicant: a dummy variable equal to 1 if there is a coapplicant on loan i, 0 otherwise.

Applicants per capita: the number of mortgage applications per 1,000 population in the census tract where loan i is located.

House prices: the FHFA house price index in the census tract where loan i is located.

Renter occupied housing: the ratio of rented properties to total properties in the county where loan i is located.

Arrangement fee: the mean of the ratio of the arrangement fee to loan amount in the county where loan i is located.

Loan term: term to maturity (in months) on loan i.

Mortgage insurance: the share of GSE-eligible loans with mortgage insurance in the county where loan i is located.

DTI: the debt-to-income ratio of loan i.

FICO: the mean FICO score of mortgages in the county where loan i is located.

Right of redemption: a dummy variable equal to 1 if loan i is located in a state that permits right of redemption within 12 months of foreclosure, 0 otherwise.

Deficiency judgment: a dummy variable equal to 1 if loan i is located in a state that permits deficiency judgment, 0 otherwise.

Homestead exemption: the maximum value of property that is exempt in bankruptcy in the state where loan i is located is located.

Nonhomestead exemption: the the sum of automobile, other property, and wildcard exemptions that is exempt in bankruptcy in the state where loan i is located.

Zoning index: an index measuring the intensity of restrictions on building single-unit homes in the state loan i is located.

Legal cost: the mean cost to lenders of foreclosing a loan in the state loan i is located.

Timeline: the mean duration of the foreclosure process (excluding process delays)

in the state loan i is located.

Renegotiation rate: the ratio of delinquent borrowers that successfully renegotiate terms with the mortgage servicer to total delinquent loans in the county loan i is located.

Refinancing rate: the ratio of refinancing loan applications to total mortgage applications in the census tract where loan i is located.

State corporate tax rate: the top marginal state corporate income tax rate in the state loan i is located.

State personal tax rate: the top marginal state personal income tax rate in the state loan i is located.

Auto delinquency rate: the ratio of auto loans that are at least 90 days delinquent to total auto loans in the county loan i is located.

Credit card delinquency rate: the ratio of credit card loans that are at least 90 days delinquent to total credit card loans in the county loan i is located.

Adjustable rate loan: the ratio of adjustable rate loans to total mortgage loans in the county loan i is located.

HHI: a Herfindahl-Hirschman index of lenders' market shares in the county where loan i. Market share is the ratio of the total value of mortgage loans originated in county c by lender l relative to the total value of mortgage loans originated by all institutions in county c.

Nonbank: a dummy variable equal to 1 if loan i is originated by a non-depository institution.

Bank size: total assets of lender l.

Z-score: calculated using the formula $Z_l = (ROA_l + ETA_l)/ROASD_l$ where ROA_l, ETA_l, and $ROASD_l$ are return on assets, the ratio of equity to total assets, and the standard deviation of returns on assets over the 4 quarters of 2018 for bank l, respectively.

Capital ratio: the ratio of equity capital to total assets for lender l.

Non-bank: a dummy variable equal to 1 if loan i is originated by a non-deposit taking institution.

NII ratio: the ratio of net interest income to total assets for lender l.

Cost of deposits: the ratio of deposit interest expenses to deposit liabilities for lender l.

Out of state: a dummy variable equal to 1 if loan i is located in a state outside lender l's headquarter state.

Unemployment rate: the unemployment rate in the county loan i is located.

Per capita income: the level of income per capita in the county loan i is located.

Urbanization: a dummy variable equal to 1 if loan i is located in urban areas.

Poverty rate: the ratio of the population living below the poverty line to total population in the county loan i is located.

Black population: the ratio of the population who are black to total population in the county loan i is located.

Hispanic population: the ratio of the population who are Hispanic to total population in the county loan i is located.

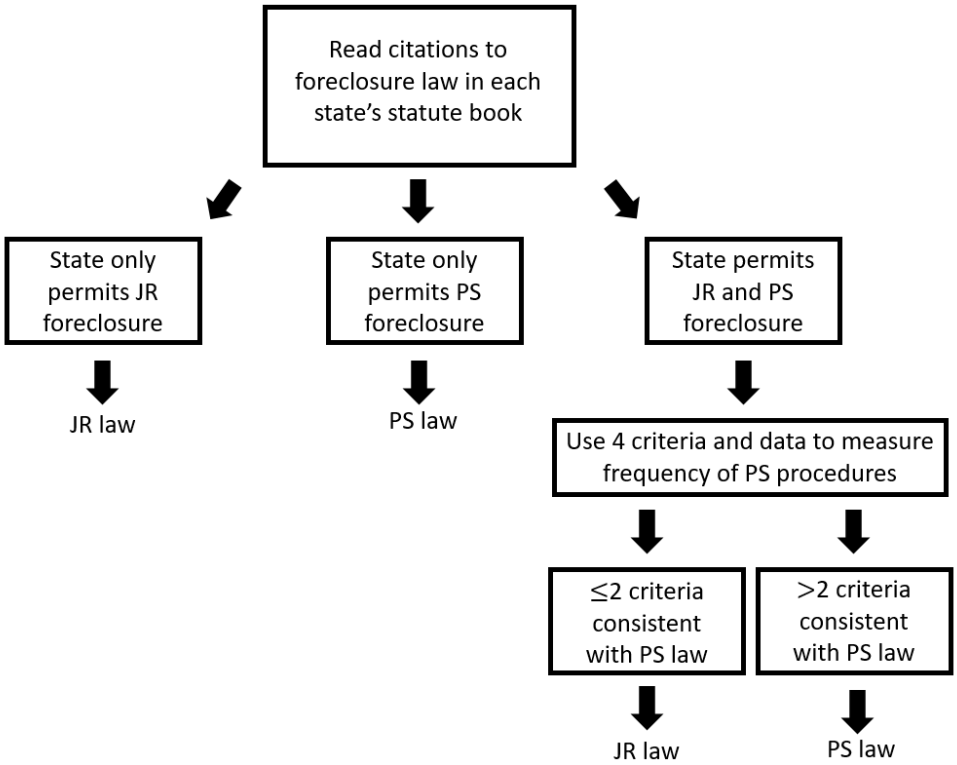
Violent crime rate: the number of violent crimes per 1,000 population in the county loan i is located.

Degree: the ratio of the number of people with at least a College degree eduation to total population in the county loan i is located.

Net migration: net migration (immigration minus emigration) per 1,000 population into county c between 2013 and 2017.

C: Legal Appendix

We develop a system to classify each state as a JR or PS jurisdiction. The flowchart below illustrates the essence of this classification system. We first read the citations to foreclosure law in each state's statute book. This indicates whether a state permits foreclosure through JR, PS, or both procedures. Where only one procedure is available we designate a state as either a JR or PS state (although we also verify this using data). To identify the most common method in states where the law permits both procedures, we use four additional criteria and data collected from state statutes, foreclosure attorneys, foreclosure auctions, and evidence from the legal literature to verify whether JR or PS law is used. We report the criteria and this data on a state-by-state basis below.



Criteria 1: The text of the law codified in each state's statute book.

We first locate the citations to state foreclosure law in each state's statute book. For example, for California these are in the California Civil Code Sections 2924 through 29241 and California Code of Civil Procedure Sections 580a through 580d. For Massachusetts the legal process regulating foreclosure is in Massachusetts General Laws Chapter 244. We then screen the text to ascertain whether the state permits foreclosure using Judicial Review, Power of Sale or both procedures. Where only one type of procedure is permitted, we assign a state to that type of law. Although, we also verify this classification using data we describe below. Where both procedures are available, we use Criteria 2 to 5 to identify the most common foreclosure method.

Criteria 2: Does the state mandate that lenders initiate the foreclosure process by providing notice of foreclosure in court?

Each state's legal rules stipulate how lenders provide Notice of Foreclosure to borrowers. In Judicial Review states lenders must provide Notice of Foreclosure by filing a lawsuit in court and serving the borrower with a summons and complaint. In Power of Sale states the lender or trustee typically records a three month notice of default in the County Recorder's office and sends a copy to the borrower after the recording (a Notice of Trustee Sale). Power of Sale law does not require that the process is initiated by filing a lawsuit in court. Judicial Review is more common where a Notice of Foreclosure must be filed in court.

Florida provides an illustrative example of the Notice of Foreclosure process in Judicial Review states. The lender must file a lawsuit in court by serving the borrower with a summons and complaint. The borrower then has 20 days to file an answer to the complaint with the court. If the court determines that the borrower has defaulted on the mortgage, the judge enters a final judgment of foreclosure and mails a copy to the borrower. A date is then set for a court hearing when a judgment is declared (the judgment date). The foreclosure sale must take place between 20 to 35 days after the judgment date, unless the court order states otherwise (Florida Statutes Section 45.031). The foreclosing lender must then publish a notice of the foreclosure sale in a newspaper once a week for two consecutive weeks, with the second publication at least five days before the sale (Florida Statutes Section 45.031).

The Notice of Trustee Sale process in California is representative of Power of Sale states. To begin the foreclosure process the lender or trustee records a three month notice of default in the county recorder's office and mails a copy to the borrower after recording it (California Civil Code Section 2924, 2924b).

Criteria 3: Data collected from foreclosure attorneys on the frequency of Judicial

Review and Power of Sale procedures in the cases they are involved.

We interviewed foreclosure attorneys from each state and asked what in their experience was the most common foreclosure procedure used in the state they operate in. In almost all instances attorneys are unequivocal. Where state law permits both Judicial Review and Power of Sale foreclosure, Power of Sale is invariably used. Where state law permits only one form of foreclosure, that method is used in all cases attorneys have been involved.

Criteria 4: Lis Pendens notices / data on foreclosed properties listed for foreclosure auctions on Realtytrac.com.

We randomly sampled 100 foreclosed properties from each state listed for foreclosure auction on Realtytrac.com.[22] Each listing reports whether the borrower was issued with a Lis Pendens notice ahead of the auction. This is a notice of foreclosure that is issued pending Judicial Review foreclosure actions.

We calculate the share of the 100 foreclosed properties that were issued Lis Pendens notices in each state. The higher the share, the more common is Judicial Review. The evidence below shows that the Lis Pendens share is either 100% or close to 100% in states that permit foreclosure exclusively through Judicial Review. In states that permit both Judicial Review and Power of Sale, there are exceptionally few instances of Lis Pendens notices. This is consistent with the evidence from foreclosure attorneys that where Power of Sale is available, lenders overwhelmingly use it.

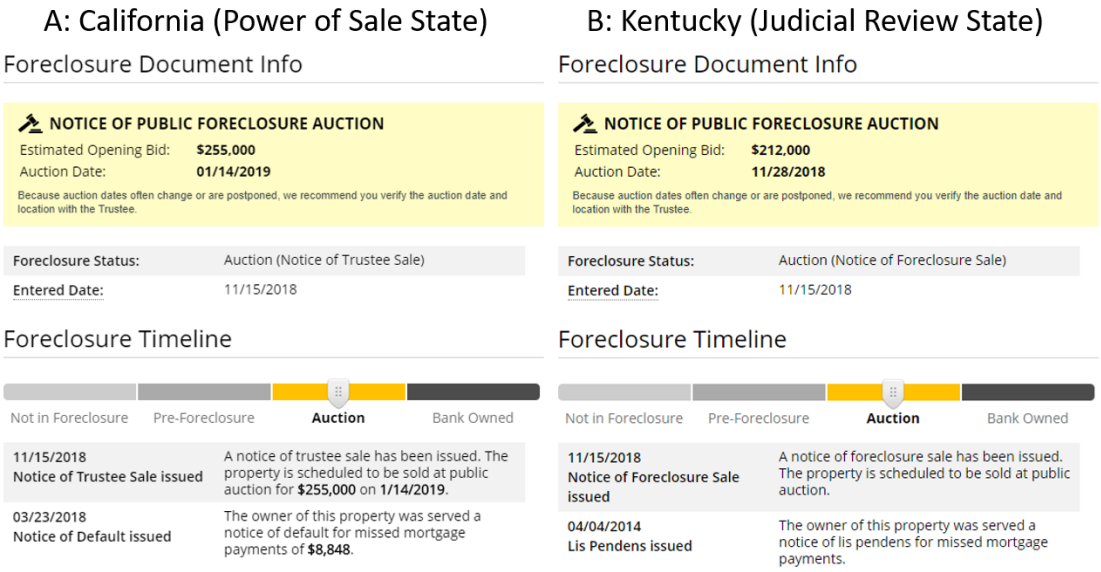
Figure A2 provides details of two foreclosed auction properties listed on Realtytr ac.com. In Panel A there is no mention of a Lis Pendens notice. Rather a Notice of Trustee Sale is issued. These data are consistent with California using Power of Sale law. In Panel B a Lis Pendens notice is recorded, consistent with Kentucky using Judicial Review law. In addition, a Notice of Foreclosure sale is issued (Criteria 2).

Criteria 5: Contributions to the legal literature.

We retrieve data reported by Ghent (2014), published in the *Journal of Law and Economics*, on the frequency that Power of Sale is used to foreclose in each state.

[22] Owing to their smaller populations, there are fewer properties listed for foreclosure auction in South Dakota and Montana. We therefore rely upon 27 observations for South Dakota and 58 for Montana.

Figure A2: Lis Pendens Notice



Notes: Source: Realtytrac.com. This figure shows two foreclosed properties listed for auction on Realtytrac.com. Panel A shows a listing for a house in California, a Power of Sale state. Panel B shows a listing for a house in Kentucky, a Judicial Review state.

Legal Classification System

Using the 5 criteria, and the data reported below, we designate each state as either Judicial Review or Power of Sale. To preview the results, there is no ambiguity in states' foreclosure law.

Following Criteria 1 we designate the 17 states that exclusively mandate Judicial Review foreclosure as JR states (Connecticut, Delaware, Florida, Illinois, Indiana, Kansas, Kentucky, Louisiana, New Jersey, New Mexico, North Carolina, North Dakota, Ohio, Pennsylvania, South Carolina, Vermont, Wisconsin). Owing to some idiosyncrasies we discuss Delaware and Pennsylvania separately below. We designate the District of Columbia a PS jurisdiction because it allows only Power of Sale foreclosure.

The remaining states permit both types of foreclosure. We therefore use Criteria 2-5 to assign them to JR or PS status. We calculate a PS index that ranges between 0 and 4. We award 1 point if a Notice of Foreclosure in court is not required, 1 point if Power of Sale is the most common type of procedure reported by attorneys, 1 point if the Lis Pendens incidence is less than 10%, and 1 point if Ghent (2014) reports Power of Sale frequency as 'Usual'.[23]

23 states have a PS index of 4. We therefore assign them to PS status (Alabama,

[23]We choose a 10% Lis Pendens threshold to remain consistent with Type-I errors.

Alaska, Arizona, Arkansas, California, Georgia, Idaho, Michigan, Minnesota, Mississippi, Missouri, Montana, Nevada, New Hampshire, Oregon, Rhode Island, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, and Wyoming).

3 states have a PS index of 3 (Colorado, Maryland, Massachusetts, and Nebraska). We assign them to PS status on the grounds that they meet the majority of our PS criteria. The reasons for these designations are:

> Colorado only uses a Judicial Review process when the borrower is protected under the Service Members Civil Relief Act (known as a "Rule 120 hearing"). This applies exclusively to veterans and is seldom used. Power of Sale is thus the default option. All other indicators are consistent with PS law.
>
> Massachusetts state law mandates Lis Pendens notices are filed before a foreclosure auction, despite Power of Sale being the default method of foreclosure. See Massachusetts General Laws Chapter 184 Section 15(a)-(b). All other indicators are consistent with PS law.
>
> Nebraska: Ghent (2014) reports Power of Sale as being 'Available' rather than 'Usual'. All other indicators are consistent with PS law.

6 states permit foreclosure using Judicial Review or Power of Sale and have PS index values between 0 and 2. Iowa, Maine, and New York have a PS index of 0. Oklahoma has a PS index of 1. South Dakota has a PS index of 2. We assign all five states to JR status because while Power of Sale is available, idiosyncrasies of state law effectively rule out Power of Sale.

> Iowa (PS index = 0): we classify Iowa as a JR state. Although Iowa permits Power of Sale, this procedure can only be used where borrowers voluntarily give up possession of their home and the lender agrees to waive any deficiency. This type of procedure is rarely used. All other criteria are consistent with Judicial Review. For example, lenders file a Notice of Foreclosure in court, the Lis Pendens incidence is 100%, attorneys report Judicial Review as the default option, and Ghent (2014) reports Power of Sale as being 'Unavailable'.
>
> Maine (PS index = 0): lenders must initiate a foreclosure by providing a Notice of Foreclosure in court, attorneys report JR as the most common procedure, the Lis Pendens incidence is 100%, and Ghent (2014) reports Power of Sale as 'Rare'. Maine has used Judicial Review historically such that it is the default option.
>
> New York (PS index = 0) has used Judicial Review law since at least the

1800s (Fox, 2015). Lenders must initiate a foreclosure by providing a Notice of Foreclosure in court, attorneys report Judicial Review as the most common procedure, the Lis Pendens incidence is 100%, and Ghent (2014) reports Power of Sale as 'Rare'. In essence, despite both foreclosure procedures being available in New York, historical precedent means that only Judicial Review is used. The classification is consistent with the huge number of foreclosure cases and court backlogs in New York.

Maryland (PS index = 1): from criteria 2-5 all indicators are consistent with Judicial Review, except that Ghent (2014) reports the Power of Sale frequency as usual. However, lenders must start the foreclosure process by filing a Notice of Foreclosure in the County Circuit court where the property is located, attorneys report Judicial Review as the default procedure and a court must ratify the foreclosure sale, and the Lis Pendens incidence is 100%. Furthermore, Pence (2006), Demiroglu et al. (2014) and Ghent and Kudlyak (2011) classify Maryland as a Judicial Review state.

Oklahoma (PS index = 1): lenders do not have to file a Notice of Foreclosure in court. However, while Power of Sale is permitted, borrowers can force a lender to use Judicial Review by sending a certified letter electing for judicial foreclosure to the lender and the county clerk's office (Oklahoma Statute title 46, Section 43). Delinquent borrowers have often chosen this route such that lenders invariably use Judicial Review. All other criteria are consistent with Judicial Review law.

South Dakota (PS index = 2): we classify South Dakota as a Judicial Review state because borrowers can easily challenge Power of Sale foreclosure and demand the process is overseen by a judge (South Dakota Codified Laws Section 21-48-9). Hence, while only 4% of foreclosed borrowers are issued with Lis Pendens notices, Power of Sale is rarely used. Ghent (2014) also reports Power of Sale to be 'Rare'. Conversations with foreclosure attorneys confirm this.

Hawaii is the only state that effectively changes the type of foreclosure law it uses during recent years. Hawaii permits foreclosure using both Judicial Review and Power of Sale. Before 2011 Power of Sale was the default option. However, Hawaii effectively became a Judicial Review state in 2011 following the introduction of a Mortgage Foreclosure Dispute Resolution program that applies exclusively to Power of Sale foreclosures. This program brings borrowers and lenders together with the goal of resolving mortgage default. This can result in a longer foreclosure timeline as the borrower is granted time to find ways to avoid foreclosure. To avoid the burdens this imposes, lenders now mainly foreclose using Judicial Review. This classification

is supported by the fact that lenders file a Notice of Foreclosure in court, evidence from attorneys supports Judicial Review is primarily used, and the Lis Pendens incidence is 64%.

Table A4: Foreclosure Cost and Timeline across Legal Frameworks

Legal framework	1 Foreclosure cost to lenders ($)	2 Timeline (Days)
Power of sale	4,035	101
Judicial review	6,428	252
Scire facias	8,304	275

Notes: Legal Framework is the type of legal process used to regulate foreclosure. Foreclosure cost to lenders is the mean cost incurred by lenders foreclosing mortgages in each legal framework. Data on foreclosure cost to lenders and the Timeline is taken from the SFLD database.

Finally, we discuss Delaware and Pennsylvania separately. Both states' law allows only Judicial Review foreclosure. However, they rely upon scire facias law which is designed to be somewhat more creditor friendly than Judicial Review law by placing the onus on borrowers to provide evidence why a lender should not be allowed to foreclose. Despite this feature, Table A3 emphatically shows that scire facias is neither expedient nor cheap for lenders. Data show the mean cost to a lender of foreclosing a property is $8,304 in scire facias states compared to $4,035 and $6,428 in Power of Sale and Judicial Review states, respectively. In addition, the foreclosure timeline is 275 days in scire facias states compared to 101 and 252 days in Power of Sale and Judicial Review states, respectively. We therefore classify Delaware and Pennsylvania as Judicial Review states because 1) the law mandates foreclosure is overseen by a judge, and 2) the foreclosure process is, on average, longer and more costly to lenders relative to even Judicial Review states.

Legal Appendix Data

This section reports the state-by-state data we use to evaluate the five criteria and classify each state's foreclosure law. For each state we report the citations to foreclosure in state law, whether the state permits foreclosure through Judicial Review, Power of Sale, or both procedures, if a lender must provide Notice of Foreclosure in court, the most common type of foreclosure procedure reported by foreclosure attorneys operating in the state, the share of foreclosed properties listed for auction on Realtytrac.com with Lis Pendens notices, and the frequency of Power of Sale reported by Ghent (2014).

Alabama
Citations to state foreclosure law: Alabama Code Sections 35-10-1 to 35-10-30, and Sections 6-5-247 to 6-5-257.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Alaska
Citations to state foreclosure law: Alaska Statutes Sections 34.20.070 to 34.20.100.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Arizona
Citations to state foreclosure law: Arizona Revised Statutes Sections 33-721 to 33-730 (judicial), and Sections 33-801 to 33-821 (nonjudicial).
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Arkansas
Citations to state foreclosure law: Arkansas Code Annotated Sections 18-49-101 through 18-49-106, and Sections 18-50-101 through 18-50-116.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

California
Citations to state foreclosure law: California Civil Code Sections 2924 through 2924l, and California Code of Civil Procedure Sections 580a through 580d.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.

Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Colorado
Citations to state foreclosure law: Colorado Revised Statutes Sections 38-38-100.3 through 38-38-114.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale. There is some minimal court involvement when the attorney representing the foreclosing party files a motion under Rule 120 of the Colorado Rules of Civil Procedure asking a court for an order authorizing the foreclosure sale by the public trustee. The court sets a hearing (called a "Rule 120 hearing"), which is limited to an inquiry of whether the borrower is in default and in the military and subject to protections under the Service Members Civil Relief Act. Neither of these issues is typically in dispute, such that Rule 120 hearings do not need to take place and the court enters the requested order.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Connecticut
Citations to state foreclosure law: Connecticut General Statutes Title 49, Sections 49-1 through 49-31v, and Connecticut Superior Court Rules 23-16 through 23-19.
Law available: Judicial Review.
Notice of Foreclosure in court: Yes. The foreclosing party starts the foreclosure by filing a complaint with the court and serving it to the borrower along with a summons.
Most common type of procedure (attorneys): Judicial Review. Foreclosures are either by sale (where the court orders the home sold and the proceeds paid to the foreclosing party to satisfy the outstanding debt) or strict foreclosure (where the court transfers title to the home directly to the foreclosing party without a foreclosure sale). Connecticut Geneneral Statutes Section 49-24.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Unavailable.

Delaware
Citations to state foreclosure law: Delaware Code Annotated Title 10, Chapter 49, Sections 5061 through 5067.
Law available: Judicial Review.
Notice of Foreclosure in court: Yes. To officially start the foreclosure, the foreclosing party files a lawsuit in court and provides notice of the suit to the borrower by serving him or her with a summons and complaint.

Most common type of procedure (attorneys): Judicial Review. The lender must sue the borrower in court in order to foreclose.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Unavailable.

District of Columbia
Citations to state foreclosure law: District of Columbia Code Sections 42-815 through 42-816.
Law available: Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Florida
Citations to state foreclosure law: Florida Statutes Sections 702.01 through 702.11, and Sections 45.031 through 45.0315.
Law available: Judicial Review.
Notice of Foreclosure in court: Yes. The foreclosing party files a lawsuit in court to start the foreclosure and gives notice of the lawsuit by serving the borrower with a summons and complaint.
Most common type of procedure (attorneys): Judicial Review.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Unavailable.

Georgia
Citations to state foreclosure law: Georgia Code Annotated Sections 44-14-160 through 44-14-191.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Hawaii
Citations to state foreclosure law: Hawaii Revised Statutes Sections 667-1.5 through 667-20.1 (judicial), and Sections 667-21 through 667-41 (nonjudicial).
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: Required if a lender opts for foreclosure using Judicial Review.
Most common type of procedure (attorneys): Power of Sale (until 2011), Judicial

Review (post 2011). The state implemented a Mortgage Foreclosure Dispute Resolution Program in 2011 which applies to Power of Sale foreclosures. To bypass the mediation program, most lenders now use Judicial Review.
Lis Pendens incidence: 64%.
PS frequency (Ghent, 2014): Available.

Idaho
Citations to state foreclosure law: Idaho Code Sections 45-1505 through 45-1515.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Illinois
Citations to state foreclosure law: Illinois Compiled Statutes Chapter 735, Sections 5/15-1501 through 5/15-1605.
Law available: Judicial Review.
Notice of Foreclosure in court: Yes. To begin the foreclosure, the foreclosing party files a lawsuit and gives notice of the suit by serving the borrower with a complaint and summons, along with a notice that advises the homeowner of his or her rights during the foreclosure process.
Most common type of procedure (attorneys): Judicial Review.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Unavailable.

Indiana
Citations to state foreclosure law: Indiana Code Sections 32-30-10-1 through 32-30-10 -14, Sections 32-29-1-1 through 32-29-1-11, and Sections 32-29-7-1 through 32-29-7-14.
Law available: Judicial Review.
Notice of Foreclosure in court: Yes. The foreclosing party gives the lender notice of the lawsuit by serving a court summons and complaint.
Most common type of procedure (attorneys): Judicial Review.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Unavailable.

Iowa
Citations to state foreclosure law: Iowa Code Sections 654.1 through 654.26, and Sections 655A.1 through 655A.9.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: To officially start the foreclosure, the lender files a

lawsuit in court.
Most common type of procedure (attorneys): Judicial Review. Iowa law also allows an alternative non-judicial voluntary foreclosures (where the borrower voluntarily gives up possession of the home and the lender agrees to waive any deficiency). However, these non-judicial procedures rarely occur.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Unavailable.

Kansas
Citations to state foreclosure law: Kansas Statutes Annotated Sections 60-2410, 60-2414, and 60-2415.
Law available: Judicial Review.
Notice of Foreclosure in court: The lender starts the foreclosure process by filing a lawsuit in court.
Most common type of procedure (attorneys): Judicial Review.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Unavailable.

Kentucky
Citations to state foreclosure law: Chapter 426 of the Kentucky Revised Statutes.
Law available: Judicial Review.
Notice of Foreclosure in court: Yes. The foreclosing party gives the borrower notice of the lawsuit by serving him or her with a summons and complaint.
Most common type of procedure (attorneys): Judicial Review.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Unavailable.

Louisiana
Citations to state foreclosure law: Louisiana Code of Civil Procedure Articles 3721 through 3753, Articles 2631 through 2772, and Louisiana Revised Statutes Section 13:3852.
Law available: Judicial Review.
Notice of Foreclosure in court: Upon a default, the foreclosing party files a foreclosure petition in court with the mortgage attached and the court orders the property seized and sold. The homeowner can fight the foreclosure only by appealing or bringing a lawsuit.
Most common type of procedure (attorneys): Judicial Review.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Unavailable.

Maine

Citations to state foreclosure law: Maine Revised Statutes Title 14 Sections 6101 through 6325.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: Yes. To officially start the foreclosure, the foreclosing party files a lawsuit in court and gives notice of the suit by serving the borrower a summons and complaint.
Most common type of procedure (attorneys): Judicial Review.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Rare.

Maryland
Citations to state foreclosure law: Code of Maryland (Real Property) Sections 7-105 through 7-105.8, Maryland Rules 14-201 through 14-209, and Rules 14-305 through 14-306.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: Yes. The lender initiates a foreclosure case with the Circuit Court in the county in which the property is located.
Most common type of procedure (attorneys): Judicial Review.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Usual.

Massachusetts
Citations to state foreclosure law: Massachusetts General Laws Chapter 244.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 99%.
PS frequency (Ghent, 2014): Usual.

Michigan
Citations to state foreclosure law: Michigan Compiled Laws Sections 600.3101 through 600.3185, and Sections 600.3201 through 600.3285.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Minnesota
Citations to state foreclosure law: Minnesota Statutes Sections 580.01 through 580.30 (foreclosure by advertisement), Sections 581.01 through 581.12 (foreclosure

by action), and Sections 582.01 through 582.32 (general foreclosure provisions).
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%
PS frequency (Ghent, 2014): Usual

Mississippi
Citations to state foreclosure law: Mississippi Code Annotated Sections 89-1-55 through 89-1-59.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Missouri
Citations to state foreclosure law: Missouri Revised Statutes Sections 443.290 through 443.440 (nonjudicial foreclosures), and Missouri Revised Statutes Section 443.190 and 443.280 (judicial foreclosures).
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Montana
Citations to state foreclosure law: Montana Code Annotated Sections 71-1-221 through 71-1-235, and Sections 71-1-301 through 71-1-321.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of sale. Home mortgages in Montana are trust indentures (also known as deeds of trust) under the state's Small Tract Financing Act, which is for properties that do not exceed 40 acres. This type of mortgage can be foreclosed nonjudicially (without a lawsuit) or judicially (with a lawsuit). However, non-judicial foreclosure is the default option.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Nebraska
Citations to state foreclosure law: Nebraska Revised Statutes Sections 76-1005

through 76-1018 (nonjudicial), and Sections 25-2137 through 25-2155 (judicial).
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Available.

Nevada
Citations to state foreclosure law: Nevada Revised Statutes Sections 107.0795 through 107.130, Sections 40.430 through 40.450, and Sections 40.451 through 40.463.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

New Hampshire
Citations to state foreclosure law: Title XLVIII, Chapter 479 of the New Hampshire Revised Statutes.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

New Jersey
Citations to state foreclosure law: New Jersey Statutes Annotated Sections 2A:50-1 through 2A:50-21 and Sections 2A:50-53 through 2A:50-63.
Law available: Judicial Review.
Notice of Foreclosure in court: Yes. The foreclosing party starts the foreclosure process by filing a lawsuit in court and giving notice of the suit by serving the borrower with a summons and complaint.
Most common type of procedure (attorneys): Judicial Review.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Unavailable.

New Mexico
Citations to state foreclosure law: New Mexico Statutes Sections 48-7-1 through 48-7-24, Sections 39-5-1 through 39-5-23, and Sections 48-10-1 through 48-10-21.
Law available: Judicial Review
Notice of Foreclosure in court: Yes. The foreclosing party officially starts a judicial

foreclosure by filing a lawsuit (a complaint) in court.
Most common type of procedure (attorneys): Judicial review. Nonjudicial foreclosures are also possible, but uncommon.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Available only for deeds of trust.

New York
Citations to state foreclosure law: New York Real Property Actions & Proceedings Sections 1301 through 1391.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: Yes. The foreclosing party officially starts the foreclosure process by filing a lawsuit (a complaint) in court. It gives notice of the lawsuit to the borrower by serving him or her with a summons and complaint, along with notices advising the borrower about the foreclosure process.
Most common type of procedure (attorneys): Judicial Review.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Rare.

North Carolina
Citations to state foreclosure law: North Carolina General Statutes Sections 45-21.1 through 45-21.38C, and Sections 45-100 through 107.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No. However, to officially start the foreclosure, the foreclosing party files a notice of hearing with the court clerk.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

North Dakota
Citations to state foreclosure law: North Dakota Century Code Sections 32-19-01 through 32-19-41, and Sections 28-23-04 to 28-23-14.
Law available: Judicial Review
Notice of Foreclosure in court: Yes. The foreclosing party officially starts the foreclosure by filing a lawsuit (a complaint) in court. It gives notice of the lawsuit to the borrower by serving him or her with a summons and complaint.
Most common type of procedure (attorneys): Judicial Review.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Unavailable.

Ohio
Citations to state foreclosure law: Title 23, Chapter 2323 (Section 2323.07) and

Chapter 2329 of the Ohio Revised Code.
Law available: Judicial Review.
Notice of Foreclosure in court: Yes. The foreclosing party files a lawsuit to begin the process and gives the borrower notice of the suit by serving him or her with a summons and complaint.
Most common type of procedure (attorneys): Judicial Review.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Unavailable.

Oklahoma
Citations to state foreclosure law: Oklahoma Statutes Title 12 Sections 686, 764 through 765, 773, and Sections 41 through 49.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Judicial Review. Foreclosure can take place using Power of Sale if the mortgage contract includes a power of sale clause. However, borrowers can force the lender to foreclose using Judicial Review by taking the following steps at least ten days before the date of the foreclosure sale: 1) notify the foreclosing party (the lender or servicer) by certified mail that the property to be sold is their homestead (primary residence) and that they elect for judicial foreclosure, and 2) record a copy of the notice in the county clerk's office (Oklahoma Statute title 46, Section 43). Judicial review is the most common foreclosure procedure.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Rare.

Oregon
Citations to state foreclosure law: Oregon Revised Statutes Sections 86.726 through 86.815 (nonjudicial foreclosures), and Sections 88.010 through 88.106 (judicial foreclosures).
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Pennsylvania
Citations to state foreclosure law: Pennsylvania Statutes Annotated Title 35, Sections 1680.402c to 1680.409c, Section 41, Sections 403 to 404, and Pennsylvania Rules of Civil Procedure, Rules 1141-1150.
Law available: Judicial Review.

Notice of Foreclosure in court: Yes. The foreclosing party officially starts the foreclosure process by filing a lawsuit (a complaint) in court. It gives notice of the lawsuit to the borrower by serving him or her with a summons and complaint.
Most common type of procedure (attorneys): Judicial Review (scire facias).
Lis Pendens incidence: 100%,
PS frequency (Ghent, 2014): Unavailable.

Rhode Island
Citations to state foreclosure law: Rhode Island General Laws Sections 34-27-1 through 34-27-5, and Sections 34-25.2-1 through 34-25.2-15.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

South Carolina
Citations to state foreclosure law: South Carolina Code Sections 15-39-650 through 15-39-660, and Sections 29-3-630 through 29-3-790.
Law available: Judicial Review.
Notice of Foreclosure in court: Yes. The lender must give the borrower notice of the lawsuit by serving a summons and complaint.
Most common type of procedure (attorneys): Judicial Review.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Unavailable.

South Dakota
Citations to state foreclosure law: South Dakota Codified Laws Sections 21-47-1 through 21-47-25 (judicial foreclosures), and Sections 21-48-1 through 21-48-26 (nonjudicial foreclosures).
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Judicial Review. Foreclosures in South Dakota can be through Power of Sale. However, even if the lender starts a Power of Sale foreclosure, the borrower can require the lender to foreclose using Judicial Review by making an application in the appropriate court (South Dakota Codified Laws Section 21-48-9).
Lis Pendens incidence: 4%.
PS frequency (Ghent, 2014): Rare.

Tennessee

Citations to state foreclosure law: Tennessee Code Annotated Sections 35-5-101 to 35-5-111, and Sections 66-8-101 through 66-8-103.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Texas
Citations to state foreclosure law: Texas Property Code Section 51.002 through 51.003.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Utah
Citations to state foreclosure law: Utah Code Annotated Sections 57-1-19 through 57-1-34, and Sections 78B-6-901 through 78B-6-906.
Law available: Judicial Review & Power of Sale
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Vermont
Citations to state foreclosure law: Vermont Statutes Title 12, Sections 4941 through 4954, and Vermont Rules of Civil Procedure 80.1.
Law available: Judicial Review.
Notice of Foreclosure in court: Yes. The lender begins the foreclosure by filing a complaint with the court and serving it to the borrower along with a summons and notice of foreclosure.
Most common type of procedure (attorneys): Judicial Review. Foreclosures are either by judicial sale or strict foreclosure. With both types of foreclosure, the lender files a lawsuit in a state court. In a foreclosure by judicial sale, the court issues a judgment and orders the home to be sold to satisfy the debt. In a strict foreclosure, the court gives the home directly to the foreclosing lender without a foreclosure sale. Strict foreclosure is allowed if the court finds that the value of the property is less than the amount of the mortgage debt (Vermont Statute title 12, Section 4941).
Lis Pendens incidence: 100%.

PS frequency (Ghent, 2014): Very rare.

Virginia
Citations to state foreclosure law: Virginia Code Annotated Sections 55-59 to 55-66.6.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Washington
Citations to state foreclosure law: Washington Revised Code Sections 61.24.020 through 61.24.140 (nonjudicial foreclosures), and Sections 61.12.040 to 61.12.170 (judicial foreclosures).
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

West Virginia
Citations to state foreclosure law: West Virginia Code Sections 38-1-3 through 38-1-15.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Wisconsin
Citations to state foreclosure law: Wisconsin Statutes Sections 846.01 through 846.25.
Law available: Judicial Review.
Notice of Foreclosure in court: Yes. The lender files a lawsuit in court in order to foreclose. The lender gives notice of the lawsuit by serving a summons and complaint.
Most common type of procedure (attorneys): Judicial Review.
Lis Pendens incidence: 100%.
PS frequency (Ghent, 2014): Unavailable.

Wyoming

Citations to state foreclosure law: Wyoming Statutes Sections 34-4-101 to 34-4-113, and Sections 1-18-101 to 1-18-115.
Law available: Judicial Review & Power of Sale.
Notice of Foreclosure in court: No.
Most common type of procedure (attorneys): Power of Sale.
Lis Pendens incidence: 0%.
PS frequency (Ghent, 2014): Usual.

Table A5 presents our classification of foreclosure law in each state and the District of Columbia.

Table A5: State Foreclosure Law Classification

State	Foreclosure Law	State	Foreclosure Law
Alabama	PS	Montana	PS
Alaska	PS	Nebraska	PS
Arizona	PS	Nevada	PS
Arkansas	PS	New Hampshire	PS
California	PS	New Jersey	JR
Colorado	PS	New Mexico	JR
Connecticut	JR	New York	JR
District of Columbia	PS	North Carolina	PS
Delaware	JR*	North Dakota	JR
Florida	JR	Ohio	JR
Georgia	PS	Oklahoma	JR
Hawaii	JR	Oregon	PS
Idaho	PS	Pennsylvania	JR*
Illinois	JR	Rhode Island	PS
Indiana	JR	South Carolina	JR
Iowa	JR	South Dakota	JR
Kansas	JR	Tennessee	PS
Kentucky	JR	Texas	PS
Louisiana	JR	Utah	PS
Maine	JR	Vermont	JR
Maryland	JR	Virginia	PS
Massachusetts	PS	Washington	PS
Michigan	PS	West Virginia	PS
Minnesota	PS	Wisconsin	JR
Mississippi	PS	Wyoming	PS
Missouri	PS		

Notes: JR indicates that a state uses Judicial Review law. PS indicates that a state uses Power of Sale law. * indicates that a state uses a scire facias form of Judicial Review law.

D: Ginnie Mae Tests

Table A6: Ginnie Mae Sample Estimates

	1	2
Dependent variable:	Sec	IR
JR	0.0227***	0.0243
	(2.91)	(1.35)
Control Variables	Yes	Yes
Region FE	Yes	Yes
Lender FE	Yes	Yes
Observations	101,361	100,707
R^2	0.66	0.35

Notes: This table reports parametric estimates of equation (1). In column 1 the dependent variable is equal to 1 if a loan is securitized through sale to Ginnie Mae, 0 otherwise. In column 2 the depedent variable is IR. The sample contains observations of loans eligible for sale to Ginnie Mae. That is, loans insured by the Federal Housing Administration. The unreported control variables are assignment, the JR-assignment interaction variable, applicant income, LTV, lenders per capita, minority, and male. The sample is restricted to loans within 10 miles of the threshold. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. *** indicates statistical significance at the 1% level.

E: Sensitivity Checks

E.1: Tests using 2000 to 2017 data

A natural question is whether our findings are specific to the year 2018. Our choice to focus on this year is due to a lack of information on interest rates and other loan characteristics in previous HMDA vintages. To examine the effects of JR law during the years 2000 to 2017 we rely on HMDA for

1. Securitization of GSE-eligible loans
2. Securitization of non-GSE-eligible loans (subprime and jumbos)
3. Interest rates on non-GSE-eligible loans (subprime)

HMDA data limitations prevent observation of interest rates on GSE-eligible loans and jumbo loans. We therefore rely exclusively on subprime loans (that account for the majority of non-GSE-eligible loans) to inspect the pricing effects of JR law in the non-GSE-eligible market. Interest rates are calculated using the HMDA rate spread variable. The rate spread measures the difference between the annual percentage rate (APR) on a loan and the average interest rate on prime loans. We therefore calculate IR for non-GSE-eligible loans in year t as the sum of the rate spread and average prime offer rate provided by the Federal Financial Institutions Examination Council during year t. Information on the interest rate at the point of origination on GSE-eligible loans is taken from the Fannie Mae Single Family Loan database (SFLD).

Pooling annual HMDA and SFLD data results in a data set that is computationally too large. In addition to the sample screens we apply to the 2018 data, we take a 10% random sample of the data sets. To mirror the previous econometric set-up, we include region-year and lender-year fixed effects in equation (1). The LATEs are therefore computed through cross-sectional comparisons of the treatment and control groups at the same point in time within the same region.

The results in Table A7 are qualitatively and quantitatively similar to the estimates from the 2018 data set. Consistent with the persistently higher credit risk of JR law through time, the inferences also exist before and after the financial crisis.

Table A7: Estimates using data from 2000 to 2017

	1	2	3	4	5	6	7	8
Sample	GSE				Non-GSE			
Dependent variable	GSE Sec		IR		NSec		IR	
Period	Pre	Post	Pre	Post	Pre	Post	Pre	Post
JR	0.0155***	0.0172***	0.0081	0.0125	0.0051	0.0035	0.0707*	0.0958***
	(3.30)	(3.85)	(0.93)	(0.98)	(0.52)	(0.50)	(1.78)	(2.76)
Assignment	0.0000	-0.0001	0.0003	0.0007**	0.0013	-0.0006	0.0001	0.0003
	(0.06)	(-0.20)	(0.86)	(2.26)	(0.91)	(-0.21)	(0.18)	(0.06)
JR * Assignment	-0.0011	0.0010	-0.0011	0.0013	-0.0007	-0.0084*	0.0006	-0.0001
	(-0.01)	(1.05)	(-1.56)	(-1.62)	(-0.29)	(-1.94)	(0.45)	(-0.21)
Applicant income	-0.0038	0.0104**	0.0280	0.0545	-0.0496***	-0.0168	0.0008	-0.0047
	(-1.00)	(2.22)	(0.78)	(1.19)	(-10.57)	(-1.24)	(0.13)	(-1.28)
Male	0.0093***	0.0076***	0.0010	-0.0157	0.0130**	0.0114	0.0072*	0.0012
	(5.70)	(4.82)	(0.01)	(-0.11)	(2.39)	(1.21)	(1.75)	(1.02)
Minority	-0.0252***	-0.0347***	-0.0128	-0.1569*	0.0470***	-0.0211	-0.0226**	0.0031
	(-4.61)	(-5.70)	(-1.50)	(-1.70)	(7.23)	(-1.22)	(-2.24)	(1.40)
Original LTV	0.0003	0.0011	0.0054**	0.0530***	-0.0002	-0.0105**	0.0031*	0.0379***
	(0.28)	(0.80)	(31.84)	(23.67)	(-0.26)	(-2.49)	(2.01)	(5.94)
House price index	0.0021*	-0.0150**	0.0112	-0.0006	-0.0006	-0.1256***	-0.0012	0.0039
	(1.70)	(-2.46)	(1.24)	(-0.05)	(-0.20)	(-6.14)	(-0.40)	(1.39)
Lenders per capita	0.0250	0.0668**	-0.6312***	-0.7792***	-0.0795*	0.4095***	0.0579*	-0.1097
	(1.31)	(2.47)	(-4.61)	(-4.95)	(-1.87)	(4.01)	(1.79)	(-1.30)
Region * Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender * Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	244,916	190,884	240,145	189,561	34,036	26,160	29,226	26,018
R^2	0.51	0.58	0.74	0.79	0.83	0.73	0.61	0.80
LATE (%)	4.1114	4.3877	-	-	-	-	0.5907	0.9628

Notes: This table presents parametric estimates of the equation $y_{ilrst} = \alpha + \beta JR_s + \gamma f(X_{ilrst}) + \varphi W_{ilrst} + \delta_{rt} + \delta_{lt} + \varepsilon_{ilrst}$ where all variables are defined as in equation (1) but with t subscripts that denote year. δ_{rt} and δ_{lt} represent region-year and lender-year fixed effects, respectively. GSE (Non-GSE) indicates the sample includes GSE-eligible (non-GSE-eligible) loans. In columns 1 and 2 the dependent variable is GSE Sec. In columns 3, 4, 7, and 8 the dependent variable is IR. In columns 5 and 6 the dependent variable is NSec. The Pre (Post) sample includes observations from 2000 to 2006 (2010 to 2016). The sample includes all loans within 10 miles of the threshold. LATE (%) is the local average treatment effect expressed in per cent relative to the mean value of the dependent variable within the control group. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

E.2: RMBS Pricing Tests

To study market-based pricing reactions to JR law, we collect data from Bloomberg on residential mortgage backed securities (RMBS) issued between 2000 and 2016. For each deal we observe the coupon and yield, the ratio of the value of properties in JR states to the total deal value, the share of properties in the deal that are owner occupied, investment properties, fixed rate mortgages, and the mean LTV and FICO score at the point of issue. This provides 43,943 observations.

Table A8: Residential MBS Pricing Results

	1	2
JR share	0.0797***	0.0808***
	(6.60)	(7.01)
Owner occupied		0.1010***
		(4.92)
Investment purpose		0.1126***
		(9.46)
Fixed rate		0.1166***
		(11.09)
LTV		0.0194***
		(39.06)
Credit score		-0.0062***
		(-50.81)
Issue year FE	Yes	Yes
Observations	43,943	43,943
R^2	0.04	0.12

Notes: This table presents estimates of the equation $i_{dt} = \alpha + \beta JRshare_{dt} + \gamma X_{dt} + \varphi_t + \varepsilon_{dt}$, where i_{dt} is the yield on RMBS deal d at the point of origination in year t; $JRshare_{dt}$ is the ratio of the value of loans in JR states to the total value of all loans in deal d in year t; X_{dt} is a vector containing the share of the deal by value that are owner occupied, for investment purposes, fixed rate mortgages, the mean LTV ratio in the deal, and the mean credit score; φ_t denote issue year fixed effects; ε_{dt} is the error term. Data are taken from Bloomberg. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. *** indicates statistical significance at the 1% level.

F: Methodological Robustness Checks

Table A9: Higher Order Polynomial and Non-Parametric Regressions

	1	2	3	4	5	6	7	8
Dependent variable	Securitization				IR			
Estimator	PAR			NPAR	PAR			NPAR
Panel A: GSE-eligible								
JR	0.0218***	0.0239**	0.0197**	0.0173***	0.0225	0.0177	0.0131	0.0123
	(2.83)	(2.69)	(2.22)	(5.78)	(1.02)	(1.28)	(1.28)	(1.08)
Assignment	0.0014	0.0016	0.0100**		0.0010	0.0007	0.0010	
	(0.82)	(0.49)	(2.18)		(0.50)	(0.15)	(0.15)	
JR * Assignment	-0.0055**	-0.0097**	-0.0140*		-0.0060**	0.0032	0.0172*	
	(-2.58)	(-2.07)	(-1.70)		(-2.10)	(0.49)	(1.72)	
Assignment^2	-0.0000	-0.0001	-0.0043**		-0.0000	0.0001	-0.0001	
	(-0.15)	(-0.08)	(-2.18)		(-0.05)	(0.06)	(-0.03)	
JR * Assignment^2	0.0004*	0.0016	0.0037		0.0005*	-0.0021	-0.0091*	
	(1.90)	(1.32)	(0.85)		(1.80)	(-1.14)	(-1.93)	
Assignment^3		0.0001	0.0007**			-0.0001	0.0001	
		(0.05)	(2.36)			(-0.07)	(0.05)	
JR * Assignment^3		-0.0001	-0.0004			0.0002	0.0013*	
		(-1.03)	(-0.58)			(1.41)	(1.70)	
Assignment^4			-0.0001**				-0.0001	
			(-2.47)				(-0.06)	
JR * Assignment^4			0.0001				-0.0001	
			(0.47)				(-1.41)	
Control variables	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	327,549	327,549	327,549	327,549	327,549	327,549	327,549	327,549
R^2	0.52	0.52	0.52	-	0.24	0.24	0.24	-

Table A9 Cont'd: Higher Order Polynomial Regressions

	1	2	3	4	5	6	7	8
Dependent variable	Securitization				IR			
Estimator	PAR			NPAR	PAR			NPAR
Panel B: Non-GSE eligible								
JR	-0.0003	0.0017	0.0032	0.0078	0.0690***	0.0598**	0.0538**	0.1597***
	(-0.06)	(0.29)	(0.51)	(1.08)	(3.53)	(2.55)	(2.25)	(2.65)
Assignment	-0.0052***	-0.0055	-0.0063		-0.0015	-0.0022	-0.0069	
	(-4.26)	(-1.10)	(-0.77)		(-0.33)	(-0.17)	(-0.35)	
JR * Assignment	0.0044**	0.0017	-0.0014		-0.0028	0.0145	0.0431	
	(2.07)	(0.26)	(-0.15)		(-0.45)	(0.76)	(1.43)	
Assignment^2	0.0005***	0.0006	0.0010		0.0001	0.0003	0.0027	
	(3.04)	(0.41)	(0.28)		(0.25)	(0.09)	(0.30)	
JR * Assignment^2	-0.0003	0.0004	0.0020		0.0002	-0.0046	-0.0189	
	(-1.33)	(0.24)	(0.48)		(0.25)	(-0.93)	(-1.37)	
Assignment^3		-0.0000	-0.0001			-0.0001	-0.0004	
		(-0.08)	(-0.14)			(-0.26)	(-0.16)	
JR * Assignment^3		-0.0001	-0.0003			0.0003	0.0027	
		(-0.42)	(-0.46)			(1.05)	(1.19)	
Assignment^4			0.0000				0.0000	
			(0.13)				(0.27)	
JR * Assignment^4			0.0000				-0.0001	
			(0.37)				(-1.03)	
Control variables	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	135,181	135,181	135,181	135,181	135,181	135,181	135,181	135,181
R^2	0.57	0.57	0.57	-	0.54	0.54	0.54	-

Notes: This table presents parametric estimates of equation (1) with second, third, and fourth order polynomials and interactions as additional covariates. PAR and NPAR indicate equation (1) is estimated parametrically and nonparametrically, respectively. In Panel A (B) the sample contains GSE-eligible (non-GSE-eligible) loans. In columns 1 to 4 of Panel A the dependent variable is GSE Sec. In columns 5 to 8 of Panel A the dependent variable is IR. In columns 1 to 4 of Panel B the dependent variable is NSec. In columns 5 to 8 of Panel B the dependent variable is IR. The sample includes loans within 10 miles of the threshold. The control variables are the assignment variable, the JR-assignment interaction variable, applicant income, LTV, lenders per capita, minority, and male. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

Table A10: Narrower Bandwidths

	1	2	3	4	5	6	7	8
Bandwidth	5 miles				2.5 miles			
Sample	GSE		Non-GSE		GSE		Non-GSE	
Dependent variable	GSE Sec	IR	NSec	IR	GSE Sec	IR	NSec	IR
JR	0.0160**	0.0191	-0.0030	0.0484***	0.0139*	0.0127	-0.0042	0.0396**
	(2.30)	(1.40)	(-0.60)	(3.49)	(1.78)	(1.56)	(-0.63)	(2.10)
Assignment	0.0001	0.0015	-0.0041***	-0.0006	0.0012	-0.0006	-0.0010	0.0022
	(0.17)	(1.00)	(-4.32)	(-0.25)	(0.68)	(-0.24)	(-0.32)	(0.31)
JR * Assignment	-0.0027*	-0.0050**	0.0052***	-0.0003	-0.0071**	0.0062	-0.0004	0.0183
	(-1.70)	(-2.15)	(3.32)	(-0.06)	(-2.64)	(1.04)	(-0.10)	(1.37)
Applicant income	-0.0172**	-0.0589***	0.0221***	-0.1390***	-0.0181**	-0.0588***	0.0215***	-0.1442***
	(-2.48)	(-7.29)	(4.84)	(-29.31)	(-2.70)	(-9.79)	(4.22)	(-22.18)
LTV	-0.0009***	0.0051***	-0.0006***	0.0052***	-0.0008***	0.0054***	-0.0005**	0.0052***
	(-7.07)	(14.05)	(-2.88)	(23.61)	(-5.95)	(13.80)	(-2.52)	(16.91)
Lenders per capita	0.0004	-0.0006*	-0.0003	-0.0016***	0.0003	-0.0000	-0.0003	-0.0005
	(1.20)	(-1.74)	(-1.38)	(-2.82)	(0.70)	(-0.04)	(-0.82)	(-0.60)
Minority	-0.0189***	-0.0066	-0.0265***	0.0178**	-0.0155***	-0.0056	-0.0232***	0.0165*
	(-7.23)	(-1.02)	(-5.49)	(2.55)	(-4.29)	(-0.99)	(-3.88)	(1.72)
Male	0.0015	-0.0126***	-0.0092***	0.0214***	0.0006	-0.0117***	-0.0071**	0.0149*
	(0.75)	(-4.87)	(-3.50)	(3.33)	(0.32)	(-3.65)	(-2.23)	(1.67)
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	199,672	199,672	80,259	80,259	105,261	105,261	44,877	44,877
R^2	0.52	0.25	0.58	0.57	0.52	0.25	0.59	0.60

Notes: This table presents parametric estimates of equation (1). A bandwidth of 5 (2.5) miles indicates the sample includes loans within 5 (2.5) miles of the threshold. GSE (Non-GSE) indicates the sample includes GSE-eligible (non-GSE-eligible) loans. In columns 1 and 5 the dependent variable is GSE Sec. In columns 3 and 7 the dependent variable is NSec. In all other columns the dependent variable is IR. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

G: Private Sales of GSE-Eligible Loans

Table A11: Private Securitization of GSE-eligible Loans

	1	2	3
Panel A: Private securitization of GSE-eligible loans			
Purchaser:	All	Private	Private
JR	0.0091*	-0.0116**	-0.0100**
	(1.81)	(-2.22)	(-2.01)
Assignment	0.0004	-0.0009**	-0.0005
	(0.91)	(-2.06)	(-1.32)
JR * Assignment	-0.0002	0.0016**	0.0011
	(-0.24)	(2.39)	(1.57)
Applicant income	-0.0179***	-0.0013	-0.0006
	(-5.82)	(-0.34)	(-0.16)
LTV	0.0001	0.0012	0.0012
	(1.10)	(0.89)	(0.70)
Lenders per capita	0.0002	-0.0003	-0.0004**
	(1.38)	(-1.59)	(-2.10)
Minority	-0.0147***	0.0065**	0.0060*
	(-7.53)	(2.16)	(1.89)
Male	-0.0018	-0.0019	-0.0025*
	(-1.16)	(-1.34)	(-1.78)
Renegotiation rate			0.0251
			(0.45)
Region FE	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes
Observations	327,549	327,549	327,549
R^2	0.48	0.62	0.63
Panel B: Multinomial logit estimates			
Outcome:	Unsold	GSE	Private
JR	-0.0161	0.0556**	-0.0394**
	(-1.05)	(4.39)	(-2.52)
Control variables	Yes	Yes	Yes
Region FE	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes
Observations	327,549	327,549	327,549
R^2	0.13	0.13	0.13
Panel C: Interest rates			
Sample:	Unsold	GSE	Private
JR	0.0095	0.0210	0.0142
	(0.57)	(1.65)	(1.44)
Control variables	Yes	Yes	Yes
Region FE	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes
Observations	97,186	142,533	90,291
R^2	0.51	0.26	0.20

Notes: Panel A presents parametric estimates of equation (1). In column 1 the dependent variable is Sec. In columns 2 and 3 the dependent variable is Private Sec. Panel B reports multinomial logit estimates of equation (1) using GSE-eligible loans. In column 1 the potential outcome is unsold (the lender does not securitize the loan). In column 2 (3) the potential outcome is GSE Sec (Private Sec). Panel C provides estimates of equation (1) where the dependent variable is IR. The sample contains unsold loans, loans sold to a GSE, and loans sold to a private buyer in column 1, 2, and 3, respectively. The control variables are the assignment variable, the JR-assignment interaction variable, applicant income, LTV, lenders per capita, minority, and male. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

H: Probability of Mortgage Default

Table A12: Spliting sample by Probability of Default

	1	2	3	4	5	6	7	8
Sample	GSE-eligible				Non-GSE-eligible			
Dependent variable	GSE Sec		IR		NSec		IR	
Sample	Low PD	High PD	Low PD	High PD	Low PD	High PD	Low PD	High PD
JR	0.0189***	0.0201**	0.0012	0.0314	-0.0097	-0.0041	0.0620***	0.0665***
	(2.76)	(2.37)	(0.12)	(1.26)	(-1.41)	(-0.76)	(3.08)	(3.35)
LATE (%)	4.03	4.78	-	-	-	-	1.33	1.38
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	178,113	149,436	178,113	149,436	32,387	102,794	32,387	102,794
R^2	0.52	0.53	0.24	0.28	0.63	0.57	0.53	0.57

Notes: This table presents parametric estimates of equation (1). GSE-eligible (Non-GSE-eligible) indicates the sample includes GSE-eligible (non-GSE-eligible) loans. In columns 1 and 2 the dependent variable is GSE Sec. In columns 3, 4, 7, and 8 the dependent variable is IR. In columns 5 and 6 the dependent variable is NSec. Low (High) PD indicates the sample includes loans with a probability of default below (above) the mean probability of default. The probability of default is estimated using the approach outlined by Agarwal et al. (2012). The control variables are the assignment variable, the JR-assignment interaction variable, applicant income, LTV, lenders per capita, minority, and male. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. ** and *** indicate statistical significance at the 5% and 1% levels, respectively.

I: Supplementary Robustness Tests

Table A13: Legal Factors

	1	2	3	4	5	6	7	8
Dependent variable	Securitization				IR			
Sample excludes	DE & PA	TX	LA	MA	DE & PA	TX	LA	MA
Panel A: GSE-eligible								
JR	0.0177***	0.0164**	0.0169**	0.0157**	0.0164	0.0152	0.0151	0.0189
	(2.82)	(2.55)	(2.61)	(2.35)	(1.59)	(1.43)	(1.41)	(1.60)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	309,645	314,876	314,197	316,001	309,645	314,876	314,197	316,001
R^2	0.52	0.52	0.52	0.52	0.25	0.25	0.25	0.24
Panel B: Non-GSE-eligible								
JR	-0.0070	-0.0064	-0.0083	-0.0100	0.0671***	0.0567***	0.0668***	0.0609***
	(-1.39)	(-1.25)	(-1.66)	(-1.20)	(3.68)	(3.12)	(3.57)	(3.18)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	131,822	131,865	131,866	133,125	131,822	131,865	131,866	133,125
R^2	0.57	0.57	0.58	0.57	0.54	0.53	0.53	0.54

Notes: This table presents parametric estimates of equation (1). In Panel A (B) the sample contains GSE-eligible (non-GSE-eligible) loans. The dependent variable in columns 1 to 4 of Panel A (B) is GSE sec (NSec). The dependent variable in columns 5 to 8 of both panels is IR. In columns 1 and 5 the sample excludes observations from Delaware and Pennsylvania. In columns 2 and 6 the sample excludes observations from Texas. In columns 3 and 7 the sample excludes observations from Louisiana. In columns 4 and 8 the sample excludes observations from Massachusetts. The sample includes all loans within 10 miles of the threshold. The control variables are the assignment variable, the JR-assignment interaction variable, applicant income, LTV, lenders per capita, minority, and male. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. ** and *** indicate statistical significance at the 5% and 1% levels, respectively.

Table A14: Lending Industry Robustness Tests

	1	2	3	4	5	6	7	8	9	10	11	12
Dependent variable	Securitization						Interest rates					
Sample	Banks			SC Banks	NC Banks	Low OTD	Banks			SC Banks	NC Banks	Low OTD
Panel A: GSE-eligible loans												
JR	0.0447**	0.0449**	0.0456**	0.0131**	0.0114**	0.0119**	0.0205	0.0212	0.0218	0.0061	0.0048	0.0108
	(2.41)	(2.42)	(2.41)	(2.24)	(2.47)	(2.24)	(1.09)	(1.12)	(1.19)	(0.46)	(0.30)	(0.97)
Bank size	0.0595***	0.0594***	0.0529***				-0.0122***	-0.0150***	-0.0227***			
	(22.47)	(21.84)	(11.97)				(-2.85)	(-3.82)	(-4.47)			
NII	0.0110	0.0126	0.0132				-0.0402	-0.0406	-0.0407			
	(0.17)	(0.18)	(0.19)				(-1.10)	(-0.99)	(-0.93)			
Z-score	-0.0534	-0.0545	-0.0591				-0.1151***	-0.1170***	-0.1217***			
	(-0.72)	(-0.74)	(-0.79)				(-3.31)	(-3.43)	(-3.85)			
Capital ratio	-0.0022	-0.0021	-0.0028				0.0001	0.0056**	0.0047*			
	(-0.73)	(-0.71)	(-0.87)				(0.05)	(2.12)	(1.91)			
Cost of deposits		-0.0139	-0.0206					-0.0098	-0.0098			
		(-0.45)	(-0.62)					(-1.19)	(-1.05)			
Out of state			0.0708*						0.0855***			
			(1.82)						(3.31)			
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	No	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
Observations	185,289	185,289	185,289	146,413	38,876	117,370	185,289	185,289	185,289	146,413	38,876	117,370
R^2	0.16	0.16	0.17	0.44	0.56	0.45	0.07	0.09	0.10	0.24	0.33	0.27
Panel B: non-GSE-eligible loans												
JR	-0.0174	-0.0219	-0.0217	-0.0030	-0.0013	-0.0040	0.0421**	0.0436**	0.0456**	0.0382**	0.0798*	0.0735***
	(-1.30)	(-1.16)	(-1.17)	(-0.44)	(-0.07)	(-0.88)	(2.30)	(2.43)	(2.56)	(2.31)	(1.69)	(4.07)
Bank size	-0.0337***	-0.0468***	-0.0497***				-0.0527***	-0.0502***	-0.0692***			
	(-12.34)	(-11.18)	(-11.39)				(-32.18)	(-32.26)	(-37.85)			
NII	-0.0935***	-0.0534**	-0.0564**				-0.1122***	-0.2106***	-0.2291***			
	(-2.73)	(-2.26)	(-2.34)				(-5.68)	(-11.29)	(-12.23)			
Zscore	0.0155	0.0105	0.0130				-0.3393***	-0.3056***	-0.2977***			
	(0.25)	(0.18)	(0.23)				(-11.45)	(-10.60)	(-10.43)			
Capital Ratio	0.0140***	0.0079**	0.0078*				-0.0078***	-0.0079***	-0.0103***			
	(3.62)	(2.08)	(2.02)				(-4.59)	(-4.70)	(-6.03)			
Cost of deposits		0.0157	0.0119					0.0800***	0.0593***			
		(0.64)	(0.48)					(6.28)	(4.72)			
Out of state			0.0351*						0.2163***			
			(1.69)						(21.01)			
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	No	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
Observations	86,037	86,037	86,037	74,575	11,462	62,468	886,037	86,037	86,037	74,575	11,462	62,468
R^2	0.16	0.22	0.22	0.48	0.49	0.23	0.20	0.23	0.24	0.51	0.54	0.54

Notes: This table presents parametric estimates of equation (1). In Panel A (B) the sample contains GSE-eligible (non-GSE-eligible). In columns 1 to 6 of Panel A (B) the dependent variable is GSE sec (NSec). In columns 7 to 12 of both panels the dependent variable is IR. In columns 1 to 3 and 7 to 9 the sample contains observations of banks. In columns 4 and 10 the sample contains state chartered banks. In columns 5 and 11 the sample contains national chartered banks. In columns 6 and 12 the sample contains banks that securitize less than 50% of the loans they originate. The sample includes all loans within 10 miles of the threshold. The control variables are the assignment variable, the JR-assignment interaction variable, applicant income, LTV, lenders per capita, minority, and male. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

A danger is that there exist discontinuities in the incentive to default on other types of debt at the threshold such that the estimates simply capture the riskiness of the population that live in border areas. Although this appears implausible, we append the empirical model with controls for the delinquency rate on automobile and credit card debt. The effect of JR law in columns 1 and 2 of Table A15 remains robust.

The longer timeline in JR states may allow delinquent borrowers to self-cure. Alternatively, the propensity to securitize a loan may differ across states because the likelihood of successfully renegotiating with borrowers that default is lower due to the longer foreclosure timeline in JR states (Piskorski et al., 2010; Agarwal et al., 2011). The estimates in column 3 of Table A15 show that renegotiation does not drive our inferences.

Lenders' profitability expectations are also influenced by pre-payment risk. We approximate pre-payment risk using the refinancing rate reported in HMDA on mortgages over the past five years in each state. The results in column 4 of Table A14 are similar to before. In column 5 of Table A15 we control for whether a mortgage is an adjustable rate loan. This has no bearing on our findings. Han et al. (2015) show that taxation is linked to securitization incentives. The results in columns 6 and 7 of Table A15 demonstrate that the LATE is robust to controlling for state-level corporate and personal tax rates.

Table A15: Miscellaneous Sensitivity Checks

	1	2	3	4	5	6	7
Panel A: GSE-eligible securitization							
JR	0.0200***	0.0201***	0.0162**	0.0202***	0.0201***	0.0200***	0.0192***
	(3.23)	(3.34)	(2.50)	(3.24)	(3.68)	(3.26)	(3.01)
Auto Deliquency	-0.0019						
	(-0.46)						
Credit Card Delinquency		0.0073					
		(0.82)					
Renegotiation Rate			-0.0579				
			(-0.69)				
Refinancing Rate				0.0129			
				(1.13)			
Adjustable Rate Loan					-0.3781***		
					(-14.54)		
Corporate Tax						-0.0024	
						(-0.75)	
Income Tax							0.0061***
							(3.41)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	327,549	327,549	327,549	327,549	327,549	327,549	327,549
R^2	0.51	0.51	0.51	0.51	0.54	0.51	0.51

Table A15 Cont'd: Miscellaneous Sensitivity Checks

	1	2	3	4	5	6	7
Panel B: GSE-eligible interest rates							
JR	0.0159	0.0151	0.0163	0.0158	0.0158	0.0319	0.0140
	(1.39)	(1.60)	(1.37)	(1.39)	(1.41)	(1.12)	(1.27)
Auto Deliquency	-0.0003						
	(-0.08)						
Credit Card Delinquency		0.0279***					
		(3.70)					
Renegotiation Rate			0.0069				
			(0.08)				
Refinancing Rate				0.0392**			
				(2.02)			
Adjustable Rate Loan					-0.2512***		
					(-6.33)		
State Corporate Tax						0.0127**	
						(2.52)	
State Personal Tax							0.0033
							(1.53)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	327,549	327,549	327,549	327,549	327,549	327,549	327,549
R^2	0.23	0.23	0.23	0.23	0.24	0.23	0.23

Table A15 Cont'd: Miscellaneous Sensitivity Checks

	1	2	3	4	5	6	7
Panel C: Non-GSE-eligible securitization							
JR	-0.0069	-0.0070	-0.0097**	-0.0067	-0.0069	-0.0123	-0.0062
	(-1.34)	(-1.46)	(-2.24)	(-1.34)	(-1.32)	(-1.01)	(-1.28)
Auto Deliquency	-0.0005						
	(-0.24)						
Credit Card Delinquency		0.0008					
		(0.17)					
Renegotiation Rate			-0.0387				
			(-0.90)				
Refinancing Rate				-0.0100			
				(-1.22)			
Adjustable Rate Loan					-0.0968***		
					(-6.43)		
State Corporate Tax						-0.0012	
						(-0.52)	
State Personal Taxe							-0.0006
							(-0.42)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	135,181	135,181	135,181	135,181	135,181	135,181	135,181
R^2	0.57	0.57	0.57	0.57	0.58	0.57	0.57

Table A15 Cont'd: Miscellaneous Sensitivity Checks

	1	2	3	4	5	6	7
Panel D: Non-GSE-eligible interest rates							
JR	0.0611***	0.0542***	0.0542**	0.0624***	0.0623***	0.0591**	0.0491**
	(2.77)	(2.76)	(2.34)	(2.82)	(3.00)	(2.10)	(2.51)
Auto Deliquency	-0.0054						
	(-0.79)						
Credit Card Delinquency		0.0380**					
		(2.08)					
Renegotiation Rate			0.0126				
			(0.07)				
Refinancing Rate				0.0421			
				(1.33)			
Adjustable Rate Loan					-0.3074***		
					(-10.63)		
State Corporate Tax						0.0027	
						(0.26)	
State Personal Tax							0.0121**
							(2.54)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	135,181	135,181	135,181	135,181	135,181	135,181	135,181
R^2	0.53	0.53	0.53	0.53	0.54	0.51	0.53

Notes: This table reports parametric estimates of equation (1). In Panel A the sample contains GSE-eligible loans and the dependent variable is GSE sec. In Panel B the sample contains GSE-eligible loans and the dependent variable is IR. In Panel C the sample contains non-GSE-eligible loans and the dependent variable is NSec. In Panel D the sample contains non-GSE-eligible loans and the dependent variable is IR. The control variables are the assignment variable, the JR-assignment interaction variable, applicant income, LTV, lenders per capita, minority, and male. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

Table A16: Estimates by Population and Region

	1	2	3	4
Sample	GSE		Non-GSE	
Dependent variable	GSE Sec	IR	NSec	IR
Panel A: Most populous border regions				
JR	0.0174**	0.0145	-0.0051	0.0461**
	(2.18)	(1.18)	(-0.89)	(2.21)
Control variables, Region FE, Year FE	Yes	Yes	Yes	Yes
Observations	127,836	127,836	50,303	50,303
R^2	0.52	0.25	0.58	0.56
Panel B: Least populous borders regions				
JR	0.0231***	0.0239	-0.0121	0.0790***
	(3.66)	(1.25)	(-0.98)	(3.82)
Control variables, Region FE, Year FE	Yes	Yes	Yes	Yes
Observations	199,713	199,713	84,878	55,203
R^2	0.51	0.24	0.58	0.55
Panel C: Northeast				
JR	0.0308**	0.0177	0.0125	0.1423***
	(2.89)	(1.11)	(0.47)	(4.51)
Control variables, Region FE, Year FE	Yes	Yes	Yes	Yes
Observations	31,582	31,582	12,091	12,091
R^2	0.49	0.27	0.54	0.48
Panel D: Midwest				
JR	0.0198*	-0.0032	-0.0033	0.0159*
	(1.84)	(-0.20)	(-0.49)	(1.79)
Control variables, Region FE, Year FE	Yes	Yes	Yes	Yes
Observations	127,187	127,187	43,878	43,878
R^2	0.51	0.20	0.58	0.48
Panel E: West				
JR	0.1229	0.2792	-0.0079	0.4032
	(0.98)	(1.46)	(-0.05)	(0.98)
Control variables, Region FE, Year FE	Yes	Yes	Yes	Yes
Observations	458	458	309	309
R^2	0.77	0.54	0.69	0.93
Panel F: South				
JR	0.0186**	-0.0023	-0.0318**	0.2360***
	(2.12)	(-0.15)	(-2.01)	(4.96)
Control variables, Region FE, Year FE	Yes	Yes	Yes	Yes
Observations	58,904	58,904	28,202	28,202
R^2	0.53	0.27	0.59	0.66

Table A16 Cont'd: Estimates by Population and Region

	1	2	3	4
Sample	GSE		Non-GSE	
Dependent variable	Sec	IR	NSec	IR
Panel G: Borders between regions				
JR	0.0179**	0.0306	-0.0106	0.0767***
	(2.18)	(1.28)	(-0.90)	(3.28)
Control variables, Region FE, Year FE	Yes	Yes	Yes	Yes
Observations	156,864	156,864	74,076	74,076
R^2	0.52	0.26	0.58	0.59

Notes: This table presents estimates of equation (1). GSE (Non-GSE) indicates the sample includes GSE-eligible (non-GSE-eligible) loans. In column 1 the dependent variable is GSE Sec. In column 2 the dependent variable is IR. In column 3 the dependent variable is NSec. In column 4 the dependent variable is IR. The sample includes loans within 10 miles of the threshold. Panel A includes observations from regions with above the mean population. Panel B includes observations from regions with below the mean population. In Panel C the sample includes observations from CT, MA, ME, NH, NY, RI, and VT. In Panel D the sample includes observations from IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, and WI. In Panel E the sample includes observations from AZ, CO, and NM. In Panel F the sample includes observations from AR, KY, LA, MS, OK, TN, TX, VA, and WV. In Panel G the sample includes observations from regions that border the accepted regions in the US (for example, between Northeastern and Southern states) AL, AR, DC, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, and WV. The control variables are the assignment variable, the JR-assignment interaction variable, applicant income, LTV, lenders per capita, minority, and male. Standard errors are clustered at the state level and the corresponding t-statistics are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels respectively.

Online Appendix References

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