The Impacts of Mortgage Servicer Licensing Requirements

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Abstract

The 2007-2008 U.S. financial crisis illustrated the way in which mortgage servicers, through their role in influencing deliquencies, foreclosures, and in administering mortgage modification programs, can influence housing market outcomes at a broad scale. We study a wave of state-level mortgage servicer licensing laws passed in the wake of the crisis. We study mortgage market outcomes using a difference-in-differences approach and pooled mortgage-backed security outcomes using an exposure design. We find evidence that the reforms decreased in late-stage delinquencies and foreclosures. Compliance costs may have been passed through to increased interest rates. Other borrower and loan characteristics were unchanged.

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1 Introduction

Buying and financing a home is among the most important and difficult decisions faced by consumers. Though consumers who finance a home through a mortgage ultimately interact with a mortgage servicer regularly and repeatedly, the importance of mortgage servicing is often overshadowed by loan origination and settlement. However, the experience of the 2007-2008 U.S. housing and financial crisis illustrates the way in which mortgage servicing can generate large-scale disruptions to broader housing, mortgage, and financial markets (McNulty et al., 2019; Shoemaker, 2019). Some have argued that soaring foreclosure rates were amplified by the practices of loan servicers in the form of short-term forbearance agreements for delinquent loans in lieu of sustainable loan modification measures (Thompson, 2011), and mishandling of loan modification applications (Sandler, 2023).

These disruptions are a result of the characteristic information asymmetries present in financial markets combined with misaligned incentives between servicers and homeowners: while the latter prefers averting foreclosure, the former may benefit from initiating foreclosure when reimbursed foreclosure costs outweigh servicing fees (Diop and Zheng, 2022). Despite substantial post-crisis reforms to encourage market discipline including enhanced disclosure rules and the creation of the Consumer Financial Protection Bureau (CFPB), the underlying design of the mortgage servicing industry has not changed: in many cases, mortgage originators contract with third-party mortgage servicers (or sell loans to other banks who engage in such contracts). This practice increases informational frictions both by making it more difficult for consumers to understand who will be servicing their loan after it is funded and, in a very literal sense, by increasing the possibility of errors in loan servicing documentation

due to informational transfer between corporate entities (Axelson and Hutchings, 2013).

While the CFPB has implemented national standards for mortgage servicing, it has fallen to states to implement licensing. Several states have done so, and these laws are the focus of our study. Proponents of such requirements generally cited the significance of mortgage servicers within the broader mortgage industry and the persistence of issues including "sloppy account transfers," "poor payment processing," and "loss mitigation mistakes."[1] On the other hand, economists have long raised concerns about licensing requirements for firms, arguing that they are costly yet largely result in opportunities for license holders to extract rents from consumers (Moore, 1961; Dranove and Jin, 2010). Thus, these laws may result in either (a) increased costs to firms that are then passed-through to consumers directly through higher fees or indirectly through the price charged to banks who then pass those costs through (Shapiro, 1986); or (b) increased market power on the part of servicers which in addition to various pricing channels could also result in decreased quality. That said, if consumers are sensitive to quality variations and the cost of compliance is minimal, licensing requirements could increase aggregate consumer surplus (Leland, 1979).

We first study the effects of mortgage servicing licensing requirements on several mortgage industry and homeownership outcomes by leveraging the staggered adoption of servicing standards across states in the post-crisis era from 2008-2022. We collect publicly available data on the mortgage industry, including originations, outstanding loans, and consumer complaints. We implement a difference-in-differences empirical design. Our setting features multiple treatment periods and so we adopt the estimation strategy of Callaway

[1]These quotes come from testimony during the legislative process resulting in Oregon's mortgage servicer licensing bill in 2018. See `https://olis.oregonlegislature.gov/liz/2017R1/Downloads/CommitteeMeetingDocument/98433`.

and Sant'Anna (2021). We verify that the reforms did lead to increases in applications for licenses. We find evidence that the reform decreased late-stage delinquency and foreclosure rates, though states may have selected into treatment based on foreclosure patterns. We find some evidence that these requirements increased interest rates, suggesting costs may have been passed-through. We find no evidence that these requirements affected other loan or borrower characteristics, or consumer complaints.

We then consider the impact of these requirements on the Mortgage-Backed Security (MBS) market through data on the loan pools for Ginnie Mae I and II MBSs. As MBSs are often comprised of loans from more than one state, we implement a shift-share exposure design. Again, we find evidence that licensing requirements decrease the level of delinquent balances across both Ginnie Mae MBS programs.

Our work contributes to several literatures concerning retail banking, consumer lending, and mortgage markets. Clark et al. (2021) show that in a market for loans with multiple agents (originators, lenders, and servicers), consumers' search efforts determine up-front costs and the dispersion of interest rates across consumers with different credit histories; Agarwal et al. (2020) study the consumer search process empirically. The evidence suggests that borrowers face optimization constraints: Keys et al. (2016) find that approximately 20% of homeowners fail to refinance their mortgage when it is optimal (from a financial/cash-flow perspective). Agarwal et al. (2016) find that borrower sophistication is correlated with errors of commission and omission of refinancing. Within this literature, loan servicing is relatively understudied, creating an opportunity for a contribution to the broader understanding of homeownership finance. One exception is Herbst (2023), who provide causal evidence on the effect of income-driven repayment programs using random variation in a loan servicer's

dialing system. They find that flexible student loan contracts result in lower delinquency rates and improved long-run outcomes, with temporary cash-on-hand benefits.

We also contribute to the empirical literature on occupational and business licensing. Farronato et al. (2020) study licensing requirements in the market for home improvement services and find that the requirements lead to less competition and higher prices and have no effect on service quality. However, Larsen et al. (2020) study licensing for secondary school teachers and find that more stringent requirements shift the distribution of quality to the right by cutting off the lower tail of the quality distribution. Chung (2022) studies a reform in Illinois that increased ongoing training requirements for real estate agents and found that it caused an outflow of agents and a decrease in sales without changing the incidence of misconduct. Cramer and Krueger (2016) compare Uber and traditional taxi services (with accompanying licensing restrictions) and find that Uber drivers spend a higher fraction of their working time with a passenger in their vehicle. Zooming out, Kleiner and Soltas (2023) study occupational licensing in the context of an equilibrium model of the labor market and find that licensing raises wages and hours for employed workers but reduces employment overall; total welfare (relative to a model without licensing requirements) is reduced by 12%.

The empirical literature on business licenses has long featured a focus on the liquor industry (Levin, 1963; Smith, 1982). The empirical results largely follow results for occupational licenses. For example, Illanes and Moshary (2020) study deregulation in Washington State's off-site liquor industry and find that it increased competition and the variety of products offered. To the best of our knowledge, our paper is the first studying licensing requirements for mortgage servicers.

A final strain of literature related to our work concerns licensing related to financial

advising, as servicers can play a role in nudging homeowners towards loan modification programs. Agarwal et al. (2014) study the mortgage counseling program implemented in Chicago in 2006 and find that the incentive of interacting with counselors affects the composition of lenders and borrowers while those who attended a counseling session did not follow the counselor's advice, while Moulton et al. (2015) find evidence that simple counseling interventions improve borrower debt repayment based on a randomized field study with mortgage counseling. Evidence on the effect of more stringent licensing requirements on mortgage brokers suggests improvements in loan performance and access, with negligible effect on price (Shi and Zhang, 2018).

The rest of the paper is organized as follows. We begin in Section 2 with an overview of the mortgage industry and the incentive structure for mortgage servicers. Our analysis proceeds in two parts. First, we examine the mortgage industry in Section 3. We then examine mortgage-backed securities in Section 4. We conclude in Section 5 by highlighting policy implications and directions for future work.

2 Background

Historically, the prototypical real estate mortgage market consisted of a simple flow of funds between a lender and a borrower. A prospective borrower would apply for a mortgage. The lender would process the application, underwrite the loan, and provide funds for the purchase of the real asset. The lender would hold the loan on its books, and service the loan by collecting payments from the borrower over the life of the loan and applying those payments to the principal and interest.

The modern U.S. mortgage market has decoupled the roles of origination, funding, and servicing through the creation of the market for mortgage-backed securities (MBSs). An MBS is a bond whose cash flows to investors are determined by the principals, interest rates, and delinquency and foreclosure rates of an underlying tranche of mortgages (Fuster et al., 2022). Most mortgages are eventually packaged into an MBS by firms built for that purpose. As a consequence, today, a prospective borrower may apply for a loan with one firm, have that application underwritten and initially funded by a second firm, and then ultimately send payments to a third-party servicer.[2] In 2017, 53% of mortgages were originated by nonbank entities, and 42% of active mortgages were being serviced by third-party nonbank servicers (Shoemaker, 2019). By 2019, according to Loewenstein (2021), over 65% of loans in securities organized by the Government Sponsored Enterprise (GSE) Ginnie Mae were serviced by a third party, while 40% of loans in Fannie and Freddie Mac securities were serviced by a third party.

2.1 The role of servicers

Servicers are generally hired either by originators or by the firms creating MBSs to manage the loans in an MBS pool (Diop and Zheng, 2022). The compensation for servicers is not strictly tied to the performance of the loan and revenue come from fees deducted from the flow of cash from the borrowers' payments to investors in the MBS; the fees generally depend on the outstanding principal balance. The primary determinant of the cost of servicing is its delinquency status (Mayock and Shi, 2022).

[2]In the context of lending markets, U.S. Law defines "servicing" as *"...receiving any scheduled periodic payments from a borrower pursuant to the terms of any loan, including amounts for escrow accounts..., and making the payments of principal and interest and such other payments with respect to the amounts received from the borrower as may be required pursuant to the terms of the loan."* (12 USC § 2605(i)(3)).

This decoupled structure creates conflicting incentives between servicers and MBS investors when borrowers become deliquent or default on their loan terms. When a mortgagee defaults, servicers face a trade-off between initiating foreclosure or providing loan loss mitigation measures (Thompson, 2011). Delaying foreclosure translates to the accrual of servicing fees which have precedence over investors' claims in the event of foreclosure (Diop and Zheng, 2022). As servicers play an intermediary role, financially-constrained servicers may pursue foreclosure in order to advance mortgage payments to investors (Aiello, 2022). Adding to the extant principal-agent problem, servicers of delinquent loans may prioritize loan modification based on servicing fees (Diop and Zheng, 2022) instead of initiating foreclosure and claiming foreclosure-related costs Kruger (2018). In short, servicers play an important intermediation role, the cost of which contributes to the overall cost of the loan which may be passed-through to consumers (Fuster et al., 2017).

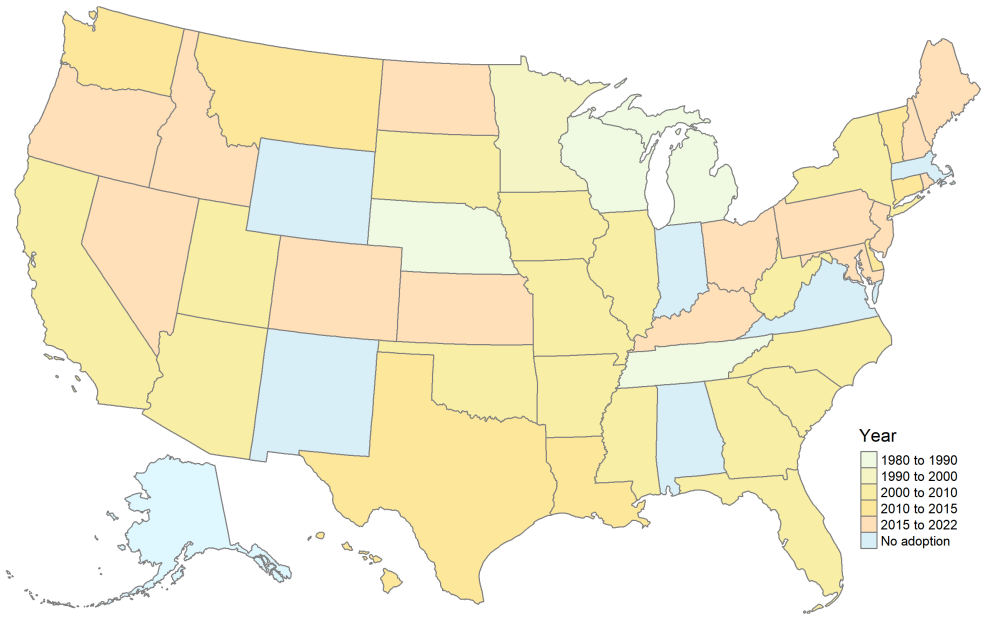
2.2 Post-crisis reforms

The 2007-2008 housing and financial crisis led to a wave of licensing and regulatory reforms throughout the mortgage industry, including the state-level servicer licensing requirements that we focus on. The first set of reforms addressed mortgage originators by (among other things) requiring licensing either through states or the federal government. Modifications of the regulatory environment for mortgage servicers were left to the nascent Consumer Financial Protection Bureau (CFPB). The CFPB issued new rules that took effect in 2014. Chief among these were new foreclosure standards that required at least 120 days of delinquency before foreclosure proceedings were initiated by lenders or servicers (CFPB, 2013). These

rules likely improved the performance of mortgages in part by allowing for more time for borrowers in financial distress to receive modifications to the loan terms (Sandler, 2023).

Unlike mortgage originators, neither Congress nor the CFPB mandated a licensing requirement for servicers. Instead, individual states chose to implement licensing requirements over a period of time stretching from the late 1980s to 2022. Figure 1 illustrates this rollout across the U.S. by shading each state according to the date when the licensing requirement was first introduced, or when mortgage servicing was recognized as a business subject to pre-existing licensing requirements.[3] The latter occurred in five states prior to 2000. Five additional states added rules between 2000 and 2006. Between 2007 and 2010, twelve states enacted this type of rule. In the post-crisis period, seven states implemented the policy in the first half of the 2010s, and thirteen states adopted these measures starting in 2016.

Figure 1: Enactment of Mortgage Servicer Licensing



While the details vary across states, most share several features in common. These

[3]Appendix Table A.1 provides more detail on individual laws.

include net worth and solvency requirements, a surety bond, and a detailed plan for compliance with federal and state rules. State agencies are given powers to investigate complaints and penalize servicers for noncompliance. It is this compliance aspect that may generate additional costs (from the perspective of servicers) that could be passed-through to consumers. Federal and state rules dictate not only how servicers communicate and interact with mortgagees, but may also regulate participation in loan modification measures or other programs for distressed borrowers. As these programs may result in outcomes which are not profit-maximizing from the perspective of servicers, compliance generates an opportunity cost.

A key difference between the early-adopter and late-adopter states is the joint adoption of lender or broker licensing in conjunction with servicer license requirements. For example, in 2008 Arizona implemented the loan originator license and required their mortgage commercial bankers, who are allowed to lend, and servicers, to renew their license under new terms. In other states, a single license type is applicable to encompasses servicers, brokers, or mortgage bankers. For a contrasting example, in California, a mortgage lender who also services mortgages must obtain separate licenses for each activity.[4]

Almost all states implemented servicing licensure by amending the existing regulation of occupations in the mortgage market (be it loan originators, brokers, and mortgage bankers), with some exceptions such as Oregon, Maine, and Louisiana where the new measures focused entirely on mortgage servicing. Most recently, several states have adopted or updated additional modifications for mortgage servicing to address issues such as cybersecurity

[4]Depository institutions acting as servicers are usually not subject to state licensure as these institutions are regulated by federal institutions. Although it is beyond the scope of this work, we can reasonably argue that state-level licensing requirements can be different from the regulation in place of bank servicers.

(Arkansas), remote working (Virginia, Florida, Kentucky), and capital and liquidity standards (Montana). We focus on the enactment and enforcement of licensing requirements and acknowledge that these developments could result in differential trends. Though there are differences in the licensing measures across states, we hypothesize that the commonalities of the measures and that the implementation and enforcement of licensure for mortgage servicers represent a policy shift with (potentially) measurable effects on outcomes in the mortgage market.

3 Mortgage Industry Analysis

In this section we explore the impact of the rollout of mortgage servicer licensing requirements on 'direct' outcomes in the mortgage industry including loan performance, borrower characteristics, and complaints.

3.1 Methods

We exploit the staggered roll-out of mortgage servicing licensing requirements across states. We model outcome y_{st} in state s and time t with

$$y_{st} = \beta D_{st} + \gamma X_{st} + FX_t + FX_s + \varepsilon_{st}, \tag{1}$$

where D_{st} is an indicator of whether state s has implemented licensing requirements at time t. β is the parameters of interest. X_{st} is a vector of covariates influencing the housing market. FX_t is a time fixed effect and FX_s is a state fixed effect.

This 'two-way fixed effects' research design is based on the 'parallel trends' assumption: in the absence of the treatment, the expected change in the outcome of interest over the analysis window would have been the same across the treated and untreated units after conditioning on other observables covariates. Our setting features heterogeneous treatment timing, which naturally implies the possibility of heterogeneous treatment effects along both dimensions of our fixed effects. For example, the effect of licensing requirements in states with a higher share of less sophisticated borrowers may be different than in other states. Similarly, requirements implemented immediately after the financial crisis may have greater effects than those implemented later on as the mortgage and mortgage servicing industry responded to broad changes in the national regulatory and financial landscape.

To address this issue, we follow the approach of Callaway and Sant'Anna (2021) to recover the average treatment effect. The approach defines an Average Treatment Effect on the Treated (ATT) for each reform date (i.e. the group treatment effect). These effects are then aggregated to produce the overall average treatment effect. We assume that our covariates are stationary (Abadie, 2005). We use not-yet-treated states as controls, and implement the Doubly Robust Inverse Weighting Probability (DRIWP) estimand from Sant'Anna and Zhao, 2020. This approach models both the evolution of the outcome across the treated and non-treated groups as well as the probability of treatment conditional on covariates. The key feature of DRIWP relevant to our analysis is that the estimand is robust to the misspecification of one of these models. We implement the estimator using the `csdid` Stata package (Rios-Avila et al., 2023). We estimate standard errors using the multiplicative wild bootstrap and cluster at the state level.

Callaway and Sant'Anna (2021) estimate all feasible average treatment effects (ATTs)

and offer several possible aggregations researchers may use to compute overall ATTs. We focus on three: an event study using a 4 year window centered on the date of enactment of the policies (we report both the pre- and post-reform coefficients to check for pretrends), a cohort average treatment effect (where the treatment effect is calculated separately for each date on which a reform was implemented and then those effects are aggregated), and a calendar average treatment effect (where the treatment effect is calculated separately for each date for which there are treated states and then those effects are aggregated).[5] As a heuristic, the event study coefficients can be thought of as identifying short term effects, as they comprise while the calendar and cohort coefficients are more informative about longer-term effects.

One key assumption of our heterogeneous treatment effect design is parallel trends conditional on covariates. The pretrend of the studied outcomes in yet-to-be treated states could be driven by unobserved factors, such as heterogeneous responses to federal servicing standards, in states that would eventually adopt mortgage servicer licensure. Similarly, spill-over effects between states would violate the assumptions of staggered adoption and permanent treatments: large servicers may have chosen to comply with the additional licensing standards entailed by licensing requirements, in states which did not yet have them in anticipation of future requirements. In light of these issues, and because there is no differential timing in the federal mortgage servicing standards, we assume that any effects from licensure stem from either (a) the costs of complying with state-level rules or (b) state-level enforcement measures, or both.

[5]Event study and group average treatment plots are omitted for space but are available from the authors.

3.2 Data

We collect publicly available data from a variety of sources. Our data are summarized in Table 1. For completeness, we report the full data observed, though the estimation sample may be limited. We provide sample means for the observations used in the estimation sample with our results.

3.2.1 License applications

We collect license applications data from the National Mortgage Licensing System (NMLS). NMLS is a system of record for licenses of businesses related to mortgages and real estate more broadly. We observe the number of license applications at the state-month level starting from 2009. The activity data is only broken down by entity type (company, branch, and individual) and does not distinguish between loan originator, broker or servicer licence. We focus on companies and branches as individual licenses are generally independent brokers or staff at mortgage originators who work directly with consumers.

The first panel of Table 1 summarizes these data. The number of observations differs slightly between applications by companies and branches due to different reporting patterns across states. On average, we observe roughly 40 company applications and 106 branch applications per state-quarter.

3.2.2 Aggregate loan performance

We collect quarterly data on 30-89 and 90+ days delinquency rates rates at the state-month level for 2008-2021 from the CFPB Mortgage Performance Trends Report. The report is produced from a nationally representative 5% sample of closed-end, first-lien, 1-4 family

Table 1: Mortgage industry summary statistics

Variable	N	Mean	Std. dev	10th-%-ile	Median	90th-%ile
New license applications by type (NMLS)						
Company	2,917	39.53	93.73	9	23	65
Branch	2,771	106.40	126.74	16	67	224
Loan performance (CFPB)						
Delinq. rate, 30-90 days	9,360	2.36	1.13	.9	2.3	3.9
Delinq. rate, 90+ days	9,360	1.80	1.37	.5	1.4	3.6
Loan performance (NMDB)						
Delinq. rate, 30-60 days	4,284	2.32	1.03	1	2.2	3.7
Delinq. rate, 90-180 days	4,284	1.48	1.23	0.4	1.1	3.1
Foreclosure rate	4,284	1.25	1.06	0.2	1.1	2.4
Borrower characteristics, all outstanding loans (NMDB)						
MTMLTV less than 60%	2,040	35.35	9.97	23.4	34.2	50.5
Average VantageScore	2,040	730.91	12.32	715.0	732.0	747.0
Fraction Very Poor score (300-499)	2,040	1.06	0.61	0.4	1.0	1.9
Fraction Poor score (500-600)	2,040	6.22	2.43	3.3	6.0	9.7
Fraction Fair score (601-660)	2,040	10.83	2.25	7.9	10.9	13.8
Borrower characteristics, originations (NMDB)						
Average interest rate	969	4.68	1.16	3.2	4.4	6.6
Fraction First-time Home Buyer	969	19.81	5.93	12.6	19.2	28.3
Fraction Cashout refinance	969	23.86	7.60	15.7	21.7	35.6
Fraction Rate and Term refinance	969	29.31	14.06	12.5	26.9	49.7
Average Term (years)	969	27.21	1.40	25.3	27.4	28.9
Average Debt-to-Income ratio	969	36.18	2.25	33.3	36.1	39.3
Average VantageScore	969	730.80	18.63	700.0	736.0	751.0
Average Loan-to-Value ratio	969	79.19	3.90	73.8	79.7	83.5
Consumer complaints (CFPB)						
Mortgage servicing complaints per capita	2,345	0.015	0.013	0.004	0.011	0.030
Credit reporting complaints per capita	2,345	0.073	0.147	0.000	0.016	0.210
Complaint ratio (servicing/all others)	2,345	0.231	0.278	0.025	0.127	0.627
Covariates (various)						
Percent of GSE loans (HMDA)	2,847	47.78	7.88	36.89	48.43	57.21
House Price Index (log diff, FHFA)	2,847	0.01	0.02	-0.01	0.01	0.02
GDP growth (BEA)	2,847	0.00	0.01	-0.01	0.00	0.02
Unemployment rate (BEA)	2,847	5.76	2.29	3.20	5.30	9.10

Notes: See text for detailed description of sources.

residential mortgages. We pair this data with similar performance statistics including 30-60 and 90-180 days delinquency rates and foreclosure rates (including Bankruptcy and Deed in Lieu) from the National Mortgage Database (NMDB) published by the Federal Housing Finance Agency from 2002-2022. We observe these series at the state-quarter level.

These data are summarized in the second panel of Table 1. The early delinquency rates (30-60 days or 30-90 days delinquent) match closely (roughly 2.3%) between the two sources. The overall average foreclosure rate for the entire 2002-2022 period is 1.25%.

3.2.3 Borrower and loan characteristics

We collect data on borrower and loan characteristics for new residential originations and borrower characteristics for all outstanding residential mortgages from the NMDB. Characteristics at origination are available on an annual basis from 1998-2022, while characteristics for outstanding loans are available at the quarterly level from 2013-2022.

These data are summarized in the third panel of Table 1. Most active loans have a relatively high mark-to-market loan-to-value (MTMLTV); the fraction of loans in the data with a MTMLTV of less than 60% is 35%. Credit scores, as measured by the VantageScore, are nearly identical at origination and for outstanding loans. The average loan term at origination is 27 years, highlighting the predominance of the 30-year mortgage product.

3.2.4 Consumer complaints

We collect data on consumer complaints from the CFPB complaint database, which is available from 2011-2022. This database of financial product and service complaints compiles consumer complaints sent to companies published after the company responds confirming a

commercial relationship, or after 15 days, whichever comes first. We identify issues related to mortgage servicing and collapse the individual complaints at the state level to construct three variables. First, we construct the number of mortgage servicing complaints and credit reporting complaints per capita. We then calculate the ratio of mortgage servicing complaints to all other complaints. As reported in Table 1, the mean complaint ratio is 0.231.

3.2.5 Covariates

Outcomes in the mortgage industry may be influenced by other factors that covary with the introduction of mortgage servicer licensing requirements including macroeconomic trends. We compute a proxy for macro trends in mortgage markets in particular by computing the share of originated loans purchased by the GSEs at the state-quarter level from the Home Mortgage Disclosure Act (HMDA) mortgage database. This fraction is particularly relevant for the servicing industry as Critchfield et al. 2019 document that large servicers serve over three-quarters of conventional loans for these enterprises.

We collect state-quarter-level measures of GDP growth and the unemployment rate from the Bureau of Economic Analysis, and a house price index from the FHFA. We transform the raw index into a log-differenced variable to capture differential changes in housing price growth across states. These are summarized in the last panel of Table 1.

3.3 Results

3.3.1 License applications

We begin with a measure of licensing itself: the number of new businesses licensed at the state-quarterly level in the Nationwide Multistate Licensing System (or NMLS), in Table 2. We first note an important caveat: while we observe the *type of entity being licensed* (firms or branch offices), we do not observe the *type of license* that the entity received. This means that, in addition to observing new license applications for mortgage servicers, the data also includes licenses for mortgage brokers and originators.

The results, particularly when aggregated by calendar or by cohort, suggest that the reforms led to an increase in the number of license applications. This offers a salience test for the policies writ large: that the introduction of licensing requirements did indeed lead to more applications for licenses implies that at least on the margin some previously non-regulated servicers became subject to licensure and supervision.

3.3.2 Aggregate loan performance

Table 3 reports our estimates of the effect of these policies on mortgage performance as measured by delinquency and foreclosure rates. We use both CFPB and FHFA data to examine delinquency outcomes as they offer different delinquency windows.

The estimates suggest that the the enactment of mortgage servicing standards may lead to a slight increase in short-term delinquencies but a slightly larger decrease in later delinquencies. Foreclosure rates declined substantially (the Calendar and Cohort coefficients are roughly equal to a standard deviation in the foreclosure rate), though not immediately –

Table 2: Effects of licensing requirements on new license applications

	Company	Branch
Pre	-3.840	-3.490
	(-1.08)	(-0.40)
Post	29.256**	32.048
	(2.84)	(1.83)
Calendar	60.548***	106.622***
	(5.50)	(3.52)
Cohort	54.712***	109.414***
	(3.76)	(3.62)
N	1,672	1,623
Mean of dep. var	36.30	104.7

Notes: Table reports estimates of Equation (1) using the `csdid` Stata package with new license applications to the Nationwide Multistate Licensing System as outcomes. An observation is a state-quarter. The number of observations differ across regressions due to differences in reporting across states. The regression is weighted by the log of the state population. Following Callaway and Sant'Anna (2021), 'Pre' and 'Post' refer to event study effects aggregated over eight quarters; 'Calendar' and 'Cohort' effects refer to average treatment effects aggregated over the relevant group. Standard errors are computed using the Wild bootstrap and clustered by state. We report t statistics in parentheses and denote p tests with stars: $* : p < 0.05$, $** : p < 0.01$, $*** : p < 0.001$.

the event study Post coefficient is smaller in magnitude and estimated with more noise. An important caveat up front: we also see some evidence of a pre-trend in foreclosure rates, suggesting that states may have been compelled to pass licensing rules in response to worsening mortgage performance.

This pattern of results corresponds to a shift in behavior among servicers to make participation in loan modification and other programs designed to assist stressed borrowers easier (Sandler, 2023). Such efforts would naturally tend to 'cure' late-stage delinquencies and potential foreclosures at the expense of some increased early-stage delinquencies. Furthermore, as foreclosures occur after a lengthy process, it is not surprising that the decrease in foreclosures would become apparent after some delay.

Table 3: Effects of servicing requirements on mortgage performance through delinquency and foreclosure

	CFPB		FHFA: All Mortgages		
	30-90 days del.	90+ days del.	30-60 days del.	90-180 days del.	Foreclosure rates
Pre	-0.063	0.086	-0.082	0.057	0.191**
	(-0.85)	(1.26)	(-1.35)	(1.03)	(2.79)
Post	0.777***	0.137	0.818***	0.119	-0.472
	(4.36)	(0.53)	(4.43)	(0.46)	(-1.09)
Calendar	0.462**	-0.940***	0.502***	-0.948***	-1.365***
	(3.11)	(-5.13)	(3.52)	(-5.66)	(-6.48)
Cohort	0.266	-0.730***	0.282	-0.719***	-0.989***
	(1.40)	(-5.77)	(1.32)	(-5.26)	(-7.11)
N	2,205	2,205	2,365	2,365	2,365
Mean dep. var	2.384	1.942	2.357	1.858	1.322

Notes: Table reports estimates of Equation (1) using the `csdid` Stata package with new license applications to the Nationwide Multistate Licensing System as outcomes. An observation is a state-quarter. The number of observations differ across regressions due to differences in data across sources. The regression is weighted by the log of the state population. Following Callaway and Sant'Anna (2021), 'Pre' and 'Post' refer to event study effects aggregated over eight quarters; 'Calendar' and 'Cohort' effects refer to average treatment effects aggregated over the relevant group. Standard errors are computed using the Wild bootstrap and clustered by state. We report t statistics in parentheses and denote p tests with stars: $*: p < 0.05$, $**: p < 0.01$, $***: p < 0.001$.

3.3.3 Originations

Changes in servicing costs could pass-through to originations either through changing the set of applicants approved for loans or through the terms offered to borrowers. We explore both of these possibilities in Table 4. The first set of columns focuses on borrower characteristics. We find no evidence that the reforms affected borrower debt-to-income ratios or credit scores. When aggregating treatment effects by cohort, we find some evidence that the mix of borrowers shifts away from first-time buyers towards refinance, though we interpret this as suggestive at best.

several borrower characteristics, including the term, the debt-to-income ratio, the credit

score, and the loan-to-value, we do not find any evidence of effects driven by the policies.

Table 4: Effects on originations

	Borrower characteristics					Loan characteristics		
	First-time Buyer (%)	Cashout Refinance (%)	Other Refinance (%)	Avg. Debt-to-Income Ratio	Avg. Credit Score	Avg. Interest rate	Avg. Term	Avg. Loan-to-Value
Pre	1.517	-2.850	-2.445	0.306	-0.046	0.007	-0.356	0.026
	(1.09)	(-1.44)	(-1.20)	(0.96)	(-0.02)	(0.14)	(-1.06)	(0.02)
Post	-1.144	-0.862	-0.380	0.164	-1.686	0.086*	-0.137	0.929
	(-0.61)	(-0.52)	(-0.16)	(0.40)	(-0.55)	(2.29)	(-0.48)	(0.59)
Calendar	-3.946	0.754	4.004	0.608	0.237	0.092*	-0.068	0.035
	(-1.73)	(0.39)	(1.48)	(1.10)	(0.09)	(2.08)	(-0.22)	(0.02)
Cohort	-3.057*	0.781	4.159*	0.470	0.196	0.067	-0.024	-1.106
	(-2.51)	(0.55)	(2.07)	(1.05)	(0.08)	(1.74)	(-0.10)	(-1.06)
N	595	595	595	595	595	595	595	595
Mean	20.271	22.117	30.444	36.238	735.953	4.457	27.370	79.228

Notes: Table reports estimates of Equation (1) using the `csdid` Stata package. Outcomes are borrower characteristics at origination as reported by the National Mortgage Database 5% sample. An observation is a state-year. The credit score is the VantageScore. Following Callaway and Sant'Anna (2021), 'Pre' and 'Post' refer to event study effects aggregated over two years; 'Calendar' and 'Cohort' effects refer to average treatment effects aggregated over the relevant group. Standard errors are computed using the Wild bootstrap and clustered by state. We report t statistics in parentheses and denote p tests with stars: $* : p < 0.05$, $** : p < 0.01$, $*** : p < 0.001$.

What may be potentially concerning are our estimates for the interest rate: when aggregating treatment effects either by the event window or by calendar, we find evidence (in the sense of $p < 0.05$) that the average interest rate increases by roughly nine basis points. When aggregating by cohort, the point estimate is similar but is estimated with additional noise. This effect size is small: around 8% of a standard deviation. However, it does suggest that the costs of licensing may indeed be passed on to new borrowers at origination. We note that these costs are likely not the literal fees paid to states along with license applications, but rather the costs of complying with rules that licensing requires.

3.3.4 Characteristics of active residential borrowers

We now turn to the characteristics of borrowers for outstanding loans as adjustments by servicers may impact credit scores. Table 5 reports our results. In the first column, we observe an uptick in the share of loans with a mark-to-market loan-to-value (MTMLTV) at or below 60%. In other words, we find evidence that net indebtedness decreased after the reform.[6] As previously discussed, the policy is associated with slightly higher early delinquency rates followed by lower late delinquency rates which implies that this result is likely not driven by an increase in prepayments or abnormal loan amortization. In other words, the policy likely did not affect LTV numerators systematically.

Instead, it is more likely like this result is driven by changes in the denominator: house prices. Indeed, this result might be driven by states that adopted the requirements immediately before the Covid-19 pandemic and the contemporaneous increase in house prices (Zhang et al., 2023). We note, however, that house prices can also be affected via the foreclosure process as changes in the rate of foreclosures impact the supply of houses in the real estate market.

In the remaining columns, we explore the distribution of credit scores. Though estimates are generally noisy, the point estimates indicate that the reforms may have improved credit scores. Again, this result is sensible given our previous delinquency results; these events substantially reduce credit scores and so reducing delinquencies should increase average credit scores.

[6] We repeated this analysis focused only on the subset of loans acquired by Fannie Mae and Freddie Mac and found similar results.

Table 5: Effects on characteristics of active residential borrowers

	MTMLTV ≤ 60 (%)	Credit score			
		Average	Very Poor: 300-499 (%)	Poor: 500-600 (%)	Fair: 601-660 (%)
Pre	1.071	0.814	-0.005	-0.111	-0.239
	(1.50)	(0.93)	(-0.11)	(-0.68)	(-1.51)
Post	8.594**	4.008	0.041	-1.000*	-0.969
	(3.12)	(1.40)	(0.55)	(-2.49)	(-1.46)
Calendar	7.463***	1.531	-0.028	-0.896*	-0.253
	(5.61)	(0.26)	(-0.38)	(-2.00)	(-0.18)
Cohort	11.413***	3.027	0.113	-0.648	-1.045
	(5.03)	(1.17)	(1.59)	(-1.71)	(-1.84)
N	847	847	847	847	847
Mean dep. var.	34.378	729.863	1.126	6.372	10.934

Notes: Table reports estimates of Equation (1) using the `csdid` Stata package with borrower characteristics for active loans as reported by the National Mortgage Database 5% sample as outcomes. 'MTMLTV' means 'mark-to-market loan-to-value.' The credit score is the VantageScore. An observation is a state-quarter. Following Callaway and Sant'Anna (2021), 'Pre' and 'Post' refer to event study effects aggregated over eight quarters; 'Calendar' and 'Cohort' effects refer to average treatment effects aggregated over the relevant group. Standard errors are computed using the Wild bootstrap and clustered by state. We report t statistics in parentheses and denote p tests with stars: $* : p < 0.05$, $** : p < 0.01$, $*** : p < 0.001$.

3.3.5 Consumer complaints

A priori, the effect of servicer licensing on the number of consumer complaints is ambiguous. A plausible development is that once licensing requirements are in place, mortgage servicing practices improve, and consumers file fewer complaints. Alternately, state rules may lead to more empowered and/or demanding consumers.

Table 6 presents our results for consumer complaints as aggregated by the CFPB. In the first two columns, we explore the overall per-capita mortgage servicing complaint rate, and the rate for complaints excluding payment struggles. In the third column we calculate

the ratio of mortgage servicing complaints to other complaint types recorded by the CFPB. Across all three columns, we find no evidence that licensing generated any changes in complaints. We note that these estimates exclude states that adopted licensing requirements prior to 2013 due to lack of available data. These results are perhaps unsurprising given that licensing requirements likely did not impact demand-side factors (see Farronato et al., 2020, for a demand-side analysis of the impact of licensing in a different context).

Table 6: Effects of licensing requirements on consumer complaints

	Mort servicing comp. (per cap.)		Ratio (see note)	Credit reporting complaints (per cap.)
	All	Excluding payment struggles		
Pre	0.000	0.000	-0.003	-0.028
	(0.12)	(0.06)	(-0.20)	(-0.93)
Post	-0.000	0.001	0.006	0.006
	(-0.01)	(0.48)	(0.20)	(0.20)
Calendar	0.005	0.005	0.063	-0.005
	(0.90)	(1.01)	(0.92)	(-0.14)
Cohort	0.001	0.002	0.009	-0.009
	(0.44)	(0.91)	(0.45)	(-0.18)
N	1,008	1,008	1,007	1,008
Mean dep. var.	0.017	0.015	0.254	0.053

Notes: Table reports estimates of Equation (1) using the `csdid` Stata package with measures of consumer complaints as outcomes. An observation is a state-quarter. 'Ratio' refers to the ratio of the number of mortgage servicing complaints to all other complaints; one state-quarter did not record any non mortgage-servicing complaints. The regression is weighted by the log of the state population. Following Callaway and Sant'Anna (2021), 'Pre' and 'Post' refer to event study effects aggregated over eight quarters; 'Calendar' and 'Cohort' effects refer to average treatment effects aggregated over the relevant group. Standard errors are computed using the Wild bootstrap and clustered by state. We report t statistics in parentheses and denote p tests with stars: $* : p < 0.05$, $** : p < 0.01$, $*** : p < 0.001$.

In the last column of Table 6, we examine the number of complaints related to credit reporting per capita, as this is the largest category of all consumer complaints. This category includes issues such as incorrect information in the credit report, improper use, and problems

with credit reporting companies investigating existing problems. All of these issues could be created by inappropriate behavior from mortgage servicers. Again, we find no evidence that the reforms affected complaint rates.

4 Mortgage-Backed Securities Analysis

Given the link between the mortgage servicing and MBS industries, the implementation of licensure regimes could have an effect on the overall performance of the loan pool from which MBSs are constructed. Consider two different MBS, one with an underlying pool comprised of loans solely from never-treated states and the other with some share of loans serviced by licensed mortgage servicers. If licensing requirements have any bearing on servicer behavior that flows through to the underlying loans, we expect to find differences in the performance of these two MBSs.[7] In reality, however, MBSs tend to be constructed from loans across several states, only some of which may be treated. We therefore examine this premise by implementing a shift-share exposure design with each MBS being a unit with differential exposure to the treatment.

4.1 Data

We collect end-of-quarter data for both Ginnie Mae I and Ginnie Mae II Single Family MBS from December 2013 to December 2022. These are both core 'modified pass-through security' products of Ginnie Mae, which acts primarily as a guarantor of securities that

[7]Servicers of loans which are pooled under Freddie Mac or Ginnie Mae MBS programs are offered reputational incentives to promote efficient resolution of delinquent loans (Cordell et al., 2008), suggesting that licensing requirements can also act through non-pecuniary incentives.

consist of pooled mortgages (Lasko, 1987). The primary difference between these programs for our purposes are the restrictions on the underlying loans that comprise the MBSs. In short, Ginnie Mae I securities are more restrictive: the MBS is issued by a single issuer and the underlying mortgages generally have the same or similar maturity dates and interest rates. In contrast, Ginnie Mae II securities may be issued by a pool of a issuers and the underlying loans may have substantial heterogeneity.

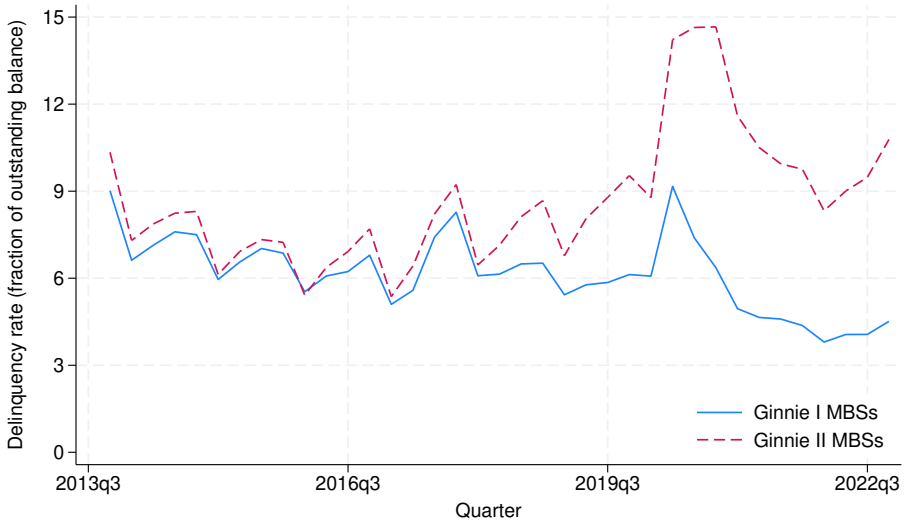
We aggregate the loan-level data to the MBS level. For each MBS-quarter, we construct a performance measure: the fraction of the outstanding balance that is delinquent. These data are illustrated in Figure 2. On average, Ginnie I MBS pools are comprised of underlying balances of which 6.28% are delinquent. For Ginnie II, the average delinquent balance is 9.42%. These differences are relatively recent; while Ginnie II delinquency rates are higher than Ginnie I delinquency rates throughout our data, the difference becomes substantially more pronounced after 2019. We note that there is substantial variation between pools: over half of the Ginnie I pools have delinquency rates below 1% and the median delinquency rate for Ginnie II pools is merely 1.26%.

4.2 Methods

Our exposure design proceeds in three steps. First, we estimate the effect of the policy change at the state-quarter level. Then we compute MBS-quarter level measures of exposure to licensing requirements. Finally, we model MBS-level delinquency outcomes as a function of those exposure measures.

To begin, following Greenstone et al. (2020), let ΔUPB_{imst} be the change in unpaid

Figure 2: Mortgage-backed security delinquent rates



principal balance for loan i in MBS pool m from state s at time t (i.e. ΔUPB_{imst} is the amount of payment applied to the principal for loan i over the time period t). We model

$$\Delta UPB_{imst} = \beta_{st} D_{st} + \alpha' X_i + \phi_s + \phi_m + \phi_i + \varepsilon_{it} + \varepsilon_m + \varepsilon_{st} \tag{2}$$

where D_{st} is an indicator variable denoting the implementation of licensing requirements, and the vector X_i controls for observable loan characteristics such as the remaining term and the interest rate. The coefficients β_{st} capture the way in which licensure requirements influence payment behavior at the state-time level. ϕ_s, ϕ_m, and ϕ_i are state, MBS, and individual fixed effects respectively.

Following Borusyak et al. (2022), we consider the state-level effect β_{st} as an 'estimated shock' and construct an exposure measure using the share of loans from state s in the MBS pool m, α_{mst-1}:

$$z_{mt} = \sum_s \alpha_{mst-1} \hat{\beta}_{st} D_{st} \tag{3}$$

Based on the quartiles of z_{mt}, we compute the indicator variable Q_{pmt} for whether MBS m lies between the p_{th} and $(p-1)_{th}$ percentile according to the estimated exposure shock, with the bottom 25th percentile being the base group, namely, MBS with lower exposure to the predicted amortization shocks. Let pr_{mt} be a measure of performance of the MBS m at time t. We write

$$pr_{mt} = \sum_{p} \delta_p Q_{pmt} + \gamma_m + \gamma_t + \varepsilon_{mt} \tag{4}$$

where γ_m and γ_t represent MBS and time fixed effects, respectively. The coefficient of interest is δ_p, which is the effect of licensing requirements on MBS performance per unit of exposure. We calculate standard errors using the bootstrap and report t-statistics for inference.

Our MBS performance measure is the share of the outstanding unpaid balance in the pool which is delinquent. The identifying assumption, therefore, is that the predicted shocks that ultimately comprise Q_{pmt} is exogenous from unobservable factors which may influence delinquent balances. While it is likely that other state-level policies or economic conditions influence delinquency rates, we note that our predicted shocks are effectively purged of both state-level and individual loan-level effects per Equation (2)

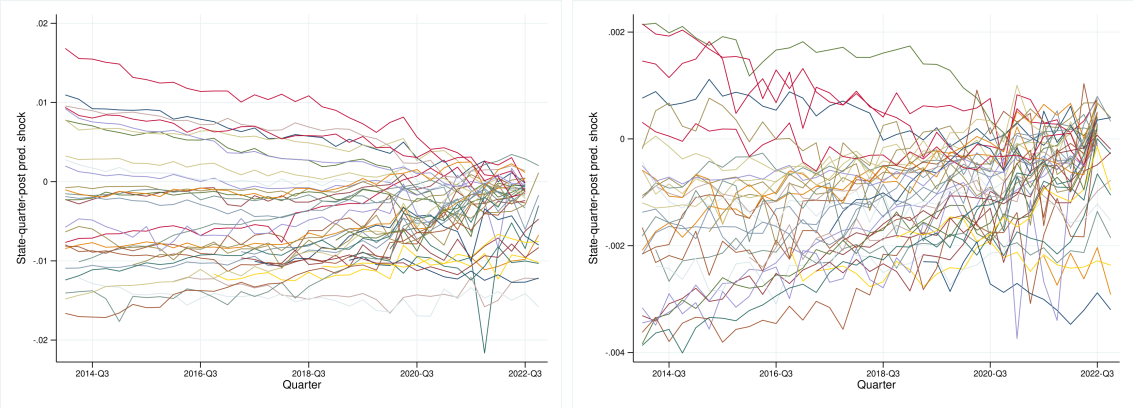
4.3 Results

We illustrate the ingredients of our exposure design in Figure 3. Subfigures (a) and (b) illustrates the variation in the estimated state-quarter level shocks $\hat{\beta}_{st}$ of Equation (2) for Ginnie Mae I and II, respectively. The variation is highest early in our data, which is relevant since state laws coalesced with similar language as time passed. Subfigures (c) and (d) illustrates the distribution of predicted shocks z_{mt} across Ginnie Mae I and II MBSs

(respectively) for the last quarter of several years; this is the variation exploited to identify δ_p in Equation (4). These, too, show a reduction in variance over time.

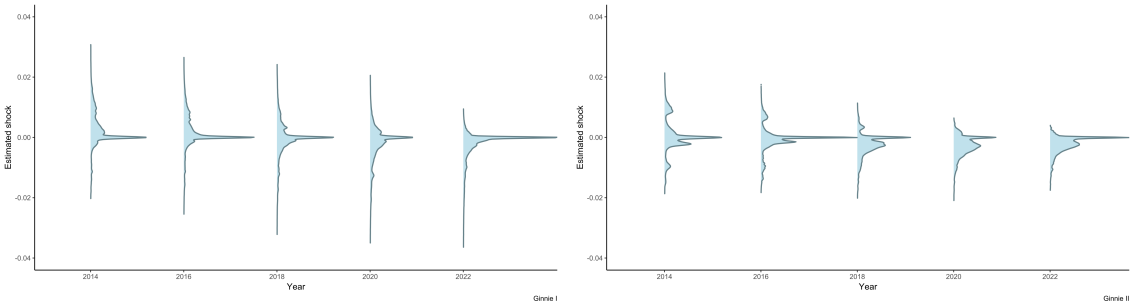
Figure 3: Mortgage-backed securities first stage analysis

State-level post-period quarterly predicted shocks



(a) Ginnie Mae I **(b)** Ginnie Mae II

Distribution of MBS-level predicted shocks



(c) Ginnie Mae I **(d)** Ginnie Mae II

Notes: Subfigures (a) and (b) illustrate the estimated $\hat{\beta}_{st}$ of Equation (2). Each line represents a different state after its reform; pre-reform quarters and never-treated states are omitted for display. Subfigures (c) and (d) illustrate the pooled distribution of z_{mt} computed in Equation (3) for a subset of the available years. Data is restricted to the last quarter of each calendar year for display.

We report estimates of the parameters of Equation (4) for Ginnie Mae I MBSs in Table 7. In columns (1)-(4) our performance measure is the share of the MBS balance which is between 30-90 days delinquent. In columns (5)-(8) we use the share of the balance which is greater than 30 days delinquent. Relative to MBS in the lowest quartile, in average, loan pools

exposed to mortgage servicing markets requiring licensure have lower delinquent balances. This is consistent with our findings in Section 3.3.4.

Table 8 repeats the analysis for Ginnie Mae II MBSs. The results are qualitatively identical: exposure to licensing standards is generally associated with lower delinquent balances. One difference between the two pools is the effect of the interest rate – our estimates suggest that for Ginnie Mae II, higher interest rates are associated with higher delinquencies. This may be driven in part by the additional flexibility afforded to the issuers of Ginnie Mae II securities as the underlying loans behind any single MBS may feature exposure to a broader swath of the credit spectrum.[8]

Table 7: The effect of servicing standards on delinquent balance shares in Ginnie Mae I MBSs

	Delinquent balance							
	30-90 days				30+ days			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Q_{25-50th}$	-0.410***	-0.365***	0.0156	0.0158	-0.206***	-0.147**	0.288***	0.288***
	(-9.95)	(-8.56)	(0.38)	(0.39)	(-4.53)	(-3.13)	(6.31)	(6.32)
$Q_{50-75th}$	-0.714***	-0.672***	-0.297***	-0.297***	-0.460***	-0.391***	-0.0280	-0.0277
	(-18.82)	(-16.98)	(-6.74)	(-6.74)	(-10.08)	(-8.20)	(-0.53)	(-0.53)
$Q_{75-100th}$	-0.995***	-0.865***	-0.606***	-0.606***	-1.099***	-0.912***	-0.643***	-0.643***
	(-17.44)	(-13.95)	(-8.83)	(-8.83)	(-17.03)	(-13.04)	(-8.15)	(-8.15)
Mean interest rate				-0.0154				-0.0144
				(-0.90)				(-0.82)
MBS Fixed Effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Time Fixed Effects	No	No	Yes	Yes	No	No	Yes	Yes
Observations	4,302,519	4,302,519	4,302,519	4,302,519	4,302,519	4,302,519	4,302,519	4,302,519

Notes: This table presents estimates of Equation (4) for Ginnie Mae I securities. The unit of observation is an MBS-quarter. The dependent variable is the fraction of the MBS outstanding balance which is delinquent. The independent variables are quartiles of exposure shocks. Standard errors are computed using the bootstrap method with 50 replications. We report t statistics in parentheses and denote p tests with stars: $* : p < 0.05$, $** : p < 0.01$, $*** : p < 0.001$.

[8]To be clear, Ginnie Mae I MBSs are also offered with exposure to different credit risks, but the restrictions imply that there is less credit risk heterogeneity *within* a particular MBS.

Table 8: The effect of servicing standards on delinquent balance shares in Ginnie Mae II MBSs

	Delinquent balance							
	30-90 days				30+ days			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Q_{25-50th}$	-0.0403	-0.0396	-0.0220	-0.0174	-0.189***	-0.226***	0.0354	0.0442
	(-0.86)	(-0.76)	(-0.41)	(-0.32)	(-3.86)	(-4.46)	(0.67)	(0.84)
$Q_{50-75th}$	-0.138**	-0.169**	-0.239***	-0.232***	-0.677***	-0.789***	-0.488***	-0.475***
	(-2.66)	(-2.81)	(-3.89)	(-3.80)	(-12.47)	(-13.23)	(-8.06)	(-7.87)
$Q_{75-100th}$	-0.514***	-0.574***	-0.259***	-0.253***	-0.840***	-0.949***	-0.854***	-0.841***
	(-9.18)	(-9.16)	(-3.99)	(-3.90)	(-12.96)	(-13.85)	(-11.84)	(-11.71)
Mean interest rate				0.000433***				0.000827***
				(3.41)				(5.42)
MBS Fixed Effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Time Fixed Effects	No	No	Yes	Yes	No	No	Yes	Yes
Observations	2130387	2130387	2130387	2130387	2130387	2130387	2130387	2130387

Notes: This table presents estimates of Equation (4) for Ginnie Mae II securities. The unit of observation is an MBS-quarter. The dependent variable is the fraction of the MBS outstanding balance which is delinquent. The independent variables are quartiles of exposure shocks. Standard errors are computed using the bootstrap method with 50 replications. We report t statistics in parentheses and denote p tests with stars: $* : p < 0.05$, $** : p < 0.01$, $*** : p < 0.001$.

5 Discussion and conclusion

The U.S. mortgage industry and related markets have received substantial policy scrutiny since the 2008 crisis. Among the many reforms has been a wave of state-level licensing requirements for mortgage servicers, as those firms are generally the first point of contact for borrowers under financial duress. However, licensing requirements are often controversial, with proponents claiming that they can solve informational problems, and opponents claiming that the costs of compliance will be passed on to consumers with little benefit.

We examine the impact of this wave of reforms on outcomes in the mortgage market and in the market for mortgage-backed securities. We show that licensing requirements led to a decrease in late-stage delinquencies and foreclosures, along with a small increase in early-stage delinquencies. We also observed a modest increase in interest rates at origination, though the estimates are noisy. These results suggest that the reforms were at least

somewhat effective at their stated goals, but that compliance costs were passed-through to consumers. We did not observe an effect on consumer complaints or borrower characteristics at origination. Our analysis of MBSs confirms a modest decrease in delinquencies.

This work has several policy implications. Our evidence supports the hypothesis that licensing requirements have collateral effects on borrowers' welfare. We hypothesize that this is primarily due to the ease of enforcing compliance with various state- and federal-level programs to assist distressed borrowers. Our evidence further suggests that compliance costs may be passed on to consumers through the interest rate at origination. One defining trait of the mortgage servicing market is the absence of consumer choice, and the unresponsiveness of the number of complaints per capita to the supervisory environment indicates that the disclosure of CFPB complaint databases might not be fulfilling its role as a market discipline mechanism.

Our results are in line with previous work studying the incidence of the Home Affordable Modification Program (HAMP), a federal program that encouraged participating mortgage servicers to modify mortgages so that borrowers could adjust their monthly payments, and required specific tasks to improve servicing processes. This sub program of Making Home Affordable (MHA) program was among many other measures derived from the Emergency Economic Stabilization Act of 2008 (EESA). The MHA was created to help homeowners avoid foreclosure by promoting loan modification, refinance, temporary forbearance, and transitioning out of home ownership, with HAMP as the largest MHA program. The evidence suggests that the unwinding of the interest rate subsidy implied by HAMP modifications resulted both in higher interest rates and default rates (Scharlemann and Shore, 2022), whereas loan forgiveness modifications to underwater loans had a modest reduction

in the probability of default at the expense of a substantial cost per avoided foreclosure (Scharlemann and Shore, 2016). These findings suggest that a large-scale programs such as HAMP may not suffice to achieve permanent effect on the mortgage servicing industry and mortgagor outcomes. Licensing standards and licensing requirements, and large-scale loan modification programs may need to act in tandem in order to attain the desired policy outcome of aligning incentives. We note that servicers are likely at least somewhat heterogeneous which is likely to result in different frictions across geographies in implementing such programs (Kim et al., 2022). Further work in this direction is warranted.

A natural question concerns the direction of future policy. As licensing did not result in fewer complaints, it may be tempting for legislators to increase penalties for violation of state- and federal-level standards. On the other hand, any increase in quality depends on several market factors and may not be valued by consumers. Policymakers should therefore assess regulatory stringency in light of servicer-level variation, compliance costs, and enforcement within the mortgage servicing market.

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A Appendix

Table A.1: Summary of Mortgage servicer licensing reforms by state

State	Has law?	Reference	Code	Date of passage	Effective date
AL	No				
AK	No				
AZ	Yes	SB 1029 (2008)	ARS § 6-943	June 26, 2008	July 7, 2008
AR	Yes	HB 1668 (2003)	ARK Code § 23-39-510	March 21, 2003	January 1, 2004
CA	Yes	SB 36 (2009)	CA Fin Code § 50002	October 11, 2009	October 11, 2009
CO	Yes	HB 21-1282 (2021)	CO Code § 5-21-107	July 7, 2021	January 1, 2022
CT	Yes	HB 5353 (2014)	CT Gen Stat § 36a-718	June 3, 2014	October 1, 2014
DE	Yes	SB 42 (2011)	Del C. § 2400	September 21, 2011	March 21, 2012
DC	No				
FL	Yes	SB 2226 (2009)	Flo Stat s.494	June 29, 2009	October 1, 2010
GA	Yes	HB 312 (2008)	OCGA § 7-100	April 29, 2009	July 1, 2009
HI	Yes	HB 2502 (2012)	HI Rev Stat § 454M	July 10, 2012	July 10, 2012
ID	Yes	HB 401 (2020)	Idaho Code § 26-31-206	March 11, 2020	July 1, 2020
IL	Yes	NA	205 ILCS § 635	July 1, 2003	July 1, 2003
IN	No				
IA	Yes	SF 2353 (2006)	IAC § 8-535B	April 1, 2006	April 1, 2006
KS	Yes	SB 369 (2016)	Kan. Stat. § 9-2203	March 24, 2016	July 1, 2016
KY	Yes	KDFI Memo	KRS § 286.8	December 22, 2016	March 1, 2017
LA	Yes	HB 807 (2014)	LA Rev Stat § 6:1086	May 19, 2014	June 30, 2014
ME	Yes	SP 444 (2017)	MRSA §2-302	May 30, 2017	May 30, 2017
MD	Yes	HB 61 (2019)	MD Fin Inst Code § 11-508	April 18, 2019	October 1, 2019
MA	No				
MI	Yes	Act 173 (1987)	MI Comp L § 445.1651	November 18, 1987	November 18, 1987
MN	Yes	SF 2966 (1998)	MN Statutes Sec. 47	March 20, 1998	August 1, 1999
MS	Yes	SB 3100 (2000)	Miss. Code § 81-18-7	May 22, 2000	July 1, 2002
MO	Yes	HB 382 (2009)	RSMo 443.805	July 8, 2009	July 8, 2009
MT	Yes	HB 90 (2011)	Mont. Code Ann. § 2-15-115	May 5, 2011	October 1, 2011
NE	Yes	LB 272 (1989)	Neb. Rev. Stat. § 45-705	May 25, 1989	May 25, 1989
NV	Yes	AB 480 (2015)	Nev. Admin. Code § 645F.950	June 1, 2015	January 1, 2016
NH	Yes	HB 457 (2017)	NH Rev Stat § 397-A:1	May 11, 2017	August 7, 2017
NJ	Yes	A4997 (2019)	NJ Rev Stat § 17:16F-29	April 29, 2019	July 29, 2019
NM	No				
NY	Yes	S8143-A	BNK § 590	May 8, 2008	July 1, 2009
NC	Yes	HB 1529 (2009)	NC Gen Stat § 53-244.040	July 31, 2009	July 31, 2009
ND	Yes	HB 1068 (2023)	N.D. Cent. Code § 13-13-03	April 14, 2023	July 1, 2023
OH	Yes	HB 489 (2019)	Ohio Rev. Code § 1322.07	December 13, 2018	March 20, 2019
OK	Yes	SB 1062 (2009)	59 O.S. § 2095	February 23, 2009	July 1, 2009
OR	Yes	SB 98 (2017)	OR Rev Stat § 86A.100	August 2, 2017	August 2, 2017
PA	Yes	SB 751 (2017)	7 PA Cons Stat § 6111	December 22, 2017	December 22, 2017
RI	Yes	230-RICR-40-102	RI Gen L § 19-14-2	January 1, 2019	January 1, 2019
SC	Yes	B673	SC Code § 37-22-120	June 3, 2009	January 1, 2010
SD	Yes	SB 165 (2007)	SD Codified L § 54-14-13	March 26, 2007	March 26, 2007
TN	Yes	ND. SB 2279 (2009)	Tenn. Code Ann. §§ 45-13-101	June 30, 1988	June 30, 1988
TX	Yes	SB17 (2011)	Tex. Fin. Code § 158.051	June 17, 2011	September 1, 2011
UT	Yes	SB286 (2009)	Utah Code § 70D-2-201	March 20, 2009	May 12, 2009
VT	Yes	SB287 (2010)	8 V.S.A. § 2901	May 8, 2010	January 1, 2011
VA	No				
WA	Yes	HB 2608 (2010)	WA Admin Code 208-620-230	March 12, 2010	July 1, 2010
WV	Yes	SB 418 (2001)	WV Code § 31-17-2	April 14, 2001	July 1, 2001
WI	Yes	AB 656 (1987)	WI Stat § 224.72	April 22, 1988	May 2, 1988
WY	No				