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Do Financial Counseling Mandates Improve Mortgage Choice and Performance? Evidence from a Natural Experiment

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ABSTRACT

We explore the effects of mandatory third-party review of mortgage contracts on the terms, availability, and performance of mortgage credit. Our study is based on a natural experiment in which the State of Illinois required ‘high-risk’ mortgage applicants acquiring or refinancing properties in 10 specific zip codes to submit loan offers from state-licensed lenders to review by HUD-certified financial counselors. We document that the legislation led to declines in both the supply of and demand for credit, with state-licensed lenders and lower-quality borrowers disproportionately exiting the affected area. Controlling for the salient characteristics of the remaining borrowers and lenders, we find that the legislation succeeded in reducing ex post default rates among counseled borrowers by close to 4 percentage points (about 35% decline). We attribute this result to actions of lenders responding to the presence of external review and, to a lesser extent, to counseled borrowers renegotiating their loan terms. We also find that the legislation nudged some borrowers to choose less risky loan products in order to eschew counseling

Keywords: Financial literacy, Lax screening, Subprime crisis, Household finance

JEL Classification: D14, D18, L85, R21

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1. Introduction

In the wake of the subprime mortgage crisis, policymakers have been urged to increase their intervention in credit markets (see Sheila Bair's testimony to the House Financial Services Committee, 2007). In particular, the leading policy initiatives include tightening the oversight on lenders (Federal Truth in Lending Act, Regulation Z) and providing mandatory financial counseling to certain borrowers (President Obama's *Homeownership Affordability and Stability Plan of 2009*). Although it has been shown that these programs may slow down market activity (Bates and Van Zandt, 2007), their effects on mortgage choice and performance, and their overall effectiveness are still debated.

In this paper we study the effects of the legislative mandate for third-party review of mortgage contracts implemented in a pilot program in Cook County, Illinois, between September 2006 and January 2007. The program required 'high-risk' mortgage applicants acquiring or refinancing properties in 10 Chicago zip codes to submit loan offers from state-licensed lenders to review by HUD-certified loan counselors.¹ The empirical setting of this natural experiment allows us to study the legislation's outcomes and isolate the driving forces behind the effects.

In particular, the unorthodox *geographic* focus of the legislation makes it easy to identify the control and treatment groups for econometric analysis of mandatory counseling. In contrast to loan-based programs, the geographic mandate makes it nearly impossible for lenders and households to disguise the terms of the transaction to eschew the regulation. Consequently, we construct a control group of neighborhoods similar to the treated zip codes in pre-pilot demographic variables, foreclosure rates, and location to conduct a difference-in-differences analysis. Since the legislation applied only to a select group of financial intermediaries and borrowers, we are able to derive further identification from variation in loan terms and performance within zip codes at given points in time.

Our analysis provides new results about the effects of financial advice on behavior of low- and moderate-income households and on lender response to mandatory loan counseling

¹ HUD is the US Department of Housing and Urban Development.

programs. In particular, we find that mandatory counseling limited both the demand for new mortgages and the supply of credit, and hampered real estate market activity in the treated areas. The legislation caused up to a 60% drop in the number of applications, a 40% decline in the number of active lenders, and a 20% decline in the number of originated mortgages. These reductions were concentrated in segments of the market most affected by the legislation – low-credit-quality borrowers served by state-licensed mortgage banks.

Our key result, however, is that the legislation resulted in substantially lower ex post default rates and somewhat better loan choices among counseled borrowers that remained in the market. These results hold after controlling for improvements in the credit quality of the borrower pool and for changes in the composition of the pool of available lenders. Specifically, the 12-month default rates declined by about 4 percentage points among counseled borrowers (a 35% improvement relative to the average default rate in the treated area).

Financial counseling mandates are often thought to work by providing better information to financially unsophisticated households. However, such mandates often have another important aspect in that they subject financial intermediaries to a certain degree of oversight by an outside party. In the case studied here, the legislation interjected counselors in the loan application process. This provided an incentive for lenders to screen out lower-quality borrowers in order to protect themselves from possible legal and regulatory action. On balance, we find more evidence in support of the effectiveness of the oversight threat than information per se.

In particular, we document a spike in rejection rates of mortgage applications during the treatment period. This increase is particularly sharp for lenders singled out by the legislation. On the contrary, we obtain mixed evidence on the direct effect of information received in counseling sessions. We estimate a stronger propensity to renegotiate loan terms for borrowers who are advised that their loans are “unaffordable”, as compared to ones for whom the counselor finds “no issues” with the loan offer.² On the other hand, we detect little aggregate effect of counseling

² This analysis is carried out on a small subsample of counseled borrowers that were hand-matched with the Cook County deeds data and mortgage servicer records. We are working on obtaining access to the aggregate data on pre- and post-counseling session mortgage terms.

on interest rates and propensity to take out adjustable rate hybrid mortgages – two of the most common areas of concern for counseling agencies.

Since we are able to control for observable measures of credit quality (e.g. FICO scores), the improvements in loan performance likely indicate better screening on the basis of soft information. This is consistent with the way in which counseling agencies approached the legislation. In addition to simply reviewing the loan offer filled out by the lender, counselors asked the borrowers to bring documentation on income and assets to the session. They also started counseling sessions by interviewing the borrowers on what *they* thought the loan terms and provisions were. Both of these actions effectively converted some information on borrower creditworthiness observed (but not necessarily recorded) by lenders into information observed by counselors. The fact that such soft information could be elicited – and recorded in a State-maintained database – by an outside party may have induced lenders to screen more effectively.

Moreover, the threat of counselor involvement did not apply exclusively to lenders. Some of the borrowers – those with FICO scores between 620 and 650 – were subject to counseling only if they chose “risky” financial products, such as interest-only mortgages. Indeed, we find that such borrowers attempted to avoid counseling by substituting into mortgage products not covered by the legislation. Such actions would also be in line with the intent of the legislation, and would represent yet another channel through which a counseling mandate may achieve its stated goals.

Our paper contributes to two strands of research on the effect of mortgage choice on housing market outcomes. The first stresses the role of financial education in enabling more informed choices by households. For instance, Lusardi (2007, 2008) voiced concern that a substantial number of consumers who enter into complex financial contracts, such as mortgages, are financially illiterate. Households may borrow too much at a high rate without realizing the future consequences (Agarwal et al., 2007) or may have a hard time recalling the terms of their mortgage contracts (Bucks and Pence, 2006). Furthermore, it has been argued that insufficient financial sophistication contributed to a growing number of households in bankruptcy and

foreclosure when housing market conditions deteriorated (White, 2007). Stark and Choplin (2009) present survey evidence that borrowers fail to read and understand contracts and are thus prone to exploitation by industry professionals. They subsequently call for tightening anti-fraud legislation to account for borrowers' biases.

The second strand focuses on regulatory oversight and corresponding changes in incentives for various market participants. For instance, Keys, Mukherjee, Seru, and Vig (2008) show that the incentives associated with the securitization process result in lax screening by mortgage originators. Ben-David (2008) finds that intermediaries expand the mortgage market by helping otherwise ineligible borrowers to engage in misrepresentation of asset valuations to obtain larger mortgages. Rajan, Seru, and Vig (2008) show that soft information about borrowers is lost as the chain of intermediaries in the origination process becomes longer, leading to a decline in quality of originated mortgages.

The rest of the paper proceeds as follows. Section 2 describes the mandatory counseling program in detail. Section 3 outlines the potential impact of the program and generates a number of hypotheses to be tested. Section 4 describes our methodology and the data used to test the hypotheses. Section 5 presents the empirical results. Section 6 analyzes the causes of the changes observed in the data. Section 7 summarizes and discusses the policy implications.

2. Illinois Predatory Lending Database Pilot Program (HB 4050)

In 2005, the Illinois House passed legislation intended to curtail predatory lending practices in the state. Although the state had a number of anti-predatory provisions in place, they were based on loan characteristics, in line with prevailing practices elsewhere in the country. However, some political leaders in Illinois became concerned at the apparent ease with which the trigger criteria for the anti-predatory programs could be avoided by creative loan packaging practices. For instance, the regulatory targeted balloon mortgages were replaced with adjustable rate mortgages with short fixed rate terms and steep reset slopes (the so-called 2/28 and 3/27

hybrid mortgages). Consequently, the legislature sought to shift focus from policing loan issuers to educating the borrowers.

To that effect, the legislation pioneered by Illinois House speaker Michael Madigan mandated financial counseling for mortgage loan applicants whose credit scores were sufficiently low (or product choices were sufficiently risky) to identify them as “high-risk borrowers.” The legislation set the FICO threshold for mandatory counseling at 620, with an additional provision that borrowers with FICO scores in the 621-650 range be subject for counseling *if* they chose certain “high-risk” mortgage products. Such mortgages were defined to include interest-only loans, loans allowing for negative amortization, loans adjustable within three years, mortgages with prepayment penalties, mortgages with less than five percent down payment and mortgages with closing costs in excess of five percent.³ The proposal was modeled on a successful FHA program run in the 1970’s (Merrick, 2007), and it generated a lot of excitement among Illinois lawmakers. The program was meant to run as a four-year pilot in select parts of the state, after which its coverage could be expanded. Somewhat ironically, given the eventual response of the population in the treated areas, the politicians clamored to have their districts included in the pilot (*ibid.*). In the end, the program (titled HB 4050) was passed on the last day of the 2005 legislative session and encompassed ten zip codes on the Southwest side of Chicago (see Figure 1).⁴

HB 4050 mandated that each of the “high-risk borrowers” attend a counseling session with one of the HUD-certified loan counseling agencies. The determination of the need for such a session was made on the day of the application, and the borrower had 10 days to fulfill the requirement. The goal of these sessions, lasting one to two hours, was to discuss the terms of the loan offer for a home purchase or refinancing and to explain their meaning and consequences to the prospective borrower. The counselor was also expected to verify the loan application information about the *borrower* (e.g. income and expenses). At the end of the session the

³ Repeat refinancings within the last 12 months also triggered counseling for mid-FICO score borrowers.

⁴ The selected zip codes are: 60620, 60621, 60623, 60628, 60629, 60632, 60636, 60638, 60643, and 60652.

counselor was required to record a number of “recommendations” about the loan, such as whether the lender charged excessive fees, whether the loan interest rate was “in excess of market rate”, whether the borrower understood the transaction, or could afford the loan, etc. Both the interview and the independent collection of data on borrower income and expenses allowed counselors to form an assessment of borrower creditworthiness that potentially went beyond what was conveyed by the lender. Effectively, the counselors were able to elicit soft information that was not necessarily reported by lenders and make it a matter of public record by entering their recommendations in the State-maintained database. This may well have induced the lenders to screen better prior to referring approved applications to counseling for the fear of future regulatory or legal action. It should be noted that none of the recommendations was binding in the sense that borrowers could *always* choose to proceed with the loan offer at hand.

HB 4050 stipulated that the \$300 cost of the session be borne by the mortgage originator, and not the borrower. However, even if the direct costs of counseling were shouldered by the lender, HB 4050 imposed other burdens on the borrowers. Those included finding the time to attend the counseling session, the psychological costs of potentially exposing their ignorance, and the implicit surrender of the future option to complain or sue for being misled by the lender. Finally, by lengthening the expected amount of time until closing, HB 4050 could force borrowers to pay for longer credit lock periods, raising the cost of the loan.

As mentioned earlier, only the loans offered by state-licensed mortgage lenders were subject to this requirement, as the state lacks the legal authority to regulate any federally-chartered institutions and generally exempts such institutions and state-chartered banks from mortgage licensing. However, lending in disadvantaged neighborhoods has been done primarily through the state-licensed mortgage bankers that presented themselves as a local and nimble alternative to the more traditional bank lenders.⁵ Consequently, the legislation was likely to increase the regulatory burden on the very entities providing credit in the selected pilot areas.

⁵ Using the HMDA data described in greater detail in section 4, we estimate that state-licensed mortgage bankers accounted for 56% of mortgage loans originations in the HB 4050 zip codes during 2005.

The possibility that this could result in credit rationing prompted many observers to voice concern on the potential effect of HB 4050 on housing values in the selected zip codes.

HB 4050 imposed a substantial compliance burden on the affected lenders as well. In addition to the cost of counseling (assuming it was not “recovered” through other loan charges), lenders had to make sure that the certification requirements of HB 4050 were implemented fully.⁶ Otherwise, lenders could potentially lose the right to foreclose on the property. Finally, lenders reportedly feared losing some of their ability to steer borrowers toward high margin products that may not have matched their financial needs and capabilities.

A recent report by the non-profit Housing Action Illinois (2007) summarized the counselors’ assessment of HB 4050. Over the course of the pilot, about 1,200 borrowers received counseling. In 9% of the cases, mortgages were deemed as having indications of fraud. About half of the borrowers were advised that they could not, or were close to not being able to afford the loan. For 22% of the borrowers, loan rates were determined to be more than 300 basis points above the market rate. For 9% of the borrowers, the counselors found a discrepancy between the loan documents and the verbal description of the mortgage by the prospective borrowers. And perhaps most alarmingly, an “overwhelming majority of borrowers” did not understand that their adjustable rate mortgage payment was not fixed over the life of the mortgage.

The geographic focus of the legislation differed substantially from typical regulatory approaches that required counseling for certain loan types and did not apply uniformly to a particular area (Bates and Van Zandt, 2007). This feature of the legislation generated considerable opposition from community activists and residents and prompted several lawsuits. Since the selected pilot areas were overwhelmingly (82%) populated by Hispanic and African-American residents, the selection prompted heated accusations of discriminatory intent on the

⁶ Under HB 4050, title companies did not receive a "Safe Harbor" provision for “good faith compliance with the law.” As a result, any clerical errors at any point in the loan application process could potentially invalidate the title resulting in loss of lender right to foreclose on a non-performing loan. According to the Cook County Recorder of Deeds, even federally-regulated lenders had to procure a certificate of *exemption* from HB 4050 to obtain a clean title. Consequently, *all* lenders were affected to at least some degree by the legislation.

part of lawmakers.⁷ As mortgage bankers threatened to withdraw from the pilot zip codes en masse, and as the rising tide of concerns about subprime mortgages began to have both demand and supply effects in the real estate market, the opposition to HB 4050 reached fever pitch. The pilot program was suspended indefinitely in January 2007, after only 20 weeks of operation.

3. Data and Empirical Setup

3.1 Data Used in the Study

Our study relies on several complementary sources of data. First, we use data collected under the Home Mortgage Disclosure Act (HMDA) to assess elements of supply and demand for credit. Ideally, we would rely on the loan application and counseling data collected under the statutory authority of HB 4050 to analyze credit demand. In its absence, however, we turn to HMDA as the next best source of information on loan application volume, rejection rates, etc. Using information from HUD as well as hand-collected data, we are able to distinguish between lenders who specialize in prime and subprime loans, as well as between lenders that are licensed by the State and those who are exempt from licensing. Since the effects of the legislation were likely to be felt most acutely by state-licensed subprime lenders, we use this list to refine our analysis. Furthermore, the HMDA data allows us to examine how the HB 4050 affected the credit supply along the extensive margin, i.e., to identify lenders that left the market altogether. In addition, we use Census data and Internal Revenue Service data to control for zip code level characteristics of income and population composition.

Next we employ the universe of actual properties that were put on the market by real-estate agents and the universe of actual transactions that were completed. The first database is the Multiple Listing Service (MLS). This includes all the transactions that are mediated by real-estate agents and includes information on listing prices, time on the market, property characteristics, and mortgage details. We also employ the Cook County Recorder of Deeds

⁷ Felicia Stovall, a community activist, referred to HB 4050 as “legislative redlining.”

database that includes all transactions (mediated by agents or sold by owner) that took place in the region, including information about the associated mortgages.

Also, we use the First American CoreLogic LoanPerformance database to assess the effect of HB 4050 on the composition of mortgages originated in the treated zip codes. This dataset is the main source of loan-level information available for subprime mortgages. According to LoanPerformance, as of 2006 their database covered over 90% of securitized subprime mortgages. The database includes detailed borrower and loan information such as FICO scores, debt-service-to-income ratios, zip code, and home characteristics, as well as mortgage terms such as maturity, product type (e.g., fixed or adjustable rate mortgage), interest rate, and interest rate cap. FICO scores are designed to forecast adverse credit events over the two year horizon and are used extensively by lenders to assess the creditworthiness of the borrower and the appropriate loan terms. For the purposes of our study, the FICO scores also allow us to determine which borrowers in the treated zip codes were automatically or conditionally subject to loan counseling (see the discussion in Section 2 for details).

Finally, we received a sample of counseling data from one of the agencies that provided counseling services during the HB 4050. The data includes information on 212 original mortgage offers that applicants received from lenders. We matched these data to HMDA and LoanPerformance, based on approximate date, location, and mortgage amount and type. Overall, we perfectly matched 99 observations. We use this dataset to gauge the extent to which counseling had a direct effect on mortgage selection.

3.2 Summary Statistics

Table 1 summarizes some of the key demographic and mortgage characteristics for the Chicago market and, specifically, for the ten zip code area selected under the HB 4050. The ten zip codes occupy a contiguous geographic block on the Southwest Side of Chicago (represented by the orange-shaded area on Figure 1), and are predominantly minority-populated. As can be seen in the table, the HB 4050 area has higher delinquency and default rates than the county as a

whole, with a disproportional share of subprime and Alt-A mortgages. The area also has much higher rates of poverty, unemployment, and dependence on public assistance, although population-weighted homeownership rate is similar to that in the rest of the county.⁸ The table also provides information for a geographic area made up of set of zip codes with similar demographic characteristics (shaded in light green in Figure 1) that were not subject to HB 4050. This will be used as one of the control samples in our empirical analysis.

3.3. Design of Tests: Difference-in-Differences Micro-Level Analysis

Our empirical analysis is designed to exploit cross-sectional and temporal variation in a difference-in-differences framework. Specifically, our tests measure the difference in response of various variables (e.g., foreclosure, interest rate, etc.) as a function of whether the property was in a zip code included in the mandatory counseling program. Our regressions include both time controls and cross-sectional controls, as in classic difference-in-differences analysis.

Our basic specification regressions have the following form:

$$Response_{ijt} = \alpha + \beta Treatment_{jt} + \gamma Time\ dummies_t + \delta Zip\ code\ dummies_j + \theta Controls_{ijt} + \varepsilon_{ijt},$$

where $Response_{ijt}$ is the response variable (e.g., foreclosure status or change in house price) at the transaction level. $Treatment_{jt}$ is a dummy variable that receives the value of 1 if zip code j is treated at month t and 0 otherwise. $Time\ dummies_t$ and $Zip\ code\ dummies_j$ capture fixed time and location effects. In all the regressions, we cluster errors at the zip code level.⁹ The set of controls varies with the underlying data source, but it includes variables such as loan-to-value ratios at origination, borrower FICO score, current loan interest rate, etc.

⁸ The homeownership rate in the HB 4050 treatment area is somewhat distorted by two zip codes, 60638 and 60652 that have ownership rates of 79% and 91%, respectively. These zip codes also have much lower rates of poverty and public assistance than the rest of the HB 4050 area.

⁹ Doing so allows for an arbitrary covariance structure of error terms over time within each zip code and thus adjusts standard error estimates for serial correlation. As the number of treatment zip codes is fairly large, this is an effective method of correcting a potentially serious inference problem (Bertrand, Duflo, and Mullainathan, 2004).

We are concerned about selection effects in the treated zip codes. In particular, the set of HB 4050 zip codes is patently non-random, but rather concentrates on low-income neighborhoods in which foreclosure rates were high at the outset. The problem with selecting such zip codes is that there is a possibility that they have different resilience to economic shocks unrelated to treatment. For example, it is possible that prices in low-income areas were more sensitive to the general price decline following the housing market peak around November 2006.

We offer two solutions for the treatment zip code selection. First, we use the design of the pilot project and separate the effect of treatment across FICO groupings, while also allowing time and zip fixed effects to vary with FICO group. Effectively, we are treating each zip code as consisting of three sub-“locations”, only some of which are subject to mandatory counseling.¹⁰ This approach has the advantage of retaining the flavor of standard difference-in-differences analysis while also exploiting the within zip code heterogeneity in treatment. By interacting time dummies with FICO groups, we also allow the effect of shocks to vary with the creditworthiness of the borrower, thereby alleviating some of the selection concerns.¹¹ The regression specification that we run is:

$$\begin{aligned}
 \text{Response}_{ijt} = & \alpha + \beta_1 (\text{Treatment}_{jt} \times \text{Low-FICO}_{ijt}) + \beta_2 (\text{Treatment}_{jt} \times \text{Mid-FICO}_{ijt}) \\
 & + \beta_3 (\text{Treatment}_{jt} \times \text{High-FICO}_{ijt}) \\
 & + \gamma_1 (\text{Month dummies}_t \times \text{Low-FICO}_{ijt}) + \gamma_2 (\text{Month dummies}_t \times \text{Mid-FICO}_{ijt}) \\
 & + \gamma_3 (\text{Month dummies}_t \times \text{High-FICO}_{ijt}) \\
 & + \delta_1 (\text{Zip code}_j \times \text{Low-FICO}_{ijt}) + \delta_2 (\text{Zip code}_j \times \text{Mid-FICO}_{ijt}) \\
 & + \delta_3 (\text{Zip code}_j \times \text{High-FICO}_{ijt}) + \theta \text{Controls}_{ijt} + \varepsilon_{ijt}.
 \end{aligned}$$

Second, we conduct our tests using three alternative control groups. We first compare transactions in the treated zip codes to transactions in the entire Cook County area (excluding the

¹⁰ In a series of robustness tests, we replaced the fixed effects of the interactions of the FICO groupings with zip code and date fixed effects, in addition to interactions of date fixed effects and logged zip code level income. The results in all tests are practically the same.

¹¹ For robustness, we also evaluate a specification with a full set of time and zip code interactions. In this case, identification derives strictly from within zip code variation at a point in time. As reported in section 5.3 below, the main results remain qualitatively the same with this approach.

HB 4050 zip) (the “Full” sample). We also compare transactions with a control group comprised of eleven zip codes unaffected by HB 4050 that are similar to the treated areas on a number of socio-demographic and housing characteristics.¹² These alternative zip codes are highlighted in Figure 1 (in light green) and are summarized in the middle column of Table 1. In addition to matching the key characteristics of the HB 4050 area quite well, these zip codes also lie in close geographic proximity to the treatment group (the “Comp.” sample). Finally, to account for self-selection of lenders out of the treated zip codes, we put together a sample that includes only lenders who remained active in the treated zip codes (the “Active” sample). Hence, in this analysis we hold constant the population of lenders, i.e., we are identifying effects unrelated to the change in the composition of lenders.

4. Empirical Analysis

4.1. Exit of Borrowers and Lenders

We measure the mortgage market activity in the wake of HB 4050 as the volume of loan applications captured in the HMDA database.¹³ Figure 2 depicts the total number of loan applications in the treated zip codes (the dark blue line) and in the comparable set of zip codes (“Control”, indicated by the red line).¹⁴ This information is reported in two panels that further subdivide application volumes by state-licensed lenders that specialize in subprime loans and all other lenders (labeled “exempt lenders” in the figure). These panels capture a number of key trends related to the legislation. In both panels there is a substantial and statistically significant drop in the number of applications in the treated area around the time the regulation became effective (September 1, 2006). In contrast, the volumes in the control area remained relatively

¹² The “HB 4050-comparable” area includes transactions from the following zip codes: 60608, 60609, 60617, 60619, 60633, 60634, 60639, 60641, 60647, 60651, 60653.

¹³ We count all HMDA records associated with owner-occupied properties that have one of the following action codes: originated, denied, approved but not taken, withdrawn, and incomplete. Purchased loans are excluded because of uncertainty about the timing of the initial loan application. When purchased loans are added to the set of applications, the time patterns are effectively unchanged.

¹⁴ The results with the control group defined as all non-HB 4050 Cook County zip codes are qualitatively similar and are available upon request.

flat for much of the HB 4050 period, before beginning a rapid market-wide decline early in mortgage origination in 2007.

The decline in loan application volume is most pronounced among state-licensed mortgage bankers specializing in subprime loans. For such lenders, the application volume dropped from nearly 4,000 in August 2006 to 2,341 in September. Although this decline may potentially be exaggerated by the run-up of applications in anticipation of the regulation, it is clearly not present in the control sample. Following the repeal of HB 4050, activity levels in both geographic areas converged nearly instantaneously, and proceeded to plummet jointly to levels less than one-sixth of those in the market heyday.

Although not shown in Figure 2, HMDA data provide additional insight into lender specialization. While the vast majority of subprime lending was done by state-licensed mortgage lenders, most prime lending was done by entities exempt from the state licensing requirement, and thus from HB 4050. This specialization, and the lack of any appreciable upward trend in the number of subprime applications filed by lenders exempt from HB 4050 (the right-hand panel) are consistent with the scenario in which low FICO borrowers were the ones most adversely affected by the treatment and were not able to switch to the non-treated lenders.

Similar results are presented in regression form in Table 2, Panel A. Columns (1) and (2) show that loan application volume in treated zip codes declined by 60% to 65% among lenders most affected by the regulation. Some of this decline could be traced to much publicized lender withdrawals. However, restricting the sample only to lenders that remained active in HB 4050 zip codes during the legislation (Column (3)) still generates a substantial drop in volume. This suggests that lender response took place both along the intensive and the extensive margins. In contrast, application volumes declined by much less among other lenders; some of whom were also subject to regulation, e.g., state-licensed lenders who originated exotic mortgages to prime borrowers (Columns (4) to (6)).

We next turn our attention to actions of lenders in HB 4050 areas. In particular, we are interested in examining lender composition, actions, and market presence. We can tackle the

question of market exit by counting the number of unique lenders filing HMDA reports before, during, and after the treatment period in both the treated and the control geographic areas. To be counted as an ‘active lender’ in a given geographic area in a given month, a HMDA reporting institution must file at least 20 applications (the threshold for the larger “Full” control group is set at 50).¹⁵ The results of this simple exercise are reported in Panel A of Table 3. The left panel of the Table reports a substantial decline in the number of active lenders in treated zip codes. The magnitude of this decline is much greater and strongly statistically different from the pattern observed in either of the control areas. The right side of the table confirms that lender exit was disproportionately concentrated among state-licensed lenders specializing in subprime mortgages, whose ranks dwindled from an average of 31 prior to HB 4050 to 17 during the treatment period. These results corroborate the hypothesis that the mandatory counseling requirement resulted not just in the reduction of demand for credit, but also in the abrupt and complete exit of relatively large lenders from the affected zip codes.

We assess whether the lenders who stayed in the market have different characteristics than the ones that stayed in the market using LoanPerformance data. In Table 3, Panel B, we compare those two types of lenders, based on pre-HB 4050 mortgage characteristics. Although lenders who stay in the market are statistically different from those who left the market on almost every dimension, the differences are relatively small economically. Lenders who stayed in the market are more heavily tilted towards low-FICO score population, with somewhat higher adjustable-rate and interest-only mortgages. Overall, we do not find evidence supporting the hypothesis that lenders who stayed in the market are materially different from those who left the market following the counseling legislation.

Finally, we examine whether the borrowers who were subject to the counseling were more likely to be rationed from the market. In Figures 3a and 3b we compare the distribution of borrowers before, and during the HB 4050 legislation period across FICO ranges. The leftmost bars in the top panel shows a pronounced decline in the ratio of low-FICO borrowers (<620) to

¹⁵ None of the patterns depends on the choice of the threshold level.

high-FICO borrowers (>650) in the treated zip codes during the treatment period from 1.2 to 0.85. (The absolute share of low-FICO borrowers (not shown) declined by 10%.) In contrast, as shown by the set of bars to the right, the relative (and absolute) credit quality distribution in comparable zip codes remained virtually unchanged during the HB 4050 period. In unreported analysis, we evaluate these changes in borrower credit quality in a regression framework, with (as in Table 2) one of the specifications limiting the sample to financial institutions that remained active in the HB 4050 zip codes during the treatment period. The restricted sample also shows a sizable improvement in borrower credit quality in HB 4050 zip codes, indicating that the change was not entirely due to the exit of lenders that catered to low-FICO borrowers.

4.2. Delinquency and Default Rates

Perhaps the main goal of HB 4050 was to improve the quality of mortgage loans and reduce the extent to which borrowers defaulted and had their properties foreclosed on. To measure loan delinquency and foreclosure rates we flag borrowers that become delinquent within one year following origination (Columns (1) to (4) in Table 4, Panel A) or default within one year (Columns (5) to (8) in Table 4, Panel A).¹⁶ The independent variables include zip code fixed effects interacted with three FICO range indicators, and calendar month fixed effects interacted with three FICO range indicators. In addition, the regressions include controls for borrower characteristics (investor flag, FICO score, second-home owner flag) and contract characteristics (documentation level, logged property valuation, leverage, ARM flag, negative amortization, refinancing and prepayment penalty flags).

The results in Panel A show that treated borrowers are less likely to become delinquent and substantially less likely to default on their debt. Delinquency rate of low-FICO treated population declined by 4 to 5 percentage points (the unconditional delinquency rate in LoanPerformance was 27.4%). Loan default rates declined by 3 to 4 percentage points (the

¹⁶ A loan is considered delinquent if it is 30 or 60 days past due in the first 12 months since the first mortgage payment date. A loan is considered defaulted if it is 90+ days past due, in bankruptcy, in foreclosure, or is real-estate owned (REO) status in the first 12 months since the first mortgage payment date.

unconditional default rate was 9.2%). Hence, delinquency rate was reduced by about 15% and default rate declined by about 35% in the treated area. Figures 3a and 3b show as well the dramatic effect, based on LoanPerformance data. For mortgages originated before the legislation was in force, the default rate was higher for HB 4050 zip codes comparing with the default rate in the comparable zip codes (Figure 3a). For mortgages originated during the legislation period, however, default rate was lower than that in the comparable zip codes (Figure 3b).

The decline in borrower default could be driven by factors other than financial counseling, such as by selection of borrowers or of lenders. One possibility is that the “predatory” lenders that previously accepted less qualified borrowers simply exited the market following the legislation and ‘bad’ loans were avoided. As a consequence, the delinquency and default rates decreased for the remaining borrowers. We test for this possibility by limiting the sample to lenders that remained active during the HB 4050 period. The estimation results, presented in Columns (3), and (7) of Table 4, Panel A, indicate that our conclusions remain robust to this restriction. Even among loans made by this static group of lenders, there is a marked decline in ex post defaults for HB 4050 originations. Columns (4) and (8) show that the effect is stable even with lender fixed effects, i.e., delinquency and default rates are different for the same lenders when they are treated and when not.

Another potential interpretation of the results is that bad borrowers self-selected out of the market or were rejected by lenders (as shown in Figures 4a and 4b). To test this we include a control for the loan spread paid by borrowers in the specification (in addition to already existing controls such as the FICO score).¹⁷ The loan spread should capture the riskiness of borrowers and therefore counterbalance the selection concerns that are correlated with borrower riskiness. When this control is included in the analysis the results remain virtually unchanged (Panel B, Columns (1) to (3)).

¹⁷ For ARMs, LoanPerformance provides the relevant data item. For fixed-rate mortgages (FRMs), Loan Spread is calculated as the difference between the contract interest rate and the matching-maturity Treasury.

Lastly, as an additional robustness test, we rerun the regressions in a probit framework despite the critique of Ai and Norton (2003). The results are presented in Table 4, Panel B, Columns (4) to (6). The results (presented for the mean transaction) indicate the likelihood of default is lower by 1.6% to 2.5%. Although the results are slightly weaker in a probit framework, they remain statistically and economically significant.

In sum, we find that the financial counseling requirement reduced delinquency and default rates in the treated area. The effect on default is impressive in its economic magnitude and does not seem to be driven by selection from either lenders or borrowers.

4.3. Product Choice

Next, we discuss whether the counseling treatment affected the choice of mortgages by borrowers stayed in the market. Given that the counselors argued in many cases that mortgages are too risky for borrowers, and given that the program defined risky products very precisely (e.g., adjustable rate mortgages and interest-only mortgages), we expect that treated borrowers are less likely to select such mortgage contracts.

Hence, we model the likelihood of borrowers taking risky products (as defined by HB 4050) and whether their decisions were altered as a result of the counseling. We evaluate the probability of taking an adjustable rate, interest-only, and low-documentation mortgage. ARMs are an inherently more complicated product, with the eventual cost of the loan depending on future interest rate realizations and loan terms such as the frequency of resets and the size of the rate margin. Adjustable rate mortgages (and option ARMs) are also often cited as examples of loan products that may present a biased appearance of loan affordability to unsophisticated borrowers (Housing Action Illinois, 2008).

The regressions in Table 5, Panel A, yield interesting results concerning the effects of the HB 4050 legislation. In Columns (1) to (6) we find little evidence that following counseling treated low-FICO borrowers tried to avoid ARM and IO products. Only low-FICO borrowers at the “Active” sample were less likely to choose IO mortgages. However, we document that mid-

FICO borrowers did reduce their exposure to these risky products by a significant amount; 6.0% to 7.2% for ARMs (the unconditional likelihood is 77%) and 2.4% to 4.9% for interest only mortgages (the unconditional likelihood is 21%).

The striking result is that treated (low-FICO) borrowers did not, on average, materially change their product mix as a result of counseling. The ones that did alter their product choice appreciably were the mid-FICO borrowers who would thereby be able to eschew counseling. In other words, the regulator achieved the goal of risk reduction by threatening counseling and not by the content of counseling.

In Columns (7) to (9) we test whether the likelihood of taking a low-documentation mortgage is higher. We find that both low-FICO and mid-FICO borrowers are less likely to take low-documentation mortgages, however, the effect is stronger for mid-FICO borrowers. This result could be explained as a combination of two effects. First, as above, mid-FICO can avoid counseling by choosing full-documentation mortgages. Second, treated low-FICO borrowers are more likely to choose full-documentation mortgages because counselors require them to provide income documentation as part of the counseling process.

Overall, our findings suggest that treated borrowers did not change materially their product choice. Yet, it seems that the presence of the counseling legislation and irrespective of its content caused borrowers to modify their choices in line with the intention of the legislators.

4.4. Mortgage Characteristics

According to Housing Action Illinois (2007), common recommendations are that mortgage applicants are paying too high interest and taking on too much debt. As a result, one would expect that treated borrowers would try to reduce their leverage levels and negotiate better their loan terms.

Table 5, Panel B, explores whether borrowers' debt burden was indeed reduced following the HB 4050 legislation. We measure the debt burden using Loan-to-Value (LTV) ratio in Columns (1) to (3) and Debt-Service-to-Income (DTI) ratio in Columns (4) to (6). We find that

for low-FICO borrowers, there was a modest decrease in LTV and in DTI. Average LTV declined by up to 1.3 percentage points (the average LTV was 80%), while DTI declined by 0.2 percentage points to 0.6 percentage points (the average DTI was about 41%). Hence, borrowers who were subject to the treatment borrowed 0.5% to 1.5% less than untreated borrowers.

We next investigate whether loan spreads were lower in the treatment area (Panel B, Columns (7) to (9)). We find that there is no material effect on loan spread on either low- and mid-FICO groups. Hence, it appears that counseling did not improve the bargaining power of borrowers.

5. Pinning Down Causality: Financial Counseling vs. Threat of Regulation

Our results show that despite the fact that the mortgage market shrank due to legislation, the pilot program has largely achieved its goals for the subset of borrowers that remained in the market: delinquency and default rates sharply declined and the product mix improved somewhat. In this section we analyze the factors that led to the improvement in performance. Specifically, we evaluate whether the rationing of borrowers, exit of lenders, financial education, or increased oversight was responsible for the improvement in performance and product choice.

5.1. Effects of Selection of Borrowers and Lenders

By imposing a significant tax on borrowers and lenders, the pilot program reduced market activity. As we showed earlier, the decline in application volume is far sharper (60%) than the decline in originations (20%). This suggests that two-thirds of the applicants who were rationed from market would not have been approved for a mortgage even if they were not excluded from the market. Figures 4a and 4b show that rationed borrowers were primarily low-FICO borrowers. It is likely that the overall default rate declined as a consequence of the exit of poor-quality borrowers. Nevertheless, note that the effects that we attribute to the legislation are estimated after controlling for detailed borrower and property characteristics including geographical location, leverage, logged property valuation, FICO range, FICO score, and loan

spread. Hence, the sharp decline in default rate is robust to self-selection of borrowers, based on observables. Note that since we control for borrowers' leverage and the type of mortgages that they choose, we can rule out the possibility that improved mortgage choice accounts for the improvement in the default rate.

Another possibility is that the anti-predatory laws pushed some predatory lenders from the market, and consequently improved mortgage performance. To assess whether the exit of shady lenders is responsible for the decline in default rate, we repeated all our choice and default models regressions with a constant sample of lenders who remain in the market (presented as the "Active" sample in Tables 4 and 5). The effects we report are largely robust to the restriction of the sample to active lenders, suggesting that the decline in default rate did not happen because of the displacement of predatory lenders from the market.

5.2. The Informational Content of Financial Counseling

Since the improvement in default rate and mortgage choice is robust to controls of self-selection, it must be that either a change in the behavior of remaining borrowers or a change in the behavior of remaining lenders were responsible for these effects. We begin with analyzing the response of borrowers to counseling requirement by assessing how counseling affected the behavior of borrowers.

We assess whether counseled borrowers changed their original choice following the counseling session. To do so, we obtain detailed counseling session information from one of the counseling agencies. For each borrower among 99 that could be identified we compared the original terms (as recorded by the agency) to the mortgage details as recorded in LoanPerformance. Table 6, Panel A, presents a breakdown of these mortgage offers organized by counselor recommendation. Of these mortgage offers, only two were rejected by borrowers following the counseling. The majority of the remaining reviewed offers (54 out of 97) received a "no issues" entry, indicating that the counselor had no concerns about affordability, understanding, or disclosure in the original offer. Yet, 20 of those loans did become modified

after counseling, with 15 obtaining lower monthly payments. The share of loans modified post-counseling is markedly higher for “problematic” recommendations, as nearly two-thirds of “unaffordable” or “fraudulent” loans were renegotiated.

Looking more closely into the specifics of renegotiated “problem” loans highlights some of the complexities in establishing a direct mapping between counseling recommendations and the eventual loan choice. Some contract changes appear incongruous with the recommendation. For example, some “unaffordable” loans were renegotiated to loans with shorter amortization periods or longer resets. This may have made such choices less risky, but also less affordable at the time of origination. Although counselors commonly recommended fixed rate mortgages as the best means to lessen the risk of mortgage obligations, very few borrowers (less than 20 percent) switch away from their original ARM offers. In fact, almost as many borrowers went from fixed rate mortgages to ARMs, as the other way around. Among those renegotiating their ARM deals, extending reset periods (by going from, say 2/28 to 3/27 loans) was also nearly as common as shortening them.

Despite the fact that many counseled borrowers renegotiated their original mortgages, Table 5 shows that important risk characteristics were not altered on average. Specifically, Table 5, Panel A, presents evidence that counseled borrowers did not shy away from adjustable-rate mortgages (ARMs) and interest only mortgages, both considered risky mortgages by the legislator. In addition, the table shows that counseled borrowers (low-FICO borrowers) reduced their average leverage by a modest one percentage point and could not improve their interest rate margin at all.

5.3. The Threat of Financial Counseling on Borrowers

Beyond its informational value, financial counseling is a burden for borrowers. Specifically, the legislation required borrowers to attend a session that lasts a couple of hours, and further sessions for each new mortgage offer. In this section we evaluate whether borrowers viewed counseling as a benefit or burden.

To test this idea, we estimate whether borrowers were more likely to reject mortgage offers following counseling. In Table 6, Panel B, we use aggregate HMDA application data to test whether borrowers were more likely to reject mortgages during the legislation period. The table shows that rejection of mortgages by borrowers actually declined during the legislation period by 6 to 8 percentage points. Similar result can be seen on the time-series chart in Figure 5a. This is a remarkable result given that more than half of the borrowers were advised that they cannot afford the loan and another large fraction of borrowers was advised that their loan rate is above market and that they should seek alternative mortgage offers. Since we do not identify that counseled borrowers significantly improved their terms following counseling (e.g., interest margin), a likely explanation for the low rejection rate is that borrowers preferred to accept the first offer they had at hand and not to return for further counseling with offers from a different lender.

This result is consistent with the results found in Section 4.3, that the legislation affected the product choice of mid-FICO borrowers, and not of low-FICO borrowers. There are few explanations to the extent to which mid-FICO borrowers reduced their share of ARM, IO, and low-documentation mortgages, while treated low-FICO borrowers did not reduce their product mix. First, by choosing less-risky mortgages, mid-FICO borrowers could avoid the burden of counseling. Second, the fact that some products command counseling while others do not may signal to borrowers their relative riskiness. This interpretation does not explain however why treated borrowers, who presumably were warned against risky products, did not act on the information. Third, it is possible that lenders steered mid-FICO borrowers away from risky products knowing that otherwise their offer would be reviewed by an external party. Unfortunately, although all explanations are consistent with effects of the threat of regulation, we cannot distinguish between them.

In sum, the threat of counseling seems to generate stronger effects than the informational content of counseling. Borrowers attempt to limit their encounters with the counselors. In the

case of HB 4050, some borrowers can do that by choosing low-risk mortgages, and others simply stick with the original lender.

5.4. The Threat of Regulator's Oversight on Lenders

Earlier we found that state-licensed lenders who are subject to legislation were more likely to exit the market relative to lenders who are not state-licensed. The remaining lenders must submit their loan offers for a large fraction of the population to inspection by officials. In this section, we investigate the response of lenders who stayed in the market to the increased oversight.

Table 6, Panel C, documents that the rejection rate by lenders most affected by the regulation increased in the treatment period by anywhere from 7% to 9%. In comparison, rejections by lenders largely exempt from counseling increased by a modest 2%. These results are also apparent in the simple time series of Figure 5b that show a dramatic spike in the rejection share of state-licensed mortgage bankers issuing subprime loans.

6. Conclusion

Mandated financial counseling and increased oversight on lenders (anti-predatory legislation) are important policy tools that are being considered for implementation by policymakers following the meltdown of the housing market in 2007-2008. Unlike other proposals, both these proposed policies include elements that impose restrictions on free contracting between borrowers and lenders. As such, they are expected to shrink the credit markets, in particular for the disadvantaged segments of the populations.

In this paper, we analyzed the outcome of a pilot project that implemented mandated financial counseling and increased oversight on lenders in Chicago in late 2006. The design of the pilot allowed us to disentangle the effects of financial education on borrowers from those of increased oversight on lenders.

Our main results show that the legislation had material effects on market composition, on borrower default rates, and on the behavior of both borrowers and lenders. We find that the pilot caused both borrowers and lenders to leave the market. Yet, controlling for observable characteristics of the remaining borrowers and holding the sample of remaining lenders constant, we find that default rates declined dramatically. Loan terms for counseled borrowers improved as well, albeit only marginally. While the product choice for the low-FICO borrowers did not change appreciably, we find that mid-FICO borrowers switched towards products that did not subject them to counseling.

Our results are consistent with the explanation that the threat of third-party oversight and not merely the informational content of counseling had a substantial effect both on borrowers and lenders. We find that borrowers altered their mortgage choice to minimize interaction with the regulators. Specifically, borrowers who could eschew counseling did so by choosing less risky products, and those who were required to attend, did not apply to multiple lenders in order to avoid visiting the counselors again. Furthermore, we find that lenders reject borrowers more often based on unobservable characteristics when loan proposals are reviewed by third-party counselors.

The overall welfare analysis of this mandatory counseling intervention requires weighing the benefits of lower foreclosures against changes in utility incurred by the excluded borrowers and lenders. It is further complicated by the many distortions that already exist in the housing market (tax treatment, zoning restrictions, etc.) and the need to account for many externalities produced by individual housing decisions. Some recent papers (e.g. Carlin and Gervais, 2008) focus on careful modeling of the welfare effects of certain policy choices in household financial markets. This approach is unfortunately beyond the scope of this paper and is left for future research.

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Table 1. Summary Statistics

Panel A: Statistics of HB 4050 and Comparable Zip Codes

	HB 4050 ZIPs	Comp ZIPs	Rest of Cook County
Population (18 plus)	49997	53775	24601
Households	22027	24765	12374
<u>Subprime loans</u>			
Loans issued since 2005	24913	20647	100717
Delinquency rate (%)	34.2	32.3	30.8
Default rate (%)	12.4	11.8	10.3
<u>Alt-A loans</u>			
Loans issued since 2005	5301	6326	41044
Delinquency rate (%)	20.9	19.2	15.5
Default rate (%)	7.2	6.2	4.6
Ownership rate (%)	61.0	45.1	66.4
Unemployment rate (%)	14.3	13.4	6.1
Below poverty rate (%)	17.0	18.8	8.2
Share on public assistance (%)	9.6	9.5	3.3

Demographic characteristics are based on the 2000 Census data

Panel B: Summary Statistics of Recorder of Deeds and MLS Databases

	Full (n = 205936)				Comp (n = 22890)			
	Mean	StdDev	Min	Max	Mean	StdDev	Min	Max
Change in price percentile of repeat sales (%)	2.81	18.17	-95.3	98.5	10.66	18.98	-89.6	98.5
Percentile(Purchase Price)	51.73	27.00	0.6	99.9	47.58	24.58	0.6	99.8
# Days on the market	57.52	65.11	0.0	717.0	51.09	59.35	0.0	707.0
Price/Listing (%)	97.47	4.01	50.0	198.3	98.02	5.10	57.1	198.3
HB4050 (%)	0.63	7.89	0.0	100.0	5.64	23.06	0.0	100.0
LTV	86.80	15.04	25.5	103.5	91.79	12.20	25.5	103.5
log(Purchase Price)	12.49	0.57	10.4	15.7	12.38	0.48	10.4	15.5

Table 1 (Cont.). Summary Statistics

Panel C: Summary Statistics of Recorder of Loan Performance Database

	Full (n = 171970)				Comp (n = 57183)				Active (n = 82697)			
	Mean	StdDev	Min	Max	Mean	StdDev	Min	Max	Mean	StdDev	Min	Max
Delinquency (x 100)	27.35	44.57	0.0	100.0	30.62	46.09	0.0	100.0	28.69	45.23	0.0	100.0
Default (x 100)	9.15	28.84	0.0	100.0	11.01	31.31	0.0	100.0	10.11	30.14	0.0	100.0
ARM mortgage (x 100)	77.44	41.80	0.0	100.0	77.66	41.65	0.0	100.0	82.02	38.40	0.0	100.0
IO mortgage (x 100)	20.53	40.40	0.0	100.0	14.99	35.69	0.0	100.0	15.40	36.09	0.0	100.0
FICO < 621	36.02	48.01	0.0	100.0	40.38	49.07	0.0	100.0	39.84	48.96	0.0	100.0
FICO < 651	55.10	49.74	0.0	100.0	60.27	48.94	0.0	100.0	60.56	48.87	0.0	100.0
LTV (%)	80.16	11.22	20.0	107.1	80.24	11.12	20.0	107.0	80.48	11.03	20.0	107.0
Debt Service-to-Income	40.80	8.87	0.2	96.1	40.81	8.99	0.2	96.0	41.12	8.98	0.2	96.0
Contract Interest Rate (%)	7.78	1.19	4.0	15.5	7.91	1.14	4.0	14.1	7.89	1.18	4.0	14.1
Margin (%)	4.88	1.36	0.1	13.2	5.01	1.22	0.1	10.1	4.98	1.24	0.1	12.9
Teaser Indicator (x 100)	87.42	33.17	0.0	100.0	86.91	33.73	0.0	100.0	88.40	32.02	0.0	100.0
Teaser (%)	1.86	1.10	0.0	8.5	1.88	1.09	0.0	7.1	1.88	1.07	0.1	8.5
Reset Period (Months)	32.13	15.94	0.0	204.0	30.46	13.04	0.0	180.0	31.12	14.18	0.0	180.0
HB4050	0.02	0.14	0.0	1.0	0.06	0.24	0.0	1.0	0.02	0.15	0.0	1.0
HB4050 x Low FICO	0.01	0.09	0.0	1.0	0.02	0.15	0.0	1.0	0.01	0.10	0.0	1.0
HB4050 x Mid FICO	0.00	0.07	0.0	1.0	0.01	0.11	0.0	1.0	0.01	0.08	0.0	1.0
HB4050 x High FICO	0.01	0.09	0.0	1.0	0.03	0.16	0.0	1.0	0.01	0.09	0.0	1.0
LTV (%)	80.16	11.22	20.0	107.1	80.24	11.12	20.0	107.0	80.48	11.03	20.0	107.0
FICO	644.14	66.19	440.0	862.0	635.41	63.75	440.0	824.0	636.15	63.17	441.0	862.0
Prepayment Penalty	0.17	0.37	0.0	1.0	0.19	0.39	0.0	1.0	0.17	0.38	0.0	1.0
Refinance	0.58	0.49	0.0	1.0	0.60	0.49	0.0	1.0	0.58	0.49	0.0	1.0
Refinance cashout	0.48	0.50	0.0	1.0	0.52	0.50	0.0	1.0	0.51	0.50	0.0	1.0
Prepayment penalty	0.17	0.37	0.0	1.0	0.19	0.39	0.0	1.0	0.17	0.38	0.0	1.0
Negative amortization	0.01	0.09	0.0	1.0	0.00	0.07	0.0	1.0	0.00	0.07	0.0	1.0
Full Doc	0.48	0.50	0.0	1.0	0.50	0.50	0.0	1.0	0.50	0.50	0.0	1.0
Borrower is investor	0.13	0.34	0.0	1.0	0.17	0.38	0.0	1.0	0.13	0.33	0.0	1.0
Second home	0.01	0.08	0.0	1.0	0.00	0.06	0.0	1.0	0.01	0.07	0.0	1.0

**Table 2. Effects of HB 4050 on Market Activity: Application and Transaction Volume
(Source: HMDA)**

	State-Licensed Lenders Specializing in Subprime loans			All Other Lenders		
	Full	Comp	Active	Full	Comp	Active
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Dependent: log(# Applications)						
HB 4050	-0.592*** (0.027)	-0.649*** (0.041)	-0.438*** (0.026)	-0.096*** (0.015)	-0.131*** (0.028)	-0.038** (0.019)
Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5640	756	5640	5652	756	5652
Adj. R ²	0.96	0.97	0.99	0.99	0.97	0.99
Panel B: Dependent: log(# Purchase-Related Mortgages)						
HB 4050	-0.318*** (0.039)	-0.538*** (0.049)	0.009 (0.057)	-0.007 (0.027)	-0.165*** (0.044)	0.051* (0.029)
Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5323	755	5273	5471	756	5462
Adj. R ²	0.884	0.940	0.835	0.929	0.887	0.913
Panel C: Dependent: log(# Refinancing Mortgages)						
HB 4050	-0.741*** (0.037)	-0.738*** (0.053)	-0.345*** (0.030)	-0.157*** (0.014)	-0.118*** (0.026)	-0.102*** (0.018)
Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5447	756	5396	5472	756	5472
Adj. R ²	0.938	0.959	0.884	0.969	0.975	0.961

Table 3. Effects of HB 4050 on Credit Supply

Panel A: Average Number of Active Lenders per Month[#] (Source: HMDA)

	Dependent: log(# Lenders)			
	State-Licensed Lenders		All Other Lenders	
	Specializing in Subprime loan:			
	Full	Comp	Full	Comp
	(1)	(2)	(3)	(4)
HB 4050	-0.216*** (0.028)	-0.286*** (0.041)	-0.036* (0.019)	-0.095*** (0.032)
Date FE	Yes	Yes	Yes	Yes
Zipcode FE	Yes	Yes	Yes	Yes
Observations	5437	756	5472	756
Adj. R ²	0.918	0.951	0.970	0.965

[#] active lenders are defined as those filing at least 10 HMDA applications per month in HB4050 or Comp geographic areas, or 50 HMDA applications per month in the Full geographic area

Panel B: Which Lenders Stayed in the Market?[#] (Source: LoanPerformance)

(Source: HMDA)	Stayed in the Market (N = 66)		Left the Market (N = 45)	
	Mean	Std Error	Mean	Std Error
Average # originations	235.91	31.96	105.84	19.91
Mortgage amount (\$k)	133.09	4.82	144.01	4.60
Income (\$k)	71.43	1.57	80.33	3.90
Refi (%)	60.07	3.18	52.24	3.85
Rejection rate (%)	25.09	2.05	20.58	1.90
Second liens / Total originations (%)	23.70	2.06	21.11	2.15

(Source: LoanPerformance)	Stayed in the Market (N = 18)		Left the Market (N = 17)	
	Mean	Std Error	Mean	Std Error
Average # originations	7173.44	3430.88	3336.00	1615.29
Delinquency (%)	28.38	1.17	28.79	1.27
Default (%)	9.85	1.52	9.40	1.17
Loan Spread (%)	4.65	0.06	4.60	0.09
Low FICO (%)	42.12	1.85	38.26	3.34
Mid FICO (%)	20.99	0.74	19.14	1.44
Full Documentation (%)	52.66	0.45	47.19	1.06
Valuation (\$k)	274.31	12.84	290.96	20.50
LTV (%)	80.03	0.56	80.40	0.43
FICO	632.19	1.47	639.99	1.68
ARM Mortgages (%)	79.41	2.11	87.95	1.68
IO Mortgages (%)	13.22	2.39	23.93	2.23
Refi (%)	62.26	1.43	57.51	1.22
Refi Cashout (%)	55.09	0.85	46.19	0.84
Prepayment Penalty (%)	21.08	3.79	18.00	4.92

Table 4. Effects of HB 4050 on Mortgage Performance

Panel A: Delinquency and Default Rates in Treated Areas (Source: LoanPerformance)

	Delinquency (x 100)				Default (x 100)			
	Full	Comp	Active	Active	Full	Comp	Active	Active
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HB 4050 x Low FICO	-4.09** (1.77)	-4.95** (2.36)	-3.87 (2.40)	-2.62 (2.38)	-3.19*** (1.17)	-4.09*** (1.26)	-3.73** (1.61)	-2.81* (1.63)
HB 4050 x Mid FICO	1.61 (2.05)	5.65* (2.76)	-0.56 (2.63)	-0.01 (2.80)	2.24 (1.52)	2.50 (1.79)	3.03* (1.72)	2.26 (2.25)
HB 4050 x High FICO	-1.18 (1.28)	-2.72 (1.87)	-2.25 (1.44)	-0.88 (1.61)	0.08 (1.04)	-0.52 (1.17)	-0.99 (1.18)	-0.38 (1.30)
Lender FE				Yes				Yes
Borrower Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Contract Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date * FICO Range FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode * FICO Range FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	165969	55241	63563	63563	165969	55241	63563	63563
Adj. R ²	0.09	0.09	0.09	0.09	0.06	0.08	0.06	0.06

Panel B: Robustness Tests of Default Regressions

	Default						
	OLS Regression (x 100)				Probit Regression		
	Full	Comp	Active	Active	Full	Comp	Active
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
HB 4050 x Low FICO	-3.14*** (1.18)	-3.99*** (1.27)	-3.68** (1.63)	-3.03* (1.64)	-0.016*** (0.006)	-0.025*** (0.007)	-0.022** (0.009)
HB 4050 x Mid FICO	2.20 (1.55)	2.40 (1.82)	3.10* (1.74)	3.24* (1.78)	0.008 (0.009)	0.016 (0.015)	0.019 (0.015)
HB 4050 x High FICO	0.26 (1.04)	-0.35 (1.19)	-0.89 (1.18)	-0.85 (1.18)	-0.007 (0.007)	-0.005 (0.012)	-0.013 (0.010)
Loan Spread (%)	1.16*** (0.07)	1.22*** (0.12)	0.84*** (0.11)	0.87*** (0.15)	0.010*** (0.001)	0.012*** (0.001)	0.009*** (0.001)
Lender FE				Yes			
Borrower Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Contract Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date * FICO Range FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode * FICO Range FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	165962	55240	63556	63556	163066	50797	58954
Adj. R ² (Pseudo R ²)	0.07	0.08	0.06	0.06	0.14	0.16	0.15

Table 5. Effects of HB 4050 on Mortgage Characteristics

Panel A: ARM, IO, and Low Documentation Mortgages (Source: LoanPerformance)

	ARM (x 100)			IO mortgage (x 100)			Low Documentation (x 100)		
	Full	Comp	Active	Full	Comp	Active	Full	Comp	Active
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
HB 4050 x Low FICO	0.14 (2.13)	-0.60 (2.21)	-0.06 (2.56)	-0.25 (0.66)	-0.37 (0.84)	-1.38** (0.59)	-4.89*** (1.71)	-7.16*** (1.99)	-3.92** (1.64)
HB 4050 x Mid FICO	-6.60*** (1.76)	-6.66** (2.50)	-9.39*** (1.96)	-1.78 (1.31)	-2.97* (1.62)	-1.88 (1.63)	-5.39*** (1.88)	-4.55* (2.42)	-7.10*** (2.67)
HB 4050 x High FICO	-3.34** (1.63)	-3.04 (1.98)	-6.77*** (1.99)	1.12 (1.49)	1.12 (1.92)	1.06 (2.16)	-2.17* (1.31)	-2.14 (1.73)	-3.02 (2.59)
Borrower Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Contract Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date * FICO Range FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode * FICO Range FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	165969	55241	63563	165969	55241	63563	165969	55241	63563
Adj. R ²	0.14	0.15	0.13	0.16	0.13	0.17	0.22	0.23	0.20

Panel B: Loan-to-Value, Debt Service-to-Income, and Loan Spread (Source: LoanPerformance)

	Loan-to-Value (%)			Debt Service-to-Income (%)			Loan-Spread (%)		
	Full	Comp	Active	Full	Comp	Active	Full	Comp	Active
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
HB 4050 x Low FICO	-1.28*** (0.31)	-0.88** (0.34)	-1.24*** (0.43)	-0.61** (0.28)	-0.53 (0.38)	-0.16 (0.35)	-0.05 (0.05)	-0.09 (0.05)	-0.07 (0.04)
HB 4050 x Mid FICO	-0.25 (0.42)	-0.22 (0.55)	-0.86 (0.60)	-0.23 (0.62)	-0.08 (0.65)	-1.09 (0.82)	0.03 (0.05)	0.06 (0.06)	-0.09* (0.05)
HB 4050 x High FICO	0.62** (0.31)	0.40 (0.51)	-0.14 (0.47)	-0.49 (0.34)	-0.53 (0.37)	-0.68* (0.38)	-0.15*** (0.03)	-0.14*** (0.04)	-0.12*** (0.04)
Borrower Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Contract Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date * FICO Range FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode * FICO Range FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	165969	55241	63563	114415	39121	53219	165962	55240	63556
Adj. R ²	0.13	0.12	0.11	0.07	0.08	0.07	0.51	0.47	0.42

Table 6. Effects of Counseling on Borrower Behavior

Panel A: Counseling Outcome (Source: Counseling Agency)

Category	Total Mortgages	Counselor recommendation				
		No issues	Cannot afford or close to it	Indicia of fraud	Loan above market rate	Seek another bid
Total matched originations	97	54	23	14	4	2
No changes at all	50	34	8	5	1	2
Loans with changes post counseling	47	20	15	9	3	0
(percent with changes)		37%	65%	64%	75%	0%
Lower monthly payments (percent of all changed loans)		15 75%	9 60%	4 44%	3 100%	0 -
Switch from ARM to fixed (percent of all changed loans)		1 5%	5 33%	2 22%	0 0%	0 -
Lower interest rate (percent of all changed loans)		14 70%	10 67%	3 33%	3 100%	-

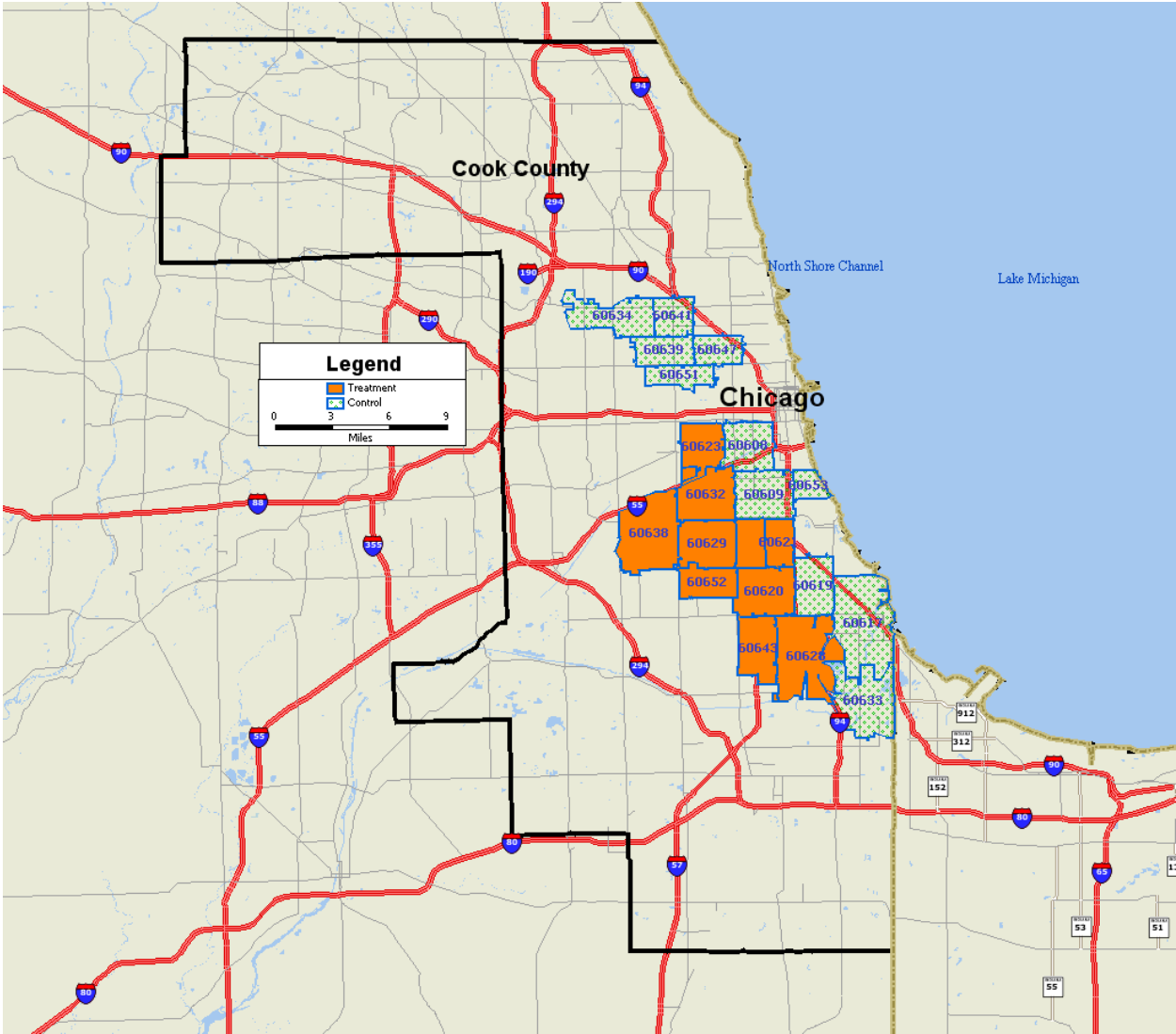
Panel B: Did Borrowers Reject More Approved Mortgages? (Source: HMDA)

	Dependent: Borrower Rejection Ratio (of all approved mortgages)					
	State-Licensed Lenders			All Other Lenders		
	Specializing in Subprime loans					
	Full	Comp	Active	Full	Comp	Active
(1)	(2)	(3)	(4)	(5)	(6)	
HB 4050	-0.062*** (0.007)	-0.061*** (0.007)	-0.086*** (0.007)	-0.005 (0.004)	0.004 (0.005)	-0.003 (0.004)
Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5640	756	5640	5643	756	5631
Adj. R ²	0.22	0.55	0.31	0.31	0.54	0.27

Panel C: Do Treated Lenders Reject More? (Source: HMDA)

	Dependent: Average Lender Rejection Ratio					
	State-Licensed Lenders			All Other Lenders		
	Specializing in Subprime loans					
	Full	Comp	Active	Full	Comp	Active
(1)	(2)	(3)	(4)	(5)	(6)	
HB 4050	0.096*** (0.014)	0.082*** (0.018)	0.100*** (0.012)	0.018*** (0.005)	0.025*** (0.006)	0.019*** (0.006)
Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5640	756	5640	5640	756	5629
R ²	0.38	0.68	0.40	0.75	0.81	0.70

Figure 1. HB 4050 Treatment (Orange) and Control (Spotted) Zip Codes



**Figure 2. Number of HMDA Loan Application Filings:
Lenders Subject to HB 4050 vs. Exempt Lenders**

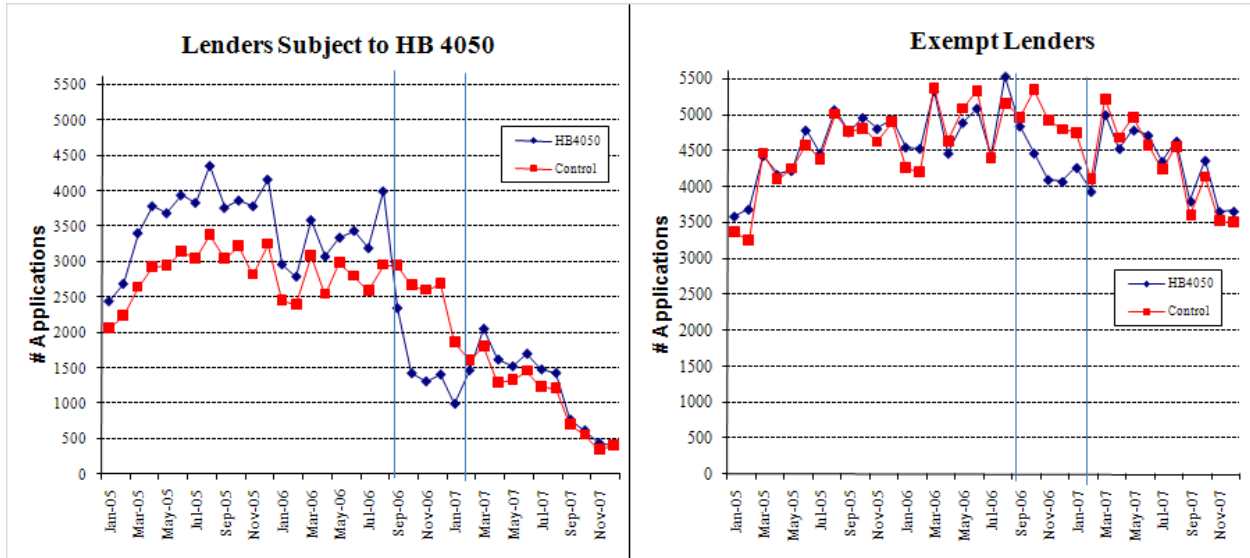


Figure 3a. Cumulative Probability Distribution of Default for Mortgages Originated in the Pre-Treatment Period

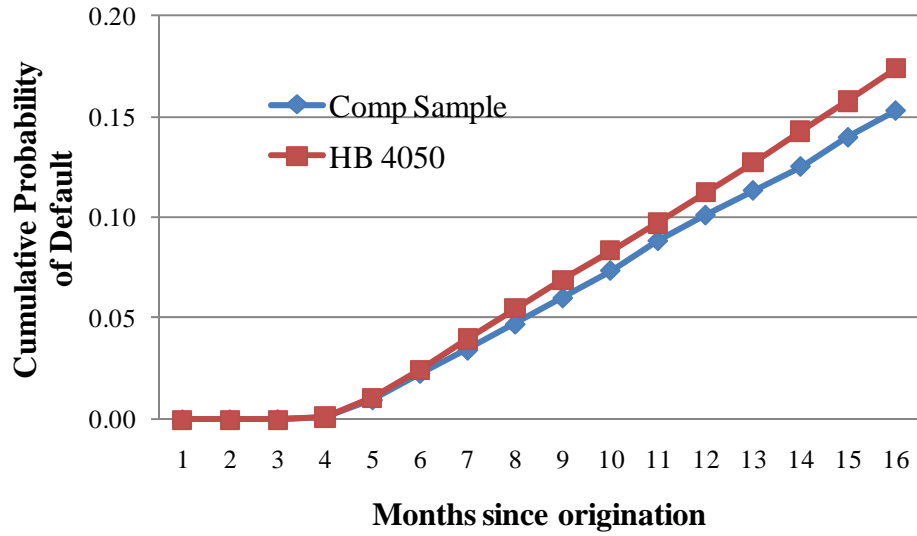


Figure 3b. Cumulative Probability Distribution of Default for Mortgages Originated During the Treatment Period

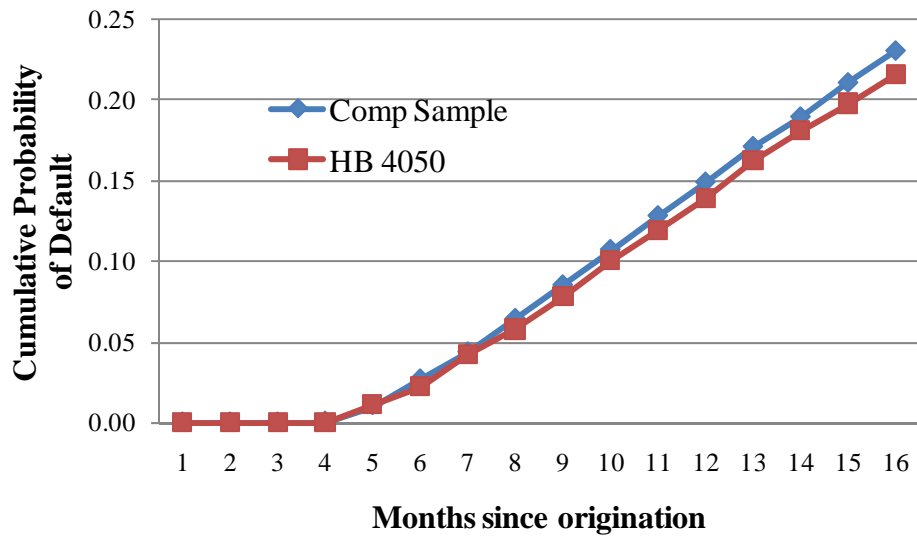


Figure 4a. Distribution of FICO Scores of Originated Mortgages Before and During the HB 4050 Period in the HB 4050 Zip Codes

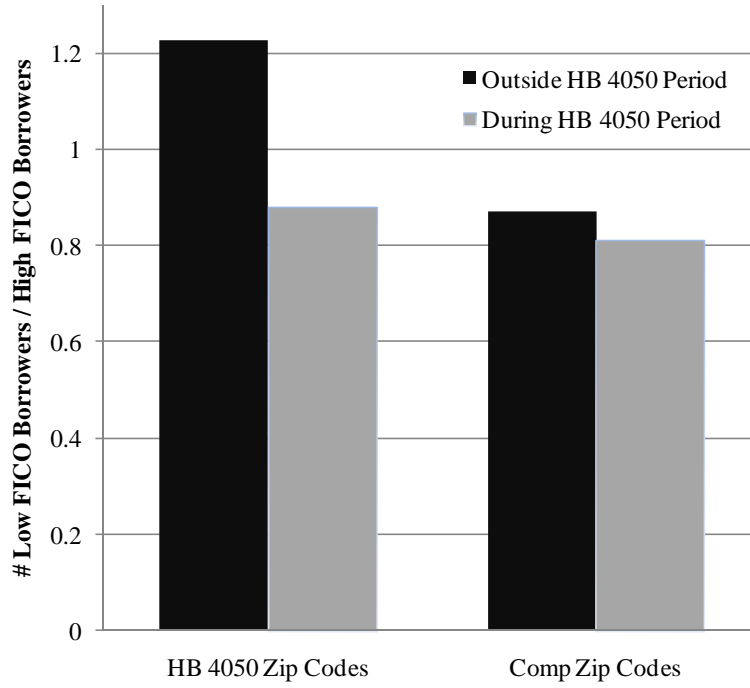


Figure 4b. Cumulative distribution of mortgages originated before and during the HB 4050 period in non-HB 4050 zip codes, as function of FICO scores

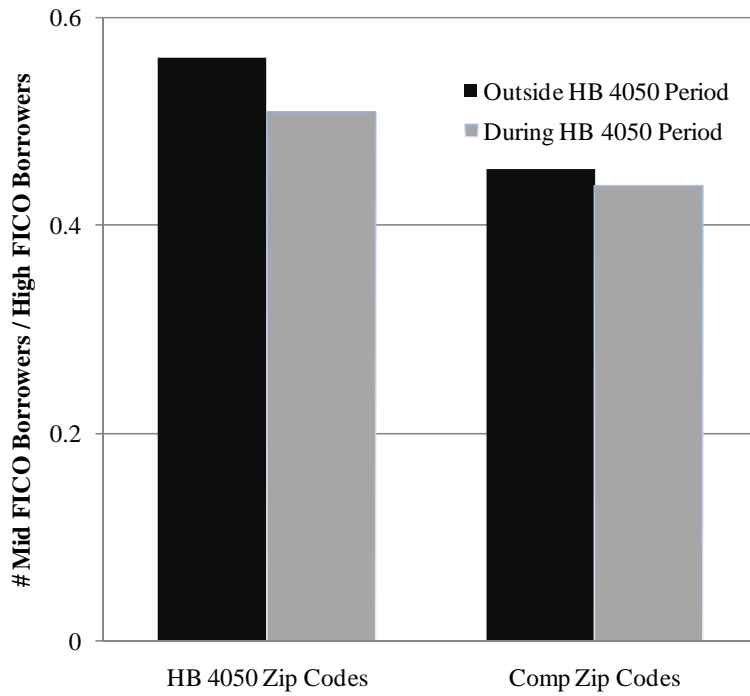


Figure 5a. Shares of HMDA-Reported Applications “Rejected” by Borrowers: Lenders Subject to HB 4050 vs. Exempt Lenders

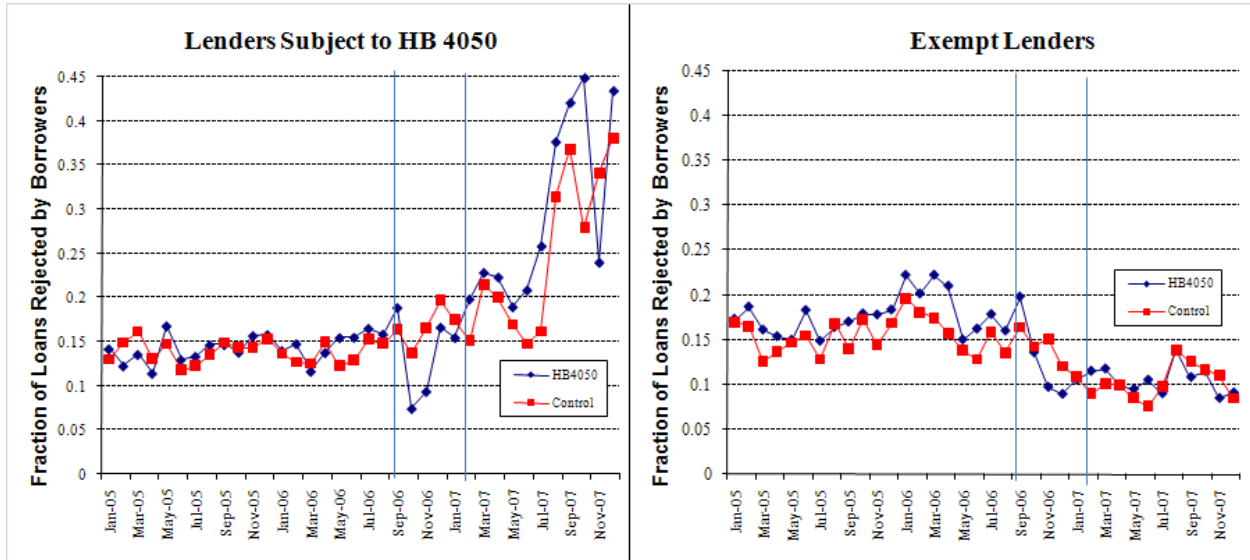


Figure 5b. Shares of HMDA-Reported Applications “Rejected” by Lenders: Lenders Subject to HB 4050 vs. Exempt Lenders

