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Can Mandated Financial Counseling Improve Mortgage Decision-Making? Evidence from a Natural Experiment

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Can Mandated Financial Counseling Improve Mortgage Decision-Making? Evidence from a Natural Experiment

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ABSTRACT

We explore the effects of mandated financial counseling on terms and availability 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 third-party review. We document that as a consequence of the legislation both the supply of and demand for credit declined, and marginal borrowers were pushed out of the market. State-licensed lenders disproportionately exited the affected area and sharply increased their loan application rejection rates. Although home sales activity dropped off during the treatment period, we fail to detect a material impact on transaction prices. Controlling for salient characteristics of remaining borrowers and lenders, we find that mortgages originated during the legislation period were substantially less likely to default, and that their terms improved somewhat. We attribute these improvements both to actions of lenders responding to external review and counseled borrowers renegotiating loan terms. We also find that some borrowers eschewed counseling by choosing less risky products. On net, the adverse effects of reduced market activity appear to have been partially offset by the better terms and performance of loans obtained by the counseled borrowers.

***Keywords**:* Financial education, Financial literacy, Subprime crisis, Household finance
JEL Classification: D14, D18, L85, R21

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1. Introduction

Whether and how borrowers should be educated about financial products is a central topic in the current debate about the regulation of financial markets. Financial literacy is thought to have advantages, such as increasing awareness of the risks entailed in certain loan classes. At the same time, however, financial education programs are costly and may discourage both lender and borrower participation. In this paper we address these tradeoffs by studying the evidence from a natural experiment of mandatory mortgage counseling in Illinois between September 2006 and January 2007.

Several recent studies voiced concern that a substantial number of consumers who enter into complex financial contracts, such as mortgages, are financially illiterate (Lusardi, 2007). In particular, households may borrow too much at a high rate without realizing the future consequences (Agarwal et al., 2007) and 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). As a result, policy makers have put forth proposals for increased disclosure requirements and financial education (see Sheila Bair's testimony to the House Financial Services Committee, 2007).

The relationship between the quality of household financial decisions and financial education ignites a policy debate around the role of regulation in 'managing' access to credit for the less financially astute borrowers. Some argue for tighter regulation of credit markets, claiming that a sustainable mortgage market requires that borrowers have some minimal level of financial knowledge and protection from questionable lending practices. One example of such regulation is the recent Federal Reserve amendment to Regulation Z.[1,2] The opposing view is that

[1] Regulation Z describes the Federal Reserve's requirements for implementing the Federal Truth in Lending Act. Its purpose is to promote the informed use of consumer credit by requiring disclosures about its terms and cost.

[2] Bar-Gill (2009) claims that certain mortgage contracts were specifically designed to capture mistakes of borrowers due to irrational decision making, and therefore require additional regulation. However, Hirshleifer (2007) argues that certain regulatory actions are ineffective since they are responses to short-term events to satisfy public pressure.

limiting access to finance on the basis of financial education denies underprivileged populations the opportunity to escape the cycle of poverty. Furthermore, since these populations often come from specific racial and ethnic backgrounds (African-American or Hispanic families) there is a concern that such policy is discriminatory in nature.

In this paper we examine the effects of a program that required 'high-risk' mortgage applicants acquiring or refinancing properties in 10 Chicago zip codes to submit loan offers from state-licensed lenders to third-party review. We evaluate the program's effects on household mortgage contract choices and the subsequent loan performance, as well as on the supply of credit, both in terms of lender participation and loan terms.

The unorthodox *geographic* focus of the counseling program makes it easy to identify the control and treatment groups for econometric analysis of mandatory loan 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 based on 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 consumer behavior at low- and moderate-income levels and on lender response to mandatory loan counseling 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. We also find that the reductions were concentrated in segments of the market most affected by the legislation – low-credit-quality borrowers served by state-licensed mortgage banks. This may have been acceptable to the proponents of the legislation had the terms and the performance of the remaining mortgages improved. We find mixed evidence on this count. We document that counseled borrowers obtained better mortgage terms and borrowed at lower

leverage ratios. Importantly, loans originated by counseled borrowers during the treatment period experienced markedly lower ex post default rates. 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. The improved performance of mortgages subjected to counseling could be attributed both to actions of lenders responding to the threat of external review and to borrowers renegotiating loan terms after attending mandatory sessions.[3] Furthermore, we document that certain borrowers attempted to avoid counseling by substituting into "less risky" mortgage products not covered by the legislation. On the other hand, counseling did not appear to cause the lowest-credit-quality borrowers to avoid the more 'exotic' mortgage products: adjustable rate, interest only, or teaser 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. The empirical results are presented in Section 5. Section 6 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

[3] We are currently in the process of analyzing micro data on counseling sessions that may enable us to allocate changes in loan terms and performance between post-counseling negotiations and pre-counseling improvements in loan terms.

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.[4] 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).[5]

HB 4050 mandated that each of the "high-risk borrowers" attend a counseling session with one of the HUD-accredited loan counseling agencies.[6] 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

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

[5] The selected zip codes are: 60620, 60621, 60623, 60628, 60629, 60632, 60636, 60638, 60643, 60652.

[6] HUD is the US Department of Housing and Urban Development.

information about the *borrower* (e.g. income and expenses). At the end of the session the 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. None of the recommendations was binding in the sense that the borrower 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.[7] Consequently, the legislation was likely to increase the regulatory burden on the very entities providing credit in the selected pilot areas. 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

[7] 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.

fully.[8] 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 Illinois Housing Alliance (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 part of lawmakers.[9] 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 four-and-a-half months in operation.

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[8] 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.

[9] Felicia Stovall, a community activist, called the counseling pilot evaluated in this study (HB 4050) "legislative redlining."

3. Testable Hypotheses

The stated purpose of HB 4050 was to provide borrowers with sufficient information about the terms of the loan to enable them to make an informed decision. It was understood that the counseling mandated by the Act could have differential effects on certain segments of the population. The empirical setting of the legislation allows us to test several hypotheses regarding these effects. We discuss our predictions in five parts: (1) overall market activity, including price and quantity effects on the housing market; (2) volume and composition of loan applications which reflect both the supply and demand elements of credit; (3) ex post performance of the mortgages originated during the treatment period; (4) additional characteristics of realized mortgage transactions; and (5) evidence of regulatory avoidance behavior.

3.1 Overall Housing Market Activity

At the aggregate level, imposition of additional transaction costs on certain borrowers and lenders through HB 4050 would be expected to decrease the supply of credit and potentially discourage some borrowers from applying for new mortgage loans or refinancing existing ones. Such decrease in availability of credit would also be expected to lower demand on the real side of the housing market. Thus, in the short-term the legislation-induced decrease in demand could lead to fewer transactions at lower prices. In the longer run, prices may decline further as the buildup in inventories of unsold properties would expand the supply of houses for sale; although this could also help restore the volume of transactions.

Hypothesis 1: HB 4050 led to a reduction in the number of real estate transactions and in transaction prices in the treated areas.

We test this hypothesis with data on real estate transactions recorded in the Multiple Listing Service (MLS). These data are augmented with sales-by-owner registered by the Cook County Recorder of Deeds. We measure the price effect of the legislation by looking at several different

measures: the ratio of purchase price to the listing price, the rank of the purchase price, and the change in the price rank in repeat transactions.

The proponents of HB 4050 argued that it would have a number of beneficial effects on the housing and mortgage markets. Ensuring an independent review of loan proposals could allow borrowers to make better contract choices and more informed decisions about loan affordability. It also could have resulted in better loan terms for counseled borrowers. We tackle both of these claims with data on loan market applications and loan terms, described below.

3.2. Loan Application Volumes and Disposition

As described earlier, the legislation targeted a specific subset of lenders and a specific group of borrowers. Therefore, we are able to refine hypothesis 1 for *credit* market activity as follows:

> *Hypothesis 1a: HB 4050 led to a reduction in mortgage activity in the treated area. This reduction in mortgage market activity should be concentrated among state-regulated lenders specializing in subprime borrowers.*

This hypothesis can be tested with data collected under the Home Mortgage Disclosure Act (HMDA) that tracks the overall volume of loan applications for individual lenders across time.[10] We are able to identify state-regulated lenders by matching the HMDA data with the list of Illinois mortgage licensees. We make use of the HUD database of lenders specializing in subprime loans to create a proxy for the low-FICO borrower population targeted by HB 4050. In addition to testing the above hypothesis, this lender-based data allows us to evaluate two of the key claims made by the opponents of the legislation:

> *Claim 1: HB 4050 resulted in substantial curtailment of credit, particularly credit geared towards the low-FICO borrowers.*

[10] In theory, we can attempt to isolate the effect of the legislation on real estate transactions of low-FICO borrowers working with state-regulated lenders by merging the MLS, HMDA, and loan performance data described below. We are currently working on creating such dataset.

Claim 2: Low-FICO borrowers did not have access to alternative sources of mortgage credit by turning to non-state-licensed lenders unaffected by HB 4050

It should be noted that the HMDA data conflates the effects of HB 4050 on the supply of and the demand for mortgage loans. Assuming that lender response to HB 4050 is manifested primarily in withdrawal from the marketplace, we can attempt to isolate the supply effect stressed in Claim 1 by computing the number of unique lenders active in treated ZIP codes before, during, and after the treatment period. We further evaluate this claim by looking at loan volumes at subprime lenders that remained active in the affected markets during the treatment period. Similarly, evaluation of Claim 2 is based on the comparison of changes in the number of non-state-licensed lenders and application volumes in the treated and untreated areas.

On the other hand, supporters of the legislation claimed that mandatory counseling would help borrowers reject disadvantageous loans. Such loan offers could be rejected outright or be renegotiated on more favorable terms. In the former case, the proportion of loans classified as offered but "not taken" in the HMDA data would increase, and in the latter case such proportion would decline. Consequently, we to help us test the following claim:

Claim 3: The rate of loan offers rejected by borrowers would increase (decrease) during the treatment period and would be higher (lower) among state-licensed subprime lenders in the treated ZIP codes if counseling does not result (results) in loan renegotiations.

This claim can be evaluated more precisely through analysis of the recommendations and outcomes of loan counseling sessions; information that we are attempting to obtain. Such data were collected by HUD-certified counselors that provided feedback on loan offers under the terms of HB 4050. The results of these sessions were entered into the database managed by the state mortgage regulator.

3.3 Characteristics of Realized Mortgage Transactions

Arguably, HB 4050 had the greatest effect on low-FICO borrowers because lenders specializing in serving this population were disproportionately state-regulated. The only way for

such borrowers to avoid the costs (and benefits) of counseling was by turning to non-state-licensed lenders. In the absence of such a substitution channel, any exit of subprime lenders from the marketplace would reduce the level of low-FICO borrowers. This hypothesis is summarized as follows:

Hypothesis 2: The distribution of the credit quality of loans originated in treated areas during the treatment period will improve as low-quality borrowers exit the market.

Such displacement of low quality borrowers may also have salutary effects that would result in "better" product choices, better loan terms, and better ex post loan performance. Some of these effects would result from direct improvements in credit quality composition of the borrower pool, while others could be attributed to better education and improved bargaining power of counseled borrowers.

If the educational effect of counseling resulted in better mortgage product choices, treated borrowers should obtain 'better' quality mortgage products. This could produce lower future delinquency and default rates, after controlling for leverage and credit quality.

Hypothesis 3 (Performance): loans originated to treated borrowers during the HB4050 period have lower delinquency and foreclosure rates.

Also, to the extent that treated borrowers make 'better' financial decisions they will engage in less risky and more affordable mortgages. Since borrowers were advised that some mortgages would create an excessive financial burden, we expect that treated borrowers will have lower leverage and lower debt service ratios. 'Better' financial decisions can also be manifested through more favorable loan terms. Finally, since counselors were supposed to ensure that borrowers understood the products that they utilized, we expect that fewer borrowers will take adjustable rate mortgages (ARM) due to the risk entailed in interest rate resets. In particular, we posit the following hypotheses concerning HB4050 induced credit quality, and evaluate them using loan level data from the LoanPerformance database:

Hypothesis 4 (Product choice): counseled borrowers (i) have lower loan–to-value ratios; (ii) have lower debt service ratios; (iii) have lower loan spreads, (iv) are less likely to take out exotic mortgages; and (v) are more likely to take fixed-rate mortgages.

Finally, given the pecuniary and non-pecuniary costs of financial education, we anticipate that some prospective borrowers will attempt to avoid mandated counseling. These borrowers may substitute to products that do not require counseling (e.g., full-documentation loans) if they have a FICO score in the mid-range (621 to 650), or they may borrow from non-state-licensed lenders that are not subject to HB 4050. We summarize the potential counseling avoidance effect in the following hypothesis:

Hypothesis 5: Qualified borrowers in treatment areas will substitute away from products and lenders that are subject to the HB 4050 legislation. Mid-FICO borrowers (621 to 650) take on fewer "exotic" mortgages[11]*, while both low and mid-FICO borrowers will switch to non-state-licensed institutions.*

4. Data & Empirical Setup

4.1 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 rely on 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 and 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 lenders specializing in subprime borrowers, we use this list to refine our analysis. Furthermore, the HMDA data allows us to examine how the HB 4050

[11] These mortgages are defined in section 2.

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 database that includes all transactions (mediated by agents or sold by owner) that took place in the region, including information about the associated mortgages. We use the Cook Country Recorder of Deeds as one source to identify foreclosures.[12]

Finally we use the 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 credit details about borrowers, 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 rate mortgage, adjustable rate mortgage), interest rate, and interest rate cap. Borrower characteristics, such as the FICO scores, are used extensively by the lenders to assess the creditworthiness of the borrower and the appropriate loan terms. FICO measures are designed to forecast adverse credit events over the next two year horizon. For the purposes of our study, the FICO scores also allow us to determine which borrowers in the treated zip codes were automatically and/or conditionally subject to loan counseling (see the discussion in section 2 for details).[13]

[12] We identify foreclosure processes if there is a “Lis pendens” registry on the deeds records. This is a proxy for foreclosure, since the “Lis pendens” registry suggests that there is a suit pending on the property. According to background interviews with real estate lawyers, most “Lis pendens” registries are related to foreclosures, although it is possible that other disputes (such as divorce) result in such registry.

[13] In the near future we also intend to incorporate the McDash loan level data into our analysis. The McDash data are structured similar to LoanPerfomance, but includes servicer records for about 30 million prime loans, in addition to a sizable set of subprime loans.

4.2 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. 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, dependence on public assistance, and lower rates of homeownership. 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. Information is also provided for a geographic area made up of set of zip codes with similar demographic characteristics (shaded in blue in Figure 1) that were not subject to HB 4050. This will be used as one of our control samples in our empirical analysis.

4.3. 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. $Time\ dummies_t$ is a series of month dummies, and $Zip\ code\ dummies_j$ is a series of zip code dummies. In all the regressions, we cluster errors at the zip code

level.[14] 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.

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 such selection of zip codes is that there is a possibility that these zip codes 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 decline in prices following the housing market peak around November 2006. As can be seen in Figure 1, the treated zip codes are concentrated in the economically disadvantaged Southwest Side of Chicago.

We offer three solutions for the treatment zip code selection. First, we include time dummies interacted with the log of the average zip code income, as reported by the IRS.[15] This set of controls captures at each point in time (each month) the shocks that are correlated with population income. Hence, if in a particular time, low income zip codes suffered a shock stronger than did high income zip codes, then the shock would be absorbed by this set of variables. The modified specification is therefore:

$$\begin{aligned} Response_{ijt} = \alpha + \beta_1\, Treatment_{jt} \\ + \gamma_1\, Time\ dummies_t + \gamma_2\, Time\ dummies_t \times \log(Average\ Income)_j \\ + \delta\, Zip\ code\ dummies_j + \theta\, Controls_{ijt} + \varepsilon_{ijt}. \end{aligned}$$

Second, we use the design of the pilot project and introduce zip code-month fixed effects while separating the impact across FICO groupings. In particular, since borrowers were subject to the legislation based on their FICO score, we can exploit the within zip code variation to identify the effects of financial counseling. The regression specification that we run is:

[14] When we cluster errors at the zip code-month and at the month level, results are more statistically significant, although to a limited degree.

[15] Our results do not materially change when we replace the interactions of time dummies and logged income with interactions of time dummies and the percentage of population in poverty as reported by the Census of 2000.

$$
\begin{aligned}
Response_{ijt} = \alpha &+ \beta_1 \, (Treatment_{jt} \times Low\text{-}FICO_{ijt}) \\
&+ \beta_2 \, (Treatment_{jt} \times Mid\text{-}FICO_{ijt}) \\
&+ \gamma_1 \, Low\text{-}FICO_{ijt} + \gamma_2 \, Mid\text{-}FICO_{ijt} \\
&+ \delta \, Zip\ code \times Time\ dummies_j + \theta \, Controls_{ijt} + \varepsilon_{ijt}.
\end{aligned}
$$

Third, we conduct our tests using two alternative control groups. We first compare transactions in the treated zip codes to transactions in the entire Cook County area (excluding the HB 4050 area). 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.[16] 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. In the empirical analysis below, the Cook County control sample is labeled "Full," while the alternative control sample is labeled "Comp."

5. Empirical Tests

We employ three different datasets for our empirical tests: MLS-Deeds, HMDA, and LoanPerformance. In the first set of tests, we assess whether market-wide activity and prices were affected by the legislation. In the second set of tests, we examine the effect of the mandatory counseling requirement on the supply of mortgages and on the demand for credit. Finally, we explore whether the legislation affected the mortgage products chosen by borrowers and the ex post loan performance.

All of our regressions are linear regressions (Linear Probability Models in the case of binary dependent variables). We pursue this approach when we have binary dependent variables because the variables of interest in our right-hand side variables are interactions, and previous

[16] This "HB 4050-comparable" area includes transactions from the following zip codes: 60608, 60609, 60617, 60619, 60633, 60634, 60639, 60641, 60647, 60651, 60653.

research has shown may lead to incorrect inference of interaction terms in non-linear models (Ai and Norton 2003). In addition, because our regressions often include thousands of controls, not all non-linear estimation models converge. In all our regressions we cluster errors by zip code to account for correlation across borrowers with similar unobserved characteristics.

5.1 Overall Housing Market Activity

In this section we explore the effect of HB 4050 on equilibrium market activity. In particular, we examine whether housing transaction volume and transaction prices changed.

5.1.1 Transaction Volume

Based on univariate analysis, Bates and Van Zandt (2007) attribute the decline in transaction volume in the HB 4050 zip codes to the legislation. To examine whether transaction volume changed, we count purchases of new properties at the zip code-month level and test whether the number of transactions in treated zip code-months are significantly different, controlling for zip code effects, month effects, and month effects interacted with logged average income (to control for temporal shocks that are associated with income). The results are presented in Table 2, Panel A. Consistent with Hypothesis (1), the panel shows that transaction volume declined (adjusted for time and zip code effects) close to 20% per month in the treated area. This is a significant drop in volume, both statistically and economically, relative to the average number of transactions in the treated zip codes prior to the legislation (an average of 314 loans, see Table 1). Since the drop in volume is particularly strong when the entire sample is considered, we test whether it is attributable to income-specific temporal shocks (by incorporating the interaction of log of income and date dummies). Our results (not presented) are virtually unchanged.

5.1.2 Transaction Prices

Hypothesis 1 also indicates that purchase prices in the treated area could decline, consistent with the arguments of Bates and Van Zandt (2007). We test the effect of the legislation on prices using several methods. For this analysis we use the Recorder of Deeds and MLS data.

We first regress logged prices on the Loan-to-Value (LTV) ratio, month fixed effects, zip code fixed effects, logged average income (at the zip code level) interacted with date fixed effects, property type fixed effects and property controls (logged age, logged number of bedrooms, bathrooms, and car garages). Columns (1) and (2) of Table 2, Panel B show that for both the full sample and the comparable sample prices actually increase by about 2% in the treatment period.

Second, we replace the logged price as our dependent variable with price percentile to account for the time-series dynamics in the data. Each month we sort all transactions by price, and compute their percentiles. Results in Columns (3) and (4), therefore, evaluate relative price changes in the treatment period. Consistent with columns (1) and (2), price levels in the treatment area increased by approximately one percentile (equivalent to a 1.8% increase in price).

Third, we examine a subset of homes for which there is repeat-sale data (some previous sales date back to early 1990s). We compute the change in percentile rank between sales. This method attempts to more fully control for home characteristics. The results in Columns (5) and (6) indicate that same-house prices increased by approximately half a percentile; a change insignificantly different from zero.

Finally, we examine the discount of transaction prices relative to listing prices. An adverse shock from the treatment could have put downward pressure on prices that would be reflected in this measure. However, the results in Columns (7) and (8) indicate that there was no change in the listing price discount during the treatment period.

Overall, the balance of evidence is inconsistent with the prediction of Hypothesis (1) concerning transaction prices, and suggests that there was no material effect of HB 4050 on transaction prices in the treated zip codes. One potential explanation is that HB 4050 deterred sellers from the market (since many look to move to homes *within* the treatment area and therefore are potential buyers as well), and hence restricted the supply of housing.

5.2 Effects on Lenders and Borrowers

5.2.1 Application Volume

An alternative measure of mortgage market activity in the wake of HB-4050 is the volume of loan applications captured in the HMDA database.[17] Figure 3 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).[18] 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 flat for much of the HB-4050 period, before beginning a rapid secular decline early in 2007. In fact, the volume of loan applications post-HB 4050 is effectively similar in the treated and control areas.

The decline in loan applications is most pronounced among state-licensed mortgage bankers specializing in subprime loans, lending direct support to Hypothesis 1a. For such lenders, the application volume dropped from nearly 4,000 in August 2006 to 2,341 in

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[17] 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.

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

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 3, 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 upper right-hand panel) are consistent with Claims 1 and 2 in section 3.2; i.e., low FICO borrowers were most adversely affected by the treatment and did not switch to the non-affected lenders.

Similar results are presented in regression form in Table 3, Panel A. Columns (1) and (2) show that loan application volume in treated zip codes declined by about 60% to 65% among lenders most affected by the regulation. 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 non-subprime borrowers (Columns 4-6).

5.2.2 Borrower Composition

In Figure 2 we assess whether the composition of borrowers changed during the HB 4050 period. The leftmost bars in the top panel shows a pronounced decline in the ratio of low-FICO borrowers (<620) to 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 10 percentage points.) 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 3) 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 improvement is not due to the exit of lenders that catered to low-FICO borrowers. These results are consistent with Hypothesis 2.

5.2.3 Borrower Responses to Counseling

Next, we analyze whether mandatory counseling resulted in borrowers rejecting original loan offers and attempting to renegotiate or shop around for an alternative loan. Panel C of Table 3 summarizes the evidence found in the HMDA data. In particular, the table reports regressions of the share of all approved loan applications "not taken by borrowers." We find strong evidence that this share declines during the treatment period. (These results are also apparent from the time series depicted in Figure 4a.) One possible explanation for this finding is that the pervasive negative publicity surrounding HB 4050 persuaded prospective borrowers that alternative credit offers would be difficult to obtain. Consequently, they chose to hold on to whatever loan they could get. Alternatively, the counseling could have resulted in a better-informed borrower and triggered renegotiations of loan terms (or could have forced lenders to offer better terms to pre-empt such negotiations). In this case, borrowers would not have had to reject offers at the same rate during the treatment period, but instead would have negotiated for better terms. As discussed in section 5.3 below, evidence from originated loans is broadly consistent with the latter hypothesis.[19]

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5.2.4 Lender Response to the Counseling Requirement

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.

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[19] As mentioned earlier, we look to obtain *direct* evidence of loan renegotiations from counseling session data.

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).[20] The results of this simple exercise are reported in Panel A of Table 4. 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.

5.2.5 Rejections by Lenders

Panel C of Table 4 documents that the rejection rate by lenders most affected by the regulation increased in the treatment period by anywhere from 7 to 9 percentage points. In comparison, rejections by lenders largely exempt from counseling increased by a modest 2 percentage points. These results are also apparent in the simple time series of of Figure 4b that show a dramatic spike in the rejection share of state-licensed mortgage bankers issuing subprime loans.

Why do such lenders increase their rejection rate? We offer two explanations. First, state-licensed lenders may have tightened their lending criteria due to the increased oversight in order to avoid external review of their loan offers. Second, high rejection rate could be a way to finance the high counseling fees. In particular, lenders had to pay $300 per mortgage, but could not recoup this amount from borrowers, and presumably not from buyers of the loans in the

[20] None of the patterns depends on the choice of the threshold level.

secondary market. As a consequence of these additional costs, marginal borrowers may not have been as attractive for lenders, and therefore they were rejected. In either case, these results are consistent with Hypothesis 1a and Claims 1 and 2. It is interesting to note that a more detailed review of the monthly data indicates that the spike in rejection rates by state-licensed subprime lenders is limited to the first three months of HB 4050. By December 2006, the opposition to the pilot reached such level that the repeal of HB 4050 may have been regarded as imminent.

5.3 Delinquencies and Defaults

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 (3) in Table 5, Panel A] or default within one year [Columns (4) to (6) in Table 5, Panel A].[21] The independent variables include zip code binaries interacted with calendar month fixed effects (i.e., there is a dummy for each combination of zip code and calendar month). This specification allows us to identify the effects of the treatment within zip code-month. 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 the period of mandatory financial education is associated with a mild decline in delinquencies and a substantial reduction in default rates. These results are consistent with Hypothesis 3: delinquencies and defaults decline for counseled borrowers. Loans that were delinquent after 12 months in the treatment zip code-months declined by about 2 percentage points (the unconditional delinquency rate in LoanPerfrormance was 27.4%). The likelihood of loan default declined by about 3 percentage points (the unconditional default rate was 9.2%). Hence, the default rate declined by about a third in the treated area.

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[21] We define all loan terms in Appendix A.

The decline in borrower default could be driven by factors other than financial counseling, such as by selection of borrowers or of lenders. We test for this potential bias. 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. However, results presented in columns (4) and (6) of Table 5, Panel A, indicate that when we restrict the sample to mortgages originated by lenders who stayed in the market during the legislation period, the results remain robust.

Another potential interpretation of the results is that bad borrowers self-selected out of the market or were rejected by lenders (as shown in Table 3). As a result, delinquency and default rates would decline. To test this we include a control for the loan spread paid by borrowers in the specification. 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.

Lastly, as a robustness test, we replace the zip code and month interaction fixed effects with zip code fixed effects and calendar month fixed effects, and interactions between logged income and month fixed effects to identify the effect across zip codes and dates, and not within zip code-dates. Again, the results in columns (4)-(6) of Panel B remain unchanged.

In sum, we find that the financial counseling requirement reduced delinquency rates and foreclosure 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.

5.4 Effects of HB 4050 on Mortgage Choice

In this section we discuss whether the counseling treatment affected the choice of mortgages by borrowers who remained in the market. Proponents of the legislation may have been willing to accept the curtailment of lending in the treated areas if the resulting loans were of higher quality.

5.4.1. Leverage and Debt Service-to-Income

Table 6, Panel A, explores whether borrowers' debt burden was relieved following the HB 4050 legislation. We measure the debt burden using Loan-to-Value (LTV) measure in Columns (1) to (3) and Debt-Service-to-Income (DTI) in Columns (4) to (6). Consistent with Hypothesis 4(i) and 4(ii) we find that for low-FICO borrowers, those most subject to the legislation, there was a decrease in LTV and in DTI. Average LTV declined by up to 1.0% (the average LTV was 80%), while DTI declined by 0.4 to 0.8 (the average DTI was about 41). Hence, borrowers who were subject to the treatment borrowed 1% to 2% less than untreated borrowers.

5.4.2. Loan Spreads

We next investigate whether loan spreads were lower in the treatment area. For adjustable rate mortgages the loan spread information was obtained from LoanPerformance. For fixed rate mortgages we impute the loan spread by subtracting the Treasury bond rate, matched on maturity from the contract interest rate. The results are presented in Table 6, Panel B. In line with Hypothesis 4(iii), the results show that loan spreads for low-FICO borrowers, and to a lesser extent for mid-FICO borrowers, were lower in the treatment area. To account for borrower quality, and potential selection of poor-quality borrowers out of the market we control for FICO scores in addition to documentation flags.

In the specification in Panel B, we use zip code-month interaction fixed effects, hence, the identification comes from the difference between low- and mid-FICO borrowers relative to high-FICO borrowers within zip code-month (in line with Hypothesis 4(iii)). In unreported analysis we find that this result remains robust when we use a less strict specification with zip code and calendar month fixed effects, in addition to logged average income interacted with date fixed effects. One possible explanation of these results is that the change in the mix of lenders accounts for the decline in interest rates. The results in Column (3), however, indicate that this is

not the case as the findings are virtually identical for the subsample of mortgages originated by lenders who remained in the market.

5.4.3. ARMs, FRMs and Interest Only Mortgages

We next model the likelihood of borrowers taking risky products (as defined by HB 4050) and whether decisions were altered as a result of the counseling. We evaluate the probability of taking an adjustable rate or interest-only 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). Adjustable rate and interest only mortgages are expected to be less attractive to financial literate borrowers due to the risk entailed in maintaining high leverage.

The regressions in Table 6, Panel C, yield interesting results concerning the effects of the HB 4050 legislation. Inconsistent with Hypothesis 4(iv) and 4(v), we find no evidence that low-FICO borrowers significantly changed their choices following counseling. This result is robust across samples and products.

Nevertheless, 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 plausible explanation for this phenomenon is that the mid-FICO borrowers could eschew the counseling requirement if they avoided risky products (Hypothesis 5). Hence, the legislation effectively steered borrowers with a choice from risky products, in the spirit of Thaler and Sunstein (2003).

6. Discussion and Conclusion

Our results document the effects of mandated mortgage counseling on lender and borrower behavior. We find that both lenders and borrowers exited the market. We document a strong decline in mortgage applications for lenders who were subject to the counseling requirement, but no substitution towards lenders that were exempt from the legislation. In addition, we find that lenders that were subject to the legislation dramatically increased their loan application rejection rate, possibly related to the increased oversight. Although we do see a reduction in home sales in the area affected by the legislation, which we attribute to a decrease in the demand for housing, we do not find an effect on house prices.

Overall, financial education has positive effects on borrowers that remained in the market. We document that counseled borrowers default less on their mortgages. In addition, we document marginal declines in leverage, and improvements in loan spreads. We do not find an effect on the riskiness of mortgage choice, i.e., borrowers who were treated with counseling are not less likely to take interest-only or teaser-rate products. We do find that borrowers in the mid-range of FICO credit scores attempted to avoid counseling by substituting toward products that were not subject to the legislation. Although such substitution reduced the incidence of counseling, it was arguably consistent with the legislation's intent by steering borrowers away from certain type contracts.

Admittedly, our results are based on a pilot, limited in time and geographical location. However, some of the results have broader ramifications if the pilot were to be expanded more broadly. In particular, we believe that the supply of credit would decline following a broader implementation of mandated counseling since lenders incur considerable legal and pecuniary costs, and may prefer to lend in less regulated markets (e.g., credit cards). Furthermore, displacement of marginal (lower-credit-quality) borrowers will likely result in reduced rates of homeownership. This, in turn, may exacerbate home price pressures in certain areas.

Our study shows that mandatory counseling under HB 4050 resulted in somewhat better loan terms and lower ex post defaults. These benefits appear to derive from two channels. One

channel operates through pre-emptive actions of lenders that do not want to expose themselves to systematic oversight by a third-party (especially if it is made up of housing agency advocates). The second channel likely operates through loan renegotiation by the better informed borrowers following their counseling sessions. Restricting the counseling program to the riskiest borrowers and loan products also produced a migration of borrowers to less risky products (at least as defined by the legislation) for which they did not incur the tax of counseling.

References

Ai, Chunrong, and Edward C. Norton, 2003, Interaction Terms in Logit and Probit Models, Economic Letters, 80, pp. 123-129.

Agarwal, Sumit, John Driscoll, Xavier Gabaix, and David Laibson, 2007, The Age of Reason: Financial Decisions over the Lifecycle, NBER Working Paper #13191.

Bair, Sheila C., 2007, Improving Federal Consumer Protection in Financial Services, Statement before the Financial Services Committee, U.S. House of Representatives, June 13.

Bates, Lisa K. and Shannon Van Zandt, 2007, Illinois' New Approach to Regulating Predatory Lending: Unintended Consequences of Borrower Triggers and Spatial Targeting, University of Illinois, Spatial Policy Analysis Research Consortium, working paper 2007-02.

Ben-David, Itzhak, 2008, Manipulation of Collateral Valuations by Borrowers and Intermediaries, Working Paper.

Bucks, Brian K., and Karen M. Pence, 2006, Do Borrowers Know their Mortgage Terms?, Federal Reserve Board working paper.

Hirshleifer David, 2007, Psychological Bias as a Driver of Financial Regulation, University of California Irvine working paper.

Illinois Department of Financial and Professional Regulation, 2007, Findings from the HB 4050 Predatory Lending Database Pilot Program, Memorandum

Lusardi, Annamaria, 2007, Household Saving Behavior: The Role of Literacy, Information and Financial Education Programs, written for the conference "Implications of Behavioral Economics for Economic Policy" held at the Federal Reserve Bank of Boston on September 27-28, 2007.

Merrick, Ann, 2007, Illinois Tries New Tack Against Predatory Loans, Wall Street Journal, August 22.

Thaler, Richard H., and Cass R. Sunstein, 2003, Libertarian Paternalism, American Economic Review, 93 (2), 175-179.

White, Michelle, 2007, Bankruptcy Reform and Credit Cards, *Journal of Economic Perspectives*, 21(4), 175-199.

Appendix A: Variable Definitions

LoanPerformance

Variable	**Definition**
Delinquency	A loan is 30 or 60 days past due in the first 12 months after the first mortgage payment date
Default	A loan is 90+days past due, in bankruptcy, in foreclosure, and is real estate owned (REO) in the first 12 months after the first mortgage payment date
FICO	FICO score at loan origination
LTV	Loan-to-Value Ratio at loan origination
DTI	Debt-Service-to-Income Ratio
Log(Valuation)	Log(property appraisal value at loan origination)
Refi	A refinance loan (includes no cashout, cashout and unknown cash)
Refi Cashout	A cashout refinance loan
Prepayment Penalty	A loan with prepayment penalty
Negative amortization	A loan has negative amortization
Full Documentation	A loan is fully documented at origination
Borrower is investor	Investor occupancy
Second home	Second home occupancy
IO Mortgage	Interest-only payment is due on fixed and adjustable rate loans
ARM Mortgage	An Adjustable Rate Mortgage (ARM)
ARM Teaser	An ARM has a teaser rate
Teaser Rate Size	Size of the teaser rate
Teaser Rate Period	Period of the teaser rate
Loan Spread	Loan spreads above Treasury. For ARMs, LoanPerformance provides item. For FRMs, Loan Spread is calculated as the difference between the contract interest rate and the matching-maturity Treasury.

Table 1. Select Demographic and Mortgage Characteristics of HB 4050 ZIP Codes

Panel A: Statistics of HB 4050 ZIP Codes and Comparable ZIP Codes
(All figures are averages across ZIP codes)

	HB-4050 Z	Comp. ZI	st of Cook Cour
Population (18 plus)	49997	53775	24601
Households	22027	24765	12374
Subprime loans			
Loans issued since 2004	1516	1202	380
Foreclosure rate	0.113	0.12	0.107
Delinquency rate	0.228	0.211	0.203
Alt-A loans			
Loans issued since 2004	314	422	189
Foreclosure rate	0.071	0.055	0.036
Delinquency rate	0.098	0.101	0.069
Ownership rate	0.61	0.451	0.664
Unemployment rate	0.143	0.134	0.061
Below poverty rate	0.17	0.188	0.082
Share on public assistance	0.096	0.095	0.033

Demographic characteristics are based on the 2000 Census data
note: only loans on owner-occupied properties are considered

Table 1 (Cont.). Summary Statistics

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

Panel C: Summary Statistics of Recorder of LoanPerformance 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: Transaction Volume and Pricing

Panel A: Transaction Volume (Source: Recorder of Deeds)

	log(# Transactions)			
	Purchases		Refi's	
	Full	Comp	Full	Comp
	(1)	(2)	(3)	(4)
HB4050	-0.22***	-0.18	-0.19***	-0.16***
	(0.06)	(0.12)	(0.01)	(0.03)
Date FE	Yes	Yes	Yes	Yes
Zipcode FE	Yes	Yes	Yes	Yes
Observations	10626	540	11234	540
R^2	0.91	0.95	0.95	0.97

Panel B: Transaction Prices (Source: Recorder of Deeds + MLS)

	log(Price)		Percentile (Purchase Price)		Change in price percentile of repeat sales		Price/Listing (%)	
	Full	Comp	Full	Comp	Full	Comp	Full	Comp
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HB4050	0.0176*	0.0233*	1.01**	0.98	0.56	0.53	-0.24	-0.04
	(0.0094)	(0.0126)	(0.44)	(0.66)	(0.80)	(0.82)	(0.18)	(0.19)
LTV	-0.0051***	-0.0050***	-0.24***	-0.22***	0.05***	0.12***	0.02***	0.04***
	(0.0002)	(0.0011)	(0.01)	(0.04)	(0.00)	(0.02)	(0.00)	(0.00)
log(Purchase Price)					12.08***	16.37***	-0.52***	-0.42**
					(0.69)	(1.46)	(0.07)	(0.17)
Property Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Type FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
log(Avg Income) x Date FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	178725	21411	178725	21411	125365	15137	178725	21411
R^2	0.61	0.51	0.61	0.55	0.17	0.19	0.06	0.04

Table 3. Effects of HB 4050 on Borrower Behavior

Panel A: Did the Number of Mortgage Applications Change?

	Dependent: log(# Applications)					
	State-Licensed Lenders Specializing in Subprime loans			All Other Lenders		
	Full	Comp	Active	Full	Comp	Active
	(1)	(2)	(3)	(1)	(2)	(3)
HB 4050	-0.592***	-0.649***	-0.438***	-0.096***	-0.131***	-0.038**
	(0.027)	(0.041)	(0.026)	(0.015)	(0.028)	(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
R^2	0.96	0.97	0.99	0.99	0.97	0.99

Panel B: Did Low-Income Borrowers Avoid Applying or Were Being Rejected?

	Dependent: log(Income)					
	All Applications			All Originations		
	Full	Comp	Active	Full	Comp	Active
	(1)	(2)	(3)	(1)	(2)	(3)
HB 4050	-0.03***	-0.04***	-0.03***	-0.02**	-0.03**	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Licensed Subprime Lenders	0.02***	0.03***	0.02***	0.01	0.02*	0.00
	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.00)
x HB 4050	0.05***	0.03***	0.05***	0.01	0.00	0.03*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1526781	440758	994303	683875	174737	455097
R^2	0.22	0.09	0.23	0.25	0.11	0.25

Panel C: Did Borrowers Reject More Approved Mortgages?

	Dependent: Borrower Rejection Ratio (of all approved mortgages)					
	State-Licensed Lenders Specializing in Subprime loans			All Other Lenders		
	Full	Comp	Active	Full	Comp	Active
	(1)	(2)	(3)	(1)	(2)	(3)
HB 4050	-0.021***	-0.035***	-0.010	-0.021***	-0.011	-0.025***
	(0.007)	(0.010)	(0.007)	(0.004)	(0.006)	(0.004)
Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4556	743	3932	5433	756	5405
R^2	0.52	0.56	0.58	0.52	0.63	0.47

Table 4. Effects of HB 4050 on Credit Supply

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

	State-Licensed Lenders Specializing in Subprime loans			All Other Lenders		
	HB 4050	Comp Only	Full ex HB 4050	HB 4050	Comp Only	Full ex HB 4050
pre-HB4050 (1/05 - 8/06)	31	29	28	77	76	85
HB 4050 (9/06 - 2/07)	17	24***	22**	62	72***	80***
post-HB 4050 (3/07 - 12/07)	14	14	11	68	67	74

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

*** means statistically different from the number of active lenders in the HB 4050 zip code at 1 percent level

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

	Stayed in the Market (N = 24594)		Left the Market (N = 49759)	
	Mean	Std Error	Mean	Std Error
Delinquency (%)	28.45	0.29***	27.12	0.20
Default (%)	8.62	0.18***	9.14	0.13
Loan Spread (%)	4.83	0.01***	4.78	0.01
Low FICO (%)	44.27	0.32***	41.71	0.22
Mid FICO (%)	64.85	0.30***	62.62	0.22
Full Documentation (%)	53.98	0.32***	51.23	0.22
Valuation ($)	263686	1021.80***	261900	748.4
LTV (%)	80.70	0.07***	80.86	0.05
FICO	629.38	0.40***	633.11	0.28
ARM Mortgages (%)	89.05	0.20***	86.42	0.15
IO Mortgages (%)	19.44	0.25***	13.89	0.16
Refi (%)	60.97	0.31***	54.63	0.22
Refi Cashout (%)	51.25	0.32***	48.74	0.22
Prepayment Penalty (%)	17.23	0.24	17.46	0.17

*** means statistically different from the lenders that left the market

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

	Dependent: Lender Rejection Ratio					
	State-Licensed Lenders Specializing in Subprime loans			All Other Lenders		
	Full	Comp	Active	Full	Comp	Active
	(1)	(2)	(3)	(1)	(2)	(3)
HB4050	0.084***	0.073***	0.089***	0.016***	0.025***	0.018***
	(0.012)	(0.014)	(0.010)	(0.005)	(0.005)	(0.006)
Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	5364	756	5266	5460	756	5449
R^2	0.49	0.68	0.51	0.83	0.85	0.81

Table 5. Effects of HB 4050 on Mortgage Performance

Panel A: Within Zip Code-Month Identification (Source: LoanPerformance)

	Delinquency (x 100)			Default (x 100)		
	Full	Comp	Active	Full	Comp	Active
	(1)	(2)	(3)	(4)	(5)	(6)
HB4050 x Low FICO	-2.61*	-1.82	-1.32	-2.94**	-3.03**	-3.25**
	(1.54)	(1.58)	(2.06)	(1.29)	(1.22)	(1.45)
HB4050 x Mid FICO	1.90	2.19	1.83	2.79	2.06	4.23**
	(2.16)	(2.15)	(2.35)	(1.86)	(1.78)	(2.01)
Low FICO Flag	6.22***	4.79***	5.03***	2.81***	2.76***	2.75***
	(0.58)	(1.15)	(0.87)	(0.39)	(0.83)	(0.62)
Mid FICO Flag	2.46***	1.82**	1.99***	1.42***	2.11***	1.20***
	(0.41)	(0.67)	(0.62)	(0.29)	(0.53)	(0.41)
Borrower Controls	Yes	Yes	Yes	Yes	Yes	Yes
Contract Controls	Yes	Yes	Yes	Yes	Yes	Yes
Property FE	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode * Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	166115	55244	63606	166115	55244	63606
R^2	0.08	0.08	0.08	0.05	0.07	0.05

Panel B: Robustness Tests of Default Regressions

	Default (x 100)					
	Full	Comp	Active	Full	Comp	Active
	(4)	(5)	(6)	(4)	(5)	(6)
HB4050 x Low FICO	-2.74**	-2.89**	-3.11**	-2.67**	-3.60***	-3.54**
	(1.29)	(1.22)	(1.45)	-1.05	(1.08)	(1.36)
HB4050 x Mid FICO	2.89	2.10	4.34**	2.26	1.12	3.62**
	(1.87)	(1.79)	(2.02)	-1.5	(1.43)	(1.56)
Loan spread (%)	1.16***	1.18***	0.87***			
	(0.08)	(0.14)	(0.12)			
Low FICO Flag	2.54***	2.55***	2.73***	2.55***	2.79***	2.49***
	(0.40)	(0.84)	(0.62)	(0.39)	(0.84)	(0.61)
Mid FICO Flag	1.16***	1.91***	1.15***	1.34***	2.09***	1.09***
	(0.29)	(0.53)	(0.41)	(0.29)	(0.53)	(0.40)
Borrower Controls	Yes	Yes	Yes	Yes	Yes	Yes
Contract Controls	Yes	Yes	Yes	Yes	Yes	Yes
Property FE	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode * Date FE	Yes	Yes	Yes			
Date FE				Yes	Yes	Yes
Zipcode FE				Yes	Yes	Yes
Observations	166026	55209	63553	166110	55240	63606
R^2	0.06	0.07	0.05	0.06	0.08	0.06

Table 6. Effects of HB 4050 on Mortgage Characteristics

Panel A: 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)
HB4050 x Low FICO	-0.94**	-0.13	-0.81*	-0.71	-0.30	-0.25	-0.18***	-0.12**	-0.15***
	(0.42)	(0.44)	(0.45)	(0.49)	(0.44)	(0.45)	(0.04)	(0.04)	(0.04)
HB4050 x Mid FICO	0.20	0.34	0.58	-0.52	-0.14	-0.63	-0.11***	-0.05	-0.14***
	(0.40)	(0.43)	(0.55)	(0.57)	(0.60)	(0.66)	(0.03)	(0.04)	(0.04)
Low FICO Flag	0.08	1.40***	0.85***	-0.68***	-0.21	-0.70***	0.17***	0.14***	-0.01
	(0.23)	(0.34)	(0.29)	(0.13)	(0.24)	(0.20)	(0.02)	(0.03)	(0.02)
Mid FICO Flag	2.01***	2.62***	2.13***	0.40***	0.48**	0.39***	0.19***	0.14***	0.03**
	(0.12)	(0.15)	(0.17)	(0.10)	(0.18)	(0.14)	(0.01)	(0.02)	(0.02)
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
Zipcode * Date FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	166115	55244	63606	114498	39122	53253	166108	55243	63599
R^2	0.11	0.10	0.09	0.06	0.08	0.06	0.50	0.46	0.40

Panel B: ARM and IO Mortgages (Source: LoanPerformance)

	ARM (x 100)			IO mortgage (x 100)		
	Full	Comp	Active	Full	Comp	Active
	(1)	(2)	(3)	(4)	(5)	(6)
HB4050 x Low FICO	-1.13	0.81	-1.14	-0.16	-1.08	1.22
	(2.83)	(2.82)	(3.33)	(0.86)	(1.02)	(0.96)
HB4050 x Mid FICO	-7.18***	-5.96***	-6.75***	-4.89***	-3.98***	-2.36*
	(2.05)	(2.03)	(2.27)	(1.11)	(1.23)	(1.31)
Low FICO Flag	4.30***	4.93***	3.87***	-10.33***	-7.81***	-4.26***
	(0.51)	(0.65)	(0.58)	(0.71)	(0.98)	(0.62)
Mid FICO Flag	3.85***	3.67***	0.98*	-5.48***	-4.59***	-3.50***
	(0.41)	(0.60)	(0.50)	(0.41)	(0.69)	(0.52)
Borrower Controls	Yes	Yes	Yes	Yes	Yes	Yes
Contract Controls	Yes	Yes	Yes	Yes	Yes	Yes
Property FE	Yes	Yes	Yes	Yes	Yes	Yes
Zipcode * Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	166115	55244	63606	166115	55244	63606
R^2	0.13	0.14	0.12	0.15	0.12	0.14

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

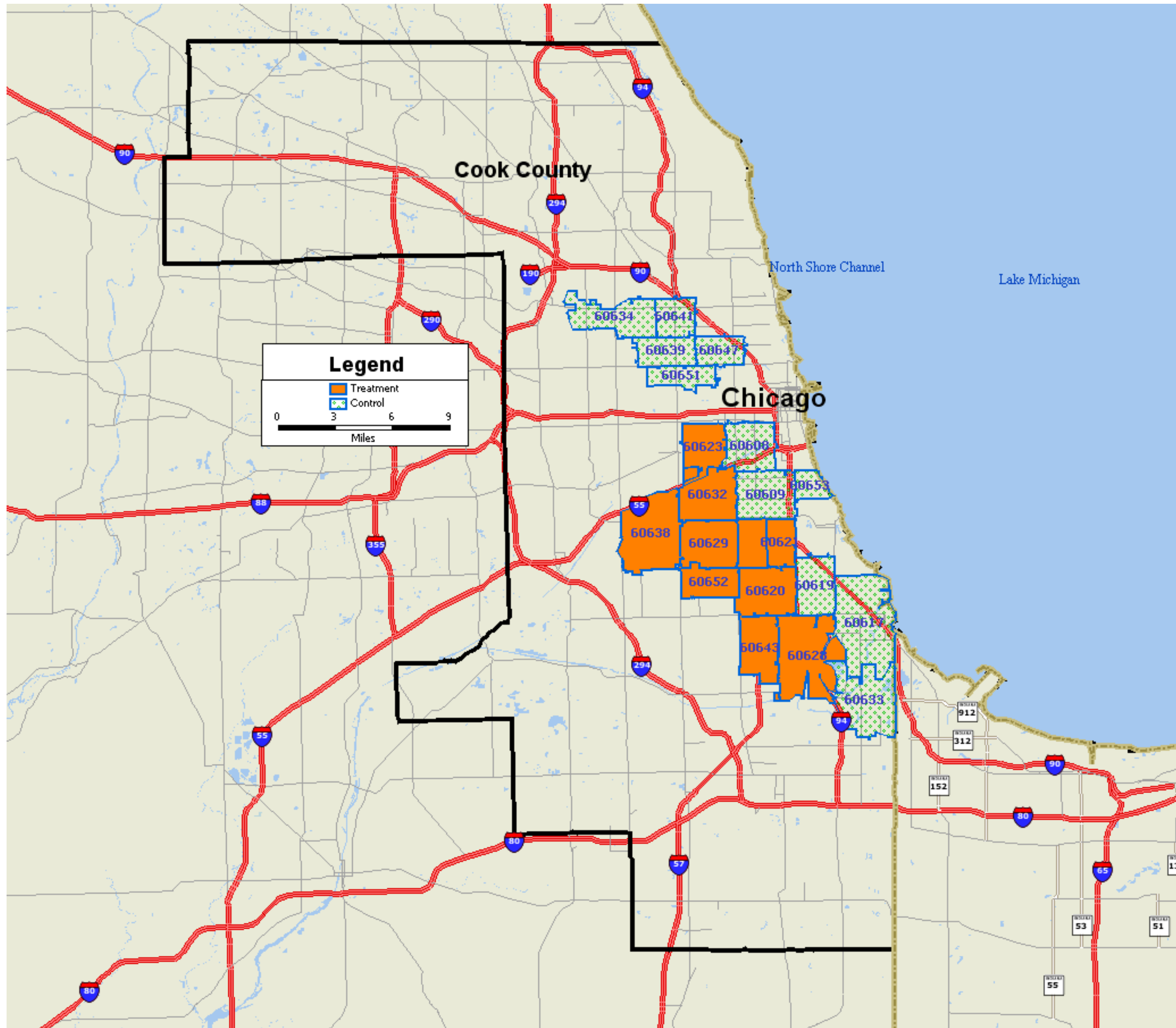

Figure 2a. Cumulative distribution of mortgages before and during the HB 4050 period in HB 4050 zip codes, as function of FICO scores

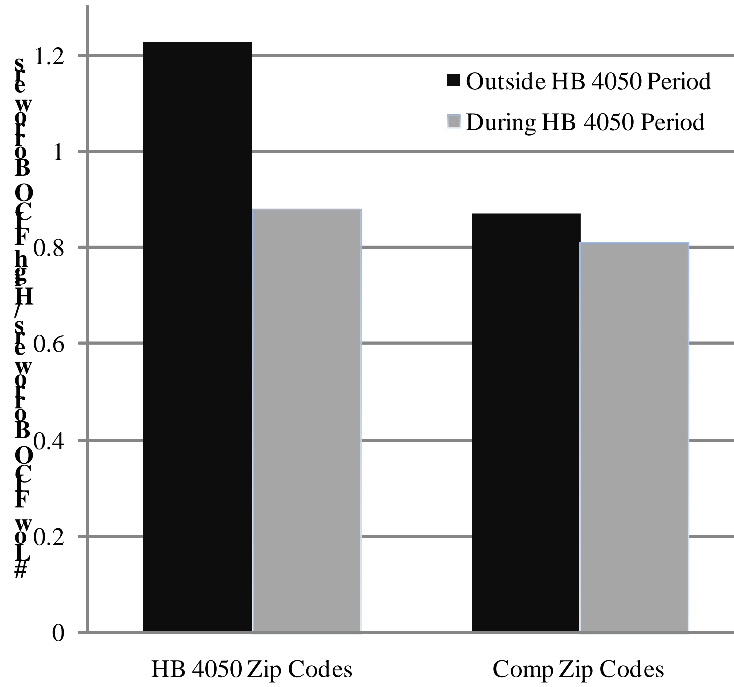

Figure 2b. Cumulative distribution of mortgages before and during the HB 4050 period in non-HB 4050 zip codes, as function of FICO scores

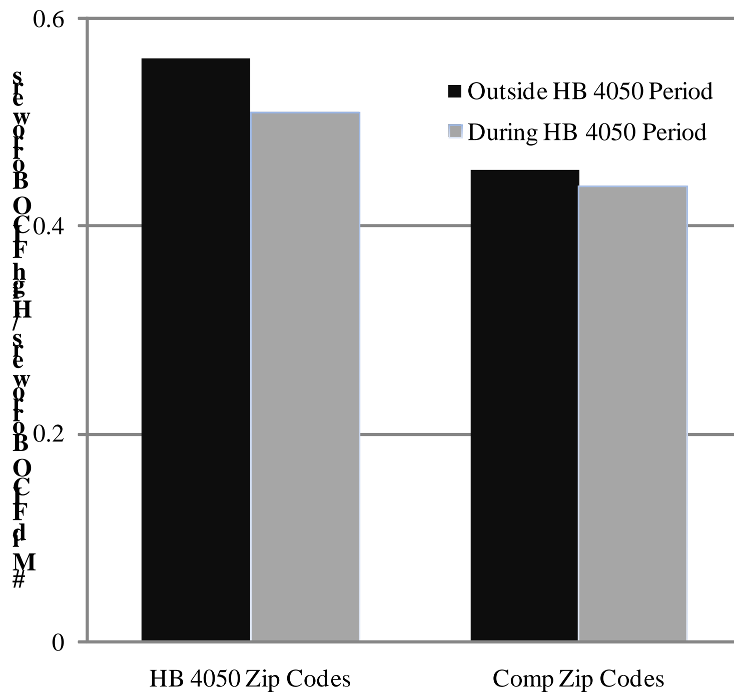

Figure 3. Number of HMDA Loan Application Filings: Lenders Subject to HB 4050 vs. Exempt Lenders

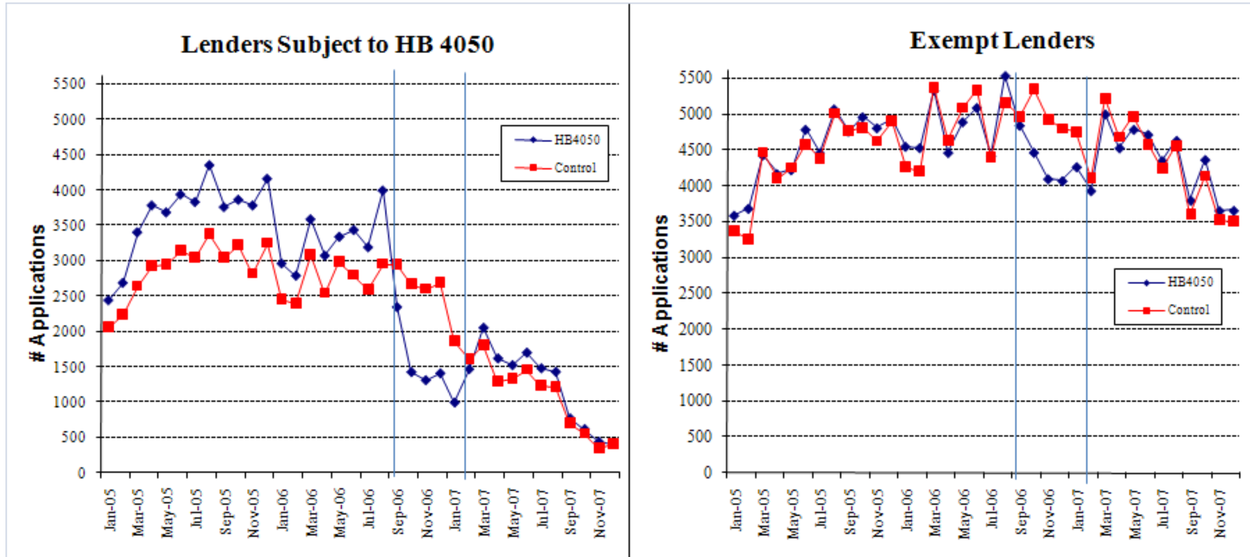

Figure 4a. Shares of HMDA-Reported Applications "Rejected" by Borrowers: Lenders Subject to HB 4050 vs. Exempt Lenders

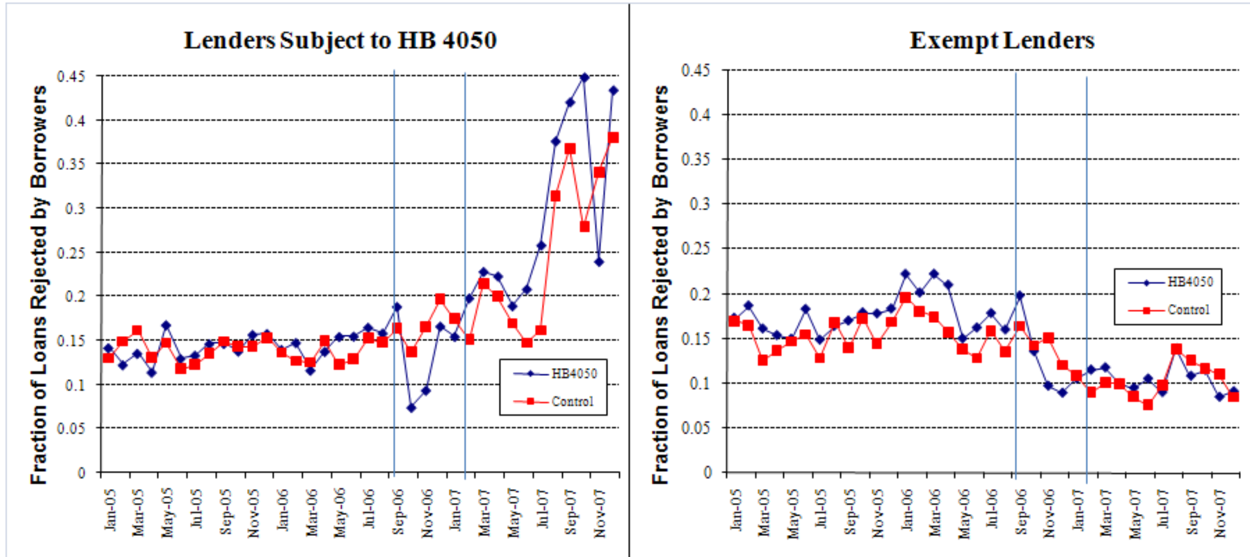

Figure 4b. Shares of HMDA-Reported Applications "Rejected" by Lenders: Lenders Subject to HB 4050 vs. Exempt Lenders