

Do Financial Counseling Mandates Improve Mortgage Choice and Performance? Evidence from a Legislative 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 legislative 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 in the treated areas. Controlling for the salient characteristics of the remaining borrowers and lenders, we find that the ex post default rates among counseled low-FICO-score borrowers were about 4.5 percentage points lower than those among similar borrowers in the control group. 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 pushed some borrowers to choose less risky loan products in order to avoid counseling.

Keywords: Financial literacy, Counseling, 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 loan counselors certified by the Department of Housing and Urban Development (HUD). The same requirement applied to applicants who chose certain mortgage products deemed risky by legislators. The empirical setting of this legislative natural experiment allows us to study the program's outcomes and isolate the driving forces behind the effects.

In particular, the unorthodox *geographic* focus of the legislation offers a way 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 similar to the treatment area in terms of pre-pilot sociodemographic measures, foreclosure rates, as well as borrower and mortgage characteristics to conduct difference-in-differences analyses.¹ 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.

¹ Our results are robust to alternative control group specifications.

Our analysis provides a series of results about the effects of financial advice on behavior of low- and moderate-income households and on lender response to mandatory loan counseling programs. In particular, we find that mandatory counseling hampered real estate market activity in the treated areas. In the 10 pilot zip codes, the legislation caused up to a 73% drop in the number of mortgage loan applications for the lenders who were subject to the legislation.

Our key result 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 18-month default rate *among low-FICO-score counseled borrowers* was about 4.5 percentage points lower than that among similar borrowers in the control group (the average pre-treatment default rate of such borrowers in both the treatment and control groups was 17 percent).

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 into 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 obtain mixed support for the *direct* effect of information received in counseling sessions. Based on individual counseling records of one agency, 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 Yet, we detect almost no *aggregate* effect of counseling on interest rates, debt leverage, and

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.

propensity by low-credit-quality borrowers to take out adjustable rate hybrid mortgages or mortgages with prepayment penalty—the most common areas of concern for counseling agencies.

We find stronger evidence for *indirect* effects of the counseling requirement on mortgage origination and mortgage decision making. First, we document a spike in rejection rates of mortgage applications by lenders who are subject to the legislation during the treatment period, with rejection rates returning to their normal level as soon as the law is rescinded. This pattern is partially due to the temporary exit of lenders with loose screening practices from the treated area, and partially due to tighter screening by the remaining lenders. Second, we find a sizable decline in the prevalence of low-documentation mortgages. We attribute this change to counselors' demand that borrowers bring their income documentation to the counseling session. Both of these responses are consistent with the hypothesis that third-party review of mortgage offers led to more thorough screening – what we refer to as the oversight effect. Third, we find that borrowers that could avoid counseling by selecting less risky products did so. Fourth, we report that counseled borrowers rejected fewer mortgage offers. Since we do not detect an aggregate improvement in loan terms, it is possible that borrowers give up shopping around for mortgages to avoid additional counseling sessions. The latter two responses are consistent with borrowers' desire to avoid the transaction costs of fulfilling the counseling mandate – the burden effect.

In general, our results suggest that the threat of oversight and the imposition of transaction and compliance costs of counseling, rather than the information contained in counseling sessions, served as the primary catalyst for change in borrower decision making and in lender behavior, ultimately leading to lower default rates. However, one should be careful not to interpret these results as a verdict on the general ability of financial counseling to convey useful information to borrowers.³ Rather, as discussed in greater detail below, the design of this particular pilot featured considerable incentives for *lenders* to shy away from certain borrowers

³ For instance, a recent volume (Lusardi, 2008) offers evidence for effectiveness of targeted, long-term financial education programs in improving financial literacy and stimulating savings.

and products. Further, by designating certain contracts as triggers for counseling, the pilot design also conveyed information about their desirability outside of counseling sessions themselves.

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.⁴ For instance, Lusardi (2007, 2008) voices concern that many consumers who enter into complex financial contracts, such as mortgages, are financially illiterate. Households may borrow too much at a high rate without realizing future consequences (Agarwal, Driscoll, Gabaix, and Laibson, 2007) or may have a hard time recalling the terms of their mortgage contracts (Bucks and Pence, 2008). Moore (2003) and Lusardi and Tufano (2009) finds that respondents with poor financial literacy are more likely to have costly mortgages. It has also 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. Although there is a shared sense that household financial literacy is inadequate and the resulting mistakes are consequential, there is less agreement on whether financial education programs are an effective means of addressing this shortcoming.⁵

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

⁴ This literature is motivated by Bernheim (1995, 1998), who was among the first to document low levels of financial literacy among consumers. One of the starkest illustrations of shortfalls in financial literacy was demonstrated by Lusardi and Mitchell (2006, 2008) who provided evidence of consumer inability to perform even simple interest-rate calculations. Lusardi and Tufano (2009) report similar concerns with household debt literacy.

⁵ For instance, Bernheim, Garrett and Maki (2001) find that high school financial education mandates have an appreciable effect on asset accumulation later in life. However, a recent paper by Cole and Shastry (2008) that uses a larger dataset and a different empirical specification fails to detect any effect of such programs on household participation in financial markets.

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 our methodology and the data used to test the hypotheses. Section 4 presents empirical results on the effects of the program on the mortgage market while Section 5 evaluates the relative importance of different channels in attaining these effects. Section 6 summarizes and discusses policy implications.

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

2.1 Description of the Pilot Program

In 2005, the Illinois legislature passed a bill intended to curtail predatory lending. 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. 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. For instance, balloon mortgages targeted by regulations were replaced with adjustable rate mortgages with short fixed rate terms and steep reset slopes (the so-called 2/28 and 3/27 hybrid ARMs).⁶ Consequently, the legislature sought to shift focus from policing loan issuers to educating the borrowers.

To that effect, the legislation sponsored by the 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 with interest rate adjustments within three years, loans

⁶ For a detailed analysis of the impact of the state anti-predatory lending laws on the type of mortgage products used in the market, see Bostic, Chomsisengphet, Engel, McCoy, Pennington-Cross, and Wachter (2008).

underwritten on the basis of stated income (low-doc loans), and repeat refinancings within the last 12 months. Borrowers were subject to counseling *regardless* of their FICO score if they took out loans with prepayment penalties, loans that allowed negative amortization, or loans that had closing costs in excess of five percent. 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 Cook County that covers the metropolitan Chicago area, after which its coverage could be expanded. In spite of vocal opposition from community-based groups and affected lenders, Illinois politicians clamored to have their districts included in the pilot (*ibid.*). This choice looked particularly ironic in retrospect, given the eventual response of the population in the pilot areas. In the end, the bill (titled HB 4050) was passed on the last day of the 2005 legislative session.

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 specific loan offer for a home purchase or refinancing and to explain their meaning and consequences to the prospective borrower. The counselors were not supposed to advise borrowers about their optimal mortgage choice in the sense of Campbell and Cocco (2003) but rather to warn them against common pitfalls. 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 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, 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 private information that was not necessarily used by lenders to make approval and/or pricing

decisions, 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 regulatory (e.g. license revocation) or legal (e.g. class action lawsuits) response. 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.⁷ However, even if this were to be the case, HB 4050 imposed other time and psychic costs on borrowers. Finally, by lengthening the expected amount of time until closing, HB 4050 could force borrowers to pay for longer credit lock periods, raising loan costs.

As mentioned earlier, only loans offered by state-licensed mortgage lenders were subject to this requirement, as the State lacks 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.⁸ 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 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.⁹ Otherwise,

⁷ There is substantial anecdotal evidence that lenders attempted to pass the \$300 counseling fee to the borrowers in the form of higher closing costs or administrative charges (Bates and VanZandt, 2007 and references therein.)

⁸ Using the HMDA data described in greater detail in section 3, we estimate that state-licensed mortgage bankers accounted for 56% of mortgage loans originations in the HB 4050 zip codes during 2005.

⁹ 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.

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.

A 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 to have 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 who were receiving adjustable rate loans did not understand that their mortgage payment was not fixed over the life of the loan.

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. 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.¹⁰ The pilot program was suspended indefinitely in January 2007, after only 20 weeks of operation.

2.2 How Was the Pilot Program Area Selected?

The HB 4050 bill instructed the State regulatory body (Department of Financial and Professional Regulation, IDFPR) to designate a pilot area on the basis of "the high rate of

¹⁰ The record of a public hearing held on November 27, 2006 provides a good illustration of the acrimony surrounding HB 4050 (it is available at <http://www.idfpr.com/newsr/s/032107HB4050PublicMeeting112706.pdf>).

foreclosure on residential home mortgages that is primarily the result of predatory lending practices.” The pilot area announced by the Department in February 2006 encompassed ten contiguous zip codes on the Southwest side of Chicago (the solid areas in Figure 1).¹¹ Four of these ten zip codes were located in Speaker Madigan’s district.

Table 1 summarizes some of the key demographic and mortgage characteristics for the pilot area and the rest of the City of Chicago. The mortgage data come from the Loan Performance dataset on securitized non-prime mortgages (described in greater detail below). As can be seen in panel B of the table, at the time of IDFP decision the selected zips indeed had substantially higher delinquency and default rates than the rest of the City (columns (1) and (3)). The pilot zip codes are also predominantly minority-populated and have much higher rates of unemployment and poverty (Panel A). A simple comparison of population counts and the total number of loans in the LoanPerformance data (Panel A) and FICO scores (Panel B) strongly suggests that the HB 4050 area has a disproportional share of subprime and Alt-A mortgages.

2.3 Constructing a Control Group

However, this set of pilot zip codes is far from unique in satisfying HB 4050 selection guidelines. We use this fact in constructing our control group that is meant to resemble the HB 4050 zip codes in terms of their pre-treatment socioeconomic characteristics and housing market conditions. Such areas could plausibly be expected to experience the same changes in outcome variables as HB 4050 zips in the absence of intervention. To fulfill this goal, we move beyond the univariate metric of foreclosure rates to a set of measures identifying economically disadvantaged, inner-city neighborhoods.

In particular, we use 2005 IRS zip-level income statistics, as well as the 2000 Census shares of minority population, of those living below the poverty level, and the unemployment rate to identify zip codes within the City of Chicago limits that have the smallest geometric distance from the HB 4050 zips. The resulting 12-zip area is summarized in column (2) of Panel

¹¹ The HB 4050 zip codes are: 60620, 60621, 60623, 60628, 60629, 60632, 60636, 60638, 60643, and 60652.

A. The statistics in Panel B of Table 1 corroborate our prior that the control zip codes are similar to the treated area in terms of their high default and delinquency rates, borrower FICO scores, and disproportionate reliance on subprime mortgage products.¹²

This set of comparable zip codes (shown by the striped area in Figure 1) is used as one of the control samples in our empirical analysis. Judging by the spirit and the letter of stated legislative guidelines, these areas could have plausibly been selected for HB 4050 treatment.¹³

To further establish the empirical robustness of our analysis, we construct a synthetic HB4050-like area in the spirit of Abadie and Gardeazabal (2003). Instead of identifying a similar-but-untreated set of loans at the zip code level, we build up a comparison sample loan-by-loan by matching on observable loan characteristics. Specifically, for each of the loans issued in the 10-zip HB 4050 area we look for a loan most similar to it that was issued elsewhere within the City of Chicago in the same month. The metric for similarity here is the geometric distance in terms of standardized values of borrowers' FICO score, loan's debt-service-to-income (DTI), loan-to-value (LTV) ratios, log of home value, and loan's intended purpose (purchase or refinancing). Once a loan is matched to an HB 4050-area loan, it is removed from the set of potential matches and the process is repeated for the next HB 4050-area loan. The resulting synthetic HB 4050-like area is comprised of observations from 42 out of 45 non-HB 4050 Chicago zip codes. Not surprisingly, more than half of the observations in this synthetic area come from the 12 comparable zip codes identified above on the basis of their socioeconomic characteristics.

In subsequent analysis we will refer to the comparable zips and the synthetic area counterfactuals as the Control and the Matched samples, respectively.

¹² In an earlier version of the paper, we used the reverse sequence for constructing the control sample. That is, we built up the set of control zips by minimizing the distance in observed mortgage characteristics in the pre-HB 4050 LP data. Afterwards, we checked for similarity on socioeconomic characteristics of treatment and control areas. All of the results reported below are robust to the definition of the control area and are available upon request.

¹³ The control area includes the following zip codes: 60609, 60617, 60619, 60624, 60633, 60637, 60639, 60644, 60649, 60651, 60655, and 60827.

3. Data and Empirical Setup

3.1 Data Used in the Study

Our study relies on several complementary sources of data that cover the calendar years 2005-2007. 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 Cook County Recorder of Deeds database to obtain information on all actual transactions (mediated by agents or sold by owner) that took place in Cook County, including basic information about the associated mortgages.

We also use the First American CoreLogic LoanPerformance (LP) database to assess the effect of HB 4050 on the composition and performance 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, their database covered over 90% of securitized subprime mortgages as of 2006. The database includes detailed borrower and loan information such as FICO scores, debt-service-to-income (DTI) and loan-to-value (LTV) 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 spread. It also includes information on whether a given loan has a prepayment penalty, allows negative amortization, and whether it

required full documentation in underwriting. These and other characteristics of LoanPerformance data are summarized in Table 1, Panel C. FICO scores are used extensively by lenders to assess the creditworthiness of the borrower and set 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).¹⁴

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 (47%) observations.¹⁵ We use this dataset to gauge the extent to which counseling had a direct effect on mortgage selection.

3.2. 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., default status, 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:

$$(1) \quad \text{Response}_{ijt} = \alpha + \beta \text{Treatment}_{jt} + \gamma \text{Time dummies}_t + \delta \text{Zip dummies}_j + \theta \text{Controls}_{ijt} + \varepsilon_{ijt},$$

¹⁴ We replicate our results using the loan-level data from LPS Applied Analytics (formerly known as McDash). The LPS data contain information similar to that in LoanPerformance with the important distinction that it is not limited to subprime securitized loans. Since the majority of loans in HB 4050 zip codes were made to subprime borrowers and the vast majority of those were securitized, both databases cover substantially similar transactions. However, using LoanPerformance forces us to focus on the subset of loans directly affected by legislation by default. This allows for a sharper test of the effects of the counseling mandate and limits concerns about selection described more fully in Section 3.2.

¹⁵ Note that for the unmatched observations we do not know whether they were unmatched because of data noise or because these applicants walked away from their mortgage offers. We are currently tracking each of these counseled borrowers in the Recorder of Deeds database to determine whether they indeed ended up originating a mortgage.

where $Response_{ijt}$ is the response variable at the transaction level (e.g., status of loan i). $Treatment_{jt}$ is a dummy variable that receives the value of 1 if zip code j is subject to mandatory counseling in 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.¹⁶ 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.

As is always the case with program evaluation studies, we are concerned about properly accounting for selection and matching effects. In particular, the set of HB 4050 zip codes is patently non-random, as it 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 different FICO groups. Recall that all of the low-FICO borrowers (FICO < 620) were subject to counseling, while those with higher FICO scores were counseled conditional on their mortgage contract choice. This approach retains the structure of standard difference-in-differences analysis while also exploiting the within zip code heterogeneity in treatment.¹⁷

We further interact time dummies with the log of the average zip code income, as reported by the IRS at an annual frequency. This allows the effects of unobservable shocks to

¹⁶ Clustering allows for an arbitrary covariance structure of error terms over time within each zip code and thus adjusts standard error estimates for serial correlation, potentially correcting a serious inference problem (Bertrand, Duflo, and Mullainathan, 2004). Depending on the sample, there are 22 or 53 zip codes in our regressions.

¹⁷ The FICO-only partitioning of borrowers in treated zip codes has the advantage of being based on a characteristic that is exogenous to the treatment regime. As shown in section 5.4, the mandate caused a sizable move away from mortgage contracts that trigger counseling for mid- and high-FICO borrowers.

vary with the level of economic resources available to households in a particular zip code, further alleviating some of the selection concerns.¹⁸ The regression specification that we therefore run is:

$$\begin{aligned}
 (2) \quad \text{Response}_{ijt} = & \alpha + \beta_1 (\text{Treatment}_{jt} \times \text{Low-FICO}_{ijt}) + \beta_2 (\text{Treatment}_{jt} \times \text{Mid-FICO}_{ijt}) \\
 & + \beta_3 (\text{Treatment}_{jt} \times \text{High-FICO}_{ijt}) + \\
 & + \gamma (\text{Time dummies}_t) + \delta (\text{Zip code dummies}_j) + \\
 & + \eta (\text{Time dummies}_t \times \log \text{IRS income}_{jt}) + \theta \text{Controls}_{ijt} + \varepsilon_{ijt}.
 \end{aligned}$$

As a second solution to non-random sample selection and matching a counterfactual control area on only a limited set of observables, we conduct our tests using several alternative control groups. We first compare transactions in the treated zip codes to transactions in a 12-zip control described in section 2.3 (the Control sample).¹⁹ We also use a synthetic HB 4050-like area that is constructed loan-by-loan using a different set of observables for identification (the Matched sample also described in section 2.3). Finally, to account for self-selection of lenders out of the treated zip codes, each of the Control and the Matched samples is restricted to a set of lenders that remained active in the HB 4050 zips during treatment (the Control Active and Matched Active samples).²⁰ This part of the analysis holds the population of lenders constant; that is, we are identifying treatment effects unrelated to the change in the composition of lenders. In each of these cases, we are evaluating the performance and characteristics of securitized subprime and alt-A mortgages contained in the LoanPerformance data.

3.3. Summary of Testable Hypotheses

We use the setup described in the previous section to test a number of hypotheses. As discussed earlier, HB 4050 increased the costs of engaging in mortgage transactions and

¹⁸ 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 across borrower categories at a point in time. The main results remain qualitatively the same with this approach.

¹⁹ It would be ideal to look at transactions that lie on either side of the border between HB 4050 and control zip codes to tease out the effect of the counseling mandate. Unfortunately, the LP data do not contain street addresses.

²⁰ The exact definition of an active lender is provided in section 4.1.

providing lending services. Consequently, we expect the legislation to restrict both the demand for and supply of lending, particularly in the directly affected market segments – subprime borrowers and state-regulated mortgage bankers. These effects may be simultaneous and mutually reinforcing and may occur along both extensive and intensive margins (e.g. lender exit and loan rejection rates).

Since the stated goal of the pilot program was to reduce foreclosures, we next evaluate the performance of transactions carried out under the new regime. If the intervention was at all effective, we would expect to find improvements in ex post mortgage performance among the counseled population, particularly low-FICO households. We subject the findings to a number of robustness checks on identification approach, functional form, and choice of control sample.

The documented change in performance could come from a number of sources – exit of predatory lenders, removal of less creditworthy borrowers, borrower ability to negotiate better loan terms, or to make better product choices. We evaluate each of these possibilities in turn.

Each of the above actions could come about through a number of channels associated with the counseling mandate. We identify three such channels: the direct information effect of counseling, the burden effect of transaction costs of fulfilling the counseling requirement, and the oversight effect of the threat of regulatory or legal action (e.g. license revocation or class action lawsuits). The data and the design of the legislation allow us to test the relative importance of these channels.

In particular, if HB 4050 succeeded in furnishing better information through counseling sessions, its effects should be most pronounced in mortgage characteristics (e.g. lower LTV and loan spreads) of the *counseled* borrowers. Absent the evidence of successful loan offer renegotiations, we would expect to see an increase in rejection of loan offers by the counseled borrowers. In contrast, we would not expect better information to have any effect on levels of loan applications since they are filed prior to any counseling.

Information can be furnished not only through counseling sessions, but also by mere designation of certain products as risky in the sense that their selection triggers counseling.

These designations are publicly known and may constitute a credible signal to avoid such mortgage products. If this signaling effect is at work, we would expect the incidence of risky product choices to decline for *all* FICO groups in the treated zip codes.

On the other hand, product selection can also be driven by the desire to avoid counseling and its associated costs. In this case, members of a given FICO group would avoid products that trigger counseling for *their* group. That is, one would expect a reduction in low-doc loans among mid-FICO households, but not high-FICO ones. Similarly, both mid- and high-FICO households (but not low-FICO ones) would be expected to choose fewer negative amortization loans and mortgages with prepayment penalty.

Turning to lenders, one possibility for their decision to exit the market is inability to make a profit in the presence of the \$300 counseling fee. If this were the case, we would expect to see greater lender rejection rates for low-value loans, since lender compensation is typically proportional to the value of originated loans.

Another possibility that was discussed earlier is that lenders are fearful of the consequences of the oversight of their actions by counselors and, implicitly, by the State. In this case, we would expect the lenders to tighten their screening of prospective borrowers, allowing fewer doubtful cases to enter the counseling process. This would be reflected in a temporary spike in rejection rates among the affected lenders during the HB 4050 period. Our final test of the oversight channel focuses on availability of low-doc loans. Under HB 4050, lenders have little reason to offer low-doc loans to any but high-FICO borrowers, since counseling would elicit income and expenses information and furnish it to the State-run database.

These hypotheses form the backbone of analysis in Sections 4 and 5 below.

4. Effects of HB 4050 on Mortgage Market Composition and Mortgage Performance

4.1 Exit of Borrowers and Lenders

We measure mortgage market activity in the wake of HB 4050 as the volume of loan applications captured in the HMDA database.²¹ Figure 2a depicts the total number of loan applications in the treated zip codes (the solid line) and in the control set of zip codes (the dashed line). 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 market-wide decline in subprime mortgage originations early in 2007.

The decline in loan application volume is much more 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 2a, 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 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.

²¹ 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.

Similar results are presented in regression form in Table 2, Panel A. These regressions are run at the zip code-month level. Column (1) shows a nearly 73% decline in loan application volume in treated zip codes among lenders most affected by the regulation. The declines are much smaller among other lenders, some of whom were also subject to regulation, e.g., state-licensed lenders that originated negative amortization mortgages to prime borrowers (column 2).

Panels B and C further differentiate between applications for mortgage refinancing and home purchases. Among subprime lenders, the decline in applications for refinancing is much greater, which we attribute to the voluntary nature of refinancing decisions versus home purchase financing. Home buyers who need to relocate are bound to take a mortgage; conversely, for existing homeowners, refinancing is an optional stand-alone action. The disparity between the declines in origination rates of purchase- and refinancing-related transactions is indicative of the extent of the burden that counseling places on borrowers.

Some of the dramatic drop in loan applications could be traced to much publicized lender withdrawals. 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, a HMDA reporting institution must originate an average of at least 1 loan per week over a given five-month period, with at least 1 origination in every given month.²² The results of this simple exercise are reported in Panel A of Table 3. The table shows a substantial decline in the number of lenders in treated zip codes. The magnitude of this decline is much greater and strongly statistically different from the pattern observed in the control area. The table also confirms that lender exit was disproportionately concentrated among state-licensed lenders specializing in subprime mortgages. These results corroborate the hypothesis that the mandatory counseling

²² The five-month period is chosen to match the duration of HB 4050. None of the patterns depends on the choice of the threshold level or geographic area. The “every month” condition is intended to eliminate lenders that withdraw from HB 4050 zip codes during the fall of 2006 after working off their backlog of earlier applications. We thank Adair Morse for this suggestion.

requirement resulted not just in the reduction of demand for credit, but also in the abrupt exit of relatively large lenders from the affected zip codes.

It is worth noting that some of the subprime lenders that exited the pilot areas appear to have returned as soon as HB 4050 was rescinded. Figure 2b illustrates the rapid run-up in loan applications filed by those lenders. As noted in footnote 8, the legislation created some legal uncertainty about enforceability of mortgage contracts in treated zips. This, by itself, may have accounted for the strong lender response along the extensive margin.

This identification of active lenders allows us to check whether the drop off in loan applications in Table 2 is due entirely to lender exit. Column (3) of Table 2 shows that restricting the sample to lenders that remained *active* in the HB 4050 area still generates a substantial (albeit smaller) drop in volume. In other words, fewer applications were filed even with the subprime lenders that did not shut down their operations in HB 4050 zips. Applications for refinancing declined more, suggesting a shift to purchase loans among the remaining lenders.²³

We further assess whether the lenders who stayed in the market have different characteristics than the ones that exited following implementation of HB 4050. Panel B of Table 3 compares those two types of lenders, based on characteristics of their mortgage applications and originations prior to HB 4050. Two of the characteristics jump out. Lenders who remained in the market are much larger than those who exited. They also have much higher pre-HB 4050 rejection rates, which could indicate more stringent screening practices. We will return to this point in Section 5.5.

Finally, we examine whether borrowers that were subject to counseling were more likely to be rationed from the market. In Figures 3a and 3b we compare the distribution of borrowers that originated their loans before and during the HB 4050 period across FICO ranges. There is a pronounced shift to the right in the FICO score distribution during the treatment period in the HB

²³ We count 9 state-licensed subprime lenders that satisfy this definition of active in the HB 4050 zip codes. This number refers to the number of lenders funding loans and filing HMDA reports. According to the Housing Action Illinois (2007) report, these lenders were represented by more than 300 mortgage brokers. This correspondence looks less surprising given the large size of entities in the active lender subset.

4050 zip codes. The share of loans originated for borrowers with sub-620 FICO scores in treated areas shrank by 10 percentage points relative to the pre-HB 4050 period. In contrast, the FICO distribution in the comparable (untreated) sample remains virtually unchanged.

In unreported analysis, we evaluate these changes in borrower credit quality in a regression framework, with 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 Default Rates

Perhaps the main goal of HB 4050 was to reduce the extent to which borrowers defaulted and had their properties foreclosed on. To measure loan performance we flag borrowers that default within 18 months of origination.²⁴ We then estimate a series of OLS regressions defined in (2), where the set of controls includes measures of borrower characteristics (FICO score and flags for being an investor or second-home owner), contract terms (LTV, loan spread, logged property valuation,), contract type (low-doc, negative amortization, interest only, prepayment penalty, or refinancing loans), and property characteristics (indicators of whether a property is a single-family home, condo, or townhouse).

The results of difference-in-difference tests are reported in Table 4. Columns (1)-(4) display the results of specification (2) that differentiates between borrowers on the basis of their FICO scores. As discussed in Section 3.2, each difference-in-differences specification is estimated for four samples: the control sample, the matched sample, and the control and matched samples restricted to lenders that remained active during the HB 4050 period.

The results in columns (1)-(4) suggest that the treatment had a strong effect on low-FICO borrowers, each of whom had to attend a counseling session. For such borrowers, the ex post

²⁴ A loan is considered delinquent if it is 30 or 60 days past due in the first 18 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.

default rates are substantially lower than those among similar borrowers in the control group. The difference ranges from 4.1 to 5.4 percentage points across the four samples, but is uniformly economically and statistically significant in each of the samples.²⁵ In contrast, there is no statistically measurable effect of HB 4050 for high- or mid-FICO score borrowers. The results are qualitatively the same if contract type controls (that determine counseling requirements for mid- and high-FICO borrowers) are added as regressors – columns (5)-(8).

The specifications in table 4 allow us to account for the possibility that the superior performance of counseled borrowers is due to factors other than counseling, such as changes in the composition of borrowers or of lenders. For instance, limiting the sample to lenders that remained active during the HB 4050 period (columns (3)-(4)), tests whether better post-treatment default rates owe to the fact that predatory lenders that previously accepted unqualified borrowers simply exited the market after HB4050, thereby eliminating some bad loans. The results indicate that our conclusions remain fully robust to this restriction. Even among loans made by this static group of lenders, there is a marked improvement in ex post defaults for HB 4050 originations among low-FICO borrowers relative to those in either control group.

Another potential interpretation of the results is that risky borrowers self-selected out of the market or were rejected by lenders (as shown in Figures 3a and 3b). However, all of Table 4 specifications control for borrower credit scores, implying that the improvement in performance is not due solely to higher FICO scores of the remaining borrowers. They also include a control for the loan spread paid by borrowers as an additional measure of borrower riskiness not captured by the credit score.²⁶ The validity of these variables as risk measures is corroborated by the consistent association of lower FICO scores and higher loan spreads with higher defaults.

As a test of our identification strategy, we estimate a specification with a full set of interactions between zip code and time dummies. This setting allows us to identify the effects of HB 4050 by exploiting within zip code heterogeneity in applicability of the counseling

²⁵ The weakest statistical result – for the matched active sample – has a t-statistic of 1.94.

²⁶ 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.

requirement. This specification represents a triple difference-in-differences estimator, with the additional set of differences taken with respect to performance of the omitted (high-FICO) group. The results shown in columns (1)-(4) of Panel B once again indicate a statistically and economically significant effect of HB 4050. To test the importance of the functional form assumptions, we rerun the regressions in a probit framework despite the critique of Ai and Norton (2003). The estimated marginal effects presented in columns (5)-(8) indicate a consistent treatment effect of 3 to 4 percentage points on defaults.

In sum, we find that the financial counseling requirement improved ex post default rates for the low-FICO counseled borrowers relative to similar borrowers outside the treatment area. The effect on default is impressive in its economic magnitude and does not seem to be driven solely by documented changes in the borrower and lender pools.

5. Disentangling the Effects of Information, Costs, and Oversight

Our results in the previous section show that the HB 4050 program had a strong contractionary effect on the mortgage market in affected zip codes. Still, the pilot program appears to have accomplished one of its stated goals – sharply lower default rates among some of the vulnerable (low-FICO) borrowers. In this section we analyze the factors that could have led to the improvement in performance. In particular, we consider changes in borrower ability to make better product choices or negotiate better loan terms, and changes in lender underwriting practices. We will use each of these actions to try to differentiate between the direct information effect of counseling, the transaction costs of fulfilling the counseling requirement, and the threat of regulatory or legal action.

5.1 Mortgage Terms

According to Housing Action Illinois (2007), common counselors' recommendations were that mortgage applicants take on too much debt at excessive interest rates. As a result, one would expect that treated borrowers would try to reduce their leverage levels and negotiate better

loan terms. If the pilot program worked by providing better information through counseling sessions, its effects should be most pronounced in mortgage terms of the *counseled* borrowers.

The top panel of Table 5 presents evidence of changes in some of the key contract terms of loans originated during the treatment period. For each dependent variable, we estimate difference-in-differences specifications for the four samples described earlier. We find a very modest decrease in LTV for the low-FICO borrowers (columns (1)-(4)) that attains marginal statistical significance only in the control sample specifications. These relative improvements are also fairly small economically, representing less than 1 percentage point difference in LTV (the pre-HB 4050 mean LTV was about 84 percent). We further investigate whether interest rate spreads improved for counseled borrowers. Regression results show no material effect of HB 4050 on loan spreads once the sample is restricted to lenders that remained active during the treatment period (columns (7)-(8)). For the broader sample, it is the mid- and high-FICO groups show statistically significant, if small, improvements in spreads.

The lower panel of Table 5 explores measures of loan affordability by looking at the Debt-Service-to-Income (DTI) ratio that captures borrowers' ability to service existing loan obligation (columns (1)-(4)) and the dollar amount of the annual mortgage payment relative to the original loan size (columns (5)-(8)). For either of these measures we fail to detect any effect of the treatment on the low-FICO population. Somewhat surprisingly, we find slightly higher mortgage payments for mid- and high-FICO borrowers in HB 4050 areas. However, the magnitude of the estimated effect is very small, never exceeding 20 basis points.

In sum, the analysis of loan terms contains only some evidence of the beneficial effects of information obtained in counseling sessions. Although debt burdens improve somewhat for counseled borrowers, the economic magnitude of these effects is fairly small. We find no evidence that counseled borrowers were able to negotiate lower loan spreads. Instead, it is the borrowers exempt from counseling that are able to obtain (slightly) better loan rates.

5.2 Direct Evidence of Loan Renegotiations [WORK IN PROGRESS]

The results in the preceding section suggest that HB 4050 did not improve the bargaining power of low- and mid-FICO borrowers. However, we can learn more about the actions of counseled borrowers by comparing the initial loan offers reviewed by counselors and the final originated loan. In particular, 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 providing services under HB 4050. For each borrower that could be identified (99 out of 216), we compared the original terms (as recorded by the agency) to mortgage details as recorded in LoanPerformance dataset.²⁷ Table 6, Panel A, presents a breakdown of these mortgage offers organized by counselor recommendation. Of the initial mortgage offers, only two were rejected by borrowers following 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)

²⁷ To match counseling records with those in LoanPerformance database, we first use the property address and counseling date to obtain the amount of originated loan in the Recorder of Deeds database. We then use the loan amount, counseling and loan recording dates, and the applicant's FICO score to find a matching loan in the LP data. Since these data sources contain different dates, and FICO scores can move by a few points between counseling and origination dates, the exact matching rate is less than 50 percent.

switched 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. Thus, it may not be surprising that, on average, counseling did not appear to change debt burden and interest costs of originated mortgages substantially (Table 5).

An open question then is whether the evidence in this small sample of treated borrowers is consistent with direct information effects of counseling. On the one hand, the nearly 50 percent share of loans renegotiated post counseling appears very high. On the other, if we assume that recorded recommendations reflect relevant information provided by counselors, the fact that many loan changes do not seem to line up with such recommendations throws cold water on the hypothesis of direct information effects.

5.3 Borrower Rejection of Loan Offers

HB 4050 also required further sessions for each mortgage offer from a new lender or a renegotiated offer from the original lender that worsened the initial terms. Hence, if counseling is regarded as a burden instead of a source of valuable information, we would anticipate fewer rejections of loan offers by treated population. Conversely, we would expect to see a spike in loan rejections by better informed borrowers if they cannot renegotiate their loan terms.

Table 6, Panel B presents a test of these hypotheses using aggregate HMDA applications data. The regressions are run at the loan level, with borrower rejection of a loan offer as the dependent variable. The table shows that rejection of mortgages by borrowers actually *declined* during the HB 4050 period by about 5 percentage points among subprime lenders. Note, however, that borrower rejection rate appears to be unchanged among subprime lenders that remained in the HB 4050 zip codes (columns (3)-(4)). This suggests that such lenders were somewhat different than the ones who exited the market.

This finding is remarkable since the majority of the counseled were advised that they cannot afford the loan and/or that they should seek alternative mortgage offers (see discussion in

Section 2.1). Since we find little evidence of significant improvement in loan terms following counseling (e.g., loan spread), a likely explanation for decrease in rejection rate is that borrowers preferred to accept the offer at hand and not to return for further counseling with offers from a different lender.

This result is consistent with the idea that decisions of low-FICO borrowers were not influenced as much by information presented in counseling sessions as they were by the costs of obtaining an alternative loan offer. For such borrowers, the costs of compliance likely outweighed the expected benefits of new offers. This finding also appears to reflect the limits of bargaining power and ability to act on new information by this subset of borrowers. Finally, this result also removes concerns that the incentives of counselors led them to convince borrowers to reject loans which ultimately resulted in low origination volume.

5.4 Product Choice

From our interviews with a number of counselors involved in HB 4050 we know that borrowers were typically warned about risks associated with hybrid ARM loans or loans carrying prepayment penalties. However, the information pertaining to broad product choices was provided not only through counseling sessions, but also by the fact that the legislation signaled that certain products were risky as their selection triggered counseling. Hence, analyzing changes in product selection in HB 4050 zip codes can help us differentiate between the effects of counselor information, signaling, and borrowers' desire to avoid compliance costs of counseling.

To do this, we again estimate difference-in-differences regressions of borrower choice of a particular mortgage contract, omitting the set of contract controls. If the information effect is at work, we would expect the low-FICO borrowers to shift away from products highlighted by counselors. In the case of signaling, we would expect the incidence of risky product choices to decline for *all* FICO groups in the treated zip codes. If product selection is driven by cost avoidance, members of a given FICO group would avoid products that trigger counseling for *their* group. That is, we would expect fewer interest only loans by mid-FICO households, but not

high-FICO ones. Similarly, we would expect both mid- and high-FICO (but not low-FICO) households to choose fewer negative amortization loans and mortgages with prepayment penalty.

Table 7 presents the results of this exercise. Category I Risky Products denotes choices that subject *only* the mid-FICO borrowers to counseling (hybrid ARMs, IO loans, and low-doc loans), while Category II indicates choices that trigger counseling for both mid- and high-FICO borrowers (prepayment penalty and negative amortization loans). As reported in the top panel, we find no evidence that low-FICO borrowers who always had to attend counseling stayed away from either of these categories of risky products at lenders that remained active during the pilot period. Instead, we find much lower prevalence of Category I products among mid-FICO borrowers in pilot areas, but not high-FICO borrowers. Although taking a Category II loan triggers counseling for all borrowers, only high-FICO borrowers in HB 4050 zips reduce their use of such products. Although these results are consistent with both signaling and cost avoidance, they do not support the hypothesis of direct information effects.

The striking result here 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- and high-FICO borrowers who would thereby be able to eschew counseling. In other words, the regulator achieved the goal of risk reduction by the threat of counseling and not by the content of counseling.

The results thus far point to the limited ability (or willingness) of the low-FICO borrowers to act on counseling information. Yet, we find strong evidence of improvement in their ex post performance. One remaining possibility is that the counseling mandate caused lenders to modify their behavior as well. We consider this in the following section.

5.5 Changes in Lender Behavior

In this section we analyze the response of lenders who *stayed* in the market to the increased oversight of their actions by counselors and, implicitly, by the State. If lenders are apprehensive of the consequences of such oversight, we would expect them to tighten their

screening of prospective borrowers, allowing fewer doubtful cases to enter the counseling process. Such behavior would be reflected in a temporary spike in rejection rates among the affected lenders during the HB 4050 period. In the same vein, we would expect lenders affected by HB 4050 to cut back on offering low-documentation loans. Under HB 4050, there is little reason to offer such loans to any but high-FICO borrowers, as income and expenses information would be gathered during counseling and then furnished to the State-run database.

The simple time series of Figure 4a indeed show a dramatic spike in the rejection rates of state-licensed mortgage bankers issuing subprime loans in the pilot area. This does not occur among similar lenders in control areas or among lenders exempt from HB 4050. This spike comes from two sources: exit of loose-screening lenders and further tightening of underwriting standards by the ones that remain active during HB 4050.

The first source is illustrated by the time series in Figure 4b that show the decomposition of lender rejection rates in the HB 4050 area between active and non-active lenders, as defined in Section 4.1. The subprime lenders that ultimately remained active experienced a very fast run-up in their rejection rates in the 6 months *prior* to implementation of HB 4050. During this time, their rejection rates went from about 30 percent to 50 percent (solid line, left panel) while their application volumes remained unchanged (Figure 2b). In contrast, the lenders that left the HB 4050 zip codes kept rejecting applications at just above the 20 percent rate (the dashed line, left panel), and then left the market altogether. Consequently, the total rejection rate spikes with the onset of HB 4050, as the lenders with tighter screening are the only ones left. The rejection rate comes down when HB 4050 is rescinded as the lenders with looser screening practices come back to the market (Figure 2b).

The further tightening of lending standards by the lenders that stayed in the pilot zip codes is captured by the regression results in Table 8. As seen in column (3) of Panel A, the rejection rates rise by an additional 4.5 percentage points among active subprime lenders. When we do not restrict the regression sample to such lenders, the spike in rejection rates is greater, in line with the decomposition in Figure 4b.

Earlier we found that state-licensed lenders that specialize in subprime loans were more likely to exit the market than lenders exempt from HB 4050. One possible explanation for lender exit is inability to make a profit in the presence of the \$300 counseling fee. If this were the case, we would expect to see greater lender rejection of low-dollar-value loans, since lender compensation is roughly proportional to the value of originated loans. We test this hypothesis by testing whether smaller loans (measured as logged mortgage size) are more likely to be rejected during the HB 4050 treatment. Table 8, Panel B, shows that there is no empirical support for this hypothesis: small mortgages were not subject to higher rejection rate.

Finally, we look at changes in availability of low-documentation loans under the counseling mandate. The results, reported in the lower panel of Table 7, indeed show substantially lower likelihood of low-documentation mortgages for both low- and mid-FICO borrowers. This is not surprising, as document review by counselors made such loan offers difficult to defend.

6. Policy Discussion and Conclusion

Mandated financial counseling and increased oversight of lenders (anti-predatory legislation) are important policy tools being considered for implementation following the meltdown of the housing market in 2007-2008.²⁸ Both policies impose restrictions on free contracting between borrowers and lenders. As such, they can be expected to shrink credit markets, in particular for the financially disadvantaged segments of the population.

In this paper, we evaluate the impact of one such pilot legislative program implemented in parts of Chicago in late 2006. The design of the pilot allows us to disentangle the effects of financial education on the behavior of borrowers from those of increased oversight on lenders.

Our main results show that the legislation had material effects on market composition of both lenders and borrowers, on borrower default rates, and on borrowers' and lenders' behavior.

²⁸ As announced on June 17, 2009 by President Obama, a new Consumer Financial Protection Agency will be created to protect consumers across the financial sector from unfair, deceptive, and abusive practices. See <http://online.wsj.com/public/resources/documents/reform.pdf>.

We find that the pilot caused low-FICO score borrowers and lenders with relatively lax approval standards to exit the market. Yet, controlling for observable characteristics of the remaining borrowers and holding the sample of remaining lenders constant, we find that mortgage 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 (the borrower group always subject to counseling), we find that mid- and high-FICO borrowers switched toward products that did not subject them to counseling.

Our results are consistent with the explanation that in this specific implementation of a mortgage counseling mandate, the threat of third-party oversight and the desire to avoid the costs of counseling had a greater impact on borrowers and lenders than the informational content of counseling as such. We find that borrowers altered their mortgage choice to minimize interaction with counselors. Specifically, borrowers who could eschew counseling did so by choosing less risky products. Those who were required to attend counseling did not appear, on average, to follow the counselor's advice, and seemed to have only limited bargaining power in renegotiations. They also tended to not walk away from the original offer following counseling and reapply for a restructured mortgage, which would have required another counseling session. Furthermore, we find evidence consistent with lenders rejecting borrowers more often based on unobservable characteristics when loan proposals were reviewed by third-party counselors.

The finding that loan quality improved in response to changes in lender and borrower behavior, and apparently not from the information provided at counseling sessions, is consistent with disclosure effect [CITE]. That is, realizing that the terms of loans would be more carefully scrutinized by counselors, lenders appear to have fine-tuned their lending model and rejected applications they may have previously accepted. The scoring model was changed to avoid public scrutiny. Thus, it was the disclosure of additional information that generated the desired results. Legislators enacted the counseling mandate with a goal of decreasing predatory lending practices that trapped home buyers in mortgages they could not afford. Thus they should have expected the decrease in mortgage activity and would have been pleased with the results.

It may be tempting to conduct a back-of-the-envelope welfare analysis by linking the estimates of reductions in defaults with costs of such defaults and of counseling itself.²⁹ However, doing so will fail to take into account a number of important effects – losses in utility incurred by excluded borrowers, positive spillovers on neighborhood property values from lower defaults, losses from inefficient contract choices guided by avoidance of counseling sessions, and many others. Moreover, evaluating the overall welfare effect of this intervention requires weighing the benefits of fewer foreclosures against changes in utility incurred by the excluded borrowers and lenders.³⁰ It is further complicated by the various distortions that already exist in the housing market resulting from unique tax treatment, zoning restrictions, etc., and potential externalities produced by individual housing decisions.

Our results suggest several policy recommendations. First, the paper shows that counseling is perceived as a burden by borrowers. Hence, many borrowers either stay away from the market altogether (as in the case of refinancing versus home-purchasing mortgages) or substitute to mortgages with lower risk in order to avoid counseling. Second, the gains from the informational content of counseling are tempered by the limited negotiating power of the borrowers. A likely possibility is that even after the (admittedly brief) counseling sessions mortgage applicants cannot negotiate well with mortgage brokers who steer them between products without real improvement. Third, the mere presence of the regulator in the marketplace and the third-party review of mortgages seem to have large effect on the quality of mortgages originated. We observe that lenders with more loose screening criteria exit the market, and the remaining lenders cut back substantially on origination of low-documentation loans.

²⁹ For instance, we could have noted that the average house value in the treated area during the treatment period was about \$190,000, and the expected deadweight loss due to foreclosure can be assumed to be about 30% (Campbell, Giglio, and Pathak 2009). Using the point estimate of a 5.04% improvement in default rates of the low-FICO borrowers (relative to the counterfactual of the control group in column (1) of Table 4), we could compute the expected benefit of counseling as \$2,850 ($0.05 * \$190,000 * 30\%$). Since approximately 60% of all counseled borrowers had low-FICO scores, their gains would have to be offset by the \$300 counseling fee charged to all counseled borrowers.

³⁰ Some recent attempts to theoretically model the welfare effects of policy choices in household financial markets; see Carlin and Gervais (2008), Bolton, Freixas and Shapiro (2007), and Carlin (2008).

References

- Abadie, Alberto, and Javier Gardeazabal, 2003. The Economic Costs of Conflict: A Case Study of the Basque Country, *American Economic Review*, 93(1), 113-132.
- Ai, Chunrong, and Edward C. Norton, 2003, Interaction Terms in Logit and Probit Models, *Economic Letters*, 80, 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, Financial Constraints and Inflated Home Prices during the Real-Estate Boom, Ohio State University Working Paper.
- Bernheim, Douglas B., 1995, Do Households Appreciate Their Financial Vulnerabilities? An Analysis of Actions, Perceptions, and Public Policy, in *Tax Policy and Economic Growth*, American Council for Capital Formation, Washington, DC, 1-30.
- Bernheim, Douglas B., 1998, Financial Illiteracy, Education and Retirement Saving, in O. Mitchell and S. Schieber (eds.), *Living with Defined Contribution Pensions*, University of Pennsylvania Press, Philadelphia, 38-68.
- Bernheim, Douglas B., Daniel M. Garrett, and Dean H. Maki, 2001, Education and Saving: The Long-Term Effects of High School Financial Curriculum Mandates, *Journal of Public Economics*, 80(3), 435-65.
- Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan, 2004, How Much Should We Trust Difference in Differences Estimates?, *Quarterly Journal of Economics*, 119(1), 249-275.
- Bertrand, Marianne, and Adair Morse, 2009, Financial Literacy, Cognitive Biases and Payday Lending, University of Chicago Working Paper
- Bostic, Raphael, Souphala Chomsisengphet, Kathleen C. Engel, Patricia A. McCoy, Anthony Pennington-Cross, and Susan Wachter, 2008, Mortgage Product Substitution and State Anti-Predatory Lending Laws: Better Loans and Better Borrowers?, Working Paper.
- Bucks, Brian K., and Karen M. Pence, 2008, Do Borrowers Know their Mortgage Terms?, *Journal of Urban Economics*, 64, 218-33.
- Campbell, John Y., and Joao F. Cocco, 2003, Household Risk Management and Optimal Mortgage Choice, *Quarterly Journal of Economics*, 118(4), 1449-1494.
- Campbell, John Y., Stefano Giglio, and Parag Pathak, 2009, Forced Sales and House Prices, Harvard University Working Paper.
- Carlin, Bruce, 2008, Strategic Price Complexity in Retail Financial Markets, Working Paper.
- Carlin, Bruce, and Simon Gervais, 2008, Legal Protection in Retail Financial Markets, Working Paper.

- Cole, Shawn, and Gauri Kartini Shastri, 2008, Smart Money: The Effects of Education, Financial Literacy and Cognitive Ability on Financial Market Participation, Working Paper.
- Freixas, Xavier, Patrick Bolton, and Joel David Shapiro, 2008, Conflicts of Interest and Credible Information Provision by Specialized and One-Stop Banks, Working Paper.
- Genesove, David, and Christopher Mayer, 2001, Loss Aversion and Seller Behaviour: Evidence from the Housing Market, *Quarterly Journal of Economics*, 116(4): 1233-1260.
- Hirshleifer David, 2007, Psychological Bias as a Driver of Financial Regulation, University of California Irvine Working Paper.
- Housing Action Illinois, 2007, Findings from the HB 4050 Predatory Lending Database Pilot Program.
- Keys, Benjamin J., Tanmoy K. Mukherjee, Amit Seru, and Vikrant Vig, 2009, Did Securitization Lead to Lax Screening? Evidence from Subprime Loans, *Quarterly Journal of Economics*, forthcoming.
- 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.
- Lusardi, Annamaria, 2008, Financial Literacy: An Essential Tool for Informed Consumer Choice, Working Paper.
- Lusardi, Annamaria, and Olivia S. Mitchell, 2006, Financial Literacy and Planning: Implications for Retirement Wellbeing, MRRC Working Paper n. 2006-144.
- Lusardi, Annamaria, and Olivia Mitchell, 2008, Planning and Financial Literacy: How Do Women Fare?, *American Economic Review*, 98(2), 413-417.
- Lusardi, Annamaria, and Peter Tufano, Debt Literacy, Financial Experience and Overindebtedness, Dartmouth College and Harvard Business School Working Paper.
- Merrick, Ann, 2007, Illinois Tries New Tack Against Predatory Loans, Wall Street Journal, August 22.
- Moore, Danna, 2003, Survey of Financial Literacy in Washington State: Knowledge, Behavior, Attitudes, and Experiences, Technical Report n. 03-39, Washington State University.
- Stark, Debra P., 2005, Unmasking the Predatory Loan in Sheep's Clothing: A Legislative Proposal, *Harvard BlackLetter Law Journal*, 21, 129-162.
- Stark, Debra P., and Jessica M. Choplin, 2009, A License to Deceive: Enforcing Contractual Myths Despite Consumer Psychological Realities, *NYU Journal of Law and Business*, Spring 2009.
- Rajan, Uday, Amit Seru, and Vikrant Vig, 2008, The Failure of Models that Predict Failure: Distance, Incentives and Defaults, Working Paper.
- White, Michelle, 2007, Bankruptcy Reform and Credit Cards, *Journal of Economic Perspectives*, 21(4), 175-199.

Table 1. Summary Statistics**Panel A: Construction of a Control Sample on the Basis of pre-Treatment Socioeconomic Characteristics**

(2005 IRS and 2000 Census data)

	HB 4050 zip codes (10 zip codes)	Control ZIP codes (12 zip codes)	all non-HB4050 Chicago zip codes (53 zip codes)
Total population	729,980	713,155	2,181,267
Total number of 2005 tax returns	259,884	244,326	888,354
Share of minority households*	0.813	0.863	0.505
Share of households below poverty level*	0.200	0.245	0.174
Average taxable income in 2005 [#]	\$31,579	\$30,844	\$56,976
Share of households with income < \$50,000 in 2005	0.823	0.837	0.720
Unemployment rate (2000 Census)*	0.141	0.151	0.101

* population-weighted averages

[#] weighted by number of 2005 IRS tax returns**Panel B: Pre-Treatment Mortgage Market and Borrower Characteristics of HB 4050 and Control Zip Codes**

(Loan Performance data, January 2005 - December 2005)

	HB 4050 zip codes (n=15,216)	Control ZIP codes (n=12,925)	all non-HB4050 Chicago zip codes (n=28,060)
I(Default within 18 months) (x 100)	14.01	13.69	9.06
FICO	627.68	628.64	648.77
LTV (%)	84.14	82.92	81.85
Debt Service-to-Income (%)	39.94	40.28	40.20
log(Valuation)	12.12	12.22	12.47

Panel C: Key Variable Means in LoanPerformance Data (1/2005-12/2007)

	1/2005-8/2006			9/2006-12/2007		
	HB 4050	Control	Matched	HB 4050	Control	Matched
	Zip Codes	Sample	Sample	Zip Codes	Sample	Sample
	n = 24,014	n = 20,686	n = 24,014	n = 2,802	n = 4,445	n = 2,802
I(Default within 18 months) x 100	17.36	17.29	15.03	21.66	25.47	20.92
Low FICO Borrowers	44.14	44.21	40.69	35.58	42.32	36.54
Mid-FICO Borrowers	19.93	19.57	20.79	20.91	20.13	20.74
High-FICO Borrowers	35.93	36.22	38.52	43.50	37.55	42.73
Risky Products Category I	88.39	88.43	91.36	81.66	84.52	86.23
Risky Products Category II	20.34	20.10	18.05	13.20	15.84	15.15
I(Low Doc) x 100	44.66	45.62	49.94	46.57	48.03	51.90
FICO	629.66	629.92	634.19	641.19	632.39	639.90
Margin (%)	4.69	4.70	4.77	4.33	4.57	4.54
Annual Mortgage Payment (%)	8.55	8.49	8.34	8.66	8.58	8.42
Loan-to-Value (%)	84.20	83.01	83.91	83.32	82.67	83.66
Debt-Service-to-Income (%)	40.46	40.85	41.07	40.32	41.28	41.02
log(House Value (\$))	12.15	12.23	12.33	12.29	12.37	12.32

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

	All Lenders		Active Lenders	
	State-Licensed Subprime Lenders	Other Lenders	State-Licensed Subprime Lenders	Other Lenders
	(1)	(2)	(3)	(4)
Panel A: Dependent: log(# Applications)				
HB 4050	-0.727*** (-0.038)	-0.072*** (-0.02)	-0.113*** (-0.036)	0.002 (-0.023)
Month FE	Yes	Yes	Yes	Yes
Month FE x log(Avg Income)	Yes	Yes	Yes	Yes
Zip Code FE	Yes	Yes	Yes	Yes
Observations	792	792	792	792
Adj. R ²	0.98	0.975	0.959	0.97
Panel B: Dependent: log(# Originated Purchase-Related Mortgages)				
HB 4050	-0.663*** (-0.041)	-0.108*** (-0.029)	-0.112** (-0.051)	-0.006 (-0.031)
Month FE	Yes	Yes	Yes	Yes
Month FE x log(Avg Income)	Yes	Yes	Yes	Yes
Zip Code FE	Yes	Yes	Yes	Yes
Observations	784	792	779	792
Adj. R ²	0.955	0.905	0.92	0.879
Panel C: Dependent: log(# Originated Refinancing-Related Mortgages)				
HB 4050	-0.788*** (-0.049)	-0.059** (-0.022)	-0.083 (-0.057)	0.005 (-0.026)
Month FE	Yes	Yes	Yes	Yes
Month FE x log(Avg Income)	Yes	Yes	Yes	Yes
Zip Code FE	Yes	Yes	Yes	Yes
Observations	792	792	791	792
Adj. R ²	0.968	0.976	0.921	0.969

Table 3. Effects of HB 4050 on Credit Supply

Panel A: Supply of Credit -- Total Number of Active[#] Lenders (Source: HMDA)

	State-Licensed Lenders			
	Specializing in Subprime loans		All Other Lenders	
	HB 4050	Control	HB 4050	Control
Before HB 4050 (9/05 - 8/06)	31	30	83	76
During HB 4050 (9/06 - 1/07)	9	23***	56	65
After HB 4050 (2/07 - 6/07)	13	15	66	66

[#] Active lenders are defined as those that originate an average of at least 1 loan per week over a given five-month period, with at least 1 origination in every given month.

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

Panel B: Which Lenders Stayed in the Market?[#]

(Pre-HB 4050 characteristics: January 2006 – August 2006)

	Stayed in Market (n = 9)		Left Market (n = 21) [*]	
	Mean	Median	Mean	Median
Mortgage Amount	147.9	147.0	144.4	147.6
Income	72.8	70.8	76.4	72.4
Total Originations	459.4	169.0	231.2	126.0
Refi (%)	50.0	51.1	56.6	53.0
Rejection Rate (%)	33.4	33.8	27.9	27.2
Lien Ratio (%)	22.4	19.8	19.8	18.9

^{*} The summary statistics are based on 1/2006 to 8/2006. Two lenders did not lend in this period.

[#] Mean lender characteristics averaged across lenders in a given group (stayed in the market, left the market)

Table 4. Effects of HB 4050 on Mortgage Performance

Panel A: Default Rates (Source: LoanPerformance)

Dependent variable: I(Default within 18 months) (x 100)								
Regression: OLS								
	Control	Matched	Control	Matched	Control	Matched	Control	Matched
			Active	Active			Active	Active
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HB 4050 x Low FICO	-5.04** (1.97)	-4.72** (1.88)	-5.39** (2.26)	-4.11* (2.12)	-4.75** (1.96)	-4.34** (1.88)	-5.19** (2.26)	-3.85* (2.12)
HB 4050 x Mid FICO	0.12 (2.65)	1.23 (2.66)	0.43 (2.59)	2.34 (2.50)	0.50 (2.60)	1.67 (2.61)	0.84 (2.54)	2.81 (2.44)
HB 4050 x High FICO	-1.48 (1.43)	-0.27 (1.44)	-1.25 (1.49)	0.77 (1.39)	-1.58 (1.45)	-0.44 (1.46)	-1.33 (1.51)	0.60 (1.41)
FICO	-0.08*** (0.00)	-0.07*** (0.00)	-0.08*** (0.00)	-0.08*** (0.00)	-0.08*** (0.00)	-0.08*** (0.01)	-0.09*** (0.00)	-0.08*** (0.00)
Margin (%)	1.77*** (0.13)	1.54*** (0.11)	1.68*** (0.15)	1.46*** (0.12)	1.72*** (0.16)	1.43*** (0.14)	1.61*** (0.18)	1.35*** (0.14)
Contract Type Controls					Yes	Yes	Yes	Yes
Contract Terms Controls	Yes							
Borrower Controls	Yes							
Property Type Controls	Yes							
Zip Code	Yes							
Month FE	Yes							
Month FE * log(Avg Income)	Yes							
Observations	55600	57619	40041	40425	55600	57619	40041	40425
Adj. R ²	0.10	0.09	0.10	0.09	0.10	0.09	0.10	0.09

The set of controls not shown in the table includes the following variables: contract type (flags for low doc loans, negative amortization loan, interest only loan, loan with a prepayment penalty, refinance loan, cashout refinance); contract terms (log of appraised value, LTV ratio); borrower characteristics (investor and second mortgage flags); and property type (flags for single family residence, townhouse, or condominium). All standard errors are clustered at the zip code level.

Table 4. Effects of HB 4050 on Mortgage Performance (Continued)

**Panel B: Default Rates, Robustness to Functional Form and Identification Strategy
(Source: LoanPerformance)**

	I(Default within 18 months)							
	Regression: OLS				Regression: Probit			
	Control	Matched	Control	Matched	Control	Matched	Control	Matched
	(1)	(2)	Active	Active	(5)	(6)	Active	Active
HB 4050 x Low FICO	-5.20*** (1.72)	-3.90** (1.66)	-5.35** (1.96)	-3.90** (1.88)	-0.040*** (0.015)	-0.032** (0.014)	-0.042** (0.017)	-0.034** (0.015)
HB 4050 x Mid FICO	0.49 (2.87)	2.55 (2.61)	0.93 (2.77)	3.11 (2.47)	0.002 (0.022)	0.017 (0.023)	0.004 (0.022)	0.016 (0.021)
HB 4050 x High FICO					-0.003 (0.012)	0.018 (0.013)	-0.002 (0.014)	0.016 (0.014)
FICO	-0.08*** (0.00)	-0.08*** (0.00)	-0.08*** (0.00)	-0.08*** (0.01)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Margin (%)	1.71*** (0.13)	1.46*** (0.11)	1.63*** (0.15)	1.34*** (0.11)	0.020*** (0.001)	0.017*** (0.001)	0.019*** (0.002)	0.017*** (0.001)
Borrower Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Contract Terms Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Type Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zip Code					Yes	Yes	Yes	Yes
Month FE					Yes	Yes	Yes	Yes
Month FE * log(Avg Income)					Yes	Yes	Yes	Yes
Zip Code * Month FE	Yes	Yes	Yes	Yes				
Observations	55600	57619	40041	39935	55600	48114	40041	40416
Adj. R ² (pseudo R ²)	0.09	0.08	0.09	0.07	0.110	0.105	0.111	0.105

The set of controls not shown in the table includes the following variables: contract terms (log of appraised value, LTV ratio); borrower characteristics (investor and second mortgage flags); and property type (flags for single family residence, townhouse, or condominium). All standard errors are clustered at the zip code level.

Table 5. Effects of HB 4050 on Mortgage Leverage and Spread

Panel A: Mortgage Leverage (Source: LoanPerformance)

	Loan-to-Value (%)				Debt-Service-to-Income (%)			
	Control Matched		Control Matched		Control Matched		Control Matched	
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
HB 4050 x Low FICO	-0.75*	-0.33	-0.81*	-0.23	-0.49	-0.34	-0.31	-0.23
	(0.41)	(0.40)	(0.42)	(0.44)	(0.41)	(0.41)	(0.42)	(0.42)
HB 4050 x Mid FICO	-0.12	0.12	-0.24	0.08	-0.34	-0.26	-0.41	-0.29
	(0.37)	(0.38)	(0.38)	(0.42)	(0.71)	(0.70)	(0.74)	(0.73)
HB 4050 x High FICO	-0.02	0.39	0.13	0.65	-0.05	-0.03	0.07	0.11
	(0.37)	(0.41)	(0.41)	(0.46)	(0.40)	(0.41)	(0.38)	(0.41)
Borrower Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Contract Terms Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Type Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE, Zip Code FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE * log(Avg Income)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	55600	57619	40041	40425	40024	49370	26604	33296
Adj. R ²	0.26	0.25	0.26	0.26	0.07	0.07	0.08	0.08

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

	Margin (bp)				Annual Mortgage Payment (%)			
	Control Matched		Control Matched		Control Matched		Control Matched	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HB 4050 x Low FICO	-7.64**	-2.49	-3.06	5.10	0.04	0.08	0.02	0.02
	(3.01)	(3.35)	(3.16)	(3.16)	(0.05)	(0.05)	(0.05)	(0.05)
HB 4050 x Mid FICO	-13.53***	-11.37***	-4.71	0.22	0.13*	0.16**	0.13*	0.13*
	(4.04)	(3.75)	(4.64)	(3.95)	(0.06)	(0.07)	(0.07)	(0.08)
HB 4050 x High FICO	-16.92***	-15.55***	-5.60	-2.87	0.07**	0.17***	0.06*	0.12***
	(4.23)	(4.20)	(4.32)	(4.45)	(0.03)	(0.03)	(0.03)	(0.03)
Borrower Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Contract Terms Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Type Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE, Zip Code FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE * log(Avg Income)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	55600	57619	40041	40425	55600	57619	40041	40425
Adj. R ²	0.22	0.21	0.22	0.21	0.22	0.24	0.22	0.23

The set of controls not shown in the table includes: borrower characteristics (FICO score, investor and second mortgage flags); contract terms (LTV (only for margin and mortgage payment regressions) and log of appraised value); and property type (flags for single family residence, townhouse, or condominium). All standard errors are clustered at the zip code level.

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 (percent with changes)	47	20	15	9	3	0
		37%	65%	64%	75%	0%
Lower monthly payments (percent of all changed loans)		15	9	4	3	0
		75%	60%	44%	100%	-
Switch from ARM to fixed (percent of all changed loans)		1	5	2	0	0
		5%	33%	22%	0%	-
Lower interest rate (percent of all changed loans)		14	10	3	3	-
		70%	67%	33%	100%	-

Panel B: Are Applicants More Likely to Reject Mortgage Offers? (Source: HMDA)

	Dependent: I(Applicant Rejects Offer)							
	State-Licensed Lenders (Subprime)				All Other Lenders			
	Control	Matched	Control	Matched	Control	Matched	Control	Matched
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HB 4050	-5.38*** (0.68)	-4.75*** (0.73)	-0.85 (0.77)	-0.43 (1.00)	-1.68** (0.60)	-0.98 (0.65)	0.17 (0.72)	0.04 (0.69)
log(Mortgage)	0.64* (0.36)	0.35 (0.38)	0.03 (0.56)	-0.28 (0.52)	2.54*** (0.35)	2.20*** (0.29)	2.16*** (0.25)	1.89*** (0.24)
log(Income)	2.44*** (0.29)	2.79*** (0.30)	1.01*** (0.22)	0.54* (0.28)	1.00*** (0.17)	0.64*** (0.16)	0.04 (0.19)	-0.22 (0.18)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE x log(income)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zip Code FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	158307	168789	56900	61929	236007	269138	155002	179842
Adj. R ²	0.02	0.01	0.04	0.04	0.01	0.01	0.01	0.01

Table 7. Mortgage Product Choice

**Panel A: Selection of Contracts that Subject Borrower to Counseling
(Source: LoanPerformance)**

	I(Risky Products: Category I) x 100				I(Risky Products: Category II) x 100			
	Control	Matched	Control	Matched	Control	Matched	Control	Matched
			Active	Active			Active	Active
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HB 4050 x Low FICO	-2.90** (1.36)	-3.04** (1.44)	-2.04 (1.59)	-1.36 (1.56)	-0.40 (1.79)	-1.91 (1.86)	-1.67 (1.79)	-2.31 (1.85)
HB 4050 x Mid FICO	-5.28*** (1.27)	-5.07*** (1.24)	-6.67*** (1.44)	-5.80*** (1.28)	-0.15 (1.27)	-1.57 (1.42)	-1.04 (1.14)	-1.47 (1.22)
HB 4050 x High FICO	0.37 (1.15)	0.87 (1.20)	-0.99 (1.31)	0.39 (1.27)	-3.95*** (1.34)	-5.76*** (1.44)	-4.37*** (1.26)	-5.17*** (1.30)
Borrower Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Contract Terms Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Type Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE, Zip Code FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE * log(Avg Income)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	55600	57619	40041	41891	55600	57619	40041	41891
Adj. R ²	0.20	0.19	0.20	0.19	0.03	0.03	0.05	0.06

Panel B: Availability of Low-Doc Loans (Source: LoanPerformance)

	I(Low Doc) x 100			
	Control	Matched	Control	Matched
			Active	Active
	(1)	(2)	(3)	(4)
HB 4050 x Low FICO	-5.48*** (1.76)	-7.55*** (1.99)	-4.03** (1.89)	-5.23** (2.04)
HB 4050 x Mid FICO	-7.26*** (2.24)	-8.61*** (2.27)	-7.17*** (2.41)	-8.03*** (2.48)
HB 4050 x High FICO	0.72 (1.36)	1.98 (1.43)	1.12 (1.58)	3.26* (1.71)
Borrower Controls	Yes	Yes	Yes	Yes
Contract Terms Controls	Yes	Yes	Yes	Yes
Property Type Controls	Yes	Yes	Yes	Yes
Month FE, Zip Code FE	Yes	Yes	Yes	Yes
Month FE * log(Avg Income)	Yes	Yes	Yes	Yes
Observations	55600	57619	40041	40425
Adj. R ²	0.20	0.18	0.20	0.18

Table 8. Lender Rejection Behavior

Panel A: Were Lenders More Likely to Reject Mortgages? (Source: HMDA)

Dependent: I(Lender Rejects Application) x 100

	State-Licensed Lenders				All Other Lenders			
	Specializing in Subprime loans						All Other Lenders	
	Control	Matched	Control	Matched	Control	Matched	Control	Matched
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HB 4050	11.15***	11.33***	3.93***	3.44***	3.25***	2.45***	1.52**	1.28
	(1.37)	(1.22)	(1.26)	(1.23)	(0.63)	(0.73)	(0.66)	(0.82)
log(Mortgage)	0.41	-3.57***	-1.31***	0.18	-2.91***	-6.18***	-2.87***	-6.98***
	(0.27)	(0.32)	(0.32)	(0.61)	(0.26)	(0.35)	(0.28)	(0.38)
log(Income)	-3.67***	-0.25	-1.04	-1.83***	-6.58***	-3.35***	-7.40***	-3.44***
	(0.35)	(0.28)	(0.62)	(0.33)	(0.36)	(0.22)	(0.41)	(0.25)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE x log(income)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zip Code FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zip Code FE x log(income)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	158307	168789	56900	61929	236007	269138	155002	179842
Adj. R ²	0.02	0.02	0.07	0.07	0.02	0.03	0.03	0.04

Panel B: Were Small Loans More Likely to Be Rejected? (Source: HMDA)

Dependent: I(Lender Rejects Application) x 100

	State-Licensed Lenders				All Other Lenders			
	Specializing in Subprime loans						All Other Lenders	
	Control	Matched	Control	Matched	Control	Matched	Control	Matched
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HB 4050	-2.51	-4.72	-4.52	-2.53	2.90	1.95	4.48	4.11
	(6.18)	(6.02)	(7.92)	(7.32)	(3.33)	(3.07)	(3.42)	(3.29)
log(Mortgage)	-3.81***	-0.24	-1.00	-2.05***	-6.61***	-3.36***	-7.38***	-3.43***
	(0.34)	(0.28)	(0.64)	(0.32)	(0.36)	(0.22)	(0.40)	(0.25)
x HB 4050	-0.85	-0.26	2.07	2.54**	-0.30	0.09	-0.44	-0.06
	(1.02)	(1.12)	(1.23)	(1.24)	(0.53)	(0.47)	(0.56)	(0.52)
log(Income)	0.44	-3.72***	-1.50***	0.32	-2.89***	-6.18***	-2.84***	-6.93***
	(0.27)	(0.30)	(0.30)	(0.62)	(0.27)	(0.35)	(0.29)	(0.37)
x HB 4050	4.28**	4.16**	-0.40	-1.55	0.43	0.02	-0.23	-0.62
	(1.72)	(1.70)	(1.72)	(1.71)	(0.74)	(0.73)	(0.78)	(0.77)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE x log(income)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zip Code FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zip Code FE x log(income)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	158307	168789	56900	61929	236007	269138	155002	179842
Adj. R ²	0.02	0.02	0.07	0.07	0.02	0.03	0.03	0.04

Figure 1. HB 4050 Treatment (Shaded) and Control (Striped) Zip Codes

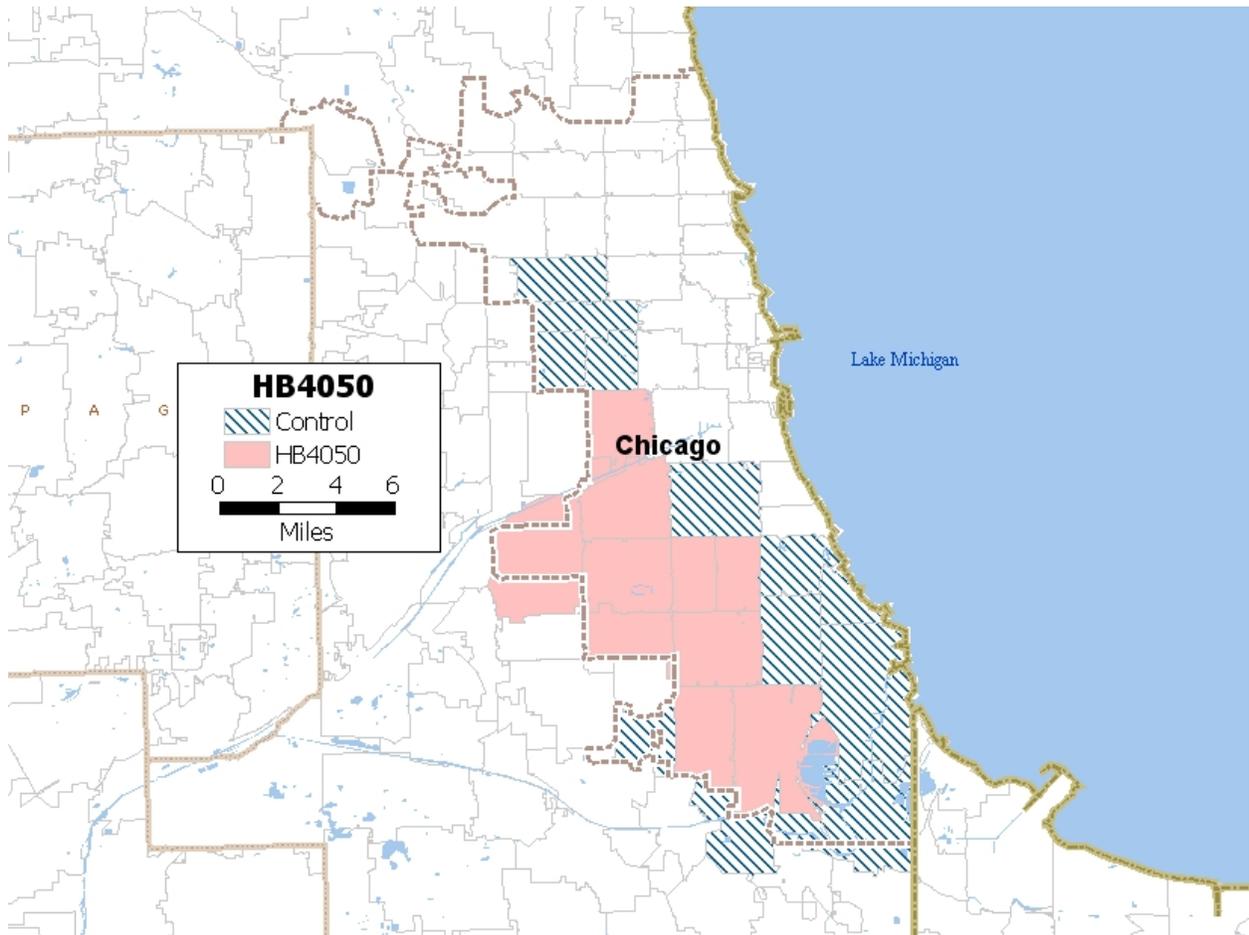


Figure 2a. Number of HMDA Loan Application Filings in HB 4050 and Control Areas: Lenders Subject to HB 4050 vs. Exempt Lenders (Source: HMDA)

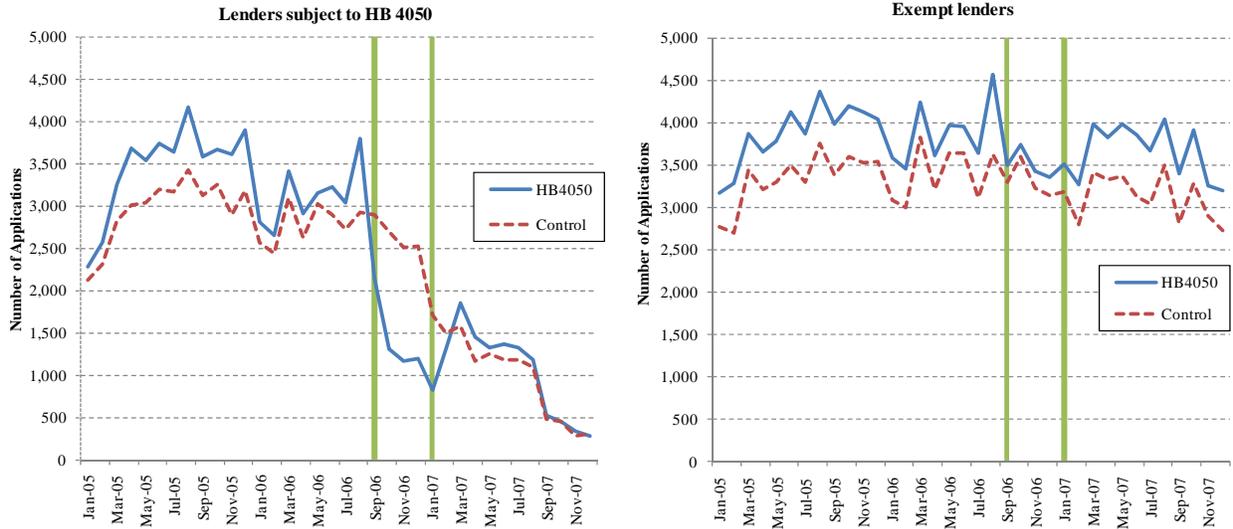


Figure 2b. Number of HMDA Loan Application Filings in HB 4050 Area: Lenders that Remained Active and Those who Exited (Source: HMDA)

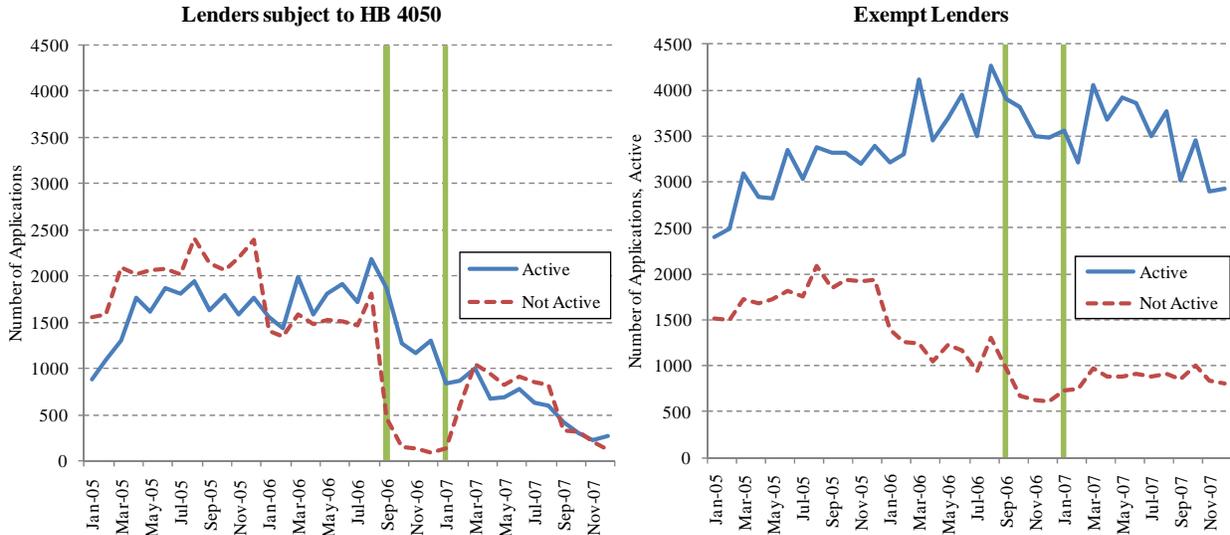


Figure 3a. Cumulative Distribution of FICO Scores of Mortgages Originated Before the HB 4050 Period (1/2005 – 8/2006) (Source: LoanPerformance)

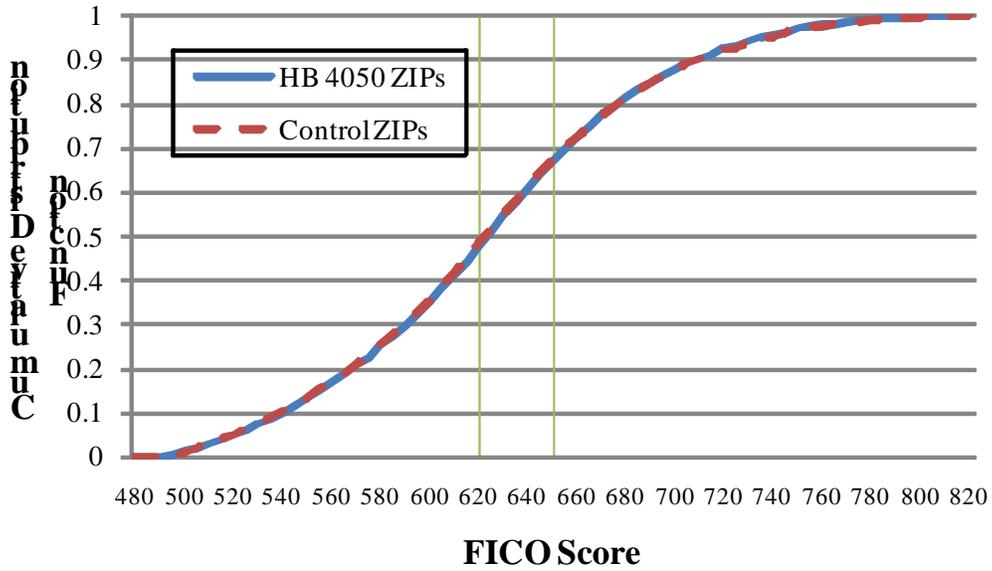


Figure 3b. Cumulative Distribution of FICO Scores of Mortgages Originated During the HB 4050 Period (9/2006 – 1/2007) (Source: LoanPerformance)

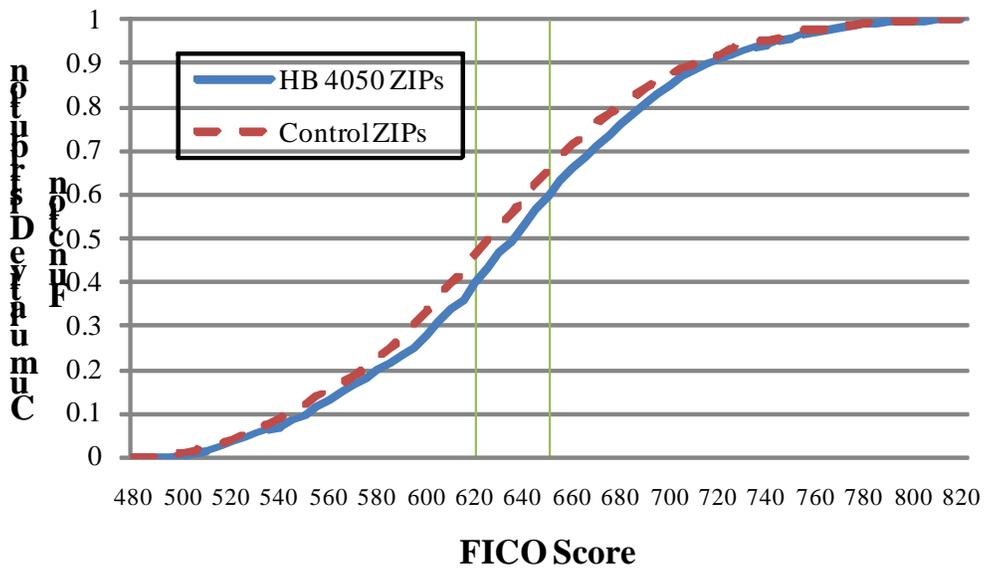


Figure 4a. Shares of HMDA-Reported Applications Rejected by Lenders: Lenders Subject to HB 4050 vs. Exempt Lenders (Source: HMDA)

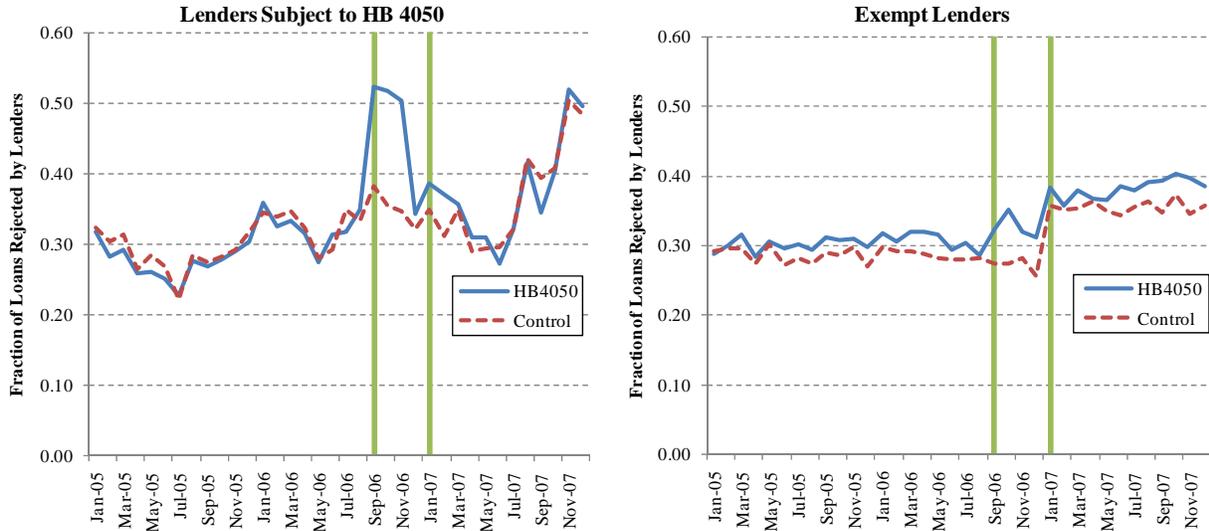


Figure 4b. Shares of HMDA-Reported Applications Rejected by Lenders: Lenders that Remained Active and those who Exited Pilot Areas (Source: HMDA)

