The Subprime Crisis: Is Government Housing Policy to Blame?

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ABSTRACT

A growing literature suggests that housing policy, embodied by the Community Reinvestment Act (CRA) and the affordable housing goals of the government sponsored enterprises, may have caused the subprime crisis. The conclusions drawn in this literature, for the most part, have been based on associations between aggregated national trends. In this paper we examine more directly whether these programs were associated with worse outcomes in the mortgage market, including delinquency rates and measures of loan quality.

We rely on two empirical approaches. In the first approach, which focuses on the CRA, we conjecture that historical legacies create significant variations in the lenders that serve otherwise comparable neighborhoods. Because not all lenders are subject to the CRA, this creates a quasi-natural experiment of the CRA's effect. We test this conjecture by examining whether neighborhoods that have been disproportionally served by CRA-covered institutions historically experienced worse outcomes. The second approach takes advantage of the fact that both the CRA and GSE goals rely on clearly defined geographic areas to determine which loans are favored by the regulations. Using a regression discontinuity approach, our tests compare the marginal areas just above and below the thresholds that define eligibility, where any effect of the CRA or GSE goals should be clearest.

We find little evidence that either the CRA or the GSE goals played a significant role in the subprime crisis. Our lender tests indicate that areas disproportionately served by lenders covered by the CRA experienced lower delinquency rates and less risky lending. Similarly, the threshold tests show no evidence that either program had a significantly negative effect on outcomes.

I.   INTRODUCTION

Increased homeownership has been a goal of federal policy for decades. Towards this end,

several initiatives have aimed to expand access to mortgage credit, particularly to low- and

moderate-income borrowers. However, experiences following the subprime crisis – particularly

the loss of wealth through house price declines and the large number of foreclosures – have led

some to question whether facilitating homeownership actually promotes the welfare of lower-

income households.

Others have gone beyond questioning whether promoting homeownership is beneficial

and have suggested that government efforts to promote homeownership may, in fact, have been a

primary cause of the crisis. Peter Wallison, one of the ten members of the Financial Crisis

Inquiry Commission (FCIC), issued a 100-page dissent from the FCIC's majority report in which

he identified government housing policy as the *"sine qua non* of the financial crisis" (Wallison,

2011, p. 2). In particular, Wallison focuses on two programs as the culprits: the Community

Reinvestment Act (CRA) and the affordable housing goals imposed on Fannie Mae and Freddie

Mac, the government-sponsored enterprises (GSEs). Wallison argues that these two programs,

which encourage lending to lower-income borrowers, caused lenders to reduce their underwriting

standards. The lower standards inflated the housing bubble and, when the bubble ultimately

burst, manifested themselves in sharply higher mortgage delinquency rates. Similar arguments

about the role of the CRA and GSE goals in the subprime crisis are increasingly being echoed by

others.[1]

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[1] For example, see Liebowitz (2009), Nichols, et. al. (2011), and Pinto (2010). Other authors, such as Engel and McCoy (2011) and Greenspan (2010), assert that the GSE goals caused Freddie Mac and Fannie Mae to purchase a

Many of the studies that argue that the CRA and GSE goals played a central role in precipitating the subprime crisis – as well as those papers that have argued against this view – have not relied on hard empirical evidence. Instead, they have pointed to a general association between the existence of the CRA/GSE goals and the overall increase in lending to lower-income borrowers and neighborhoods during the buildup to the crisis (Wallison, 2009; Liebowitz, 2008). For example, some papers compare aggregated time series of loan volumes and pricing in areas favored by these regulations with areas that are not. Loan volume differences by themselves, however, are insufficient to "prove" that the regulations contributed to the elevated mortgage delinquency observed during the crisis. Instead, a link from regulation to loan performance is necessary and here, with few exceptions, the evidence is scant.

In this paper, we examine whether a link exists between these programs and subsequent mortgage performance. Our analysis relies on two empirical approaches. The first approach, which focuses primarily on the CRA, examines whether loan outcomes across low-to-moderate income (LMI) census tracts varied according to lending activity in the tract. Census tracts differ in the composition of lenders that have historically operated within the tract and these differences tend to persist over time. Since the CRA only affects some institutions, this provides a quasi-natural experiment. If the CRA caused depository institutions to reduce their underwriting standards in LMI tracts, then LMI tracts that have been disproportionally served by CRA-covered lenders historically should have experienced worse outcomes than otherwise similar tracts. Our first approach tests this conjecture by examining the relationship between activity by CRA-covered lenders and loan outcomes.

large amount of subprime mortgage-backed securities.

The second approach takes advantage of the fact that both the CRA and GSE goals rely on hard geographic rules that were fixed for most of the past ten years. These regulations favor loans made to borrowers in census tracts where the median family income is below a fixed threshold. If these regulations provided an incentive for – or perhaps even required – loans to be made that otherwise would not have been granted, then one might expect loans in the favored neighborhoods to perform worse, all else equal, than loans made in areas that were not favored by these regulations. Using a regression discontinuity design, we test this conjecture in the region immediately surrounding the relevant thresholds for these regulations, where each regulation's impact should be easiest to detect.

The outline of the remainder of the paper is as follows. In the next section we provide background information about the CRA and the GSE goals and discuss the literature that has examined the relationship between these regulations and the subprime crisis. We set up our empirical tests in section 3 and present our results for the two empirical approaches in the following two sections. Section 6 discusses the conclusions we draw from our analysis.

II.   BACKGROUND

The Community Reinvestment Act (CRA), passed in 1977, encourages commercial banks and savings associations to meet the credit needs of their local community in a manner consistent with safe and sound operation.[2] Under the CRA, the federal banking supervisory agencies assess each covered institution's record of meeting the credit needs of its entire community, including

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[2] For more detailed background information on the CRA see Garwood and Smith (1995), Essene and Apgar (2009) and Avery, Courchane, and Zorn (2009).

lower-income neighborhoods. The financial institution itself is given the ability to define its

"community," or the areas in which its performance will be assessed. These "assessment areas"

generally correspond to the counties in which an institution has deposit-taking offices. The

financial institution is permitted to achieve its goals directly, by loan origination, or indirectly,

by purchasing loans originated by others.

Although many loan types can be used to satisfy the requirements of the CRA, residential

mortgage lending plays a prominent role. In part, this is because of the public availability of

loan-level data on mortgage originations and purchases collected under the Home Mortgage

Disclosure Act (HMDA). Since the mid 1990's, federal bank examiners have relied upon a series

of numerical measures to help evaluate compliance with the CRA. These measures include the

share of loans originated (or purchased from other lenders) in LMI census tracts or made to LMI

borrowers.

A census tract is designated as an LMI tract when its median family income is less than

80 percent of the median family income of the surrounding area at the last Decennial Census. For

urban tracts, the surrounding area is the metropolitan statistical area (MSA) and for rural tracts it

is the non-metropolitan area of the state. Borrowers are designated as LMI, regardless of the

characteristics of their census tract, when their contemporaneous income is less than 80 percent

of the median family income for the surrounding area, as estimated annually by the Department

of Housing and Urban Development (HUD). Loans reported under HMDA are typically used for

these calculations and analyses are restricted to loans within an institution's assessment area.

Based on the examiner's evaluation, which often involves comparing an institution's lending and

purchases with those of its peers, an institution is assigned a public CRA rating of "outstanding,"

"satisfactory," "needs to improve," or "substantial noncompliance."   Most institutions receive a

satisfactory rating. These CRA ratings are considered by federal banking agencies when

assessing an institution's application for a charter, deposit insurance, branch or other deposit

facility, office relocation, merger, or acquisition.

The CRA only applies to commercial banks and thrifts. Independent mortgage banks or

credit unions, which together originated about 30% of all loans reported in HMDA in 2008, are

not covered. Moreover, more than half of all loans originated or purchased by CRA-covered

institutions are made outside of their assessment areas and thus are not considered in their CRA

evaluations.[3]

The GSE affordable housing goals were imposed by Congress on Freddie Mac and

Fannie Mae as part of the Federal Housing Enterprises Financial Safety and Soundness Act of

1992 (also called the "1992 GSE Act"). Similar to the quantitative lending activity requirements

of the CRA, the GSE goals establish annual percentage of business requirements for the GSEs in

terms of their purchases of mortgages falling into three categories: loans to LMI borrowers, loans

to underserved areas, and loans to special affordable populations.

These terms are defined using similar concepts as the CRA. In urban areas, an LMI

borrower is defined for GSE purposes as one whose income is below the median family income

of the MSA (estimated, as above, by HUD). Similarly, a census tract is designated as an

underserved area if the median family income of the tract is less than 90 percent of the median

family income of the MSA. A tract with a median family income of up to 120 percent of the

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[3] Loans originated by affiliates (e.g. members of the same bank holding company) can be considered for CRA evaluations at the discretion of the institution.

MSA median is also considered underserved if more than 30 percent of the population in the

tract is minority. Finally, special affordable populations are defined based on a borrower's

income relative to the MSA median family income. Borrowers with incomes below 60 percent

of the MSA median family income, or who have an income that is below 80 percent of the

median and reside in census tracts with median family incomes below 80 percent of the MSA

median, are considered special affordable populations. Similar, but slightly more flexible,

guidelines are applied to rural areas.[4]

The numerical target levels for GSE lending goals are set in advance each year by the

GSEs' regulator (originally HUD and now the Federal Housing Finance Agency). The targeted

ratios for all three of the GSE affordable housing goals have been rising over time. In assessing

the GSEs' performance in meeting these goals, non-conforming or jumbo loans (loans above a

certain size), subprime loans, and government-backed loans (FHA and VA) are generally not

considered.[5]

In thinking about how the CRA and GSE goals might influence the activities of mortgage

lenders, one can imagine several distinct possibilities. First, the CRA and GSE goals may have

little or no effect on the activities of the regulated institutions. Banking institutions may not need

to undertake special activities to serve adequately the credit needs of their communities and the

GSEs may be able to meet the housing goals through their normal course of business. In this

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[4] For more detailed discussion of the GSE goals, see DiVinti (2009).
[5] Although the tracts that qualify for preferences under the GSE (and CRA) goals are known in advance and change little from year to year, it is sometimes difficult for the GSEs or banking institutions subject to the CRA to know how binding the regulations are. CRA evaluations are done relative to the market as a whole, for which information is available only with a significant lag. Similarly, market conditions, which are difficult to forecast can affect the number of goal-qualifying loans available to the GSEs making it easier or harder for them to meet their targets. Historically the GSEs have found it easier to meet goal requirements when interest rates rise than when they decline.

scenario, neither regulation would result in more than minimal changes in the volume, pricing, or sources of credit in any area.

Second, CRA-covered institutions may extend more credit to neighborhoods receiving greater weight in CRA performance evaluations, but accomplish this through enhanced staff training, greater community outreach and marketing, or similar activities without changing the pricing of loans or underwriting standards. Such a response to the CRA might alter the sources of mortgage credit in targeted areas (as banking institutions take origination market share from institutions not covered by the law), without resulting in a net change in lending activities at the market level. The GSE goals could produce a similar effect if the GSEs can purchase more from goal-rich sources without having to alter their underwriting standards or pricing. Again, one would expect a higher percentage of goal-satisfying loans to be purchased by the GSEs, with little or no impact on the amount of lending in a market.

Third, banking institutions may respond to the CRA by offering financial incentives to borrowers from targeted neighborhoods (or sellers of mortgages from these areas) by reducing prices for credit (including transaction costs), easing credit standards, or undertaking more costly underwriting to identify applicants who are creditworthy but not obviously so. Similarly, the GSEs may opt to pay lenders more for qualifying loans or to accept loans they otherwise would not in response to the affordable housing goals. These responses, as above, will increase the share of lending accounted for both by CRA-covered institutions and the GSEs in communities favored by these regulations. If lenders respond by lowering loan prices to borrowers or by engaging in more costly and effective underwriting without modifying existing credit standards, the amount of mortgage credit extended will increase, potentially raising home values and

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inducing borrowers to borrow more than they otherwise would have. However, if lenders also respond by lowering their credit standards, higher rates of default and foreclosure could result.

Much of the literature on the CRA and GSE affordable housing goals has focused on the effect of the regulations on market share and loan volumes. For example, Bhutta (2010); Avery, Canner, and Calem (2003); and the Joint Center for Housing Studies (2003) examine how CRA targets affect lending activity. Similarly, Bhutta (2008); Gabriel and Rosenthal (2009); Bostic and Gabriel (2006); and Conley, Porter and Zhong (2010) examine the effects of the GSE goals. However, as noted above, demonstrating that the regulations impacted market share is insufficient to show a causal link between regulation and the subprime crisis.[6] It is also necessary to establish that the regulations affected the quality of loans that were underwritten. Here, there have only been a few studies. Avery, Bostic and Canner (2005) look at the impact of the CRA on bank profitability, but do so during a period in which there was little distress in the housing market. The most applicable evidence comes from Laderman and Reid (2009) who compare the performance of loans originated in California by CRA-covered lenders with otherwise comparable loans originated by others. The data used in their analysis was constructed by matching HMDA data (used to determine the lender) with performance information from the LPS/McDash database (a sample of loans serviced by 19 top mortgage servicers). Laderman and Reid find no evidence that CRA-covered loans were lower quality; indeed, they find that such loans performed better than non-CRA loans.

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[6] However, it would be hard to argue that the regulations caused the crisis if there were no relationship between the regulations and patterns of mortgage lending. Thus, evidence on loans volumes and market share is a useful part of the debate.

III. EMPIRICAL APPROACH

An ideal test of the role of the CRA and GSE goals in the subprime crisis would focus on lending

activities that would not have taken place in the absence of the regulations. Since identifying

such loans is virtually impossible with available public data, we rely on two indirect approaches:

analyzing variation in lending and purchase activity by lender type and a regression discontinuity

examination of loan outcomes around the geographic thresholds designated by the CRA and

GSE goals.

In both of these approaches, the unit of analysis is the census tract, as defined by the 2000

Decennial Census. This unit has been used by regulators in evaluating the CRA and GSE goals

from 2003 to the present. We restrict the sample to census tracts with a constant classification –

that is, GSE goal- and CRA-qualifying or not – over the eight year period 2001 to 2008.[7] We

also limit the sample to tracts in counties that were in MSAs for the entire period, since HMDA

reporting requirements for rural areas are less comprehensive. We further require that at least

three home purchase and three refinance loans be originated in each tract in each year and limit

the construction of all HMDA-based statistics to first-lien loans for owner-occupied properties.[8]

Finally, to account for the role of significant cross-market variation in performance and lending

patterns, all of our analysis is "within market." That is, we either express variables as deviations

about MSA means or add MSA fixed effects to all of the estimated equations.

Our primary outcome measure is the percentage of mortgage borrowers in a census tract

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[7] Conley, Porter, and Zhong (2010) conduct an interesting analysis which focuses on the lending activity in tracts that changed classification over the period as evidence of whether qualification affected behavior.

[8] Lien status was not reported in HMDA until 2004. Prior to that year we assume that all loans above $40,000 (in 2008 dollars) are first liens. We exclude multi-family housing loans from the analysis.

who were 90 or more days past due on at least one mortgage obligation at the end of 2008,[9] as determined from the records of Equifax, one of the three national credit bureaus.[10] Other outcome measures are used in supplementary analyses. These include the share of first-lien mortgage loans originated in a tract during 2004-2006 that had estimated front-end payment to-income ratios (PTIs) exceeding 30 percent, generally considered marginal in underwriting, and the share that were reported as higher-priced in HMDA, which is often used as a proxy for high-risk or subprime lending activity (Avery, Brevoort, and Canner, 2007).[11] These outcome measures focus on lending activity during the period 2004 to 2006, because this was the high-water period for the subprime market, before the market collapse that began in 2007. Finally, we use estimates of house price changes from 2001-2006 and 2006-2008 as additional outcome measures to explore whether the CRA or GSE goals contributed to house price appreciation in the earlier period or depreciation in the later period. Tract-level house price appreciation is estimated using median home purchase loan sizes from HMDA in each tract over time.

In both components of the analysis, we use a common set of tract-level control variables. These variables include a set of "baseline" controls that are limited to variables that can truly be considered as exogenous and measured well before the loans that contributed to the subprime crisis. Primarily these are Census 2000 variables, but also include the relative income of the tract

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[9] The census tract included in the credit bureau data is based on the location of the borrower and not necessarily the property. This can create distortions for those tracts where a significant number of real estate investors reside, if the tract of their investment property differs from that of their residence. This problem is mitigated somewhat by using a borrower-based, as opposed to loan-based, delinquency rate. In our analysis, we also try to mitigate the effect of this distortion by limiting the HMDA-based data to loans for owner-occupied properties. However, these steps do not completely eliminate the distortions.

[10] The dataset used to calculate the delinquency rate was supplied by Equifax and it includes counts of those borrowers in each census tract who had a mortgage and those borrowers who were 90 or more days past due on a mortgage. These counts were compiled from the entirety of Equifax's credit files at the end of 2008.

[11] The HMDA data, which we rely upon for our analysis, do not have borrower credit scores, loan-to-value ratios and other measures traditionally associated with loan risk, limiting us to this set of quality indicators.

in the 1990 Census and the mean credit score of mortgage borrowers in the tract which is calculated from data from Equifax at the end of either 2000 or 2004.[12]

For the delinquency outcome variable we estimate an additional equation which includes a set of "expanded" controls. The expanded controls are calculated from HMDA data over 2004-2006. These controls capture information about the characteristics of the borrowers and the loans that they took out over this period. The expanded controls include the share of loans extended in each tract in 2004-2006 that were reported as being higher-priced, had high PTI ratios, were underwritten without income, or involved a "piggyback loan," which is a junior-lien loan that was taken out at the same time as the first lien. We also include several measures of borrower income in the expanded controls to account for the potential impact that the borrower-based CRA and GSE preferences may have had. Two of the expanded controls, the share of loans with a high PTI and the share that were reported as higher priced, are also used as outcome measures in supplementary analyses.

In some estimations, we use only the baseline controls because of concerns that the expanded controls might not be exogenous, and thus their inclusion might skew our results. For example, if the CRA caused banks to lend to more low-income borrowers and these borrowers were more likely to become delinquent, then controlling for the share of low-income lending might inappropriately reduce the estimated effect on loan outcomes that is attributed to the CRA. On the other hand, if the expanded control variables are independent of the lending effects

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[12] The data used to calculate these mean credit scores comes from a 1-in-20 sample of credit records from Equifax. The sample includes aggregated information on the credit obligations of individuals in the sample, including the number of mortgages each individual currently holds. This allows us to calculate mean credit scores for mortgage borrowers. The credit score used is the Equifax Risk Score 3.0, which uses a similar scale as the FICO score, produced by Fair Isaac.

induced by the CRA or GSE goals, then the inclusion of these variables in the estimated

delinquency equations improves the precision of our tests.

IV.   APPROACH 1: VARIATION BY LENDER TYPE

Our first approach examines differences in loan outcomes associated with variations in the type

of lender serving census tracts eligible for both the CRA and GSE underserved goals. If CRA-

covered lenders reduced their lending standards as a result of the regulation, then those tracts

with relatively more CRA-covered lending activity should have experienced worse outcomes

than similar tracts with fewer covered lenders. If the GSE goals had a similar effect on lending,

then those tracts that have proportionally more loan sales to the GSEs should have experienced

worse outcomes.

We divide lending activity in each census tract into the share accounted for by six

different institution types:

1) Depository institutions lending outside of their assessment area;[13]

2) Depository institutions lending within their assessment area;

3) Affiliates of depository institutions lending outside of their assessment area;

4) Affiliates of depository institutions lending within their assessment area;

5) Credit unions; and

6) Independent mortgage companies.

If the CRA caused lenders to loosen their underwriting standards, we would expect tracts

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[13] For convenience, we use a definition of "depository institutions" that excludes credit unions, which are not covered by the CRA though they clearly take deposits.

with a larger share of within-assessment-area lending by depository institutions, or their affiliates, to have experienced worse outcomes.[14] We include these loan shares as independent variables in the estimations in this section, with the loan share of independent mortgage companies serving as the omitted group.

In addition to originations, lenders can also meet their CRA requirements by purchasing loans. To account for the possibility that depository institutions may have purchased loans to satisfy the requirements of the CRA and GSE goals, we also include the share of loans originated in a tract that were purchased by each of the six institution types.[15] If the CRA caused depository institutions to purchase low-quality loans, then we would expect those neighborhoods with more purchases by CRA-covered institutions (or their affiliates) to have experienced higher delinquency rates. We also include the share of loans in the tract that were sold to the GSEs to determine whether a higher share of loan sales to the GSEs was associated with worse outcomes.

Because of our concerns about exogeneity, we measure these "share of lending" and "purchase" variables at two points in time. These "control periods" include 2001, which we select because it is safely before the start of the housing boom, and 2004-2006, which captures market activity during the height of the subprime market. Each model is estimated "within-MSA" (uses MSA fixed effects) using 2000 Census tracts as the unit of analysis.

A complete listing of the variables used in this phase of the analysis, along with their

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[14] Affiliate lending can be used for CRA evaluations at the discretion of the institution being examined.

[15] HMDA reporters provide information on the disposition (sales) of loans they originate as well as loans that they purchase that were originated by other lenders. In principal, the total loans reported as sold to affiliates or other banking institutions should equal the number reported as purchased by such institutions. In practice, however, these numbers may not be the same. Sales of originated loans are reported only if the sale takes place in the same year as the loan was originated. However, purchases during the year are reported regardless of the year of origination. Further, some purchasers or originators may not be required to report in HMDA.

definitions and sample means, is presented in table 1. Table 2 provides the results of our estimation using the delinquency rate of mortgage borrowers in the tract at the end of 2008 as the dependent variable. Columns (1) and (2) use the baseline controls and the share of lending variables calculated using the 2001 and 2004-2006 control periods, respectively. Column (3) presents the results of the estimation using the set of expanded controls, with 2004-2006 as the control period.

The results presented in table 2 suggest that within-assessment area lending, by either depository institutions or their affiliates, was associated with *lower* 2008 delinquency rates than similar tracts that had less lending by these institutions and more lending by independent mortgage banks (the omitted group). A comparison of the impact of in- and out-of-assessment area lending (the coefficients in the first four rows of the table) also supports the view that CRA lending is associated with better, not worse, loan quality. In all but one case, the within-assessment area coefficient is more negative than the comparable out-of-assessment area coefficient, although the difference is generally not statistically significant. GSE sales are also negatively associated with delinquency, though generally not at significant levels.

The evidence regarding the share of loans purchased by depository institutions within their assessment areas is mixed. Within-assessment-area purchases by CRA-covered institutions are positively associated with 2008 delinquency rates when 2001 is used as the control period, but negatively associated when 2004-2006 is used. This suggests that CRA-covered lenders shifted their within-assessment-area purchases towards less risky census tracts during the middle of the decade, which appears inconsistent with the CRA having induced depository institutions to purchase riskier loans during the run up to the subprime crisis. In addition, the magnitude of the

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effect found for 2001 is quite small. Since within-assessment-area purchases by CRA-covered

lenders represented only 3 percent of loan originations during 2001, this implies that, on average,

loan purchases were associated with delinquency rates that were 0.12 percentage points higher.

The magnitude of this effect appears inconsistent with CRA-related purchases having played a

large role in elevating delinquency rates.

A possible explanation for the lack of a clear relationship between either lending or

purchases by CRA-covered institutions and subsequent delinquency is that only those few

institutions that choose to pursue an "outstanding" CRA rating need to alter their behavior,

whereas most other institutions can achieve a "satisfactory" rating through their normal course of

business. In this case, worse outcomes from the CRA would only be associated with lending

activity from outstanding-rated institutions. To test for this, we subdivide the share of lending

and purchases by depository institutions and their affiliates operating within their assessment

areas into the share accounted for by outstanding-rated institutions and by satisfactory-rated

institutions.[16] The results from these estimations, shown in table 3, exhibit only small

differences between satisfactory- and outstanding-rated institutions. In each estimation, within-

assessment-area lending by outstanding-rated institutions was associated with significantly

better, not worse, loan performance than within-assessment-area lending by satisfactory-rated

institutions. These results also continue to show mixed evidence of loan purchases by within-

assessment-area depository institutions, though it is notable that the positive effect of loan

purchases observed earlier when 2001 was used as the control year derive entirely from

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[16] The institution's most recent CRA rating at the end of the lending year is used to classify lenders. Affiliates are assigned the best rating of their affiliated depositories.

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purchases by outstanding-rated depository institutions.

Another possibility is that our analysis may rely on too high a level of aggregation and obscure the fact that the subprime boom took on very different forms in different parts of the country. In particular, the CRA and the GSE housing goals may only have had an effect in those markets where lending activity grew the most, perhaps in response to local economic conditions or house price dynamics. To examine this possibility we divide the sample into three groups of states. These groups include the "sand states" of Arizona, California, Florida, and Nevada which experienced very rapid rates of loan growth; the "rust belt" states of Indiana, Michigan, Illinois, Wisconsin and Ohio which were relatively stagnant markets; and all other states.

The estimations for these three state subgroups are presented in columns (1) through (3) of tables 4A and 4B (for control years 2001 and 2004-2006, respectively). Results for the three state subgroups continue to show that lending by CRA-covered institutions was generally associated with lower levels of delinquency. The lone exception to this is the positive coefficient on depositories in their assessment areas in the sand state estimation that uses 2004-2006 controls. This coefficient is not statistically significant and is lower than the coefficient on lending by depositories outside of their assessment areas, suggesting that the positive effect likely reflects differences in the business models of institutions rather than the CRA. Coefficients in the other two state groups are consistent with those of the overall regressions. Results for loan purchases by depository institutions within their assessment areas continue to produce mixed results, though in the estimations by geography the coefficients are generally insignificant.

Another possible explanation of our results is that CRA regulators may have been more

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concerned with lending to minority populations than to low- or moderate-income borrowers (although there are no explicit racial targets in the CRA regulations). In this case, the CRA and GSE housing goals may only have induced risky behavior by lenders in neighborhoods with high minority population shares. To test this possibility, we restrict the sample to those census tracts that had minority population shares that exceeded 30 and 50 percent. The results from these estimations are shown in columns (4) and (5), respectively, of tables 4A and 4B. These results provide no evidence that either the CRA or sales to the GSEs are associated with higher delinquency rates in these census tracts. The coefficient on in-assessment area purchases by depository institutions remains positive and significant when 2001 is used as the control year and negative and statistically insignificant when 2004-2006 is used, both with magnitudes that remain quite small.

The results that we have presented thus far are based on the 2008 delinquency rate as the outcome variable. It may be that insufficient time had elapsed between the subprime loan buildup and 2008 to allow the full impact of lower lending standards to be reflected in delinquencies. Thus, as a robustness check, we also conducted similar analyses using more direct measures of loan quality during the peak 2004-2006 lending years. The alternative measures, both of which are included in our expanded controls, include the share of loans that had a high PTI ratio and the share that were reported as higher priced in HMDA.

The results of these estimations, which are shown in columns (1) and (2) of tables 5A and 5B, are consistent with our earlier findings. Tracts with more within-assessment area lending by depository institutions had less high-PTI lending and fewer loans reported as higher priced, using independent mortgage companies as the control group. The coefficients from the high-PTI

estimation suggest that this negative relationship was weaker than the relationship between outside-of-assessment-area lending and delinquency, though the difference is very small and a similar relationship is not found for affiliates or when the share of higher-priced lending is used as the dependent variable. Within-assessment-area purchases by depository institutions are positively associated with high-PTI lending and the share of higher-priced lending, though as with the results for delinquency the size of the coefficients suggest the magnitude of this effect is small.

So far we have focused on indicators of loan quality. As discussed earlier, the CRA and GSE housing goals could have affected the mortgage market not by lowering underwriting standards but by inducing lower mortgage rates in favored areas which had the effect of increasing the demand for housing in these areas. Such an increase in demand may have contributed to the increase in house prices observed during the boom period of the decade, and then potentially to price declines at the end of the period if the earlier increases were unsustainable.

To test this possibility, we use house price changes over two periods as outcome measures in our regressions. Tract-level house-price changes are calculated for 2001-2006 and 2006-2008 using the median size of home purchase loans reported in HMDA. These measures rely on the assumption that loan-to-value relationships remained constant over these periods. Because of concerns about endogeneity, we restrict ourselves to the baseline controls and use 2001 as the control period.

Column (3) of tables 5A and 5B uses the tract-level change in house prices between 2001 and 2006 as the dependent variable and columns (4) and (5) use the change from 2006 to 2008.

The estimation reported in column (5) includes the lagged 2001-2006 price increase as a control, and thus the equation can be interpreted as measuring the change in house prices appreciation rates.

Within-assessment area lending by depository institutions appears to be positively associated with house price changes during the 2001-2006 period. A positive association is observed for 2006-2008 as well. This suggests that, to the extent the CRA induced higher lending volumes that contributed to house price appreciation, the resulting price increases were sustainable. Indeed, all depositories (including credit unions), are less associated with price declines during the 2006-2008 period than the less-regulated independent mortgage banks. GSE sales are negatively related to house price appreciation during both periods, although the measured relationship in the latter period is small and insignificant.

The share of loans purchased by depository institutions within their assessment areas is positively associated with house price changes from 2001-2006 and negatively associated with changes from 2006-2008. This result is consistent with loan purchases by CRA-covered institutions having contributed to the boom and bust in house prices on both ends; however, neither of these effects is statistically significant at the 5 percent level.

In sum, there is little in the results presented in this section to suggest a link between the share of lending accounted for by CRA-covered lenders and either lower loan quality or house price appreciation that may have contributed to the subprime crisis. Indeed, the evidence suggests that, all else equal, LMI tracts served by CRA-covered lenders show *fewer*, not more, loan delinquencies in 2008 than tracts served by lenders not subject to the CRA. Our results also provide little or no evidence that within-assessment-area loan purchases by depository

institutions contributed to the subprime crisis and no evidence of a statistically significant relationship between loan sales to the GSEs and delinquency.

V.   APPROACH 2: REGRESSION DISCONTINUITY

In the previous section we focused on the role of the lender, restricting our analysis to tracts in which all loans were potentially eligible for CRA (and GSE) credit but which differed by the extent to which the lenders serving the tracts were covered by the CRA. In this section, we focus on comparing outcomes between census tracts in which loans are favored under the CRA or GSE goals and those that are not. We pay particular attention to tracts that are at the boundaries of eligibility under the assumption that these are ones where it is easiest to detect a regulatory effect. Our sample design and variable constructions are the same as used previously. All of the analysis is conducted within-MSA (MSA fixed effects) using 2000 Census tracts as the unit of analysis.

To get a sense of the potential impact of the eligibility thresholds, defined by the relative census tract income, we show the relationship between several outcome measures and tract income in figure 1. The CRA and GSE income eligibility thresholds (80 and 90 percent, respectively) are shown as vertical lines. Data used in the figure are expressed as deviations about MSA means, but normalized by adding back the sample grand mean.

Virtually all of the outcome variables show a significant relationship with relative tract income. Our measures of loan quality, the 2008 delinquency rate and the share of high-PTI lending, both decrease with tract income. Though not shown in the graphs, the same is true for other measures of loan quality including the share of loans that are higher-priced, the share with

piggyback second liens, and the share of borrowers with no reported income. Loan growth

during the height of the boom, as measured by the ratio of loans originated in 2004-2006 to those

originated in 2001-2003, is also disproportionately concentrated in lower income tracts.

These general associations suggest why the CRA and GSE goals may have been raised as

causes or contributors to the subprime crisis. Both regulations favor lending to borrowers in

lower-income census tracts, which show disproportionate growth in lending and relatively lower

measures of loan quality. The last two panels in the figure, however, suggest that there may be

more going on. Both the share of loans sold to the GSEs and the market share of CRA-covered

lenders lending in their assessment areas are *upward-sloping* in income, a relationship that would

not be expected if the CRA and GSE regulations were driving forces. The share of loans sold to

a CRA-covered lender in their assessment area is the one series that shows evidence of a

discontinuity which, by its placement, suggests an impact of the CRA. The share falls

significantly at 80 percent of median area income, which is associated with favored coverage

under CRA. None of the figures in any of the other panels shows any evidence of a discontinuity

around either the CRA or GSE regulatory thresholds. For all but loans sold, the relationships

shown in figure 1 appear to be monotonic and hold throughout the income range.

We test for the presence of regulatory threshold effects more formally in the remainder of

this section. Our analysis expands on the relationships shown in figure 1 by restricting the

sample to tracts in the immediate neighborhood of the thresholds (plus or minus five percentage

points) and by adding a series of control variables to the analysis. Census tract income levels (or

minority percentage levels for the GSE middle income threshold) are expressed as dummy

indicator variables for each percentage point. The indicator variable representation gives the least

restrictive picture of the role of the threshold. However, as the data in figure 1 show, relative census tract income is clearly related to the outcome variables, and thus, we would expect to see an implied slope from the indicator variable coefficients. Thus, we transform the indicator variables to represent first differences rather than levels and further order them such that the expected sign of the indicator variable coefficients will be positive (we assume that the outcome variables are downward sloping in income and upward sloping in minority share).

Thus transformed, the indicator variable coefficients can be interpreted as the first difference (or income slope) at each relative income (or minority share) percentage point. If the regulations matter we would expect a larger shift at the threshold than at other points along the relative income range. In our analysis we test for such a shift by separately testing whether the first difference at the threshold differs from the first differences on either side of the threshold (narrow linearity). We also test for a slope breakpoint at the threshold under the more restrictive assumption that the relationship between income (or minority share) and the outcome variables is linear for the entire ten percentage point range of income or minority share used in our regression samples (broad linearity).

Results for the CRA relative income threshold are presented in table 6. The key coefficients are those in the fifth row designated "threshold." If there were a significant regulatory effect we would expect that these coefficients would be positive and significantly larger than those in the other rows above and below them. However, only one of the key coefficients shows this pattern, loans purchased by CRA-covered lenders in their assessment areas. In the other five models, four of the threshold coefficients show the wrong sign and the fifth is smaller in magnitude than any of the other coefficients in the rows above and below it.

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Not surprisingly, for these five equations formal tests of narrow and broad linearity are consistent with the hypothesis that there is no discontinuity at the threshold.

The exception to the lack of evidence of a threshold effect is loans purchased by CRA lenders in their assessment areas. Here there is a clear discontinuity at the 80 percent relative income level which is highly significant for both of our tests. Interestingly, when the data is restricted to purchases by outstanding-rated depositories, the effect still exists but is more muted (it is more pronounced when restricted to purchases by satisfactory-rated depositories). These results suggest that for at least some lenders, particularly those with satisfactory ratings, CRA concerns are playing a role in their purchase decisions. However, results from the other five outcome equations suggest that these purchases did not have a measurable effect on the quality of the loans originated or their subsequent performance.

Results for the GSE thresholds are shown in tables 7 and 8. Again the key coefficients are those in the fifth row designated as "threshold." Here again, all of the coefficients, with one exception, show either the wrong sign or are smaller in magnitude than other coefficients. The one exception is the GSE income threshold delinquency equation with the expanded controls. Here the coefficient is positive and the narrow linearity test mildly rejects the assumption of no discontinuity. The hypothesis of the absence of a discontinuity cannot be rejected for the broader linearity test, however, and both the narrow and broad tests cannot be rejected for the delinquency equation with the baseline controls.

The overall patterns may mask threshold effects which emerge only for particular economic environments. To test this possibility we estimate our equations separately for the three state subsamples defined in the previous section (the sand states, the rust belt states and all

other states). Results, presented in tables 9, 10, and 11 (only results for the indicator variable coefficients are given) are consistent with the overall regressions. There is little evidence of a discontinuity at any of the threshold points for any of the outcome variables in any of the state groups, except for loans purchased by CRA-covered lenders in their assessment areas, where results are similar to those of the overall sample. For the other five outcome measures, with one exception, none of the formal tests of the absence of a discontinuity at the threshold point is rejected at a statistically significant level. The one exception is for the sand states and for the same equation and threshold as occurred for the sample as a whole, the delinquency equation with expanded controls for the GSE income threshold. Again though, the effect is mild and does not occur for the delinquency equation with baseline controls.

In sum, the threshold results show no evidence of a discontinuity at the margin for any of the outcome measures except for loan purchases. Indeed, most of the threshold "jumps" are either the opposite sign of what we would have expected or not statistically different from zero. Formal tests and splits by geographic region are consistent with the same conclusion.

VI.   CONCLUSIONS

It is not hard to see why the CRA and GSE affordable housing goals are raised as causes or contributors to the subprime crisis. Both regulations favor lending to borrowers in lower-income census tracts which accounted for a disproportionate share of the growth in lending during the subprime buildup, a disproportionate share of higher-priced, piggyback, no-income, and high-PTI lending, and elevated mortgage delinquency rates. However, a more nuanced look at the data, as conducted in this paper, suggests that this superficial association may be misleading.

Using a variety of indirect tests, we find little evidence to support the view that either the CRA or the GSE goals caused excessive or less prudent lending than otherwise would have taken place.

Our analysis examining the type of lenders extending credit to LMI census tracts found no evidence that tracts with proportionally more lending by CRA-covered lenders experienced worse outcomes, whether measured by delinquency rates, high-PTI loans, or higher-priced lending. In fact, the evidence suggests that loan outcomes may have been marginally better in tracts that were served by more CRA-covered lenders than in similar tracts where CRA-covered institutions had less of a footprint. Loan purchases by CRA-covered lenders also do not appear to have been associated with riskier lending. Additionally, this analysis found no evidence that either the CRA or the GSE goals contributed to house prices appreciation during the 2001-2006 subprime buildup.

Our regression discontinuity tests, which focus on lending and loan performance around the income levels used to determine whether loans are favored by the CRA and GSE goals, finds little evidence of an effect for either regulation, except for an increase in loan purchases by CRA-covered depositories in their assessment areas. Both loan quality and performance are clearly related to census tract income with both improving as income rises. However, these relationships are evident for both favored and not-favored loans and there is no evidence of a discontinuity at the threshold points. Data on loan volumes also fail to find evidence of a regulatory threshold effect; indeed, the share of loans originated by CRA-covered lenders in their assessment areas and the share of loans sold to the GSEs are higher in the tracts not favored by the regulations than in favored tracts. Though loan purchases by CRA-covered lenders appear to

have been sensitive to the definition of a CRA-favored loan, there is no evidence that this affected the overall quality of loans originated.

Since our tests are indirect, it would be inappropriate to conclude that the test results *prove* that the CRA or GSE goals did *not* cause or contribute to the crisis. The existence of "special CRA" programs and "targeted affordable" loans in the GSE portfolios suggests that both regulations led to some loans being underwritten with different prices or terms than might otherwise have taken place. The question is, were such actions enough to materially affect market prices and standards? We do not see evidence of this in our indirect tests. However, direct evidence is potentially available by focusing on the performance of loans originated through these programs. To date, the data to conduct such analysis is not publicly available, and until it is, we may be unable to draw definitive conclusions on the role that the CRA and GSE affordable housing goals played in the subprime crisis.

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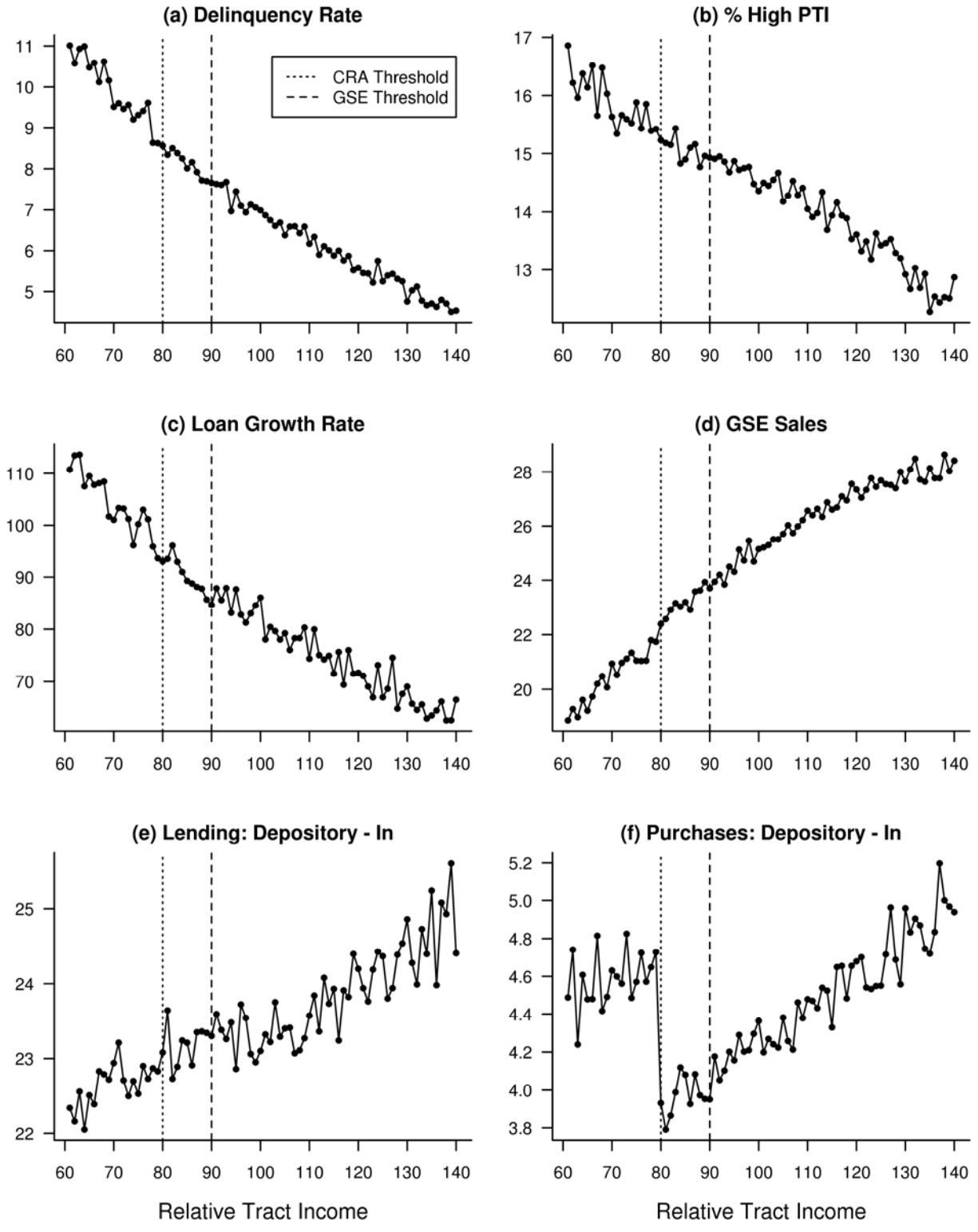
Figure 1: Outcome Measures Around CRA and GSE Thresholds

Table 1: Variable Definitions and Summary Statistics

Variables	Description	(1) Control Period: 2001	(2) Control Period: 2004-2006
Dependent Variable (from Equifax)			
Delinquency Rate	Share of mortgage holders in tract that are 90 or more days past due on a mortgage	10.89	10.89
Share of Lending in Tract (from HMDA)			
Depository - Out	Loans by depositories outside of their assessment areas	11.65	17.34
Depository - In	Loans by depositories in their assessment areas	20.81	20.57
(Satisfactory)	with a "satisfactory" CRA rating	8.97	6.56
(Outstanding)	with an "outstanding" CRA rating	11.84	14.01
Affiliate - Out	Loans by depository subsidiaries or affiliates outside of their assessment areas	21.00	16.89
Affiliate - In	Loans by depository subsidiaries or affiliates in their assessment areas	9.33	5.24
(Satisfactory)	with a "satisfactory" CRA rating	3.43	1.39
(Outstanding)	with a "outstanding" CRA rating	5.90	3.85
Credit Union	Loans by credit unions	2.30	2.32
GSE Sales	Loans sold to Fannie Mae or Freddie Mac	34.21	19.99
Purchases as Share of Lending in Tract (from HMDA)			
Depository - Out	Purchased by depositories outside of their assessment area	7.76	11.40
Depository - In	Purchased by depositories in their assessment area	2.97	4.92
(Satisfactory)	with a "satisfactory" CRA rating	0.92	0.84
(Outstanding)	with a "outstanding" CRA rating	2.05	4.08
Affiliate - Out	Purchased by depository subsidiaries or affiliates outside of their assessment areas	7.79	11.67
Affiliate - In	Purchased by depository subsidiaries or affiliates within their assessment areas	3.91	3.51
(Satisfactory)	with a "satisfactory" CRA rating	0.75	0.31
(Outstanding)	with an "outstanding" CRA rating	3.16	3.20
Credit Union	Purchased by credit unions	0.01	0.04
Independent Mortgage Co.	Purchased by independent mortgage companies	10.82	8.93

Table 1: Variable Definitions and Summary Statistics (continued)

		(1)	(2)
		Control Period:	Control Period:
Variables	Description	2001	2004-2006

Baseline Controls (unless stated from 2000 Census)

Variable	Description	(1)	(2)
Center City	Indicator for whether tract is in a center city	0.63	0.63
Relative Median House Value	Ratio of median house value in tract to MSA median	0.22	0.22
Median Age	Median age of individuals in tract	32.04	32.04
% 65 or Older	Share of residents who are 65 or older	11.65	11.65
Unemployment Rate	Unemployment rate in tract	8.59	8.59
% Minority	Share of tract population that is minority	54.12	54.12
Owner Occupancy Rate	Share of housing units in tract that are owner occupied	48.03	48.03
Vacancy Rate	Share of housing units in tract that are vacant	8.05	8.05
2000 Relative Income Level	Median income of tract relative to MSA median	66.15	66.15
1990 Relative Income Level	Median income of tract relative to MSA median in 1990	93.39	93.39
Mean Credit Score (from Equifax)	Mean credit score of mortgage borrowers in the tract	678.57	679.64

Expanded Controls (from HMDA)

Variable	Description	(1)	(2)
% High PTI	Share of loans with a front-end PTI > 30 percent		16.94
% Higher Priced	Share of loans in tract reported as higher priced		32.18
% Piggyback	Share of first-lien loans that had a piggyback loan		10.05
% No Income	Share of loans in tract with no reported income		6.27
% Low/Moderate Income	Share of loans in tract to borrowers with incomes below 80 percent of area median		38.80
% Below Median Income	Share of loans in tract to middle-income borrowers		53.21

House Price Variables (from HMDA)

Variable	Description	(1)	(2)
House Price Change, 2001-2006	Percent change in house prices from 2001 to 2006	61.67	61.67
House Price Change, 2006-2008	Percent change in house prices from 2006 to 2008	-5.37	-5.37

Note: Data are limited to Census tracts that were LMI each year from 2001-2008 and that had at least 3 home purchase loans and 3 refinance loans each year. Loan data are for 1st liens on owner-occupied properties.

Table 2: Delinquency Rate Estimations

	(1)			(2)			(3)		
Dependent Variable:	Delinquency Rate			Delinquency Rate			Delinquency Rate		
Sample:	All Observations			All Observations			All Observations		
Control Period:	2001			2004-2006			2004-2006		
	Estimate		Std. Error	Estimate		Std. Error	Estimate		Std. Error
Share of Lending									
Depository - Out	-0.062	***	0.008	-0.124	***	0.009	-0.036	***	0.009
Depository - In	-0.063	***	0.005	-0.175	***	0.007	-0.027	***	0.007
Affiliate - Out	-0.035	***	0.007	-0.124	***	0.010	-0.037	***	0.009
Affiliate - In	-0.073	***	0.007	-0.176	***	0.012	-0.057	***	0.011
Credit Union	-0.131	***	0.015	-0.312	***	0.019	-0.111	***	0.018
GSE Sale	-0.003		0.005	-0.097	***	0.007	-0.013	*	0.008
Puchases as Share of Lending									
Depository - Out	-0.005		0.008	0.006		0.011	-0.020	**	0.010
Depository - In	0.040	***	0.012	-0.060	***	0.012	-0.028	**	0.011
Affiliate - Out	0.045	***	0.008	-0.032	***	0.010	-0.037	***	0.009
Affiliate - In	-0.006		0.010	-0.074	***	0.015	-0.070	***	0.014
Credit Union	0.234		0.302	-0.313		0.206	-0.446	**	0.186
Independent Mortgage Company	-0.001		0.007	0.142	***	0.013	0.028	**	0.012
Baseline Controls									
Center City	-0.557	***	0.079	-0.343	***	0.074	-0.392	***	0.067
Relative Median House Value	-3.517	***	0.235	-1.791	***	0.224	-1.428	***	0.234
Median Age	-0.334	***	0.015	-0.281	***	0.014	-0.181	***	0.013
% 65 or Older	0.104	***	0.011	0.096	***	0.010	0.048	***	0.009
Unemployment Rate	0.002		0.009	-0.015	*	0.009	-0.025	***	0.008
% Minority	0.040	***	0.002	0.019	***	0.002	0.004	**	0.002
Owner Occupancy Rate	0.008	***	0.003	-0.010	***	0.003	-0.013	***	0.002
Vacancy Rate	-0.029	***	0.006	-0.034	***	0.006	-0.007		0.006
2000 Relative Income Level	0.006		0.021	0.021		0.020	0.021		0.018
1990 Relative Income Level	0.000		0.015	-0.014		0.014	-0.018		0.012
Mean Credit Score	-0.022	***	0.001	-0.018	***	0.001	-0.016	***	0.001
Expanded Controls									
% High PTI							0.157	***	0.006
% Higher Priced							0.107	***	0.006
% Piggyback							0.324	***	0.009
% No Income							0.111	***	0.014
% Low/Moderate Income							-0.038	***	0.010
% Below Median Income							0.033	***	0.009
Observations	12,003			12,003			12,003		
R-Squared	0.756			0.793			0.832		
Dependent variable mean	10.894			10.894			10.894		

Additional Hypotheses Tested:

	F-Statistics		
Share of Lending			
(T1) Depository - In = Depository - Out	0.03	31.37 ***	1.38
(T2) Affiliate - In = Affiliate - Out	23.11 ***	15.48 ***	2.69
(T3) Joint test of (T1) and (T2)	11.70 ***	25.68 ***	1.92

Note: *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively. Each estimation is limited to Census tracts that were LMI tracts from 2001-2008 and that had at least 3 home purchase loans and 3 refinance loans in each year. All estimations include MSA-level control variables.

Table 3: Delinquency Rate Estimations with CRA Ratings

	(1)			(2)			(3)		
Dependent Variable:	Delinquency Rate			Delinquency Rate			Delinquency Rate		
Sample:	All Observations			All Observations			All Observations		
Control Period:	2001			2004-2006			2004-2006		
	Estimate		Std. Error	Estimate		Std. Error	Estimate		Std. Error
Share of Lending									
Depository - Out	-0.061	***	0.008	-0.125	***	0.009	-0.036	***	0.009
Depository - In (Satisfactory)	-0.052	***	0.007	-0.135	***	0.009	-0.002		0.008
Depository - In (Outstanding)	-0.074	***	0.006	-0.204	***	0.008	-0.046	***	0.008
Affiliate - Out	-0.033	***	0.007	-0.121	***	0.010	-0.037	***	0.009
Affiliate - In (Satisfactory)	-0.079	***	0.009	-0.215	***	0.015	-0.102	***	0.014
Affiliate -In (Outstanding)	-0.061	***	0.011	-0.091	***	0.023	0.033		0.021
Credit Union	-0.130	***	0.015	-0.318	***	0.019	-0.113	***	0.018
GSE Sale	-0.004		0.005	-0.088	***	0.008	-0.005		0.008
Purchases as Share of Lending									
Depository - Out	-0.005		0.008	0.001		0.011	-0.025	**	0.010
Depository - In (Satisfactory)	0.005		0.022	-0.081	**	0.031	-0.019		0.028
Depository - In (Outstanding)	0.056	***	0.015	-0.046	***	0.015	-0.028	**	0.014
Affiliate - Out	0.044	***	0.008	-0.035	***	0.010	-0.040	***	0.009
Affiliate - In (Satisfactory)	0.011		0.012	-0.085	***	0.016	-0.055	***	0.015
Affiliate -In (Outstanding)	-0.060	***	0.023	0.096	*	0.051	-0.129	***	0.046
Credit Union	0.261		0.302	-0.390	*	0.205	-0.461	**	0.185
Independent Mortgage Company	-0.001		0.007	0.140	***	0.013	0.029	**	0.012
Baseline Controls									
Center City	-0.548	***	0.079	-0.306	***	0.074	-0.355	***	0.067
Relative Median House Value	-3.496	***	0.235	-1.752	***	0.224	-1.337	***	0.234
Median Age	-0.332	***	0.015	-0.273	***	0.014	-0.176	***	0.013
% 65 or Older	0.104	***	0.011	0.096	***	0.010	0.047	***	0.009
Unemployment Rate	0.001		0.009	-0.016	*	0.009	-0.024	***	0.008
% Minority	0.040	***	0.002	0.022	***	0.002	0.006	***	0.002
Owner Occupancy Rate	0.008	***	0.003	-0.010	***	0.003	-0.014	***	0.002
Vacancy Rate	-0.029	***	0.006	-0.035	***	0.006	-0.007		0.006
2000 Relative Income Level	0.007		0.021	0.023		0.020	0.026		0.018
1990 Relative Income Level	-0.001		0.015	-0.015		0.014	-0.022	*	0.012
Mean Credit Score	-0.022	***	0.001	-0.018	***	0.001	-0.016	***	0.001
Expanded Controls									
% High PTI							0.156	***	0.006
% Higher Priced							0.108	***	0.006
% Piggyback							0.326	***	0.009
% No Income							0.102	***	0.014
% Low/Moderate Income							-0.033	***	0.010
% Below Median Income							0.029	***	0.009
Observations	12,003			12,003			12,003		
R-Squared	0.756			0.795			0.833		
Mean of dependent variable	10.894			10.894			10.894		

Additional Hypotheses Tested:

	F-Statistics		
Share of Lending			
(T1) Depository - In (Satisfactory) = Depository - In (Outstanding)	6.76 ***	47.56 ***	22.77 ***
(T2) Affiliate - In (Satisfactory) = Affiliate - In (Outstanding)	1.67	18.39 ***	26.57 ***
(T3) Joint test of (T1) and (T2)	4.27 **	34.70 ***	25.95 ***

Note: Same notes as table 2

Table 4A: Delinquency Rate Estimations by State Subgroup and Minority Population Share

	(1)			(2)			(3)			(4)			(5)		
Dependent Variable:	Delinquency Rate			Delinquency Rate			Delinquency Rate			Delinquency Rate			Delinquency Rate		
Sample:	Sand States			Rust Belt States			Other States			Min Pct >=30			Min Pct >=50		
Control Period:	2001			2001			2001			2001			2001		
	Estimate		Std. Error	Estimate		Std. Error	Estimate		Std. Error	Estimate		Std. Error	Estimate		Std. Error
Share of Lending															
Depository - Out	-0.023		0.028	-0.071	***	0.015	-0.076	***	0.007	-0.071	***	0.009	-0.086	***	0.011
Depository - In	-0.074	***	0.016	-0.072	***	0.011	-0.066	***	0.005	-0.078	***	0.007	-0.085	***	0.007
Affiliate - Out	-0.088	***	0.020	-0.028	*	0.015	-0.020	***	0.006	-0.048	***	0.008	-0.048	***	0.009
Affiliate - In	-0.138	***	0.020	-0.002		0.016	-0.055	***	0.008	-0.087	***	0.009	-0.096	***	0.010
Credit Union	-0.302	***	0.046	-0.108	***	0.033	-0.102	***	0.015	-0.173	***	0.021	-0.152	***	0.026
GSE Sale	0.037	**	0.015	-0.024	**	0.010	-0.022	***	0.005	0.001		0.006	0.003		0.007
Purchases as Share of Lending															
Depository - Out	-0.081	***	0.026	-0.020		0.019	0.021	***	0.007	-0.010		0.009	-0.008		0.010
Depository - In	0.046		0.030	-0.047		0.035	0.019		0.013	0.039	***	0.014	0.042	***	0.015
Affiliate - Out	0.002		0.029	0.092	***	0.020	0.039	***	0.008	0.045	***	0.010	0.060	***	0.012
Affiliate - In	-0.062	**	0.029	-0.002		0.028	-0.014		0.010	-0.016		0.012	-0.017		0.013
Credit Union	3.459	*	1.913	0.079		0.302	0.005		0.399	0.346		0.359	0.545		0.461
Independent Mortgage Company	-0.012		0.023	0.030	**	0.014	-0.005		0.007	-0.002		0.008	0.005		0.009
Baseline Controls															
Center City	0.263		0.188	-0.188		0.179	-1.193	***	0.088	-0.516	***	0.099	-0.514	***	0.117
Relative Median House Value	-5.997	***	0.626	-1.798	***	0.485	-2.782	***	0.249	-3.987	***	0.288	-4.090	***	0.333
Median Age	-0.479	***	0.038	-0.277	***	0.031	-0.184	***	0.016	-0.378	***	0.019	-0.382	***	0.022
% 65 or Older	0.173	***	0.026	0.130	***	0.026	0.073	***	0.012	0.108	***	0.016	0.113	***	0.019
Unemployment Rate	-0.009		0.025	0.008		0.020	0.001		0.010	-0.004		0.011	-0.007		0.012
% Minority	0.044	***	0.006	0.026	***	0.004	0.039	***	0.002	0.045	***	0.003	0.045	***	0.004
Owner Occupancy Rate	0.031	***	0.007	0.010	*	0.006	-0.011	***	0.003	0.004		0.003	-0.003		0.004
Vacancy Rate	-0.010		0.015	0.020		0.020	-0.018	**	0.007	-0.005		0.010	0.000		0.012
2000 Relative Income Level	-0.454	***	0.105	0.170	***	0.062	0.070	***	0.019	0.009		0.026	0.023		0.030
1990 Relative Income Level	0.324	***	0.077	-0.112	***	0.043	-0.044	***	0.013	0.007		0.019	0.001		0.021
Mean Credit Score	-0.033	***	0.004	-0.022	***	0.003	-0.019	***	0.001	-0.020	***	0.002	-0.021	***	0.002
Observations	2,857			2,016			7,130			9,104			7,150		
RSquare	0.641			0.670			0.627			0.743			0.754		
Dependent variable mean	17.325			10.192			7.987			12.356			13.157		
Additional Hypotheses Tested:						F-Statistics									
(T1) Dep. - In: Satisfactory = Outstanding	3.45 *			0.01			1.73			0.49			0.03		
(T2) Aff. - In: Satisfactory = Outstanding	4.83 **			2.14			18.83 ***			15.61 ***			18.23 ***		
(T3) Joint test of (T1) and (T2)	4.44 **			1.07			9.92 ***			8.19 ***			9.12 ***		

Note: See notes from table 2. Sand states include Arizona, California, Florida, and Nevada. Rust belt states include Indiana, Michigan, Illinois, Wisconsin, and Ohio.

Table 4B: Delinquency Rate Estimations by State Subgroup and Minority Population Share

	(1)		(2)		(3)		(4)		(5)	
Dependent Variable:	Delinquency Rate		Delinquency Rate		Delinquency Rate		Delinquency Rate		Delinquency Rate	
Sample:	Sand States		Rust Belt States		Other States		Min Pct >=30		Min Pct >=50	
Control Period:	2004-2006		2004-2006		2004-2006		2004-2006		2004-2006	
	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
Share of Lending										
Depository - Out	0.072 ***	0.026	-0.076 ***	0.019	-0.048 ***	0.009	-0.047 ***	0.011	-0.034 **	0.014
Depository - In	0.021	0.021	-0.085 ***	0.015	-0.047 ***	0.007	-0.022 **	0.009	-0.023 **	0.010
Affiliate - Out	0.016	0.024	-0.052 **	0.022	-0.051 ***	0.009	-0.033 ***	0.011	-0.032 **	0.013
Affiliate - In	-0.154 ***	0.038	-0.151 ***	0.024	-0.047 ***	0.011	-0.072 ***	0.014	-0.084 ***	0.016
Credit Union	-0.342 ***	0.064	-0.170 ***	0.037	-0.082 ***	0.017	-0.173 ***	0.026	-0.165 ***	0.031
GSE Sale	0.005	0.022	0.011	0.017	-0.017 **	0.008	-0.005	0.010	-0.009	0.012
Purchases as Share of Lending										
Depository - Out	-0.052 *	0.027	-0.048 **	0.022	-0.001	0.010	-0.025 **	0.012	-0.047 ***	0.014
Depository - In	-0.047	0.035	-0.049 *	0.026	-0.014	0.011	-0.027 *	0.014	-0.015	0.015
Affiliate - Out	-0.029	0.026	-0.004	0.020	-0.040 ***	0.010	-0.031 ***	0.012	-0.035 **	0.014
Affiliate - In	-0.204 ***	0.051	-0.037	0.041	-0.018	0.012	-0.079 ***	0.016	-0.075 ***	0.018
Credit Union	-0.308	0.408	-0.423	0.481	-0.151	0.203	-0.652 ***	0.232	-0.521 **	0.250
Independent Mortgage Company	0.018	0.033	0.033	0.025	0.029 **	0.012	0.032 **	0.015	0.035 **	0.016
Baseline Controls										
Center City	-0.163	0.151	-0.401 ***	0.152	-0.779 ***	0.076	-0.428 ***	0.085	-0.540 ***	0.100
Relative Median House Value	-1.540 ***	0.583	0.339	0.574	-0.994 ***	0.245	-1.768 ***	0.295	-1.861 ***	0.344
Median Age	-0.197 ***	0.031	-0.108 ***	0.027	-0.084 ***	0.014	-0.194 ***	0.016	-0.190 ***	0.019
% 65 or Older	0.075 ***	0.021	0.038 *	0.021	0.031 ***	0.010	0.048 ***	0.013	0.051 ***	0.016
Unemployment Rate	-0.027	0.020	-0.048 ***	0.016	-0.016 *	0.008	-0.028 ***	0.009	-0.032 ***	0.010
% Minority	0.010 *	0.005	-0.001	0.003	0.004 **	0.002	0.009 ***	0.003	0.007 *	0.004
Owner Occupancy Rate	-0.005	0.006	-0.013 **	0.005	-0.028 ***	0.003	-0.017 ***	0.003	-0.021 ***	0.003
Vacancy Rate	0.013	0.012	0.028	0.017	0.004	0.006	0.002	0.008	0.000	0.010
2000 Relative Income Level	-0.100	0.085	0.141 ***	0.053	0.084 ***	0.016	0.036	0.022	0.054 **	0.025
1990 Relative Income Level	0.063	0.063	-0.108 ***	0.037	-0.060 ***	0.011	-0.022	0.016	-0.034 *	0.018
Mean Credit Score	-0.025 ***	0.004	-0.014 ***	0.002	-0.016 ***	0.001	-0.016 ***	0.001	-0.015 ***	0.002
Expanded Controls										
% High PTI	0.238 ***	0.017	0.154 ***	0.013	0.123 ***	0.007	0.147 ***	0.007	0.136 ***	0.008
% Higher Priced	0.155 ***	0.019	0.099 ***	0.013	0.096 ***	0.006	0.108 ***	0.008	0.102 ***	0.009
% Piggyback	0.572 ***	0.025	0.184 ***	0.025	0.219 ***	0.010	0.342 ***	0.012	0.372 ***	0.013
% No Income	0.093 **	0.043	0.095 ***	0.030	0.156 ***	0.014	0.124 ***	0.017	0.125 ***	0.020
% Low/Moderate Income	0.042	0.032	-0.054 ***	0.018	-0.012	0.010	-0.049 ***	0.012	-0.049 ***	0.014
% Below Median Income	-0.076 ***	0.027	0.062 ***	0.018	0.022 **	0.010	0.043 ***	0.011	0.054 ***	0.013
Observations	2,857		2,016		7,130		9,104		7,150	
RSquare	0.772		0.777		0.747		0.820		0.828	
Dependent variable mean	17.325		10.192		7.987		12.356		13.157	
Additional Hypotheses Tested:				F-Statistics						
(T1) Dep. - In: Satisfactory = Outstanding	3.85 **		0.23		0.01		4.74 **		0.64	
(T2) Aff. - In: Satisfactory = Outstanding	18.30 ***		13.00 ***		0.13		6.34 **		8.82 ***	
(T3) Joint test of (T1) and (T2)	11.63 ***		6.59 ***		0.07		5.09 ***		4.52 **	

Note: See notes from table 2. Sand states include Arizona, California, Florida, and Nevada. Rust belt states include Indiana, Michigan, Illinois, Wisconsin, and Ohio.

Table 5A: Estimations Using Alternative Loan Measures (2001 Controls)

	(1) % High PTI (2004-2006) All Observations 2001		(2) % Higher Priced (2004-2006) All Observations 2001		(3) House Price Change 2001-2006 All Observations 2001		(4) House Price Change 2006-2008 All Observations 2001		(5) House Price Change 2006-2008 All Observations 2001	
Dependent Variable / Sample / Control Period	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
Share of Lending										
Depository - Out	-0.076 ***	0.010	-0.056 ***	0.013	0.039	0.055	0.064 **	0.031	0.069 **	0.031
Depository - In	-0.044 ***	0.007	-0.193 ***	0.009	0.152 ***	0.037	0.077 ***	0.021	0.097 ***	0.021
Affiliate - Out	-0.011	0.009	-0.021 *	0.012	-0.008	0.047	0.040	0.027	0.039	0.026
Affiliate - In	-0.112 ***	0.010	-0.139 ***	0.013	-0.077	0.053	0.084 ***	0.031	0.074 **	0.030
Credit Union	-0.050 **	0.021	-0.191 ***	0.028	0.041	0.112	0.167 ***	0.064	0.173 ***	0.063
GSE Sale	0.021 ***	0.007	-0.169 ***	0.009	-0.095 ***	0.036	-0.025	0.020	-0.037 *	0.020
Purchases as Share of Lending										
Depository - Out	-0.029 ***	0.010	0.059 ***	0.013	0.084	0.055	0.098 ***	0.031	0.109 ***	0.031
Depository - In	0.057 ***	0.017	0.037 *	0.022	0.097	0.089	-0.094 *	0.051	-0.081	0.050
Affiliate - Out	0.058 ***	0.011	-0.033 **	0.015	0.035	0.061	-0.098 ***	0.035	-0.094 ***	0.034
Affiliate - In	0.047 ***	0.014	0.001	0.019	0.270 ***	0.075	-0.022	0.043	0.013	0.042
Credit Union	0.511	0.409	-0.387	0.540	0.600	2.187	-0.943	1.259	-0.864	1.226
Independent Mortgage Company	0.010	0.010	0.070 ***	0.013	0.141 ***	0.051	-0.060 **	0.029	-0.041	0.029
Baseline Controls										
Center City	-0.122	0.107	-1.153 ***	0.141	5.301 ***	0.573	-0.039	0.330	0.658 **	0.322
Relative Median House Value	5.507 ***	0.318	-16.285 ***	0.419	-3.919 **	1.700	2.528 ***	0.979	2.013 **	0.953
Median Age	-0.375 ***	0.020	-0.144 ***	0.026	-0.167	0.106	0.566 ***	0.061	0.544 ***	0.060
% 65 or Older	0.147 ***	0.014	0.075 ***	0.019	-0.424 ***	0.077	-0.398 ***	0.044	-0.454 ***	0.043
Unemployment Rate	0.039 ***	0.013	0.117 ***	0.017	0.245 ***	0.068	0.167 ***	0.039	0.199 ***	0.038
% Minority	0.065 ***	0.003	0.150 ***	0.003	-0.026 *	0.014	-0.006	0.008	-0.009	0.008
Owner Occupancy Rate	0.096 ***	0.004	0.095 ***	0.005	0.101 ***	0.020	-0.097 ***	0.011	-0.084 ***	0.011
Vacancy Rate	-0.047 ***	0.009	-0.023 **	0.012	0.199 ***	0.047	0.066 **	0.027	0.092 ***	0.026
2000 Relative Income Level	-0.048 *	0.029	-0.038	0.038	-0.302 **	0.154	-0.044	0.088	-0.084	0.086
1990 Relative Income Level	0.038 *	0.020	0.021	0.027	0.117	0.108	0.071	0.062	0.087	0.061
Mean Credit Score	-0.014 ***	0.002	-0.075 ***	0.002	0.031 ***	0.010	0.014 **	0.006	0.018 ***	0.006
House Price Control										
House Price Change, 2001-2006									-0.131 ***	0.005
Observations	12,003		12,003		12,003		12,003		12,003	
RSquare	0.851		0.811		0.764		0.514		0.539	
Dependent variable mean	16.938		32.181		61.669		-5.374		-5.374	
Additional Hypotheses Tested:					F-Statistics					
(T1) Dep. - In: Satisfactory = Outstanding	9.78 ***		103.89 ***		4.39 **		0.18		0.86	
(T2) Aff. - In: Satisfactory = Outstanding	87.13 ***		68.82 ***		1.42		1.78		1.19	
(T3) Joint test of (T1) and (T2)	46.51 ***		93.31 ***		2.73 *		1.03		1.11	

Note: See notes from table 2.

Table 5B: Estimations Using Alternative Loan Measures

	(1) % High PTI (2004-2006)		(2) % Higher Priced (2004-2006)		(3) House Price Change 2001-2006		(4) House Price Change 2006-2008		(5) House Price Change 2006-2008	
Dependent Variable: Sample: All Observations; Control Period: 2001	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
Share of Lending										
Depository - Out	-0.075 ***	0.010	-0.057 ***	0.013	0.034	0.055	0.064 **	0.032	0.069 **	0.031
Depository - In (Satisfactory)	-0.007	0.009	-0.209 ***	0.012	0.143 ***	0.048	0.060 **	0.028	0.079 ***	0.027
Depository - In (Outstanding)	-0.079 ***	0.009	-0.175 ***	0.012	0.150 ***	0.047	0.096 ***	0.027	0.115 ***	0.026
Affiliate - Out	-0.011	0.009	-0.022 *	0.012	-0.009	0.047	0.040	0.027	0.039	0.026
Affiliate - In (Satisfactory)	-0.123 ***	0.012	-0.093 ***	0.016	-0.116 *	0.065	0.100 ***	0.038	0.085 **	0.037
Affiliate - In (Outstanding)	-0.098 ***	0.015	-0.205 ***	0.020	-0.020	0.079	0.062	0.046	0.059	0.045
Credit Union	-0.053 **	0.021	-0.186 ***	0.027	0.045	0.112	0.170 ***	0.064	0.176 ***	0.063
GSE Sale	0.018 ***	0.007	-0.165 ***	0.009	-0.098 ***	0.036	-0.023	0.021	-0.036 *	0.020
Purchases as Share of Lending										
Depository - Out	-0.030 ***	0.010	0.059 ***	0.013	0.083	0.055	0.098 ***	0.031	0.109 ***	0.031
Depository - In (Satisfactory)	0.128 ***	0.030	-0.043	0.040	0.113	0.161	-0.158 *	0.093	-0.143	0.091
Depository - In (Outstanding)	0.036 *	0.020	0.059 **	0.026	0.074	0.107	-0.072	0.062	-0.062	0.060
Affiliate - Out	0.055 ***	0.011	-0.030 **	0.015	0.032	0.061	-0.097 ***	0.035	-0.093 ***	0.034
Affiliate - In (Satisfactory)	0.049 ***	0.016	0.046 **	0.022	0.434 ***	0.088	-0.018	0.051	0.039	0.049
Affiliate -In (Outstanding)	0.054 *	0.031	-0.144 ***	0.041	-0.290 *	0.167	-0.039	0.096	-0.077	0.094
Credit Union	0.552	0.409	-0.425	0.539	0.688	2.187	-0.969	1.260	-0.878	1.226
Independent Mortgage Company	0.009	0.010	0.070 ***	0.013	0.135 ***	0.051	-0.059 **	0.029	-0.041	0.029
Baseline Controls										
Center City	-0.092	0.107	-1.159 ***	0.141	5.289 ***	0.573	-0.052	0.330	0.645 **	0.323
Relative Median House Value	5.519 ***	0.318	-16.251 ***	0.419	-3.731 **	1.700	2.524 ***	0.979	2.033 **	0.953
Median Age	-0.371 ***	0.020	-0.148 ***	0.026	-0.159	0.106	0.564 ***	0.061	0.543 ***	0.060
% 65 or Older	0.147 ***	0.014	0.074 ***	0.019	-0.429 ***	0.077	-0.398 ***	0.044	-0.455 ***	0.043
Unemployment Rate	0.040 ***	0.013	0.115 ***	0.017	0.241 ***	0.068	0.167 ***	0.039	0.198 ***	0.038
% Minority	0.068 ***	0.003	0.147 ***	0.003	-0.028 **	0.014	-0.007	0.008	-0.011	0.008
Owner Occupancy Rate	0.096 ***	0.004	0.095 ***	0.005	0.100 ***	0.020	-0.097 ***	0.011	-0.084 ***	0.011
Vacancy Rate	-0.047 ***	0.009	-0.021 *	0.012	0.199 ***	0.047	0.067 **	0.027	0.093 ***	0.026
2000 Relative Income Level	-0.048 *	0.029	-0.046	0.038	-0.300 *	0.154	-0.046	0.089	-0.086	0.086
1990 Relative Income Level	0.038 *	0.020	0.027	0.027	0.116	0.108	0.073	0.062	0.088	0.061
Mean Credit Score	-0.013 ***	0.002	-0.074 ***	0.002	0.032 ***	0.010	0.014 **	0.006	0.018 ***	0.006
House Price Control										
House Price Change, 2001-2006									-0.132 ***	0.005
Observations	12,003		12,003		12,003		12,003		12,003	
RSquare	0.851		0.812		0.764		0.514		0.539	
Dependent variable mean	16.938		32.181		61.669		-5.374		-5.374	
Additional Hypotheses Tested:					*F-Statistics*					
(T1) Dep. - In: Satisfactory = Outstanding	42.33 ***		5.65 **		0.02		1.10		1.23	
(T2) Aff. - In: Satisfactory = Outstanding	1.97		22.08 ***		0.97		0.48		0.23	
(T3) Joint test of (T1) and (T2)	22.29 ***		14.04 ***		0.49		0.80		0.74	

Note: See notes from table 2.

Table 6: Threshold Estimations - CRA

	(1)		(2)		(3)		(4)		(5)		(6)	
									Share of Lending: Depository - In		Purchases: Depository - In	
Dependent Variable:	Delinquency Rate		Delinquency Rate		% High PTI (2004-2006)		% High Rate (2004-2006)		(2004-2006)		(2004-2006)	
Sample:	All Observations		All Observations		All Observations		All Observations		All Observations		All Observations	
Control Period:	2001		2004-2006		2001		2001		2001		2001	
	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
Tract Income Level 1st Differences												
75 minus 76	-0.364 *	0.194	-0.316 **	0.154	0.340	0.277	0.160	0.376	-0.232	0.387	-0.100	0.146
76 minus 77	-0.272	0.186	-0.079	0.148	-0.187	0.267	-0.185	0.361	0.265	0.372	0.116	0.141
77 minus 78	0.698 ***	0.183	0.303 **	0.145	0.069	0.261	0.509	0.354	0.274	0.364	0.003	0.138
78 minus 79	-0.094	0.188	0.024	0.149	0.144	0.269	-0.180	0.364	-0.120	0.375	-0.129	0.142
79 minus 80 (threshold)	-0.051	0.185	-0.027	0.147	-0.012	0.264	-0.196	0.358	0.111	0.368	0.868 ***	0.140
80 minus 81	0.179	0.181	0.114	0.144	0.254	0.259	-0.122	0.351	-0.697 *	0.361	0.053	0.137
81 minus 82	-0.202	0.178	-0.036	0.141	0.008	0.254	0.190	0.345	1.189 ***	0.355	-0.020	0.134
82 minus 83	0.199	0.173	0.088	0.137	-0.243	0.247	0.696 **	0.335	-0.445	0.344	-0.075	0.130
83 minus 84	-0.238	0.165	-0.220 *	0.131	0.543 **	0.236	-0.497	0.320	-0.143	0.329	-0.106	0.125
Baseline Controls												
Unemployment rate	-0.019	0.017	-0.034 ***	0.013	0.051 **	0.024	0.244 ***	0.032	0.009	0.033	-0.047 ***	0.013
Median age	-0.325 ***	0.021	-0.171 ***	0.017	-0.281 ***	0.030	0.013	0.040	0.204 ***	0.042	0.008	0.016
% over age 65	0.097 ***	0.014	0.049 ***	0.012	0.098 ***	0.020	-0.068 **	0.028	0.008	0.028	-0.010	0.011
Center City (Dummy)	-0.110	0.097	-0.236 ***	0.078	0.441 ***	0.139	-0.587 ***	0.188	-0.423 **	0.194	0.383 ***	0.073
% Minority	0.051 ***	0.003	0.012 ***	0.002	0.073 ***	0.004	0.149 ***	0.005	-0.037 ***	0.005	-0.006 ***	0.002
Relative Median House Value	-2.343 ***	0.297	-1.445 ***	0.280	6.590 ***	0.424	-13.207 ***	0.575	2.923 ***	0.592	0.743 ***	0.224
Owner occupancy rate	0.034 ***	0.003	0.004	0.003	0.114 ***	0.005	0.082 ***	0.007	-0.030 ***	0.007	-0.008 ***	0.003
Vacancy rate	0.005	0.009	0.033 ***	0.007	-0.036 ***	0.013	-0.006	0.018	0.080 ***	0.018	-0.052 ***	0.007
Mean Credit Score	-0.026 ***	0.002	-0.020 ***	0.002	-0.024 ***	0.003	-0.093 ***	0.004	0.043 ***	0.004	-0.001	0.002
Expanded Controls												
% High PTI			0.164 ***	0.009								
% High rate			0.112 ***	0.007								
% Piggyback			0.339 ***	0.012								
% No income			0.103 ***	0.019								
% Low/mod Income			-0.043 ***	0.013								
% Below median income			0.021 *	0.011								
Observations	4,766		4,766		4,766		4,766		4,766		4,766	
R-squared	0.404		0.625		0.320		0.575		0.190		0.061	
Dependent variable mean	8.489		8.489		15.248		27.454		22.480		4.361	

Note: *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively. Each estimation is limited to Census tracts that maintained the same CRA and GSE-goal eligibility from 2001-2008 and that had at least 3 home purchase loans and 3 refinance loans in each year. Regressions include fixed effects for MSA which are not included in computing the R-squared.

Table 7: Threshold Estimations - GSE Income

	(1)		(2)		(3)		(4)		(5)	
					% High PTI		% Higher Priced		GSE Sales	
Dependent Variable:	Delinquency Rate		Delinquency Rate		(2004-2006)		(2004-2006)		(2004-2006)	
Sample:	All Observations		All Observations		All Observations		All Observations		All Observations	
Control Period:	2001		2004-2006		2001		2001		2001	
	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
Tract Income Level 1st Differences										
85 minus 86	-0.121	0.144	-0.080	0.117	0.313	0.203	0.012	0.343	0.339	0.309
86 minus 87	-0.333 *	0.137	-0.344 ***	0.111	-0.409 **	0.192	0.237	0.325	-0.297	0.292
87 minus 88	0.485 ***	0.130	0.329 ***	0.106	0.654 ***	0.183	-0.227	0.309	-0.199	0.278
88 minus 89	-0.047	0.132	-0.045	0.107	-0.082	0.186	0.419	0.314	-0.333	0.283
89 minus 90 (threshold)	0.102	0.131	0.224 *	0.106	-0.071	0.184	-0.233	0.311	0.399	0.280
90 minus 91	0.049	0.128	-0.064	0.104	0.050	0.180	0.524 *	0.303	-0.261	0.273
91 minus 92	-0.049	0.125	-0.068	0.102	0.167	0.176	0.069	0.297	-0.290	0.267
92 minus 93	-0.027	0.123	-0.034	0.100	0.069	0.173	-0.266	0.292	0.388	0.263
93 minus 94	0.130	0.122	0.124	0.099	0.021	0.172	0.303	0.289	-0.216	0.260
Baseline Controls										
Unemployment rate	-0.002	0.016	-0.009	0.013	0.041 *	0.022	0.116 ***	0.037	-0.012	0.033
Median age	-0.107 ***	0.016	-0.041 ***	0.013	-0.031	0.023	0.016	0.038	0.062 *	0.035
% over age 65	0.019 *	0.011	0.007	0.009	-0.042 ***	0.016	-0.081 ***	0.026	0.046 *	0.024
Center City (Dummy)	-0.089	0.076	-0.061	0.062	0.068	0.107	-0.659 ***	0.180	0.235	0.162
% Minority	0.082 ***	0.005	0.029 ***	0.004	0.069 ***	0.007	0.138 ***	0.013	-0.062 ***	0.011
Relative Median House Value	-1.567 ***	0.219	-0.527 **	0.218	4.156 ***	0.309	-12.785 ***	0.521	2.683 ***	0.469
Owner occupancy rate	0.023 ***	0.003	-0.002	0.003	0.073 ***	0.004	0.084 ***	0.007	-0.058 ***	0.006
Vacancy rate	0.022 ***	0.007	0.020 ***	0.006	-0.043 ***	0.009	-0.002	0.016	-0.115 ***	0.014
Mean credit score	-0.022 ***	0.002	-0.023 ***	0.002	-0.020 ***	0.003	-0.067 ***	0.004	0.035 ***	0.004
Expanded Controls										
% High PTI			0.136 ***	0.010						
% High rate			0.125 ***	0.006						
% Piggyback			0.189 ***	0.011						
% No income			0.151 ***	0.016						
% Low/mod Income			0.004	0.011						
% Below median income			-0.029 ***	0.010						
Observations	3,684		3,684		3,684		3,684		3,684	
R-squared	0.258		0.511		0.198		0.415		0.149	
Dependent variable mean	5.648		5.648		11.055		22.236		26.834	

Note: same notes as table 6

Table 8: Threshold Estimations - GSE Minority

	(1)		(2)		(3) % High PTI (2004-2006)		(4) % High Rate (2004-2006)		(5) GSE Sales (2004-2006)	
Dependent Variable:	Delinquency Rate		Delinquency Rate		% High PTI (2004-2006)		% High Rate (2004-2006)		GSE Sales (2004-2006)	
Sample:	All Observations		All Observations		All Observations		All Observations		All Observations	
Control Period:	2001		2004-2006		2001		2001		2004-2006	
	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
Tract Minority Share 1st Differences										
34 minus 33	-0.411	0.269	-0.115	0.207	-1.080 ***	0.375	-1.105 **	0.511	1.115 **	0.433
33 minus 32	0.085	0.255	0.102	0.195	0.312	0.355	0.068	0.484	0.093	0.409
32 minus 31	0.025	0.274	-0.167	0.210	0.048	0.381	0.022	0.520	-0.480	0.440
31 minus 30	0.953 ***	0.273	0.720 ***	0.211	0.859 **	0.380	1.175 **	0.519	-0.413	0.439
30 minus 29 (threshold)	-0.484 *	0.258	-0.482 **	0.199	-0.221	0.359	-0.418	0.490	-0.297	0.415
29 minus 28	0.398	0.243	0.447 **	0.187	0.415	0.339	0.965 **	0.462	0.642	0.391
28 minus 27	-0.080	0.239	-0.024	0.184	-0.078	0.332	-1.030	0.453	0.091	0.383
27 minus 26	0.067	0.247	-0.199	0.190	0.142	0.344	0.191 *	0.469	-0.260	0.397
26 minus 25	0.193	0.234	0.189	0.180	-0.179	0.326	0.820	0.444	-0.337	0.376
Baseline Controls										
Unemployment rate	0.005	0.028	-0.012	0.021	0.000	0.039	0.111 **	0.053	-0.043	0.044
Median age	-0.139 ***	0.030	-0.062 ***	0.023	-0.093 **	0.041	0.127 **	0.056	0.050	0.048
% over age 65	0.015	0.021	0.019	0.016	0.024	0.029	-0.047	0.040	0.033	0.034
Center City (Dummy)	-0.264 **	0.133	-0.450 ***	0.103	0.230	0.185	0.040	0.253	-0.431 **	0.214
% Relative income 1990	0.005	0.004	0.003	0.003	-0.009	0.006	0.014 *	0.008	0.016 **	0.007
Relative Median House Value	-1.141 ***	0.428	-0.848 **	0.430	3.993 ***	0.595	-13.057 ***	0.812	-0.772	0.687
Owner occupancy rate	0.031 ***	0.005	-0.008 *	0.004	0.097 ***	0.007	0.091 ***	0.009	-0.078 ***	0.008
Vacancy rate	0.056 ***	0.017	0.011	0.014	-0.090 ***	0.024	-0.037	0.032	-0.101 ***	0.027
Mean credit score	-0.036 ***	0.004	-0.031 ***	0.003	-0.027 ***	0.005	-0.089 ***	0.007	0.050 ***	0.006
Expanded Controls										
% High PTI			0.112 ***	0.015						
% High rate			0.141 ***	0.013						
% Piggyback			0.296 ***	0.018						
% No income			0.231 ***	0.029						
% Low/mod Income			0.008	0.022						
% Below median income			-0.064 ***	0.018						
Observations	1,621		1,621		1,621		1,621		1,621	
R-squared	0.298		0.589		0.276		0.537		0.241	
Dependent variable mean	7.052		7.052		15.206		20.165		24.969	

Note: See notes from table 6. Dummy variables for tract income are included in the regressions and in computing the R-squared.

Table 9: Threshold Estimations -- CRA by State Subsample

	(1)		(2)		(3)		(4)		(5)		(6)	
					% High PTI (2004-2006)		% Higher Priced (2004-2006)		Share of Lending: Depository - In (2004-2006)		Purchases: Depository - In (2004-2006)	
Dependent Variable:	Delinquency Rate		Delinquency Rate									
Control Period:	2001		2004-2006		2001		2001		2001		2001	
Controls Used:	Baseline		Expanded		Baseline		Baseline		Baseline		Baseline	
	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
Sample: Sand States												
Tract Income Level 1st Differences												
75 minus 76	-1.021 *	0.537	-0.286	0.396	0.833	0.560	0.335	0.761	1.065 *	0.608	-0.208	0.240
76 minus 77	-0.382	0.505	-0.512	0.372	-0.908 *	0.527	-0.732	0.716	0.291	0.572	0.118	0.226
77 minus 78	1.402 **	0.493	0.703 *	0.364	-0.242	0.514	0.242	0.698	-1.281 **	0.558	-0.072	0.220
78 minus 79	-0.183	0.532	-0.006	0.391	0.182	0.555	0.475	0.754	0.871	0.602	0.190	0.238
79 minus 80 (threshold)	0.375	0.524	0.143	0.385	-0.066	0.546	-0.741	0.741	-0.827	0.592	0.930 ***	0.234
80 minus 81	0.586	0.534	0.299	0.392	1.204 **	0.557	0.332	0.756	0.021	0.604	-0.395	0.238
81 minus 82	-0.739	0.535	0.349	0.396	-0.695	0.558	0.673	0.758	1.245 **	0.606	0.158	0.239
82 minus 83	0.517	0.481	-0.638 *	0.357	-0.154	0.502	1.266 *	0.681	-2.022 ***	0.544	-0.114	0.215
83 minus 84	-0.601	0.465	0.035	0.345	0.260	0.485	-2.179 ***	0.658	1.260 **	0.526	-0.014	0.208
Sample: Rust Belt States												
Tract Income Level 1st Differences												
75 minus 76	0.308	0.387	0.229	0.319	-0.214	0.675	0.050	0.885	-0.108	0.925	-0.218	0.160
76 minus 77	-0.120	0.357	-0.050	0.294	0.546	0.623	0.464	0.816	0.117	0.853	0.089	0.155
77 minus 78	-0.138	0.352	-0.281	0.290	0.063	0.615	-0.908	0.806	1.446 *	0.843	0.126	0.152
78 minus 79	0.536	0.374	0.375	0.308	1.206 *	0.653	0.682	0.856	-0.340	0.895	-0.137	0.156
79 minus 80 (theshold)	-0.106	0.379	0.104	0.312	-0.363	0.661	0.250	0.867	-0.192	0.906	0.842 ***	0.152
80 minus 81	-0.104	0.373	-0.190	0.307	-0.330	0.651	-0.604	0.853	0.166	0.891	0.069	0.149
81 minus 82	0.471	0.363	0.190	0.300	1.256	0.634	0.211	0.831	1.322	0.869	-0.055	0.146
82 minus 83	-0.796 **	0.354	-0.090	0.295	-1.916 ***	0.618	-0.232	0.811	0.122	0.847	-0.087	0.142
83 minus 84	-0.074	0.326	-0.683 **	0.271	2.045 ***	0.569	0.987	0.745	-1.431 *	0.779	-0.185	0.137
Sample: Other States												
Tract Income Level 1st Differences												
75 minus 76	-0.161	0.198	-0.245	0.154	0.073	0.339	0.530	0.479	-1.003 *	0.533	-0.223	0.203
76 minus 77	-0.103	0.195	0.110	0.152	0.009	0.334	-0.282	0.472	0.040	0.524	0.147	0.200
77 minus 78	0.496 ***	0.190	0.156	0.149	0.160	0.326	1.274 ***	0.461	0.961 *	0.513	0.120	0.196
78 minus 79	-0.239	0.190	-0.035	0.148	-0.085	0.325	-0.741	0.460	-0.474	0.511	-0.301	0.195
79 minus 80 (theshold)	-0.134	0.184	-0.180	0.144	0.121	0.316	-0.022	0.447	0.587	0.497	0.819 ***	0.190
80 minus 81	0.026	0.178	0.092	0.139	-0.103	0.305	-0.266	0.431	-1.125 **	0.479	0.251	0.183
81 minus 82	-0.204	0.174	-0.156	0.135	-0.082	0.298	-0.030	0.422	0.917 *	0.469	-0.090	0.179
82 minus 83	0.373 **	0.174	0.296 **	0.136	0.285	0.299	0.511	0.423	0.074	0.470	-0.058	0.179
83 minus 84	-0.124	0.167	-0.100	0.131	0.151	0.287	-0.009	0.406	-0.147	0.451	-0.297 *	0.172

Note: See notes from table 6.

Table 10: Threshold Estimations - GSE Income by State Subsample

	(1)		(2)		(3) % High PTI (2004-2006)		(4) % Higher Priced (2004-2006)		(5) GSE Sales (2004-2006)	
Dependent Variable:	Delinquency Rate		Delinquency Rate		% High PTI (2004-2006)		% Higher Priced (2004-2006)		GSE Sales (2004-2006)	
Control Period:	2001		2004-2006		2001		2001		2001	
Controls Used:	Baseline		Expanded		Baseline		Baseline		Baseline	
	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
Sample: Sand States										
Tract Income Level 1st Differences										
85 minus 86	-1.386 *	0.709	-0.391	0.490	0.403	0.622	0.625	0.948	-0.113	0.877
86 minus 87	-1.239 *	0.665	-1.135 **	0.453	-0.955	0.584	0.238	0.889	0.116	0.822
87 minus 88	1.814 ***	0.632	0.806 *	0.434	1.497 ***	0.554	0.489	0.845	-1.408 *	0.781
88 minus 89	0.352	0.630	0.338	0.425	0.075	0.553	0.457	0.842	-0.023	0.778
89 minus 90 (threshold)	0.390	0.686	0.678	0.466	-0.717	0.602	-1.935 **	0.917	0.685	0.848
90 minus 91	-0.243	0.787	-0.332	0.532	0.956	0.691	1.574	1.052	-0.009	0.973
91 minus 92	-0.106	0.758	-0.217	0.511	-0.574	0.665	0.573	1.014	-0.117	0.937
92 minus 93	-0.804	0.654	-0.369	0.446	-0.549	0.574	-0.382	0.875	-0.030	0.809
93 minus 94	0.457	0.608	0.164	0.411	-0.314	0.533	-0.393	0.812	0.616	0.751
Sample: Rust Belt States										
Tract Income Level 1st Differences										
85 minus 86	0.466	0.286	0.224	0.239	0.794 *	0.422	1.107	0.742	0.071	0.722
86 minus 87	-0.157	0.264	-0.345	0.221	-0.233	0.390	0.072	0.686	0.137	0.667
87 minus 88	-0.224	0.260	-0.073	0.217	0.604	0.384	-0.461	0.675	0.038	0.656
88 minus 89	0.138	0.260	0.173	0.216	0.092	0.384	-0.085	0.675	-1.402 **	0.657
89 minus 90 (threshold)	-0.017	0.249	0.044	0.208	0.042	0.368	-0.608	0.647	1.657 ***	0.629
90 minus 91	0.508 **	0.240	0.330	0.201	-0.082	0.355	1.157 *	0.624	-1.162 *	0.607
91 minus 92	-0.214	0.229	-0.286	0.189	-0.071	0.338	0.179	0.594	0.097	0.578
92 minus 93	-0.037	0.235	-0.009	0.195	0.676 *	0.347	-0.137	0.610	0.839	0.593
93 minus 94	0.047	0.248	-0.032	0.207	-0.383	0.366	1.074 *	0.644	-0.926	0.626
Sample: Other States										
Tract Income Level 1st Differences										
85 minus 86	-0.030	0.135	-0.030	0.111	0.191	0.240	-0.392	0.417	0.514	0.362
86 minus 87	-0.145	0.129	-0.101	0.107	-0.435 *	0.230	0.257	0.399	-0.456	0.347
87 minus 88	0.368 ***	0.122	0.281 ***	0.101	0.400 *	0.217	-0.323	0.376	-0.045	0.327
88 minus 89	-0.127	0.125	-0.198 *	0.103	-0.025	0.223	0.581	0.386	-0.108	0.335
89 minus 90 (threshold)	0.118	0.123	0.206 *	0.102	0.001	0.219	0.222	0.379	-0.074	0.330
90 minus 91	-0.098	0.117	-0.149	0.097	-0.055	0.209	0.011	0.362	0.062	0.315
91 minus 92	0.034	0.116	0.019	0.096	0.350 *	0.206	0.145	0.358	-0.360	0.311
92 minus 93	0.049	0.116	0.051	0.096	-0.001	0.206	-0.473	0.357	0.233	0.311
93 minus 94	0.123	0.113	0.130	0.094	0.182	0.202	0.299	0.350	-0.229	0.304

Note: See notes from table 6.

Table 11: Threshold Estimations - GSE Minority by State Subsample

	(1)		(2)		(3) % High PTI (2004-2006)		(4) % Higher Priced (2004-2006)		(5) GSE Sales (2004-2006)	
Dependent Variable:	Delinquency Rate		Delinquency Rate							
Control Period:	2001		2004-2006		2001		2001		2001	
Controls Used:	Baseline		Expanded		Baseline		Baseline		Baseline	
	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error
Sample: Sand States										
Tract Minority Share 1st Differences										
34 minus 33	-0.014	0.610	0.357	0.449	-0.572	0.672	-1.619 **	0.801	0.673	0.672
33 minus 32	-0.092	0.528	-0.040	0.387	0.205	0.582	0.175	0.694	0.786	0.583
32 minus 31	-0.711	0.606	-0.913 **	0.448	0.189	0.668	1.001	0.797	-0.681	0.669
31 minus 30	1.862 ***	0.624	1.392 ***	0.465	0.668	0.688	-0.050	0.821	-0.700	0.688
30 minus 29 (threshold)	-0.146	0.583	-0.222	0.431	-0.188	0.643	0.117	0.767	0.114	0.643
29 minus 28	0.014	0.524	-0.045	0.387	0.428	0.577	1.146 *	0.689	0.367	0.578
28 minus 27	0.588	0.563	1.220 ***	0.416	-0.329	0.620	-1.997 ***	0.740	0.903	0.621
27 minus 26	-0.277	0.600	-0.701	0.442	0.351	0.661	0.995	0.788	-1.182 *	0.661
26 minus 25	-0.262	0.534	-0.212	0.393	-0.117	0.588	0.437	0.702	0.959	0.589
Sample: Rust Belt States										
Tract Minority Share 1st Differences										
34 minus 33	-1.174	0.820	-1.546 ***	0.529	-2.165	1.499	1.126	1.891	-1.399	1.505
33 minus 32	0.967	0.884	0.349	0.557	1.864	1.617	-1.393	2.040	1.340	1.623
32 minus 31	0.610	1.005	0.656	0.637	0.901	1.839	-0.466	2.319	1.690	1.845
31 minus 30	0.576	1.043	1.032	0.698	-3.791 **	1.908	3.848	2.406	-2.634	1.915
30 minus 29 (threshold)	-1.593	1.043	-0.255	0.715	-4.006 **	1.907	-3.403	2.405	2.371	1.914
29 minus 28	1.638	1.288	-0.009	0.893	9.398 ***	2.356	1.109	2.972	-3.673	2.365
28 minus 27	-0.091	1.139	-0.742	0.738	-2.313	2.083	1.148	2.627	0.445	2.091
27 minus 26	-0.044	0.888	0.516	0.571	0.696	1.623	-0.150	2.047	0.108	1.629
26 minus 25	0.156	0.836	-0.026	0.539	-1.364	1.530	0.549	1.929	-0.131	1.535
Sample: Other States										
Tract Minority Share 1st Differences										
34 minus 33	-0.295	0.291	-0.005	0.215	-1.116 **	0.467	-1.140	0.717	1.356 **	0.607
33 minus 32	-0.090	0.288	-0.088	0.212	0.214	0.462	0.118	0.708	-0.075	0.599
32 minus 31	0.152	0.288	0.035	0.212	0.144	0.462	-0.129	0.709	-0.595	0.600
31 minus 30	0.619 **	0.280	0.396 *	0.207	0.902 **	0.450	1.279 *	0.690	-0.138	0.583
30 minus 29 (threshold)	-0.678 **	0.268	-0.708 ***	0.197	-0.121	0.430	-0.298	0.660	-0.703	0.558
29 minus 28	0.601 **	0.264	0.660 ***	0.194	0.003	0.423	0.374	0.649	1.173 **	0.549
28 minus 27	-0.405	0.253	-0.346 *	0.187	-0.189	0.407	-0.416	0.623	-0.372	0.527
27 minus 26	-0.158	0.253	-0.259	0.187	0.078	0.406	-0.336	0.623	0.464	0.527
26 minus 25	0.700 ***	0.246	0.558 ***	0.182	0.129	0.394	1.125 *	0.605	-1.189 **	0.511

Note: See notes from table 6.