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The Effect of the Community Reinvestment Act on Bank and Thrift Home Purchase Mortgage Lending

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Abstract

This analysis considers the extent to which the Community Reinvestment Act has led institutions under its authority to increase the number of home purchase mortgage loans to low-and-moderate-income (LMI) borrowers and neighborhoods. The basis for the analysis is a large sample of loans for the 1993-1999 time period submitted by financial institutions under the Home Mortgage Disclosure Act (HMDA) of 1975. The HMDA data for this analysis have been enhanced through linkage to a descriptive file on lenders from the Federal Reserve Board.

The paper describes findings that are consistent with the assertion that CRA has had an effect. A statistical analysis of lending patterns in individual MSA's, which includes economic and demographic controls, demonstrates two relevant facts. First, lenders subject to the requirements of the CRA and their affiliates originate a higher portion of loans to low and moderate-income borrowers and neighborhoods in areas where there is active community organization (empowered by CRA) focused on expansion of credit to LMI borrowers and neighborhoods than in areas where there is not. Second, CRA lenders and affiliates originate a higher portion of loans to LMI borrowers and neighborhoods in metropolitan areas where higher shares of metropolitan area lending take place in CRA assessment areas.¹

The analysis that identifies a positive CRA effect can be used to produce very specific quantitative estimates of how much credit expansion CRA generates. However, given the uncertainties in the model specifications and the inherent imprecision in defining explanatory variables that measure CRA impact, it seems inappropriate to read significance into precise quantitative impacts of CRA. While alternative variables and specifications are not likely to change the measures of direction of CRA impact, they could easily change the magnitude of that impact in important ways.

Finally, it is important to note that the analysis presented here does not answer the question of whether lending to low-and-moderate-income borrowers and communities has increased overall. At one extreme, it is possible that the expanded effort on the part of CRA lenders is at the expense of non-CRA lenders, and that there was no overall increase in the number of LMI loans originated. On the other hand, it is equally possible that all financial institutions, including non-CRA lenders, have benefited from financial innovations designed by CRA lenders, and that the statistical analysis systematically understates the effects of CRA in expanding LMI lending. The analysis described here addresses the narrower issue of whether or not CRA may have influenced CRA-lenders to expand LMI credit flow.

¹ Assessment areas are those geographic regions (typically MSA's) that regulators focus on when evaluating CRA lending performance. CRA lenders may also originate loans outside their assessment areas, but this portion of lending is not included in the formal assessment process.

I. Introduction and Background

The United States Congress passed the Community Reinvestment Act in 1977 to encourage financial institutions to make loans in low-and-moderate-income (LMI) neighborhoods to meet the needs of those communities. The Act was seen as a response to the perception that savings and loan associations and banks were “redlining” low income areas, in effect denying credit to an area based on its perceived average characteristics rather than the actual creditworthiness of individual loan applications (Pogge 1992, Schwartz 1998, 123 Cong. Rec. 17,604 1977). Recently, the Act has been interpreted to encourage lending to low income borrowers, irrespective of the location of their properties.

This analysis considers the extent to which the Community Reinvestment Act has led institutions under its authority to increase the number of home purchase mortgage loans to low-and-moderate-income borrowers and neighborhoods.² The four sections that follow describe the Community Reinvestment Act and how it might be expected to affect loan volume; define the specific tests developed to estimate its effect; present the empirical test results; and summarize the overall conclusions that are supported by the tests.

This analysis is noteworthy, because there have been only a few attempts to study the impacts of CRA on lending patterns, to understand how the results of the Act have compared to the intent of the Act (Evanoff & Segal 1996; Avery, Canner, Calem, Bostic 1999; Shlay, 1988, 1989; and Hula, 1991; Canner and Smith, 1991). Most of the studies of mortgage lending patterns have been cautious in drawing conclusions about the role that CRA may have played in generating observed patterns. The tentativeness of these conclusions mostly reflects weaknesses in the data as well as the difficulties in controlling for other, non-CRA-related influences. Although no empirical study has quantified the effect of the CRA on mortgage lending, several have advanced evidence suggesting CRA has increased credit flows to LMI areas and borrowers, while others

² Low-and-moderate-income borrowers are those who have incomes less than 80 percent of the MSA median. Similarly, low-and-moderate-income neighborhoods are those where median income is less than 80 percent of the MSA median.

have suggested that it has not. Two of these studies are summarized below, to illustrate the ambiguity in the key research findings.

Evanoff and Segal (1996) reached mixed results regarding the effects of CRA in their examination of mortgage lending data over the 1990-95 period. On the one hand, the researchers found that white-black differences in denial rates and applications narrowed for both lenders covered and not covered by the CRA. This evidence, by itself, supports the contention that observed expansion of low-and-moderate-income lending may be due to factors other than CRA³.

On the other hand, Evanoff and Segal also found CRA-eligible loans were an increasing share of the originations made by CRA-covered institutions and their affiliates in the first half of the 1990s, suggesting that CRA may have had a positive effect in increasing LMI originations. The authors also found that the CRA-regulated institutions and their affiliates had much greater shares of their originations in CRA loans in the 1990s (a period of more intensive CRA enforcement activity) compared with the 1980s (a period of less intensive CRA enforcement activity).⁴

Using a relatively robust database on the characteristics of financial institutions and affiliated mortgage companies required to report data under the Home Mortgage Disclosure Act (HMDA), Avery and his colleagues (1999) analyzed the behavior of “consolidating” organizations.⁵ They found that the proportion of LMI home purchase

³ There are more complicated explanations, as well. Independent mortgage companies not covered by CRA sell loans to Fannie Mae and Freddie Mac, which faced new obligations during this period to purchase loans extended to CRA-eligible borrowers and areas as well. Therefore it may be that the CRA had an impact on the depositories, and affordable housing and the GSE goals had an impact on mortgage companies.

⁴ However, these observations about CRA’s potential positive effects may in part have reflected acquisitions of independent mortgage companies (with sizable LMI loan originations) by banks and thrifts. In addition, the authors did not control for the fact that during the 1990s banks and thrifts were required to report on the activities of affiliates even in areas where they did not have branch office, whereas they were permitted not to report on these activities during the 1980s. Finally, the authors also did not control for other possible influences on the changing mix of loans made by CRA-regulated lenders, though they did use a time-series regression to try to control for economic cycle effects.

⁵ CRA-covered institutions generally have the option of reporting their affiliate activities under HMDA under a single filing. In some cases they do so and other cases they do not. Avery and his colleagues managed to create a robust file linking mortgage company affiliates to their bank or thrift parent, as well as information about geographic lending patterns by obtaining data on branch office locations. The new analysis presented here benefits from the Federal Reserve’s file linking affiliates to their parent companies.

originations made by consolidating organizations and their affiliates typically increased in the counties in which they had branch offices. These counties are likely to be included in the assessment areas regulators focus on when evaluating the LMI lending performance of CRA lenders. Moreover, LMI home purchase loans as a share of their total originations increased more among consolidating banking organizations than among organizations that did not engage in merger activity in the same counties. Because weak LMI lending performance is evidence regulators can use to block mergers, it is logical that merging institutions would strive more vigorously than non-merging institutions to expand LMI lending.

Avery and his colleagues concluded that these findings were consistent “with the view that the CRA has been effective in encouraging bank organizations, particularly those involved in consolidation, to serve LMI and minority borrowers and neighborhoods.” At the same time, Avery and his colleagues also found that consolidating banking organizations lost market share over the period to independent mortgage and finance companies and credit unions. This loss of share suggests that factors other than CRA may have been at work.

The analysis of CRA effect reported here focuses on home purchase lending, and ignores home refinancing and business loans. Regulators have emphasized home purchase loans. Also, home purchase lending is a significant part of all LMI lending, and in 1998 accounted for slightly over one-third of single-family mortgage lending, small business lending, and community development lending combined.

II. The Community Reinvestment Act and Its Expected Effects

The CRA of 1977 affirms the obligation of federally insured deposit-taking institutions to meet the credit needs of the entire communities in which they take deposits, including low and moderate income borrowers and neighborhoods, consistent with safe and sound business practices. The four regulators of these federally insured institutions (the Federal Reserve Board, the Office of the Comptroller of the Currency, the Federal Deposit Insurance Corporation, and the Office of Thrift Supervision) are required to assess the CRA performance of banks and thrifts. Lenders evaluated under the CRA receive a grade

for their performance and effort in meeting the credit needs for low-and-moderate income borrowers and neighborhoods. Clearly, the intent of the act is to encourage CRA lenders to expand LMI loan originations.

The main incentives for lenders to at least comply with the Act by achieving a satisfactory rating, or to go further and strive for an outstanding rating, are that a CRA institution's lending record and grades are released to the public and must be considered when regulators are asked to approve any of the following:

- applications for a federal bank or thrift charter or FDIC deposit insurance;
- plans to relocate a main office or to establish or relocate a branch; or
- efforts to merge, consolidate, or acquire the assets or assume the liabilities of another regulated depository institution

As a result, banks and thrifts that care about their public reputations or intend to acquire other institutions may well be motivated to strive for high marks on CRA because no other single measure signals the commitment of a bank or thrift to low-and-moderate income (LMI) borrowers and areas as clearly its CRA grade. Moreover, some government agencies and state and local governments will only place their deposits with banks that have earned high CRA ratings.

There are reasons to suspect that CRA may have been more effective in the 1990s than in earlier years. Focus groups with regulators, lenders, and leaders of community-reinvestment oriented nonprofit groups that were conducted for a project funded by the Ford Foundation suggest that regulatory behavior has evolved in several stages.⁶

1. Through much of the 1980s regulations were seen as being enforced inconsistently, and CRA was not perceived as having a major effect on lender behavior. However, during this time period, community groups were beginning to urge banks and thrifts to expand CRA lending, and banks and thrifts were experimenting with new products. As a result, infrastructure was being put in place that could support expanded LMI lending.

2. In 1989 the CRA took on a more prominent role with lenders. CRA ratings, which had been confidential, became publicly available. Community groups gained access to more information about lending patterns after legislation

⁶ Belsky, Lambert, & von Hoffman 2000.

was passed to expand the Home Mortgage Disclosure Act to include information on individual loan applicants and application disposition. For the first time under CRA, a merger was denied.

3. In 1995, the CRA regulations were strengthened still further. Evaluation standards were revised, and more attention was given to ‘quantitative measures of loans originated’ than marketing and outreach efforts. Lenders, regulators, and community groups all felt that this brought about significant changes in bank and thrift behavior.

Mergers in the financial industry accelerated in the 1990s and probably heightened awareness of CRA regulations. Because a proposed merger or acquisition could be blocked due to CRA considerations, it is reasonable to assume that senior management of banks and thrifts became more conscious of and responsive to CRA requirements, to avoid regulatory actions that could disrupt consolidation plans.

It is difficult to say to what extent CRA seems to have influenced lending by CRA-regulated institutions and their affiliates throughout the 1990s because other changes occurred simultaneously that likely helped expand credit flows to lower and moderate-income borrowers and neighborhoods. The economy expanded strongly, competition in metropolitan markets increased because an increasing number of institutions operated with a national scope, Fannie Mae and Freddie Mac pursued federal goals for expanding credit to low-and-moderate-income borrowers, new technologies permitted institutions to better measure and manage mortgage risks, and the enforcement of fair lending laws intensified. The tests defined in the next section are designed to sort out these various influences and more clearly isolate the CRA effect.

III. Two Specific Tests of CRA’s Effects

CRA should increase lending to LMI individuals and neighborhoods. This analysis includes two specific tests of the existence of this increased lending.

- **The LMI Loan Growth Rate Test** First, over the 1993 to 1999 time period, did institutions subject to CRA examinations expand originations of home purchase loans faster than institutions not under CRA?

- **The LMI Origination Share Test** Second, over the 1993 to 1999 time period, to what extent did the existence of CRA cause institutions to originate a higher proportion of their total home purchase loans to lower income borrowers and/or lower income neighborhoods ?

The tests are based on a large sample of loans for the 1993-1999 time period. The source of this sample comes from information submitted by financial institutions under the Home Mortgage Disclosure Act (HMDA) of 1975. As currently amended, HMDA requires that depository institutions and their affiliates, savings and loan corporations, credit unions, and nondepository mortgage lenders submit information on each of their loan originations and purchases that are tied to applicants located in Metropolitan Statistical Areas. The required information used for this report includes income of an applicant and the geographic location of the property for which the loan is being sought, so LMI loans can be distinguished from other loans.

At least two studies have concluded that HMDA data cover over three-quarters of all originations in metropolitan areas⁷, so that it is generally considered to be a representative picture of originations. Underreporting is thought to be most prevalent among independent mortgage and finance companies. Reporting among banks and thrifts (the institutions covered by CRA) and their affiliates is thought to be nearly complete among those required to report. Smaller banks and thrifts are exempt from HMDA, however, and so do not report at all, nor do banks operating in rural areas.

The HMDA data used in this analysis has been enhanced by linking it to a descriptive file on lenders from the Federal Reserve Board. This descriptive file makes it possible to classify individual lenders as being covered or not covered by the requirements of the Community Reinvestment Act. In addition, the file makes it possible to classify some lenders as being specialized in subprime loans or in loans related to manufactured housing.

⁷ Avery and his colleagues (1999) estimate that HMDA data from 1993 to 1997 contain about 80 to 87 percent of home purchase loans in metropolitan areas, which is broadly consistent with Bunce and Scheesle's (1996) finding that HMDA data covers about 75 to 80 percent of GSE purchases in metropolitan areas.

IV. The Empirical Results

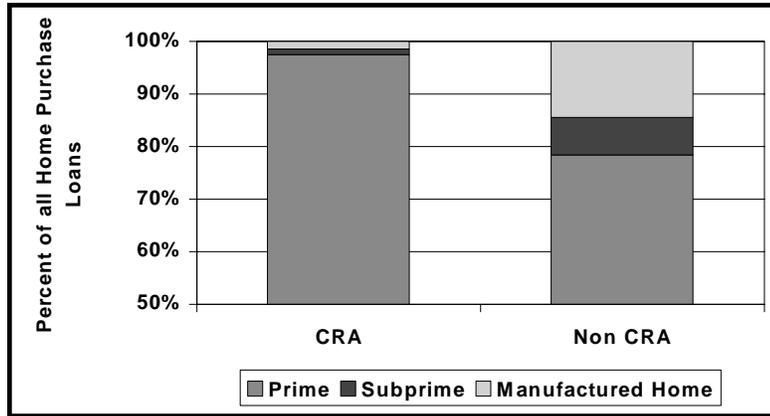
This section reports the results of both a national benchmarking test and a pooled time-series, cross-section test based on MSA-level observations. The national benchmarking test focuses on the growth of LMI loans originated by CRA lenders and their affiliates, while the MSA-level analysis reviews the increase in share of all CRA lender and affiliate loans that can be classified as LMI.

One way to understand the effect of CRA on lending institutions is to benchmark the national home purchase lending performance of CRA lenders and their affiliates against the performance of independent mortgage banks and credit unions. These “non-CRA covered” lenders accounted for about one third of all LMI lending during the 1993-99 period. Using this group as a benchmark roughly controls for economic and other changes that might also explain the expansion in overall CRA lending. Both groups were influenced by the same changes in the marketplace, but independent mortgage companies and credit unions were not subject to the CRA regulations, so the comparison has the potential to highlight the independent effects of the CRA.

Three observations about the overall lending data are essential before comparing the performance of CRA lenders and their affiliates to the performance of independent mortgage banks and credit unions. The first observation relates to the difference in loan product mixes between CRA lenders and their affiliates and independent mortgage banks and credit unions, while the second relates to the impact of acquisitions on the growth rate calculations.

Over the 1993 to 1999 time period, LMI home purchase loan originations from CRA lenders and affiliates specializing in subprime and manufactured home lending increased dramatically. However, they remained much less specialized than other lenders in these types of lending (Figure 1), and virtually all of the LMI lending over this period from CRA lenders came from prime lenders. Consequently, the home purchase loan product mixes were different for CRA lenders and non-CRA lenders.

Figure 1: CRA lenders' and affiliates' loans to LMI borrowers and areas were much more likely than non-CRA lenders to be made by prime lending specialists, 1993-1999.



Note: Non-prime loans are defined here as loans made by lenders classified by HUD as subprime or manufactured home lending specialists. Percentage breakdowns are for LMI lending only.

A second key observation about the home purchase lending from depository institutions and their affiliates concerns recent acquisitions. Acquisitions of non-bank lenders by banks and thrifts over the period complicate any benchmarking analysis. CRA-lender acquisitions of independent mortgage companies since 1993 increased their LMI lending. Using HMDA data and other records it is possible to identify non-bank affiliates that were acquired by banks or thrifts after 1993, but only if the acquired institution retained a separate HMDA reporting number. As a result, affiliate acquisitions that resulted in the termination of the acquired institution's HMDA reporting identification number are not traceable. This would suggest that the available data underestimate the share of any increase in lending attributable to acquired affiliates. On the other hand, many banks moved increasing shares of all of their activities to their affiliates over the period—including affiliates purchased after 1993. That would tend to overstate the share of the increase attributable to acquired affiliates. The estimate of the share of lending contributed by acquired affiliates is therefore imperfect and it is impossible to determine with available data whether it is an over- or under-estimate. However, in a national benchmarking analysis, the importance of acquired affiliates

suggests it is important to look at the data with and without known acquired affiliates included, to see if the conclusions depend on how these acquired affiliates are treated.

A third observation relates to the assessment area definitions of banks and thrifts. CRA performance evaluations focus on particular geographic areas that represent the key deposit-gathering areas of each lender. In the 90's banks and thrifts were expanding the scope of their lending activities to reach out beyond the boundaries of the deposit-gathering areas. Consequently, less than half of all bank and thrift lending nationwide falls within assessment areas. Arguably, CRA should stimulate loan originations inside assessment areas more than outside assessment areas.

Figure 2 presents benchmark comparisons of Non-CRA and CRA lenders over the 1993 to 1999 time period. During that time non-CRA lenders grew their LMI lending at an annual rate of 11 percent, while CRA lenders and affiliates expanded their lending slightly faster, by 11.6 percent. Differences in average annual growth rates of CRA lenders and non-CRA lenders appear after disaggregating prime lenders and other lenders (subprime and manufactured home lenders) separately. From this perspective CRA prime lenders grew lending more than 50 percent faster than non-CRA prime lenders, and CRA subprime and manufactured home lenders grew lending almost 100 percent faster than non-CRA lenders.

The performance assessment of CRA lenders reverses if only the activity of CRA lenders inside their assessment areas is considered. From that perspective, CRA lenders had lower growth rates than non-CRA lenders, principally because the LMI growth rates of CRA prime lenders (6.0 percent) were lower than CRA growth rates of non-CRA prime lenders (6.7 percent). Netting out the lending of known-acquired affiliates further widens the gap between CRA lenders and non-CRA lenders.

It's not possible to draw firm conclusions from this national benchmarking test. Conceptually, focusing solely on assessment area lending seems superior to focusing on total CRA lending, because CRA lenders face regulatory scrutiny only in those areas. This approach suggests that CRA lenders have grown CRA lending more slowly than non-CRA lenders. However, uncontrolled differences between assessment areas and non-assessment areas may be influencing the results. Consequently, the next section of

this paper uses a more robust statistical technique to control for these economic and demographic differences, and produce a more reliable test of CRA effects.

Figure 2: Benchmarking CRA Lenders at the National Level leads to Ambiguous Results. Some Categories of CRA-Lender LMI Loan Originations Grew Faster than non-CRA Lender LMI Originations, while Others Grew More Slowly.

Lending Source	Prime Lenders	Subprime and Manufactured Home Lenders	Prime, Subprime, and Manufactured Home Lenders
	Average Annual Growth Rate of LMI Home Purchase Loan Originations 1993 to 1999		
Non-CRA Lenders	6.7%	36.6%	11.0%
CRA Lenders	10.4%	84.7%	11.6%
CRA Lenders Inside Assessment Areas	6.0%	83.1%	6.7%
CRA Lenders Outside Assessment Areas	15.7%	85.3%	17.6%
CRA Lenders Inside Assessment Areas with Lending of Known Acquired Affiliates Netted Out	5.9%	66.1%	6.3%

The objective of the econometric modeling described here is to determine if the CRA, independent of other factors, has worked to promote bank and thrift lending to LMI individuals and communities. The regression model described here is based on pooled time-series/cross-section data for US Metropolitan Statistical Areas from the 1993 to 1999 time period.

Few previous studies have modeled geographic variations in mortgage credit flows. Megbolugbe and Cho (1993) model these variations at the metropolitan level. Evanoff and Segal (1996) review a handful of other studies that have modeled these flows at the census tract level (Ahlbrant 1977; Hutchinson, Ostas, & Reed 1977; Avery & Buynak 1981; Bradbury, Case & Dunham 1989; Shlay 1988; Shlay 1989; Holmes & Horvitz 1994; Perle, Lynch, & Horner 1993).⁸ Most of the studies at the census tract

⁸ Evanoff and Segal (1996) are the only authors to publish a study modeling a direct measure of CRA lending performance. They hypothesize that one effect of increased regulatory enforcement would be to increase the overall volume of lending, as lenders, responding to CRA and related legislation, target and service borrowers that they were previously passing over. They construct a series of models of the quarterly change in mortgage originations as a function of economic variables and dummy variables intended to capture any structural shifts in lending patterns occurring after 1990 and subsequent years.

level have focused on a single metropolitan area. In these previous studies, the dependent variables most commonly modeled are levels of mortgage lending, expressed as number of loans or dollar volume. The dependent variables are often divided by the number of owner-occupied homes in the tract or metropolitan area to standardize for variations in level of mortgage demand by tract. The independent variables typically used to account for variation in cross-MSA or cross-tract volumes of total mortgage credit flows in these studies focus on economic, demographic, housing supply, mortgage supply, and housing demand. The most common economic variable included in these analyses is median household income. Housing market variables include the number of building permits issued, vacancy rates, and share of owner-occupiers. Measures such as number of branch offices and total amount of deposits are used to capture the influence of mortgage supply in the area. Typical demographic variables include shares by race, shares of different family types, shares by age of household head, and median household size.

Unlike these previous studies, the dependent variable here focuses directly on CRA lending performance: **the LMI home purchase loan origination share of CRA lenders and their affiliates, net of those affiliates acquired after 1993 in each metropolitan area.**⁹ This variable was selected because it is one of the measures that bank examiners have used since 1995 under the CRA lending test to evaluate CRA lending performance of banks, thrifts, and their reported non-bank affiliates. Modeling metropolitan variations in this measure for CRA lenders and their affiliates closely models the approach taken by regulators. Regulators implicitly acknowledge that variations in economic conditions, regulatory effects, and other factors across metropolitan areas render comparison of the CRA lending performance of individual CRA lenders to national benchmarks as inappropriate. As a result, regulators compare performance of individual CRA lenders to a peer group drawn from comparable lenders in their communities (Belsky, Lambert, & von Hoffman 2000). Thus, the modeling approach followed here parallels the regulatory process and presents an opportunity to

None of their year dummies suggest that statistically significant changes in lending patterns occurred after any of the cutoff years they tested. This study, however, did not have the advantage of the additional years of data that we were able to use in the analysis report here.

⁹ Including the known acquired affiliates makes the modeling more difficult, since the growth rate and origination shares would then reflect a “relabeling” of lending as well as behavioral changes of existing institutions.

test for the influence of CRA, economic conditions, demographics, loan reselling activity and other factors on the CRA lending performance of CRA lenders and their affiliates.

MSA-level regressions of mortgage credit flows are also subject to spatial aggregation bias, which may be particularly problematic for examining home mortgage loan flows to LMI neighborhoods.¹⁰ While the models used examine the influence of MSA-level factors on credit flows at the MSA level, the supply and demand for mortgage credit varies down to the census tract level. For this reason, the effects of factors that influence credit flows at the census tract level could be lost when averaged over an entire MSA. Such factors would then erroneously appear not to influence the MSA-level measures of credit flows that constitute the dependent variables in the models. Similarly, estimates of the coefficients on independent variables may be biased. Investigating the effect and direction of spatial aggregation bias on our results would require building similar models at lower levels of geographic aggregation. The results of these models would then have to be compared against the observed importance of the various factors in each set of models, as well as with what is known about the determinants of credit flows from existing research. For these reasons, further research in the area covered by this study is warranted.

The modeling effort presented below attempts to account for the variation in CRA performance for CRA lenders and their affiliates, net of known acquired affiliates, across metropolitan areas. Affiliates that retained their HMDA identifier after acquisition and thus known to have been acquired after 1993 are netted out because we wish to isolate changes in CRA lending achieved by institutions net of those due to merger and acquisition.

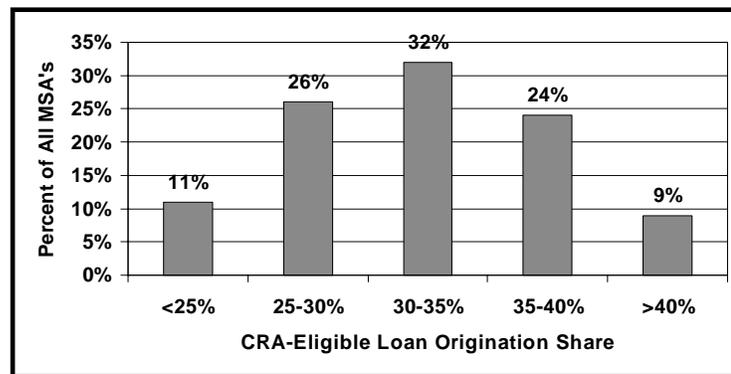
The average proportion of lending by CRA lenders and affiliates that is LMI is referred to as their “LMI origination share.” For the data used in the analysis, the average value of the LMI origination share is 31 percent, with a standard deviation of 6 percent.

¹⁰ This is bias introduced by using too large or small a spatial unit of aggregation to capture the process being modeled. Because mortgage markets are segmented by neighborhoods at the metropolitan level, using metropolitan areas as the unit of aggregation averages values of the variables in the model across variations in neighborhood mortgage markets, potentially biasing estimates of model coefficients.

The mean and standard deviation are not weighted by MSA size (in other words, each MSA observation counts equally in the calculation of the average and variance).¹¹

Figure 3 illustrates the wide range of observed LMI origination shares at the MSA level. The loan origin shares vary both across time and across MSAs. For example, the LMI loan origination share in Birmingham increases from 27 percent in 1993 to 35 percent in 1999. Over the same time period, Baltimore's share increases more slowly, from 35 to 39 percent, but is higher than Birmingham's in each individual year. In San Francisco, the LMI loan origination share is stable at about 23 percent over the entire 1993 to 1999 time period.

Figure 3: The LMI loan origination share ranges from less than 25% to over 40%



Interpreted as a performance measure, higher values of the dependent variable indicate stronger CRA lending performance.¹² Thus, the modeling effort is designed to identify which CRA impact independent variables have positive coefficients, indicating that higher values of the CRA impact variables are associated with higher values of the performance measure.

¹¹ The 1,260 observations in the origination share dependent variable result from looking at origination share over seven time periods (1993, 1994, 1995, 1996, 1997, 1998, and 1999) in a pooled cross section time series framework. Theoretically, there would be 306 observations for each of the seven time periods (1 for each MSA for each year), resulting in 2,142 observations. However, use of a potent housing affordability measure in the models restricted the number of metropolitan areas to 180 and the observations to 1,260.

¹² This stronger performance could either indicate an overall expansion of credit to low and moderate income borrowers and neighborhoods or a diversion of originations from non-CRA lenders.

In theory, a variety of factors including (1) economic conditions, (2) housing market conditions, (3) demographic characteristics, (4) regulatory influences, and the (5) industrial organization of mortgage markets (including product specialization and historic levels of services of different types of institutions in different areas) should influence the CRA home purchase loan performance of CRA lenders and their affiliates. This section describes some specific measures for each of these influences and the expected relationship between these influences and the CRA lending performance of CRA lenders and their affiliates. We use some, but not all, of the independent variables used in used in previous studies, as our dependent variable differs from the dependent variable of other models.

To maximize the use of available information, cross-sectional data on 180 metropolitan areas were pooled for the years 1993 through 1999. Individual year dummies were included to control for the fixed effects of time on the origination share levels. Because of the small number of observations after controlling for fixed effects of time and because of the lack of priors about the structure of the error term, no corrections were made for the possible presence of heteroskedasticity. Correcting for its presence might result in smaller standard errors, yielding more efficient estimates. As a result, the statistical significance of the variables reported below is likely understated, producing conservative estimates of significance. The model also does not control for possible serial correlation because the number of observed time periods is too small to support meaningful testing and correction.

For the origination share model, CRA lending performance (P) in metropolitan area (i) in a particular year (t) is modeled as a linear function of a vector of CRA regulatory impact variables (R), economic variables (E), housing market variables (H), demographic variables (D), industrial organization variables (I), time dummy variables (T), and an error term (e).¹³

¹³ In a methodological contribution on the modeling of credit flows across spatial units (census tracts), Galster (1992) concludes that both linear and double-logarithmic regression models are consistent with some "minimal theory" of geographic variations in homes-sales and lending processes. Following this guidance, the econometric models presented here are linear. Hula (1992) also uses a linear model, though his variable specifications are criticized by Galster (1992), who also critiques the semi-log models of Shlay, Goldstein, & Bartelt (1992). Furthermore, it is important to note that, while Galster additionally suggests standardizing by some measure of the number of properties that *could* be bought with a mortgage when modeling variations in loan *volumes*, because the models presented here are of variations not in levels but

$$P_{it}=f(R_{it},E_{it},H_{it},D_{it},I_{it},T)+e.$$

The variables that fall within each of the vectors in the simple linear model are listed in Figure 4, along with their mean values and standard deviations across metropolitan areas.

Figure 4: Variable Definitions and Descriptive Statistics

Independent Variable Name	Mean Value for 93-99 Time Period	Std. Deviation for 93-99 Mean Values	Expected Sign in Origination Share Model
CRA Variables			
Presence of lending agreement during part or all of the 93-99 time period	0.285	0.452	Positive
Share of CRA lender Loans which are inside performance evaluation assessment areas in time period t	0.590	0.157	Positive
Economic Variables			
Median Household Income (000's) in Time Period t	44.359	8.437	Positive
Average Unemployment Rate in time period t	0.054	0.027	Negative
Housing Market Variables			
Average Level of Housing Affordability in time period t	69.367	13.621	Positive
1990 Average Level of Home Ownership	0.638	0.066	Positive
Demographic Variables			
Proportion of loans to black borrowers in time period t	0.055	0.049	Ambiguous
Proportion of loans to Hispanic borrowers in time period t	0.068	0.111	Ambiguous
Proportion of loans to black borrowers in time period t Squared	0.006	0.010	Ambiguous
Proportion of loans to Hispanic borrowers in time period t Squared	0.017	0.069	Ambiguous
Industrial Organization and Control Variables			
Share of MSA loans repurchased by GSE's in time period t	0.256	0.075	Positive
Proportion of non-conventional loans (FHA, VA, FMHA) in time period t	0.244	0.117	Positive

in the *ratio* of LMI loans to other loans and within-areas rates of increase, they are not directly subject to this caution. While it is important to control for variations in homeownership opportunities, these variations are controlled for by including the metropolitan area homeownership rate as an independent variable, rather than by dividing the dependent and several of the independent variables by the potential number of for-sale homes as Galster suggests.

In most cases, the specification of the variables selected and their reasons for inclusion are straightforward. A discussion follows of the variables, the reason for their selection, their functional forms, and their expected relationships to the dependent variables. Important omitted variables include a more direct measure of mortgage lending risk, which is concentrated among borrowers who make low down payments (though an unemployment rate variable proxies for it), and more precise measures of differences in unemployment and income growth rates by race and income in each metropolitan area.

V. CRA Effect Variables

Two measures of CRA regulatory effects are used in this analysis. One is the share of CRA lender originations to LMI borrowers and areas that are made inside CRA assessment areas in a metropolitan area. The other is the presence or absence of lending agreements between lenders and community groups to promote LMI lending.

Assessment Area Lending

The principal measure of CRA impact used here is the proportion of CRA lender and affiliate lending that takes place in the institution's performance assessment areas. As a proxy for detailed definitions of performance areas, a loan here is considered assessment area lending if it is originated in an MSA where the lender has a branch office. If CRA is having an effect, it is reasonable to expect that LMI origination shares will be higher in MSAs where a greater proportion of the lending takes place inside assessment areas, because it is only in these areas that they receive credit for LMI lending. In addition, growth may also be faster for those MSAs where a greater proportion of all lending takes place inside assessment areas. Therefore, we expect this variable to be positively associated with CRA origination share levels.

The proportion of all CRA-lender lending inside assessment areas varies across MSAs, and, in general, trends downward over the 1993 to 1999 time period. For example, in Akron, Ohio, the assessment area share of lending declines from 47 percent to 36 percent over the 1993 to 1999 time period. In Las Vegas, the share is much lower, averaging only about 11 percent over the time period. In contrast, the share of

assessment area lending is much higher in Bloomington, Indiana, declining from 61 percent in 1993 to a still large 43 percent of all CRA-lending in 1999.

Presence of Lending Agreements

The National Community Reinvestment Coalition publishes *CRA Commitments*, which documents known agreements between CRA lenders and local community groups. For modeling purposes, any MSA where there was evidence of a lending agreement in place during part or all of the 1993 to 1999 time period was flagged as having an agreement presence. In such cases the variable is set to one, and it is set to zero for all other MSAs. One would expect that MSA's with lending agreements to have better CRA performance as measured both by higher LMI loan origination shares. Whether or not the agreements are cause or effect of this performance, one would expect the sign on this variable to be positive in both equations.

Lending agreements are more likely to be in place in larger MSAs rather than smaller MSAs. For example, Baltimore, Boston, Houston, and Washington, D.C. had agreements in place, while Muncie, Oklahoma City, and Mobile did not. However, not all large MSAs had agreements: Oakland, San Diego, and Nassau-Suffolk all had this variable coded as zero for all years.

These variables are not ideal measures of the effects of CRA, and are fairly weak in some respects. The lending agreement variable, in particular, has deficiencies because it does not capture the timing or size of agreements in place. In addition, and even more importantly, it is possible that lenders sign CRA agreements in places where they know they can meet these commitments. Therefore it is possible that signed agreements are an effect rather than a cause of CRA performance. Nevertheless, for reasons discussed below, a plausible case can be made that agreements are signed as a result of pressure brought to bear or the threat of a problem when applying to merge or acquire another bank or thrift.

Measures of merger activity in each MSA over the relevant time period would be another way to test for CRA treatment effects, since the greater the number of mergers and acquisitions the greater the number of opportunities for CRA performance to have a direct impact on bank and thrift plans. However, creating such a measure is difficult and was beyond the scope of this study. A measure that would perhaps be even more

desirable would be the number or share of merger applications from institutions doing business in each MSA that were challenged or conditioned over the period. This would be a direct measure of demonstrated effect of CRA-related merger and acquisition problems in the metropolitan area. Such measures were unavailable, however.

Economic Variables

The economic variables used to model CRA lending performance are the average levels of median household income and unemployment.

Median Household Income: Median household income is postulated to influence the LMI origination share variable because the credit scores of higher income borrowers are generally higher than those of lower income borrowers. Because LMI cutoffs are defined with reference to metropolitan-wide median incomes, higher median incomes may well translate into lower mortgage risks without leading to smaller proportions of borrowers falling below LMI cutoffs. Therefore, in the origination share equation one would expect median household income to come in with a positive sign. Galster (1992) suggests using median household income in cross-sectional models of geographic credit flows and Megbolugbe and Cho (1993) use it in their models of variations in conforming loan credit flows across MSAs.¹⁴ We control for cost of living by using a housing affordability proxy.

Local Unemployment Rate One would expect, all other things equal, CRA lenders in MSAs with lower prevailing unemployment rates will have higher CRA loan origination shares because more LMI borrowers are likely to apply and more are likely to be approved. In general, high unemployment as well as rising unemployment typically hit those in lower wage and salary positions harder and has a more significant impact on their capacity to qualify for a mortgage because they are closer to the margin of qualification anyway.

¹⁴ They do not find median household income to be a significant determinant of the flow of what they call "low conventional loans" -- conventional loans below the conforming loan limits. Modeling at the tract level in Detroit, Perle, Lynch & Horner (1993) find median income significant in a variety of models where the dependent variable, lending volume, is specified as the total for the tract and as the log of the total.

Housing Market Variables

The housing market variables used to model CRA lending performance are the average of National Association of Home Builders' (NAHB) Housing Opportunity Index over the 1993 to 1999 period and the homeownership rate in 1990.

Housing Affordability LMI loans are easier to originate in areas where housing is more affordable. LMI borrowers, who are closer to the margins of qualifying for a mortgage than other borrowers, would find it easier to qualify for loans to buy homes that are less expensive relative to their lower incomes. Consequently, affordable MSAs should exhibit higher LMI loan origination shares. The specific measure of housing affordability used is NAHB's estimate of the share of homes in an MSA that are affordable to a median income household.

Home Ownership Rates Home ownership rates tend to increase as a higher fraction of low and moderate income households become owners. Accordingly, we expect a positive relation between home ownership rates and the demand for mortgages on the part of lower income households. This increased demand for mortgages will make it easier for lenders to meet CRA goals and raise the proportions of CRA lending.

Demographic Variables

The demographic variables used here to model CRA lending performance are measures of the proportion of MSA-wide lending to black and Hispanic borrowers. Both Megbolugbe and Cho (1993) and Perle, Lynch and Horner (1993) suggest including the proportion of the population that is young and therefore might be more likely to have low incomes and be in the market to buy their first homes. However, including the share of the population aged 25-34 in the models tested revealed miniscule effects on the dependent variables that were not statistically significant. As a result, they were dropped from the models.

Minority Population Share The expected influence of minorities' shares of the population and their geographic concentration within metropolitan areas on CRA lending performance is ambiguous because, among other things, minority shares are correlated with many of other independent variables, such as unemployment rate. Thus, estimates of the race effects may be biased and priors about the direction of its effects difficult to establish. It may be the case that, because of the locations of minority populations or loan

offices, or because of product differences in the loans minorities select, CRA lenders and their affiliates will have differential success serving minority and white populations. In particular, these effects could lead to an inverse relationship between the measures of minority share and concentration, and the CRA lending performance measure.

It may also be the case that, because minority populations have historically been underserved, relatively large or concentrated minority populations in an MSA create opportunities for LMI loan expansion. It is important to note that this effect will not necessarily be related to the overall minority population of the MSA, and could instead be related to the degree to which the minority population is concentrated and segregated, suggesting greater historical discrimination in housing markets. In either case, these effects could lead to a positive relationship between the minority demographics and the CRA lending performance measure.

Some effort was made to test for different specifications of the racial and ethnic variables because, as Galster (1992) persuasively argued, the effects of these variables may be nonlinear.¹⁵ It may be, for example, that only as the population proportions reach threshold levels do the effects on CRA lending performance come into play. Since there is no *a priori* method for establishing cutoffs for categorical dummies to capture these nonlinearities, models were run with squared and cubic forms of the race and ethnic variables. The specification that used squared terms had the greatest statistical significance and is reported below.

Market Organization and Control Variables

The market organization and control variables used to model CRA lending performance include the MSA-wide proportions of non-conventional lending (FHA, VA, RHS) and loans resold to Fannie Mae and Freddie Mac.

FHA/VA/RHS (non-conventional) lending The proportion of lending that is non-conventional (principally FHA lending) is used as an explanatory variable because in MSAs where the non-conventional percentage is higher, one might expect higher CRA loan origination shares because the government insurance programs reduce the riskiness of originating LMI loans. However, it is less likely but it could also be argued that the

¹⁵ Because there is reason to believe that the influence of race might be different from ethnicity, black and Hispanic shares of home purchase loan originations were entered separately into the model.

effect could be a negative one, because non-CRA lenders use FHA insurance more intensively than CRA lenders. Indeed, where FHA's presence is greater so too are the market shares of mortgage companies. Consequently, higher FHA shares across the MSA could result in weaker CRA lender origination share performance.

Resold Loans Lenders have the option of reselling the loans they originate to other institutions, primarily to Fannie Mae and Freddie Mac for prime, conventional conforming loans and to private label companies for subprime loans. The existence of a secondary market should increase originations, as the sale of the loans can free up capital for the originator.¹⁶ Beginning in 1993, the Department of Housing and Urban Development (HUD) established affordable housing and central city goals for the purchase of mortgages by the GSEs. In 2000, HUD revised and increased these goals in an attempt to encourage the GSEs to purchase more loans made to low- and moderate-income borrowers and in low- and moderate-income neighborhoods.

Time Dummy Variables

The model in Figure 5 includes dummy variables for all years except 1993 that reflect the effect of individual year factors other than those that have been explicitly modeled. To the extent that CRA examination and consequences of a less favorable CRA rating have become more important over time, we would expect the estimated coefficients of these dummy variables to become larger over time.

VI. Results

The results set forth in Figure 5 are consistent with the hypothesis that, other things equal, CRA has increased the flow of credit to LMI borrowers and areas by CRA-covered lenders and their affiliates over the period studied. In addition, the model suggests that most factors that one might expect to drive CRA lending do influence it in the expected directions. Specifically the economic, housing market, market organization and control variables all the expected signs and are statistically significant. This suggests

¹⁶ The complex relationships between the primary and secondary markets, and the difficulty making causal attributions about them is underscored by a recent study by Hueson, Passmore and Sparks (2000) on mortgage interest rates. While some have argued that higher levels of securitization decreases the mortgage interest rate, Hueson, Passmore, and Sparks argue the reverse, that lower mortgage rates drive higher levels of securitization.

that the model is well specified. The econometric results give further weight to the proposition that CRA made a difference to lenders during this period.

**Figure 5: Model Coefficients and t-Ratios for
CRA Lender's LMI Home Purchase Loan Share Regression**

	Coefficient	T Ratios
Intercept	-.117	-5.31
Existence of Lending Agreements	.01243	3.83
Share of Lending inside Assessment Area	.03102	3.29
Average Housing Affordability 93-99	.00169	14.04
Household Income	.00234	11.89
Unemployment	-.392	-6.09
Home Ownership Rate in 1990	.19143	8.28
Loan Resell Rate	.18032	8.69
Share of FHA Lending	.14818	10.52
Percentage of Loan Originations to Black Borrowers	-.403	-4.95
Percentage of Loan Originations to Hispanic Borrowers	-.176	-5.04
Percentage of Loan Originations to Black Borrowers Squared	1.922	4.92
Percentage of Loan Originations to Hispanic Borrowers Squared	.39749	8.83
Dummy Variable for 1994 Observations	.02888	5.70
Dummy Variable for 1995 Observations	.03711	7.08
Dummy Variable for 1996 Observations	.02324	4.49
Dummy Variable for 1997 Observations	.01289	2.49
Dummy Variable for 1998 Observations	.00604	1.20
Dummy Variable for 1999 Observations	.02863	5.26
Adjusted R-Squared	.49	
Observations	1,260	

More specifically, the model has positive and statistically significant coefficients for the CRA variables: the lending-agreement dummy and the variable describing the share of all lending qualifying as assessment area lending. Taken literally MSAs that have lenders with lending agreements in place have overall LMI loan shares which are one percentage point higher than MSAs whose lenders do not have agreements in place.

Since the average LMI share over the period was 31 percent, the loan shares in MSAs with lending agreements in place were three percent higher than loan shares in other MSAs. Similarly, LMI loan shares were three percentage points (or about ten percent) higher inside assessment areas than outside assessment areas. The expectation that increasing CRA enforcement over the period would lead to larger estimated coefficients for the time dummies reflecting recent years was not met. While there was an increase in LMI lending after the reference year of 1993, the effect of passing years was essentially zero thereafter.

VII. Conclusions from the Analysis

Taken literally, the econometric analysis produces very specific quantitative estimates of how changes in factors directly related to the CRA affect lending to LMI individuals and communities. However, such a literal interpretation does not appropriately recognize that attempting to assess and control for the relevant factors (variables) is fraught with difficulty and subject to measurement, variable, and other errors. Thus, it seems more important to recognize simply that the most comprehensive evidence on lending patterns thus far analyzed is consistent with the proposition that CRA does have a positive effect on low and moderate income lending by depository institutions.

At the same time, however, it is important to note that the test presented here does not address the question of whether lending to low and moderate income borrowers and communities is increased overall: it is possible that the expanded effort on the part of CRA lenders is at the expense of non-CRA lenders, and that overall there was no increase in the number of loans originated. On the other hand, it is equally possible that all financial institutions, including mortgage companies, Fannie Mae, and Freddie Mac, have benefited from financial innovations designed by and for banks and thrifts as they have strived to comply with CRA. Thus, it is possible that the statistical analysis systematically understates the effects of CRA.

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