

RESEARCH REPORT

CRA LENDING IN A CHANGING CONTEXT:
Evidence of Interaction with FHA and Subprime Originations

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CRA Lending in a Changing Context: Evidence of Interaction with FHA and Subprime Originations

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Abstract

This article uses a unique demonstration program to examine the interaction of CRA-related lending with subprime and FHA lending activity. Specifically, the empirical analysis identifies the extent to which the origination of a CRA mortgage substitutes for FHA and subprime originations during the period 1998-2006. The results suggest that in the years prior to the expansion of the subprime market (1998-2001), the origination of CAP loans carried a small substitution effect with respect to FHA originations, with little to no impact on subprime originations. Conversely, during the years of the subprime industry's growth (2002-2006), CAP originations substituted at a much higher rate for high-cost originations. These findings are suggestive about the dynamic role of community reinvestment lending within the changing context of the broader mortgage market. To the extent that CRA originations carry lower foreclosure risk than many subprime products, they also carry implications for the extent of neighborhood externalities in the wake of the subprime foreclosure crisis.

Introduction

While the Community Reinvestment Act (CRA) has been the subject of much academic and public debate, relatively little is known about its impact on credit supply or its interaction with competing lending channels. Where a recent flurry of studies have shed light on the credit supply effects of CRA at its margin, this study uses a unique demonstration program to examine the extent to which CRA originations substituted for FHA and subprime originations during the period 1998-2006. Analyzing the overlap and interaction of CRA, subprime, and Federal Housing Administration (FHA) originations, the empirical model identifies the extent to which the observation of a community reinvestment mortgage origination is associated with a reduction in subprime and FHA originations within a given census tract.

The use of the term *community reinvestment* mortgage (or community reinvestment lending) in this context applies to the mortgage products originated through the targeted lending programs of CRA-regulated lenders. In meeting their requirements under CRA, depository lenders subject to CRA review often market specific lending products and programs to low-income borrowers and neighborhoods (Avery, Bostic, and Canner 2000). While this set of CRA-related lending activities is not well defined, this article uses the term community reinvestment lending to refer to this type of targeted lending by CRA-regulated lenders. Initially appearing during the 1990s, these loan products sought to expand the availability of mortgage credit for lower-income borrowers and neighborhoods, offering 30-year fixed-rate mortgages with near-prime interest rates. However, in the face of expanded subprime lending, these products may have instead altered the types of credit available to lower-income borrowers.

In order to examine this market segment, the analysis relies on data from the Community Advantage Program (CAP), a secondary market purchasing program for community

reinvestment mortgages. Administered by a large community development financial institution, CAP purchases 30-year fixed-rate purchase mortgages originated through the community reinvestment lending activities of regulated lenders. The resulting portfolio includes a large number of community reinvestment mortgages originated throughout the United States. This set of loans offers a large sample of community reinvestment mortgage originations, but is not designed to create a representative sample of community reinvestment mortgages. Instead, the collection of loans into the sample occurs through the purchasing activities of the CAP program. The upshot is that the empirical analysis must be considered within the context of the CAP program, which is discussed at greater length in a later section.

With these caveats in mind, analysis of the CAP dataset provides a unique opportunity to understand the relative role of community reinvestment lending. The empirical analysis examines variation across time in the origination of prime, FHA, and subprime loans within a given census tract, identifying the impact of a CAP origination. The results suggest that in the years prior to the expansion of the subprime market (1998-2001), the origination of CAP loans carried a small substitution effect with respect to FHA originations, with little to no impact on subprime originations. Conversely, during the years of the subprime industry's growth (2002-2006), CAP originations substituted at a much higher rate for high-cost originations.

These findings are suggestive about the dynamic role of community reinvestment lending within the changing context of the broader mortgage market. Given the increased risk of foreclosure attached to subprime mortgage products (Gerardi, Shapiro, and Willen 2007; Ding et.al. 2008a), the results also carry implications for the stability of neighborhood home prices in the wake of the current foreclosure crisis. To the extent that the 30-year fixed-rate mortgage products originated through CRA-related lending programs carry lower risk of foreclosure, the

origination of a community reinvestment mortgage in a census tract may act as a hedge against the risk of foreclosure-related externalities.

The Development of Community Reinvestment Lending

The Community Reinvestment Act of 1977 (CRA) established an affirmative obligation for lenders to serve the credit needs of all neighborhoods in the communities in which branches are located. This legislation exhorted lenders to create access to mortgage credit in low- and moderate-income neighborhoods, but stipulated that such lending should remain consistent with safe and sound operations. In this way, CRA directly instructs lenders to meet the credit needs of targeted borrowers, but recognizes that the extent of such lending will depend upon the context of individual lenders' operations (Barr 2005). Consistent with this approach, the CRA exam empowers the examiner to exercise discretion when considering the lending activities of a single lender. Amendments in 1989, 1995, and 1999 acted to strengthen the regulatory tools available to CRA examiners and the public, but retained this basic approach to CRA compliance (Litan et.al. 2001).

Under the revised CRA, regulated lenders are examined every three to four years and required to document evidence of service, investment, and lending activities within their assessment areas. While examiners review and evaluate each lender's efforts with respect to each of these criteria, the lending goals do not impose specific requirements on the volume or proportion of lending activities that must target low-income borrowers or neighborhoods. Instead, the examiner is instructed to evaluate an institution's lending activities within the context of the assessment area's needs. In practice, nearly all lenders have received high marks,

and regulators have only rarely applied the penalties associated with poor performance (Barr 2005; Apgar and Duda 2003).

In addition to the direct review conducted by regulators, CRA allows for public review of an institution's CRA-related performance. In response, local community organizations and advocates have actively worked to identify poorly-performing lenders and to communicate CRA-related concerns to regulators and the broader public (Immergluck 2004). The involvement of local organizations in CRA oversight varies across different metropolitan areas, depending upon the presence and involvement of local organizations. In many cases, organizations have used media campaigns and other strategies to leverage CRA-related performance into both regulatory actions and directly-negotiated CRA agreements in which lenders commit to defined future lending activities (Bostic and Robinson 2003, 2005; Schwartz 1998a, 1998b).

This regulatory structure guided regulated lenders' approaches to meeting the credit needs of low- and moderate-income neighborhoods during the period of the subprime industry's growth. Beginning in the late 1980s, technological advances in mortgage underwriting technologies dramatically improved lenders' abilities to measure the risk associated with alternative mortgage characteristics. These advances led directly to the development of credit scoring and risk-based pricing, and are commonly associated with the rapid development of the subprime mortgage industry. Among many prime-oriented lenders, the improvements in the observation and quantification of risk conversely led to experimentation with flexible underwriting and the development of targeted lending programs (Quercia, McCarthy, and Wachter 2003; Calem and Wachter 1999).

To qualify for prime credit, lenders traditionally required that applicants make a 20 percent down payment, have a credit score of 660 or higher, have a payment-to-income ratio of

no more than 28 percent, have a debt-to-income ratio of no greater than 36 percent, and retain savings of at least two monthly mortgage payments in reserve after closing. Beginning in the mid-1990s, lenders began to originate mortgages with flexible underwriting characteristics, relaxing one or more of the traditional requirements. For instance, many lenders developed products with reduced down payment requirements, initially allowing loan-to-value ratios of up to 97 percent and eventually allowing loan-to-value ratios of 100 percent or more. By 2000, many lenders offered products that relaxed one or more of the traditional underwriting criteria, often using these products as part of their strategy for CRA compliance (Avery, Bostic, and Canner 2000).

While these non-traditional mortgage characteristics increased access to mortgage credit for many households, they also created liquidity constraints for many of the lenders originating these loans. Because flexible underwriting characteristics often did not meet the rules for sale into the conventional secondary market, lenders generally were forced to hold the loans in portfolio (Quercia et.al. 2002). By contrast, subprime lenders created a more direct route to Wall Street. Where conventional loans are typically purchased and securitized by the GSEs, the AA and AAA ratings given to most mortgage-backed securities enticed multiple Wall Street investment banks to purchase and securitize subprime mortgages directly. The result was a flood of subprime mortgage credit into low-income and high-minority neighborhoods (Ding et.al. 2008b; Calem, Gillen, and Wachter 2004; Calem, Hershaff, and Wachter 2004), the same areas targeted by CRA-related lending programs.

Little is known either about the role of community reinvestment lending in meeting the credit needs of targeted communities or about the interaction of community reinvestment lending with the subprime market. Reviews of the Community Reinvestment Act generally agree that

CRA induces banks to increase their lending activity in targeted neighborhoods (Apgar and Duda 2003; Barr 2005; Haag 2000). However, the set of marginal CRA loans cannot be easily identified in empirical data, an issue that complicates efforts to describe characteristics and trends in the CRA market as a whole. The analysis performed by the Joint Center for Housing Studies (2002) offers the most detailed examination of CRA lending to date.¹ This study convincingly identifies the impact of CRA on observed lending patterns, but also illustrates the difficulties inherent in defining marginal CRA-related lending activities.

The set of subsequent studies based on regression discontinuity designs supplement this analysis by identifying the difference in lending activities across census tracts at the margin of CRA's defined targets. CRA's focus on neighborhoods below 80 percent of area median income (AMI) creates a clean distinction between the CRA status of neighborhoods just above and just below this cutoff. Taking advantage of this cutoff, Berry and Lee (2004) find a minimal to nonexistent impact of CRA on the likelihood that a loan application is approved. However, Bhutta (2009a) argues that loan application volume among marginal borrowers may also respond to any increase in lending associated with CRA.² Focusing instead on mortgage originations and lending activity, Bhutta (2009a) and Gabriel and Rosenthal (2008) find more robust discontinuities and thus stronger impacts of CRA. Bhutta (2009a) also exploits the recategorization of census tracts following the 2000 Census to provide evidence that the observed discontinuities respond to changes in CRA status.

Prior to the emergence of these studies, much of the available evidence with respect to the Community Reinvestment Act focused on the impact of lending agreements, negotiated

¹Avery, Bostic, and Canner (2000) also offer a detailed examination of CRA special lending programs at the institutional level.

² Interpretation of these estimates is also limited to the local average treatment effect implicit in the regression discontinuity design.

between community organizations and individual lenders. Evaluations of the impact of these agreements generally suggest that the presence of a CRA agreement is associated with increased lending to underserved borrowers by the participating lender (Schwartz 1998a; Schwartz 1998b), although it is less clear whether these increases are sustained after the agreement expires (Bostic and Robinson 2005; Bostic and Robinson 2003).

Interaction between CRA, Subprime, and FHA Lending

This study focuses on the overlap and substitution of CRA lending activities with the FHA and subprime markets. In contrast to the previous studies, which focus on lenders' responses to CRA regulation, the analysis examines the relationship between CRA originations and competing lending activities. While the overlap between market segments is studied at the census tract level, a brief review of the mortgage choice literature helps to define the incentives that influence borrower sorting across lenders and product types.³

Initial studies of mortgage choice suggest that credit history, down payment constraints, monthly payment constraints, mortgage insurance costs, and demographic events such as divorce and unemployment can all shape borrowers' decisions (Hendershott, LaFayette, and Haurin 1997; Pennington-Cross and Nichols 2000; Pennington-Cross, Yezer, and Nichols 2000; Courchane, Surette, and Zorn 2004). Isolating a sample of low- and moderate-income households, LaCour-Little (2007) examines the relative influence of such factors on the choice between conventional conforming, FHA, subprime, and 'specially targeted' mortgage products.⁴

³This article focuses on mortgage choice in a market with risk-based pricing. It therefore seeks to review those analyses that include subprime mortgage options, and is therefore brief in addressing the FHA-conventional choice. Readers seeking a more complete discussion should refer to LaCour-Little (2007) and to Pennington-Cross and Nichols (2000).

⁴The latter 'specially targeted mortgage program' reflects a partnership between a national bank and the GSEs.

Across products, the results are consistent with the previous studies,⁵ offering a hierarchy of preferences. Borrowers choose lower-cost products to the extent that their credit history and underwriting characteristics meet the necessary qualification requirements. As a result, the targeted program, which reduces the down payment requirement on lower-cost products, is a preferred option among many low- and moderate-income borrowers.

This competitive advantage of lower-cost products is a natural result of rational behavior, as borrowers seek to minimize cost conditional on the set of available mortgage options. As such, it can be expected to define borrower behavior more generally at the margin of the prime and subprime markets. For instance, An and Bostic (2009) examine the impact of GSE purchasing requirements on the extent and geographic distribution of subprime lending activities under the assumption that expanded access to conventional, conforming mortgages will attract borrowers that otherwise might select subprime loans. The results confirm this expectation, showing that expanded purchasing under the GSE's affordable lending goals expands the scope of prime credit.⁶ An and Bostic (2008) show a similar effect of GSE purchases on FHA loans, documenting substitution of prime mortgages for FHA mortgages among the lowest risk set of potential FHA borrowers.⁷

Where the first set of mortgage choice studies directly identifies the predictors of product choice to make inferences regarding product substitution, this second set of studies examines the

⁵The analysis also offers new evidence that a need to close quickly and/or a desire for reduced documentation requirements related to self-employment also predict the use of subprime products.

⁶Gabriel and Rosenthal (2009) similarly find that GSE purchasing crowds out private sector loan purchases, finding modest crowd out from 1994-2003 and nearly complete crowd out between 2004-2006. Gabriel and Rosenthal (2008) and Bhutta (2009b) find much smaller crowd out of GSE activity for subprime lending using regression discontinuity designs, but examine only the underserved areas goal and not the full set of GSE affordable lending goals.

⁷This study helps to explain the apparent paradox between evidence that the affordable lending goals increased purchasing activities (Bunce 2002; Temkin et.al. 2001), but had limited impacts on housing outcomes (An et.al. 2007; Bostic and Gabriel 2006). The analysis shows that the impact on FHA lending acts to moderate the direct effect of GSE purchases on housing outcomes.

impact of changes in the GSE's affordable lending goals on the flow of lower-cost mortgage credit into neighborhoods. The current study applies the latter approach to the community reinvestment market, using a unique secondary market demonstration program. Specifically, the analyses seek to identify the substitution of community reinvestment loans for FHA and subprime mortgage products.

The Community Advantage Home Mortgage Secondary Market Program (CAP)

The Community Advantage Program (CAP) is a secondary market program developed out of a partnership between the Ford Foundation, Fannie Mae, and Self-Help, a leading community development financial institution (CDFI) located in Durham, North Carolina. Under CAP, Self-Help buys 30-year fixed-rate purchase mortgages with loan features that prevent them from being readily sold in the secondary market. Because the CAP portfolio is collected through the purchasing activities of the CAP program, the analysis sample is not designed to be representative of either low-income borrowers or the population of CRA-related lending activities. As a result, the empirical analysis must be considered within the context of the CAP program, and caution must be applied in extrapolating to the broader market. Nonetheless, the CAP portfolio provides a large sample of community reinvestment mortgages originated by 32 lenders in 40 states between 1998 and 2006, creating a unique opportunity to examine the impact of community reinvestment lending.

The designed purpose for the CAP program is to create a secondary market outlet for CRA loans that contain flexible underwriting characteristics or other features that prevent sale into the traditional secondary market. Consistent with the development of community reinvestment mortgage products, many of the loans allow high debt-to-income levels, limited

down payments, waiver of private mortgage insurance, and/or non-traditional credit history. Additionally, where early experimentation with flexible underwriting allowed the relaxation of only one qualifying requirement, loans in the CAP portfolio are allowed to deviate from multiple standards. Despite these relaxed underwriting standards, each of the purchased CAP loans is structured as a 30-year fixed-rate mortgage and each carries an interest rate near the prime rate.⁸

In some cases, Self-Help purchased a portfolio of seasoned loans held in a lenders' portfolio, with a commitment from the lender to reinvest the resulting capital in similar lending activities. In others, lenders developed products intended for sale to Self Help, selling the products on a flow basis as new loans were originated. In this way, the CAP portfolio includes both 'portfolio' purchases of seasoned loans and 'flow' purchases of recent originations. In all cases, participating lenders originate and service the loans under contract with Self-Help, while Self-Help securitizes and sells the loans while retaining recourse (effectively creating a traditional outlet for otherwise illiquid loans).

As a guide for lenders, the CAP program instituted purchasing guidelines to delineate its target lending activities. To qualify for purchase under CAP, the borrower must meet one of three criteria: (1) have income under 80 percent of the area median income (AMI) for the metropolitan area; (2) be a minority with income below 115 percent of AMI; (3) or purchase a home in a high-minority (>30%) or low-income (<80% AMI) census tract and have an income below 115 percent AMI. This mix of income- and location-based requirements gives the participating lenders some flexibility in developing programs to meet the needs of their specific markets. However, the use of these requirements also imposes strict selection rules that do not directly align with the set of loans targeted under CRA. Specifically, the second and third

⁸The CAP program does not require private mortgage insurance on purchased loans, instead applying a 50-100 basis point credit enhancement. As a result, the CAP mortgages carry interest rates that hover just above the prime rate, but can be considered comparable to prime loans with respect to total cost to the borrower.

purchasing criteria broaden CAP's coverage beyond traditional CRA loans, allowing moderate-income borrowers who are minority and/or live in a low-income or high-minority tract.

Given these guidelines, the comparison of CAP loans with CRA lending depends on lenders' responses to these guidelines and the relative characteristics of CAP borrowers. Of the CAP mortgages originated between 1998 and 2006, more than 88 percent met the first purchasing criteria with borrower income below 80 percent of AMI. By implication, 12 percent of CAP mortgages fall in one of the latter two categories. Riley, Ru, and Quercia (2009) further compare CAP homeowners to the set of homeowners in the Current Population Survey (CPS) who meet the CAP purchasing criteria.⁹ While minor differences exist on multiple characteristics, the primary difference is a higher proportion of CAP homeowners in the South. Keeping in mind this characterization of the CAP dataset, the next section presents the empirical methodology and discusses interpretation of the analysis results.

Methodology and Data

The analysis relies both on loan origination data specific to the CAP program and on data reported pursuant to the Home Mortgage Disclosure Act (HMDA) for the years 1998-2006. Under HMDA, lending institutions must provide loan-level information on each mortgage application, denial, and origination processed during the previous year. The resulting dataset provides the most comprehensive information on mortgage originations available, with 27.5 million applications for home mortgages reported in 2006.¹⁰ In contrast, the CAP dataset includes 35,925 mortgages originated between 1998 and 2006 and purchased into the CAP program.

⁹ The authors report results for a simplified set of CAP purchasing criteria, excluding the third category.

¹⁰The primary exclusion to reporting to HMDA is for small institutions. In 2006, depositories whose assets totaled less than \$35 million and non-depositories whose assets totaled less than \$10 million were exempted.

The HMDA data for each year is limited to the set of first-lien home purchase mortgage originations that are located in non-rural census tracts.¹¹ The set of CAP and HMDA loans are then aggregated at the census tract level and merged, so that the resulting dataset includes one observation for each census tract in each year. Using this data, the empirical analyses identify the extent to which CAP mortgages substitute for FHA and subprime mortgage products. Because CAP lending accounts for a very small proportion of overall lending, variation in the presence of a CAP loan across years within individual census tracts can be used to identify the impact of a CAP origination on the number and share of FHA and subprime mortgages.

The formal model is a tract-level fixed effects model that can be written:¹²

$$(1) \quad Y_{it} = C_{it}\gamma + X_{it}\beta + R_t + T_i + \varepsilon_{it}$$

where i indexes census tracts and t indexes the year of origination. In this model, C_{it} is the number of CAP loans in census tract i in year t and X_{it} is the set of covariates. The model also includes a set of year indicator variables, R_t , and a set of census tract fixed effects, T_i .¹³ Estimation of equation (1) therefore identifies the change in outcome measure Y_{it} that is associated with the presence of a CAP loan. Put another way, the models isolate variation within census tracts across time, identifying the association of the presence of a CAP loan in a given year with any deviation of the outcome measure from the trend observed across all census tracts.

Equation (1) is estimated with respect to the number of prime, FHA, and subprime mortgages originated in the tract. This definition of the outcome measure Y_{it} implies that the identified ‘substitution effect’ reflects any reduction in the number of FHA or subprime

¹¹ Rural observations are excluded from analysis in response to concerns about the reliability of HMDA data in these areas.

¹²Ideally, this model might also be estimated using loan-level data. However, the sheer size of such a dataset is prohibitive. For the period from 1998 to 2006, such an analysis would exceed 30 million observations and is not possible with available computing resources.

¹³ In all analyses, standard errors are clustered at the tract level to adjust for serial correlation across years.

originations that occurs during the years when a CAP origination is present in the tract. An important observation about this substitution effect is that it is identified at the tract level, preventing inference about individual borrowers' use of CAP mortgages to replace FHA or subprime products. While substitution may occur as potential home buyers select CAP mortgages in place of FHA or subprime products, it is also possible that the identified substitution is due to a CAP borrower replacing another potential buyer who would rely on a subprime or FHA product.

In each of the analyses, FHA loans are identified directly in HMDA data, while subprime loans are identified using the list of subprime lenders maintained by HUD. Any impact of CAP on the measure of subprime loans therefore cannot be interpreted as an effect on the number of high-cost loans per se, but rather on the number of loans originated by lenders specializing in high-cost lending. Unfortunately, direct identification of high-cost loans is not possible in HMDA data until 2004. As a partial test of the robustness of the HUD measure, estimation of equation (1) is repeated for the years 2004-2006 using the high-cost measure. The remaining loans that are not identified as either FHA or subprime are grouped into the measure of 'prime' originations.

The necessary assumption for identification of a substitution effect is that variation in the presence of a CAP loan be exogenously determined. Specifically, the appearance of a CAP loan in a given year must be independent of any local economic factors that influence the outcome measure of interest. While shared economic factors are likely to determine local trends in the number of FHA and subprime originations across time, such factors likely have less influence in determining the presence of CAP loans. Instead, observed variation in the CAP measure appears disproportionately as the presence or absence of a CAP loan in a given year, which is determined

by the joint occurrence of the presence of a qualified applicant in the tract and that applicant's choice of a participating CAP lender. Within any individual census tract, variation in these occurrences across years is expected to be at least partially random. Anecdotal evidence further suggests that CAP borrowers generally were not aware of their loan's inclusion in the CAP program, implying that qualifying borrowers generally did not seek out lenders on the basis of CAP participation.¹⁴ The analyses therefore seek to isolate random variation in the presence of a CAP origination conditional on the set of included covariates.

Given this identification strategy, the primary concern is that local housing market factors and growth in mortgage originations differ systematically across localities. To directly address this concern, the analyses include the number of originations in each alternative market segment.^{15,16} Nonetheless, unobserved local economic factors may be correlated with demand for CAP, FHA, and subprime loans. To the extent that such factors bias the estimated substitution effects, the result would be upward pressure on the estimated effects, reducing the magnitude of the (negative) substitution effects. The ability of the empirical specification to isolate the impact of CAP lending is discussed further with the empirical results.

Description of the CAP Portfolio

¹⁴As CAP loans were originated, borrowers were contacted and recruited into a longitudinal survey. An early lesson of this process was that borrowers were not familiar with the CAP program.

¹⁵The additional HMDA characteristics are commonly used to construct additional covariates in other analyses. However, because CAP loans are not identifiable in HMDA data, the inclusion of such variables biases the estimate with respect to CAP. For instance, a CAP loan appears both as a prime loan and as a lower-income loan. Any included income counts would therefore identify CAP loans in the same way as the CAP variable of interest, diluting its effect. For this reason, such variables are not included.

¹⁶Additional analyses also explored the inclusion of a MSA-level measure of housing price appreciation. The annual appreciation rate is calculated from the MSA index reported by OFHEO. This measure is omitted from the analyses due to concerns about endogeneity with respect to the number of loan originations. The empirical results are similar when this appreciation measure is omitted/included.

The CAP portfolio of purchased loans includes 35,925 mortgages originated between 1998 and 2006, each of which is structured as a 30-year fixed-rate product. This set of CAP loans is aggregated at the census tract level for each year and merged to tract-level HMDA data. The resulting dataset contains one observation per census tract for each year between 1998 and 2006. Any census tract whose boundaries were redefined for the 2000 Census are removed from the analysis, as a consistent tract definition cannot be established for the analysis period.¹⁷ Census tracts in rural areas and tracts that do not have at least one observed mortgage per year in HMDA are also eliminated. Of the 48,794 tracts that are consistently observed across all years between 1998 and 2006, 6,301 tracts that include a CAP origination in at least one year.

Table 1 shows the characteristics of the 20,192 CAP mortgages originated in this set of tracts. Taken as a whole, the characteristics confirm the targeted nature of community reinvestment lending. The median household income among CAP households in the year of origination is \$32,467, which amounted to an average of 61 percent of area median income. Recalling the purchasing requirements applied to CAP loans, the income figures shown in Table 1 suggest that a large majority of CAP mortgages qualify under the first option—borrower income falls below 80 percent of the area median income. Just over 88 percent of CAP households have incomes below this threshold. Of the remainder, an additional 6 percent qualify under the second option—a minority borrower with income below 115 percent of area median income—and the remaining 6 percent qualify under the third option—a high-minority or low-income tract with borrower income below 115 percent of area median income.

¹⁷Because tract definitions are generally redrawn in response to population growth, the elimination of tracts that do not have consistent boundaries is likely to disproportionately remove fast-growing areas. While this reflects non-random elimination of sample observations, the impact is likely minimized by the nature of the analysis, which focuses on variation across time within tracts.

[INSERT TABLE 1 ROUGHLY HERE]

These borrower characteristics are supplemented with the set of loan characteristics which document the nature and pricing of the community reinvestment mortgage products. CAP mortgages averaged \$82,454 at origination and carried interest rates that averaged 7.3%. Figure 1 plots the path of originated interest rates by quarter, comparing these rates to the mean interest rates on fixed-rate (FRM) and adjustable-rate (ARM) mortgages reported by Freddie Mac's Primary Mortgage Market Survey (PMMS).¹⁸ In each quarter, the mean interest rate for CAP mortgages hovers roughly 50 to 100 basis points above the average rate reported by PMMS for the prime market. This difference reflects the credit enhancement applied to CAP interest rates. Because CAP loans do not require private mortgage insurance,¹⁹ the rates shown in Figure 1 imply that the total mortgage-related costs to CAP borrowers roughly correspond to those for prime loans.

[INSERT FIGURE 1 ROUGHLY HERE]

The remaining loan characteristics in Table 1 document the use of flexible underwriting in the origination of CAP mortgages. First, the front-end and back-end ratios reflect the ratio of the monthly mortgage payment to monthly income and the ratio of all monthly debt obligations to monthly income, respectively. The mean front-end and back-end ratios on CAP mortgages are .27 and .36, respectively, which are near the traditional standards of .28 and .36. However, the

¹⁸See Freddie Mac's Primary Mortgage Market Survey [<http://www.freddie.com/dlink/html/PMMS/display/PMMSOutputYr.jsp?year=2008>].

¹⁹CAP loans generally carry a credit enhancement of roughly 75 basis points. The interest rates reported for the prime market by PMMS exclude borrowers' mortgage insurance payments.

mean values conceal variation in the distribution of these variables, as 39 percent of CAP mortgages carry front-end ratios that exceed .28 and 53 percent carry back-end ratios that exceed .36. Second, Table 1 directly presents the distribution of loan-to-value ratios and credit scores across the portfolio of CAP loans. Eighty-seven percent of CAP mortgages carried loan-to-value ratios of 90 or higher, with 59 percent exceeding 97. Similarly, 71 percent of CAP mortgages carried credit scores below 720, with 39 percent below 660.

Table 2 uses data from the 2000 Census to further describe the neighborhood in which CAP lending occurs. Isolating the set of non-rural tracts with consistent boundaries between 1998 and 2006, the figures compare the set of tracts with an observed CAP origination in any year to the set of tracts without a CAP origination. Column 1 presents the characteristics of the 6,301 CAP tracts that meet these criteria, which can be compared to the similar set of tracts without a CAP origination. The major differences are that CAP loans tend to be located in tracts with more residents, lower median incomes and lower median home values. However, CAP tracts, on average, also have marginally higher homeownership rates, lower poverty rates, and lower unemployment rates than other tracts.

[INSERT TABLE 2 ROUGHLY HERE]

Empirical Analysis

The empirical analysis focuses on the impact of a CAP origination on the origination of subprime and FHA loans within the set of CAP tracts. Figure 2 displays the mean number of prime, FHA, and subprime loans originated in each year. Subprime loans reflect loans originated by lenders identified on HUD's subprime lender list, FHA loans are identified directly by

HMDA data, and prime loans are defined as the remaining set of conventional loans originated by non-subprime lenders. The trends shown in Figure 2 show stable proportions of each type of lending between 1998 and 2001, after which prime and subprime lending dramatically increase. While the magnitude of the increase appears larger for prime lending, the increase in the subprime market multiplied its market share during this period. Both increases are at least partially offset by the decrease in FHA lending after 2001.

[INSERT FIGURE 2 ROUGHLY HERE]

The presence of CAP originations across years differs substantively from the patterns for prime, FHA, and subprime loans. The second axis of Figure 2 shows the number of CAP originations for each year. The associated trendline shows greater variation in CAP lending activity than for the other market segments. CAP originations peak at 3,490 originations in 2000, and generally decrease thereafter.

The measure of CAP lending is defined at the tract level as the number of CAP originations in the tract.²⁰ In the analysis dataset, this appears disproportionately as the presence or absence of a CAP origination. Of the 56,709 observations (6,301 tracts x 9 years), only 11,890 observations (21%) have an observed CAP loan. While a few tracts exhibit multiple originations in several consecutive years, the typical tract contains two to three years with an observed origination.²¹ Furthermore, when a positive value is observed, the typical number of

²⁰The measure of CAP lending can also be defined as whether at least one CAP origination is observed. The results when this form of the CAP variable is used are qualitatively similar, although the magnitude of coefficients is larger (as should be expected). The number of CAP originations is used in the results presented, as it allows for direct interpretation of the coefficients.

²¹The breakdown of tracts by number of years with a cap loan is as follows: 1 year (57%); 2 years (21%); 3 years (9%); 4 years (6%); 5 years (3%); 6 years (2%); 7 or more years (2%). As a robustness check, all analyses are repeated when the sample excludes observations with 3 or more years with an observed CAP loan.

originations is one. Seventy-two percent of the observed values are one and 88 percent of the observed values are one or two.²²

Table 3 presents the first set of analyses with respect to the impact of CAP lending on the presence of prime, subprime, and FHA lending. The three models examine the impact of a CAP loan on the number of prime, subprime, and FHA loans originated in the tract, respectively. First, the presence of a CAP loan is associated with a one-to-one increase in the number of prime loans. This outcome corroborates that the CAP variable identifies the impact of a CAP origination and not unobserved economic factors, as this estimate appears to identify the presence of CAP originations among prime loans in HMDA data. Second, the presence of a CAP loan is found to be negatively associated with the number of subprime originations, but is not associated with the number of FHA originations. While the estimated coefficient with respect to the number of subprime originations is relatively small, it implies that some substitution between community reinvestment and subprime mortgages exists. The estimate implies that for every 100 CAP loans originated, 15 fewer subprime originations are observed.

[INSERT TABLE 3 ROUGHLY HERE]

Before examining this finding in greater detail, the covariate estimates also merit discussion. The number of prime originations is positively associated with the origination of subprime and FHA credit, while the number of subprime and FHA originations are negatively associated with one another. While these estimates are suggestive about the interactions of these market segments, the variation in the underlying variables likely also reflects the shared

²²As an additional robustness check, the analyses are also repeated when tracts with 2 or more observed CAP loans in a single year are eliminated from the sample.

influence of local market factors. As a result, interpretation of the estimated associations must be performed cautiously.

Table 4 repeats the analysis for the years 1998-2001 and for the years 2002-2006. Given the marked changes in the mortgage market shown in Figure 2, this analysis examines whether CAP's impact on each market segment differed under alternative market conditions. The estimates shown in Table 4 corroborate the importance of distinguishing between time periods. In the earlier years (1998-2001) prior to the surge in subprime lending, the presence of a CAP loan again carries a one-to-one association with the number of prime loans, but has little effect on the number of subprime originations. Instead, a CAP origination carries a substitution effect with respect to the number of FHA loans. The associated estimate implies that that 27 fewer FHA loans are observed for every 100 CAP loans originated.

In contrast, CAP lending appears to primarily substitute for subprime lending during the later period of subprime industry growth (2002-2006). The presence of a CAP loan during this period is strongly associated with a reduction in the number of subprime loans originated in a tract. The estimate of $-.45$ implies that CAP originations have a substantial effect on the origination of subprime loans. However, the estimates shown in the second panel of Table 4 also show a much weaker relationship between the presence of a CAP loan and the number of originated prime loans, raising questions about the identification of the CAP variable during this period. Where each of the previous analyses showed a one-to-one increase in the number of prime loans, the estimate for 2002-2006 is $.72$ and carries a marginally significant t-statistic ($t=1.92$).

[INSERT TABLE 4 ROUGHLY HERE]

One possible explanation for the weaker identification of the CAP variable in the second panel is that the definition of subprime lending on the basis of the originating lender may become less useful over time. As prime lenders moved into the subprime market, the distinction between prime and subprime lenders increasingly blurred. As a result, CAP borrowers may be substituting CAP products for high-cost products offered by prime lenders.²³

In order to verify the estimated effects reported in the second panel of Table 4, the estimated models are replicated using an alternative definition of subprime lending. Where the previous estimations examine the impact of a CAP origination on the number of loans originated by prime and subprime lenders, HMDA data directly identifies high-cost loans beginning in 2004.²⁴ This latter definition is likely preferable, as the line between prime and subprime lenders increasingly blurred over the course of the study period.²⁵

Table 5 reports the results of the analyses with respect to high-cost loan originations. The estimated coefficients ease concerns over the valid identification of the CAP variable and corroborate the basic results shown in the second panel of Table 4. In particular, the presence of a CAP loan carries a one-to-one impact on the number of originated prime loans, suggesting that the classification of subprime lending using the measure of high-cost lending is preferable for the latter time period. Using this measure, the presence of a CAP loan is associated with a reduction of .71 in the number of high-cost loans observed in the tract. While this coefficient should be considered a rough estimate (the standard deviation is .32), it suggests that a majority of the

²³The positive association between the presence of a CAP loan and the number of FHA originations in the second panel of Table 4 is inconsistent with a priori expectations about the impact of CAP lending. However, given that the estimate is small and carries a non-significant t-statistic, this result does not raise major concerns that any unobserved effect drives the substantive results presented.

²⁴High-cost originations are underreported in the 2004 HMDA data (Avery, Brevort, and Canner 2006). This is directly reflected by the coefficients on the year fixed effects in Table 5.

²⁵As the subprime industry grew, the array of loan options offered by subprime and prime lenders began to overlap, with prime lenders competing for higher-cost loans.

community reinvestment loans originated through CAP during this period substituted for subprime mortgage originations.

[INSERT TABLE 5 ROUGHLY HERE]

As an extension to the analysis in Table 5, the information reported in HMDA data allows the set of high-cost loans to be segmented by price. Table 6 reports estimates separately for loans whose interest rates exceed the prime rate by 300-499 basis points, 500-699 basis points, and more than 700 basis points.²⁶ The results suggest that CAP originations substitute primarily for originations in the two higher price categories. The first column shows a small and insignificant impact on originations with rate spreads of 3-5 percentage points. In contrast, the second and third columns imply larger substitution effects for origination of loans with rates that exceed the prime rate by 5-7 percentage points and by 7 or more percentage points, respectively. While the second column is estimated imprecisely ($t=1.76$), the estimates suggest that CAP originations primarily substitute for mortgages whose interest rates exceed the prime rate by 500 basis points or more. This result highlights the potential for CAP originations to reduce the risk of default-related externalities faced by neighboring homeowners.

[INSERT TABLE 6 ROUGHLY HERE]

When the analyses presented in this section are considered together, they offer interesting insight into the role of community reinvestment lending both prior to and during the period of

²⁶ This rate spread is operationalized in HMDA by calculating an implied annual percentage rate (APR) for the mortgage and comparing it to the outstanding rate on Treasury securities of comparable maturity.

subprime market growth. During the period prior to the expansion of the subprime market, CAP originations appear to have substituted for FHA credit in a minority of cases and had little to no effect on subprime originations. Given that the impact on FHA originations applies to relatively few CAP loans, the CAP program likely expanded access to credit for many households during this period. Conversely, the dramatic growth of the subprime market after 2002 appears to have altered to the role of the community reinvestment market. In contrast to the earlier period, a majority of CAP loans originated after 2002 appear to have substituted for high-cost originations.

Discussion and Conclusions

This article uses a unique demonstration program to examine the role of community reinvestment loans in meeting the credit needs of underserved borrowers between 1998 and 2006. Where substantial research documents the development of the subprime industry (and the decline in FHA lending) during this period, less attention has been given to the evolution of CRA lending. In large part, this disparity reflects the dramatic growth of the subprime industry, which outpaced the changes in other market segments. However, in the wake of the subprime market's collapse, community reinvestment lending may provide an important source of mortgage credit in lower-income neighborhoods.

The analysis first documents the changing role of community reinvestment lending during the period of subprime market growth. Prior to the development of subprime lending, the presence of a CAP loan carries a small substitution effect with respect to FHA originations and has little to no effect on subprime lending. Given the extensive coverage of HMDA data, it is likely that the majority of CAP loans during this period reflected new lending. This image of community reinvestment lending reverses after 2002, as dramatic growth in the subprime

industry begins. Analysis with respect to this later period suggests that community reinvestment loans increasingly supplanted subprime originations, and that the impact on FHA lending diminished. This effect is particularly apparent with respect to high-cost loans, which first appear in HMDA data with the 2004 wave. For the period 2004-2006, the estimates imply that for every 100 CAP loans originated, 71 fewer high-cost originations are observed.

The interpretation of this substitution relies directly on the empirical approach. Because the analysis is performed at the tract level, the identified substitution effect applies to the relative number of prime, FHA, and subprime originations in the tract, and does not necessarily imply that any individual borrower substituted a CAP loan for a subprime product. Instead, the substitution carries implications for the types of loan products used to finance home purchase within a given neighborhood. In particular, the results may be suggestive with respect to neighborhood stability in the face of the recent foreclosure crisis. Given the increased risk of foreclosure attached to many subprime mortgage products (Gerardi, Shapiro, and Willen 2007; Ding et.al. 2008a), origination of a CAP product may carry reduced risk of foreclosure-related externalities to neighboring homeowners.

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Tables

Table 1: Borrower and loan characteristics in CAP, 1998-2006.

Variable:	Mean
<i><u>Borrower Characteristics:</u></i>	
Annual household income	\$32,467
Ratio income to AMI	.61
Black borrower or co-borrower	.21
Hispanic borrower or co-borrower	.07
Minority borrower or co-borrower	.34
<i><u>Loan Characteristics:</u></i>	
Origination loan balance	\$82,454
Interest rate	7.3%
Front-end ratio: mortgage payment to monthly income	.27
Back-end ratio: debt to monthly income	.36
Loan-to-value ratio 100+	.29
Loan-to-value ratio 97-99	.30
Loan-to-value ratio 90-96	.28
Loan-to-value ratio 80-89	.08
Loan-to-value ratio <80	.05
Origination credit score <580	.05
Origination credit score 580-619	.12
Origination credit score 620-659	.23
Origination credit score 660-719	.32
Origination credit score 720+	.29
N	20,192

Table 2: 2000 Census characteristics for CAP and non-CAP census tracts.

	CAP Tracts	Non-CAP Tracts
Variable:	Mean	Mean
Total population	4,970	4,258
Median household income	\$41,169	\$46,686
Ownership rate	64.9	62.3
Median home value	\$103,816	\$154,585
Percent in poverty	12.9	13.3
Percent unemployed ^a	6.1	6.6
Percent with high school degree ^b	79.3	79.8
Percent with 4 year college degree ^b	21.5	25.7
Percent Hispanic	8.0	12.4
Percent black	20.6	14.8
Percent minority	33.2	33.9
N	6,301	30,396

^a Of individuals age 16 or older.

^b Of individuals age 25 or older.

Table 3: Estimated impacts of CAP lending on prime, subprime, and FHA.

	# Prime		# Subprime		# FHA	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
# CAP loans	.970**	(0.26)	-.153*	(0.07)	.128	(0.09)
# Prime loans			.154**	(0.01)	.031**	(0.01)
# Subprime loans	1.919**	(0.13)			-.278**	(0.03)
# FHA loans	.269**	(0.09)	-.192**	(0.02)		
(1998 omitted)						
Year 1999	-2.404**	(0.46)	1.891**	(0.10)	3.075**	(0.16)
Year 2000	-5.362**	(0.51)	2.867**	(0.09)	2.449**	(0.19)
Year 2001	-1.603**	(0.56)	1.861**	(0.12)	3.730**	(0.24)
Year 2002	-1.936**	(0.52)	2.479**	(0.11)	1.273**	(0.24)
Year 2003	-.270	(0.75)	4.067**	(0.17)	.302	(0.25)
Year 2004	-2.766**	(1.25)	8.317**	(0.27)	-2.904**	(0.30)
Year 2005	-1.132	(1.82)	11.933**	(0.38)	-4.756**	(0.43)
Year 2006	14.580**	(1.16)	4.045**	(0.38)	-7.905**	(0.35)
Constant	49.410**	(1.91)	-2.616**	(0.92)	16.412**	(0.73)
Tract fixed effects ^a	--**		--**		--**	

^a The joint significance of the tract fixed effects is determined by an F-statistic that tests whether all of the effects equal zero. No coefficient or standard error is reported for this test, as it reflects the joint significance of multiple fixed effects.

N=56,709 observations (6,301 tracts)

*p<.05; **p<.01

Table 4: Estimated impacts of CAP by time period.

	# Prime		# Subprime		# FHA	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
<u>Panel 1: 1998-2001</u>						
# CAP loans	.956**	(0.18)	.022	(0.03)	-.265**	(0.09)
# Prime loans			.022**	(0.00)	.131**	(0.02)
# Subprime loans	0.668**	(0.15)			.427**	(0.06)
# FHA loans	0.459**	(0.05)	.049**	(0.01)		
(1998 omitted)						
Year 1999	-.920**	(0.33)	1.429**	(0.05)	1.805**	(0.15)
Year 2000	-2.543**	(0.42)	2.425**	(0.06)	.727**	(0.18)
Year 2001	-.279	(0.38)	1.345**	(0.06)	2.429**	(0.18)
Constant	50.329**	(1.19)	1.153**	(.205)	8.109**	(1.44)
Tract fixed effects ^a	--**		--**		--**	
<u>Panel 2: 2002-2006</u>						
# CAP loans	.717	(0.37)	-.454**	(0.11)	.232	(0.15)
# Prime loans			.118**	(0.01)	-.018	(0.01)
# Subprime loans	1.327**	(0.11)			-.271**	(0.03)
# FHA loans	-0.224	(0.14)	-.300**	(0.03)		
(2002 omitted)						
Year 2003	2.364**	(0.46)	1.556**	(0.14)	-.992**	(0.16)
Year 2004	1.637	(1.04)	5.699**	(0.27)	-2.811**	(0.25)
Year 2005	5.341**	(1.54)	9.406**	(0.39)	-3.847**	(0.40)
Year 2006	16.070**	(1.33)	1.433**	(0.41)	-6.668**	(0.32)
Constant	60.207**	(2.74)	4.279**	(1.01)	18.995**	(0.66)
Tract fixed effects ^a	--**		--**		--**	

^a The joint significance of the tract fixed effects is determined by an F-statistic that tests whether all of the effects equal zero. No coefficient or standard error is reported for this test, as it reflects the joint significance of multiple fixed effects.

N=25,204 observations in Panel 1 (6,301 tracts).

N=31,505 observations in Panel 2 (6,301 tracts).

*p<.05; **p<.01

Table 5: Estimated impact of CAP on high-cost lending (2004-2006).

	# Low-Cost		# High-Cost		# FHA	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
# CAP loans	1.072*	(0.48)	-.708*	(.32)	.148	(0.10)
# Low-cost loans			.100**	(.03)	-.024**	(0.01)
# High-cost loans	.273**	(0.09)			-.119**	(0.01)
# FHA loans	-.490**	(0.16)	-.881**	(.11)		
(2004 omitted)						
Year 2005	-4.255**	(1.63)	16.271**	(0.38)	-.815**	(0.20)
Year 2006	-6.736**	(1.30)	12.812**	(0.47)	-2.234**	(0.17)
Constant	68.878**	(2.66)	20.265**	(2.85)	15.218**	(0.65)
Tract Fixed Effects ^a	--**		--**		--**	

^a The joint significance of the tract fixed effects is determined by an F-statistic that tests whether all of the effects equal zero. No coefficient or standard error is reported for this test, as it reflects the joint significance of multiple fixed effects.

N=18,903 observations (6,301 tracts).

*p<.05; **p<.01

Table 6: Breakdown of high-cost lending by interest rate premium (2004-2006).

	# High-Cost 3-5		# High-Cost 5-7		# High-Cost >7	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
# CAP loans	-.069	(0.11)	-.382	(0.22)	-.258*	(0.10)
# Low-cost loans	.044**	(0.00)	.050**	(0.02)	.004	(0.01)
# FHA loans	-.001	(0.02)	-.612**	(0.07)	-.268**	(0.03)
(2004 omitted)						
Year 2005	4.223**	(0.12)	9.544**	(0.24)	2.503**	(0.09)
Year 2006	-1.033**	(0.11)	8.629**	(0.31)	5.216**	(0.14)
Constant	6.348**	(0.43)	9.129**	(1.69)	4.788**	(0.99)
Tract Fixed Effects ^a	--**		--**		--**	

^a The joint significance of the tract fixed effects is determined by an F-statistic that tests whether all of the effects equal zero. No coefficient or standard error is reported for this test, as it reflects the joint significance of multiple fixed effects.

N=18,903 observations (6,301 tracts).

*p<.05; **p<.01

Figures

Figure 1: FRM, ARM, and CAP interest rates across time.

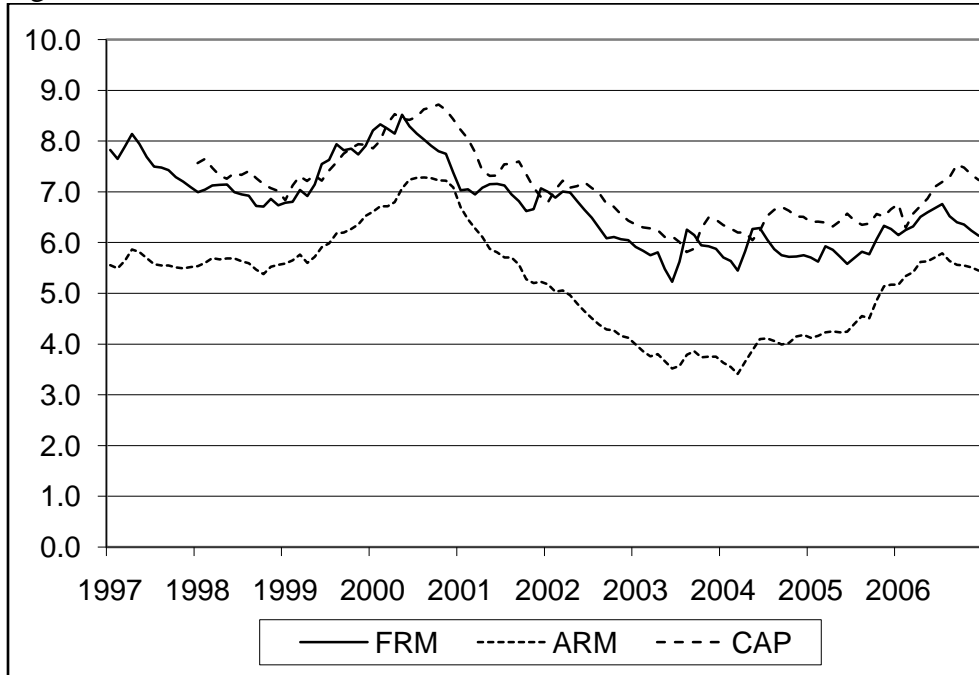
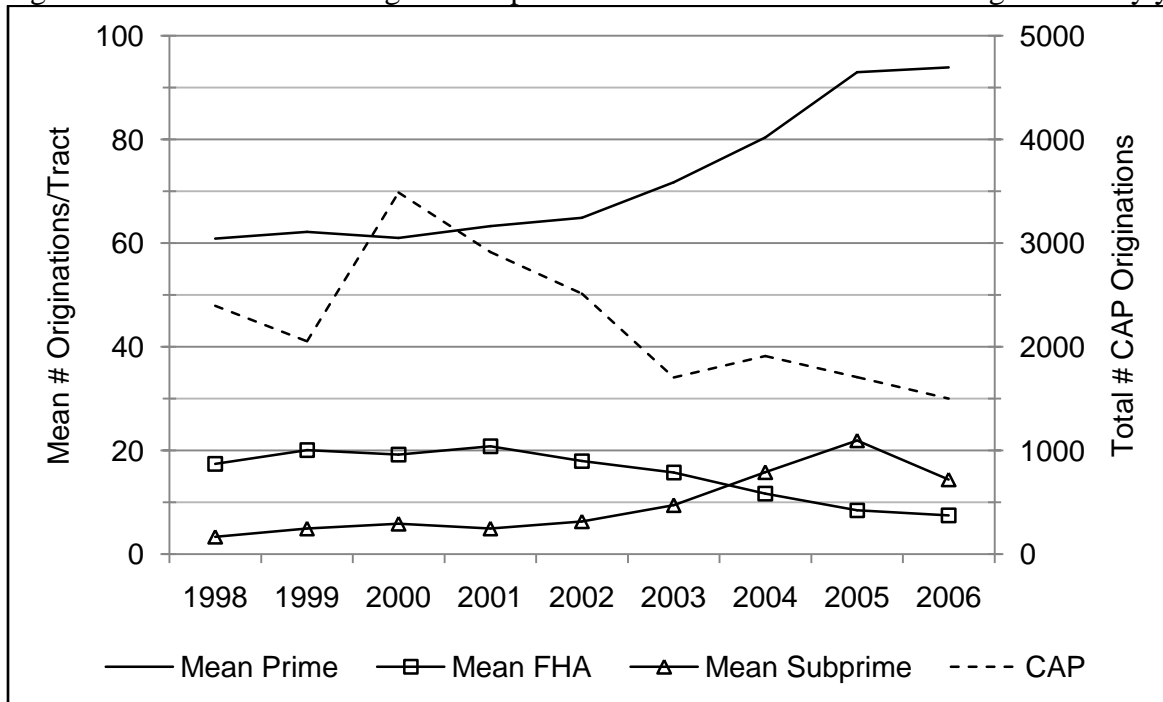


Figure 2: Mean number of originations per tract and total number of CAP originations by year.



N=56,709 tracts (6,301 observations per year).

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