Do the GSEs matter to low-income housing markets? An assessment of the effects of the GSE loan purchase goals on California housing outcomes

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Abstract

This study evaluates the effects of the GSE mortgage purchase goals on homeownership and housing conditions among communities that are the focus of the 1992 GSE Act and the HUD affordable housing goals. To identify GSE effects, the test framework exploits differences in the definition of lower-income and underserved neighborhoods under the 1992 GSE Act, which specifies loan purchase goals for the GSEs, and the 1977 Community Reinvestment Act, which governs loan origination activity among the federally-insured depository institutions. Research finding suggest little efficacy of the GSE home loan purchase goals in elevating the homeownership and housing conditions of targeted and underserved neighborhoods, in turn suggesting the importance of ongoing federal policy focus in achievement of affordable housing objectives.
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1. Introduction

Recent years have witnessed ongoing research and policy debate as regards the effects of government-sponsored enterprise (GSE) mortgage purchase goals on lower-income and under-served housing markets. While the GSEs were established to provide liquidity to mortgage markets and to mitigate severe cyclical fluctuations in housing, those entities are intended as well to support the provision of affordable housing and the attainment of homeownership in lower-income and minority communities. Indeed, federal regulators have devoted much attention of late

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to the performance of Fannie Mae and Freddie Mac in promoting the flow of funds and hence the widespread availability of mortgage credit among targeted and underserved communities.[1,2]

The 1992 Federal Housing Enterprise Financial Safety and Soundness Act of 1992 (GSE Act of 1992) raised the level of support that the GSEs are required to provide to lower-income and minority communities and authorized the Secretary of the US Department of Housing and Urban Development to establish "affordable housing goals" for the GSEs.[3] According to those goals, a defined proportion of each GSE's annual loan purchases must derive from:

- lower-income borrowers (the "low-moderate income" goal);
- borrowers residing in lower-income communities and borrowers in certain "high minority" neighborhoods (jointly, the "geographically targeted" or "underserved areas" goal); and
- very low income borrowers and low-income borrowers living in low-income areas (the "special affordable" goal).

The GSE Act defines lower-income borrowers (for purposes of the low-moderate income goal) as those having incomes less than the metropolitan area median income. Under the geographically targeted goal, lower-income neighborhoods are defined as those having a median income less than 90 percent of the area median income and high minority neighborhoods are defined as those having a minority population that is at least 30 percent of the total population and a median income of less than 120 percent of the area median. For the special affordable goal, very low income borrowers are those with incomes of less than 60 percent of the area median income. The special affordable goal also includes borrowers living in low-income areas with incomes less than 80 percent of the area median income.

The goals specify a required percentage of GSE loan purchases in each category. The specific percentages are adjusted periodically, as market conditions shift. The most recent HUD rules, set in November 2004 for purchase activity from 2005 through 2008, established the low- and the moderate-income goal at 54 percent of total GSE purchases, the geographically targeted goal at 38.5 percent, and the special affordable goal at 24 percent.[4] These categories are not mutually exclusive, so a single loan purchase can count towards multiple goals.

This paper seeks to determine whether the GSE mortgage purchase goals are associated with improved housing conditions and homeownership attainment among communities that are the

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[1] Fannie Mae, the Federal National Mortgage Association, was created in 1938 and established for the first time a secondary market in home mortgages. In order to enhance liquidity to home mortgage lenders and induce competition in the secondary mortgage market, the government in 1968 created the Federal Home Mortgage Loan Corporation, now known as Freddie Mac.

[2] The secondary mortgage market derived largely from a recognized need to reduce the non-price rationing of mortgage credit. Further, federal regulators sought to geographically redistribute loanable funds from areas of excess savings to areas of excess demand for those funds. Accordingly, academic research and policy analysis largely has focused on whether the increased liquidity and implicit Federal guarantee associated with GSE operations have influenced the stability of mortgage market operations and the pricing of mortgages. Ambrose and Warga [2] show that the GSEs have a costs of funds advantage over banking and other financial institutions on the order of 75 basis points. Similarly, Hendershott and Shilling [17] and Cotterman and Pearce [13] compare the mortgage rates on conforming loans, which the GSEs can purchase, and jumbo loans, which the GSEs cannot, and show that the presence of the GSEs is associated with a 25 to 40 basis point reduction in interest rates. Other researchers argue that the GSEs have had at best a limited beneficial impact on mortgage pricing (Heuson, Passmore and Sparks [18], Passmore [25]).

[3] This additional responsibility was added in part because of a belief that returns to GSE shareholders benefited from the federal line of credit available to the GSEs.

[4] These figures are averages over the 4-year period. Actual percentages vary from year to year.

focus of the 1992 GSE Act and the affordable housing goals set by HUD. In evaluating this question, we exploit variation in regulation that governs the mortgage loan purchase activities of the GSEs (the 1992 GSE Act) and that which governs the mortgage loan origination activities of banking institutions (The Community Reinvestment Act of 1977, or CRA). For the GSE loan purchase goals, the GSE Act uses 90 percent of area median income as the threshold for defining lower-income neighborhoods. By contrast, the CRA establishes an 80 percent threshold for identifying lower-income neighborhoods within a banking institution's loan origination assessment area. In particular, while census tracts with a median income of less than 80 percent of the area median income are of regulatory concern to both banking institutions governed by CRA and the GSEs, those neighborhoods with median incomes between 80 and 90 percent of the area median income fall only under the regulatory attention of the GSEs. We thus can use changes in measures of neighborhood and housing market activity in this latter set of census tracts, compared to changes in similar census tracts not covered by GSE regulation, as an indication of the impact of the GSE loan purchase goals on homeownership and housing conditions. This is a direct and relatively powerful test of GSE impacts on local housing markets. Additional tests evaluate the interactive effects of GSE geographic targeting of lower income tracts with those tracts ranked highly as regards proportion of borrowers qualifying for the low-moderate income and special affordable housing goals. Finally, the analysis seeks to evaluate the robustness of estimation results across local housing markets.

The plan of the paper is as follows. The following section reviews the literature and describes the empirical approach. In Section 3, we provide summary information on GSE loan purchase activity among sampled areas. Section 4 describes the data whereas Section 5 reviews the estimation results. Section 6 provides concluding remarks.

2. Background and empirical approach

In recent years, a sizable literature has emerged which examines the success of the GSEs in meeting the broad objectives of the 1992 GSE Act. Bunce and Scheessele [9] examine GSE purchase activity using data collected pursuant to the Home Mortgage Disclosure Act (HMDA) and find that the "shares of the GSEs' business going to lower income borrowers and underserved neighborhoods typically fall short of the corresponding shares of other market participants" (p. 3). Other researchers, including, Manchester, Neal, and Bunce [23], Bunce [8], and Case, Gillen, and Wachter [12], have reached similar conclusions. Of these, Case et al. [12] use a slightly different approach. They augment the HMDA data with HUD public use data base (PUDB) information on GSE purchases and compare the distribution of purchases to the distribution of mortgage originations. Looking at 44 metropolitan areas between 1993 and 1996, they find that the GSEs are less likely to purchase loans extended to lower-income borrowers, minority borrowers, borrowers in lower-income neighborhoods, and borrowers in central cities.

Taking a different approach, Canner, Passmore, and Surette [11] examine loans eligible for insurance under the Federal Housing Administration (FHA) rules and evaluate how the risk associated with those loans is distributed among four classes of institutions: government mortgage institutions, private mortgage insurers, the GSEs, and banking institutions that hold loans in their portfolio. The results indicate that the FHA bears the largest share of risk associated with FHA-eligible lending to lower-income and minority populations, with the GSEs lagging far behind. These findings are then consistent with the above discussed studies.

However, other research (see, for example, Listokin and Wyly [21] and Temkin, Quercia, and Galster [27]) has shown that the GSEs responded to the affordable housing goals by enhancing

their product offerings so as to facilitate more purchases of loans from targeted communities. These new products often feature underwriting criteria that depart from industry norms and allow for higher risks. Moreover, Bunce and Scheessele [9], Bunce [8], and others have shown that in the years following the enactment of the 1992 GSE Act, the GSEs have increased the proportion of loan purchases from targeted populations. For example, between 1992 and 1995, Fannie Mae doubled the share of loan purchases from lower-income borrowers and Freddie Mac increased its share by about 50 percent. Manchester [22] documents considerable GSE improvement in loan purchases among lower-income and targeted communities; in 1995, Fannie Mae and Freddie Mac both surpassed the affordable housing goals established by HUD. Overall, the emergent literature suggests that the GSEs have been one of a number of players important to enhancing lower-income and minority access to mortgage credit. By some measures, the GSEs have been relatively smaller players. Nonetheless, since the passage of the 1992 GSE Act, GSE performance appears to have improved significantly.

The GSEs, however, may have enhanced mortgage market functions and support of lower-income and minority communities independent of their direct loan purchase activity. For example, Harrison et al. [16] focus on whether the GSEs reduce the prevalence of adverse informational externalities in mortgage lending markets. Information externalities are potentially an important factor in the provision of mortgages to lower-income and minority communities because these areas often have low transaction volumes (i.e., "thin markets"), a characteristic that has been shown to be negatively associated with the probability of mortgage loan approval.[5] If the GSEs help to elevate the number of transactions in thin markets, then they can enhance the prospects for homeownership among individuals in lower-income and minority communities, regardless of whether the mortgage is subsequently purchased by a GSE or not. The authors find that the GSEs in general, and Fannie Mae in particular, do indeed help to increase the number of transactions in thin markets in Florida and thus help to mitigate the effects of adverse informational externalities.

In a related study, Myers [24] examines the effects of GSE activity on loan origination. He argues that lenders have a greater incentive to approve those loans most likely to be purchased by the GSEs, because increased liquidity is realized only if the GSEs purchase the originated loans. Myers specifically tests whether primary market lenders favor higher income borrowers, white borrowers, borrowers in higher-income neighborhoods, and borrowers in the suburbs, since these are the populations that have been shown to receive considerable GSE support. While Myers does find that loans with a lower probability of being sold to the GSEs do have a lower likelihood of being approved overall, he does not find support for this incentive-based explanation in analyses of racial disparities in mortgage approvals.

In contrast to the above literature, this research seeks direct evidence of the effects of GSE loan purchase activity on local housing markets. In that regard, the study attempts to determine whether GSE mortgage purchase activity is associated with improvements in housing conditions and homeownership attainment among communities that are the focus of the 1992 GSE Act and the affordable housing goals set by HUD. This paper adds to a small literature that has focused on GSE puchases and housing market outcomes (see, for example, Ambrose, Thibodeau and Temkin [1]).

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[5] Lang and Nakamura [19] develop a model of mortgage lending that shows that, because of higher uncertainty, mortgage applications for properties located in neighborhoods with thin markets will be deemed riskier than applications from neighborhoods with high transaction volumes ("thick markets"). Many studies have since found empirical evidence in support of the theory, including Harrison [15], Calem [10], and Ling and Wachter [20].

We evaluate this question by exploiting variation in regulation governing the mortgage loan purchase activities of the GSEs (the 1992 GSE Act) and that which governs the mortgage loan origination activities of banking institutions (the CRA). The CRA directs the federal banking regulatory agencies to encourage federally-insured banking institutions to assist in meeting the credit needs of all communities in their service areas, including lower-income areas, while maintaining safe and sound operations.[6] In the context of federal bank examinations, regulators are directed to assess the institution's record of meeting the credit needs of all communities in their service area and to consider the institution's CRA performance when assessing an application for merger, acquisition, or other structural change.

CRA examinations of banking institutions scrutinize the geographic distribution of lending activities. Among other tests, these examinations compare (1) the proportion of loans extended within the institution's CRA assessment area as compared to the proportion of loans extended outside of its assessment area, and (2) the distribution of loans within the institution's CRA assessment area across neighborhoods with differing incomes, with lending in lower-income neighborhoods receiving particular weight.[7] Here, lower-income neighborhoods are defined as those (census tracts) that have a median family income of less than 80 percent of the median family income of the metropolitan area in which the census tract is located.[8]

In our study, the test framework capitalizes on variation in the regulatory definition of lower-income neighborhoods under the 1992 GSE Act and the CRA. For the GSE geographically targeted loan purchase goal, the GSE Act uses 90 percent of metropolitan area median income as the threshold for defining lower-income neighborhoods. By contrast, the CRA establishes an 80 percent threshold for identifying lower-income neighborhoods within a banking institution's loan origination assessment area. Given these definitions, it is clear that a subset of neighborhoods is the focus of GSE but not banking institution regulation. In particular, while census tracts with a median income of less than 80 percent of the metro area median income are of regulatory concern to both banking institutions governed by CRA and the GSEs, those neighborhoods with median incomes between 80 and 90 percent of the area median income fall only under the regulatory attention of the GSEs. We thus can use changes in measures of neighborhood and housing market activity in this latter set of census tracts, compared to changes in similar census tracts not

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[6] The Community Reinvestment Act (CRA) derived in part from concerns that banking institutions were engaged in "redlining," a practice by which lenders would fail to seek out credit-granting opportunities in minority or lower-income neighborhoods. The resultant lack of available capital, it was argued, held back the economic development of those communities. The federal regulatory agencies that are the CRA's focus are the Board of Governors of the Federal Reserve System, the Office of the Comptroller of the Currency, the Federal Deposit Insurance Corporation, and the Office of Thrift Supervision

[7] Banking institutions specify their CRA assessment area, a geographic area that roughly corresponds to the areas where the institution operates branches and where it does considerable lending, in order to facilitate CRA performance evaluations. CRA assessment areas must be approved by the federal regulatory agencies. The CRA regulations also require that examiners evaluate the distribution of loans within its assessment area across borrowers of different economic standing. For more information on the regulations implementing the CRA, see Board of Governors [5].

[8] There is considerable evidence indicating that banking institutions have responded to the CRA by increasing the resources and lending directed to lower-income areas within their assessment areas. Avery, Bostic, and Canner [4], for example, show a limited increase in the percentage of institutions engaged in community lending activities because of the CRA. As another example, Schwartz [26] and Bostic and Robinson [6,7] examine the effects of CRA agreements, which are pledges lenders make to extend specified volumes of lending to targeted communities, and find evidence suggesting increased levels of lending on the part of banks.

covered by GSE regulation, as an indication of the impact of GSE loan purchase activities. This is a direct and relatively powerful test of the effects of GSE loan purchase goals on local housing markets.

The form of the empirical test follows Avery, Calem, and Canner [3], who conduct a similar analysis of the impact of the CRA on local communities. As in that study, the challenge is to establish the counterfactual of local housing market activity in the absence of GSE loan purchase activity. While it is relatively straightforward to identify the treatment group (census tracts with median incomes between 80 and 90 percent of the area median), there are no census tracts in the same median income range that do not receive regulatory treatment by either the banking institutions or the GSEs. As in Avery et al. [3], we address this challenge by identifying a control group as close as possible to the treatment group.[9]

The analysis here follows this general methodology, but uses the lower-income threshold as defined by the 1992 GSE Act as the key cutoff. Accordingly, our study focuses on the 90 percent threshold that defines the marginal impact of the GSE regulations alone. We compare outcomes among tracts distributed about the GSE Act threshold and use a range of 10 percentage points (80–90 percent versus 90–100 percent of area median income).[10] The key outcomes of interest are changes in three local housing market indicators, the homeownership rate, the vacancy rate, and the median house value.

A key advantage of our approach is its simplicity. Because the tracts in the control and treatment groups are located in the same metropolitan areas and often are in close proximity to each other, they face many of the same economic and demographic forces that influence metropolitan housing markets. This obviates the need to control for many factors, including technology, metropolitan area economic performance, and new mortgage and other lending practices.

The analysis seeks to establish whether GSE attention to the low-moderate income and special affordability goals is associated with improved housing market outcomes. To do so, we compute the proportion of households in each sample tract that (if they were to receive a mortgage that was purchased by a GSE) would qualify under the low-moderate income or special affordability GSE home loan purchase goals. For each goal, we rank tracts on that basis and then create a categorical variable indicating those tracts which comprise the top 25 percent of the ranking. Each categorical variable is interacted with an indicator of whether the tract qualifies for GSE loan purchase according to the geographically-targeted low-income area goal. Accordingly, we assess housing market changes as derive both from qualification of the tract according to the GSE geographically-targeted loan purchase goal as well as that variable interacted with an indicator of high proportions of GSE eligible borrowers in those same tracts. Those latter interactive terms seek to account for the added effects of the GSE low-moderate income and special affordability loan purchase goals in assessing the census tract distribution of GSE loan purchases. Finally, the empirical analysis evaluates the robustness of estimated findings across disparate local housing markets.

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[9] In the Avery et al. [3] study, the control group is the set of census tracts just above the lower-income neighborhood threshold as defined by the CRA regulations, under the reasoning that these tracts could be CRA-eligible with only a slight change in their populace.

[10] Avery et al. [3] establish the robustness of their observed relationships by varying the range of tracts about the CRA threshold. Such an approach is not possible for this study because of the small sample sizes that would result from using small income ranges.

3. GSE activity in California

The geographic focus of the analysis is the State of California. Public data on GSE activity available from HUD indicate a substantial GSE loan purchase volume in the State of California (Table 1). During the 1990s, GSE loan purchase volume in California averaged some 435,500 loans per year. Between 1994 and 1999, the GSEs purchased an average of 29.5 percent of the conventional owner-occupied 1–4 family home purchase loans originated in California. This compares with a 32.1 percent share of comparable loans nationwide. By this metric, the GSEs were relatively underrepresented in California despite the high absolute level of activity. If attention is restricted to the market for conventional conforming loans, the gap actually reverses, with GSE market share in California (41.2 percent) substantially exceeding the GSE market share nationwide. Among the GSEs and as is the case nationally, Fannie Mae purchased a larger share of California's conventional loan portfolio, and its presence increased slightly over the course of the decade.

The data show some concentration of GSE activity in coastal southern California, the Inland Empire (Riverside and San Bernardino Counties), Sacramento, and the San Francisco Bay Area. GSE purchase activity in these areas together accounted for over three-fourths of all purchase activity in the state in 1994 and 1999 (Table 1). This concentration of loan purchase activity was greater than the geographic concentration of population in the state, as these areas jointly accounted for slightly more than two-thirds (68 percent) of the state's population (not shown).[11]

A majority of GSE loan purchase activity in California during the 1990s took place in higher income neighborhoods (61.4 percent), in relatively integrated neighborhoods (46.2 percent), and for loans originated among higher income borrowers (60.5 percent). The data show that these proportions generally rose during the 1990s, so that these populations comprised an even greater share of the GSE purchase activity by the end of the decade (Table 2). Both the Fannie Mae

Table 1
Distribution of GSE loan purchases among selected California MSAs (1994 and 1999)

	1994			1999		
	Fannie Mae	Freddie Mac	Total	Fannie Mae	Freddie Mac	Total
Metropolitan statistical area						
Los Angeles–Long Beach (4480)	24.7	23.7	24.3	21.6	20.6	21.5
Alameda–Contra Costa (5775)	8.8	8.9	8.9	8.9	9.9	9.3
Orange (5945)	8.8	9.5	9.1	10.6	9.7	10.2
Riverside–San Bernardino (6780)	9.0	8.3	8.7	9.2	9.0	9.1
Sacramento (6920)	5.9	6.2	6.0	6.6	6.6	6.6
San Diego (7320)	9.1	9.0	9.0	10.7	8.9	9.9
San Francisco (7360)	4.2	4.6	4.4	4.5	4.2	4.3
Santa Clara (7400)	6.3	6.2	6.3	5.9	5.7	5.8
Remainder	23.2	23.6	23.3	22.0	25.4	23.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of purchases (000s)	228	192	420	357	265	621

[11] The Bay Area's GSE purchase share, at about 20 percent, was nearly twice its population share (about 10 percent). By contrast, the Los Angeles–Long Beach GSE loan purchase share was about 5 percentage points less than its population share.

Table 2
Distribution of GSE purchases in California by borrower and tract characteristics (1994 and 1999)

	1994			1999		
	Fannie Mae	Freddie Mac	Total	Fannie Mae	Freddie Mac	Total
Tract median income (relative to MSA median)						
120 percent or more	35.6	38.3	36.3	40.9	40.7	40.8
100–120 percent	24.4	25.8	25.1	25.7	26.0	25.8
90–100 percent	13.0	12.7	12.9	12.2	11.8	12.0
80–90 percent	10.2	9.4	9.8	9.1	9.4	9.3
Less than 80 percent	17.8	13.7	15.9	12.1	12.0	12.3
Tract income missing	0.0	0.1	0.1	0.0	0.1	0.1
Borrower median income (relative to MSA family median)						
120 percent or more	45.3	47.8	46.4	46.0	49.2	47.4
100–120 percent	14.0	14.2	14.1	13.4	14.0	13.7
80–100 percent	13.8	13.8	13.8	13.4	14.6	13.9
Less than 80 percent	16.8	16.2	16.5	19.0	20.1	19.5
Borrower income missing	10.2	8.0	9.2	8.1	2.0	5.5
Percent minority						
50 percent or more	26.2	22.2	24.4	18.6	18.1	18.4
30–49 percent	22.3	20.9	21.7	21.5	21.1	21.3
10–30 percent	44.6	48.1	46.2	51.3	51.5	51.4
5–10 percent	6.6	8.3	7.4	8.2	8.8	8.5
Less than 5 percent	0.3	0.4	0.3	0.4	0.4	0.4
Tract percent missing	0.0	0.1	0.0	0.0	0.1	0.0
Total share	54.4	45.6	100.0	57.4	42.6	100.0
Number of purchases (000s)	228	192	420	357	265	621

and Freddie Mac loan purchase portfolios also showed an increased representation of lower-income borrowers. These distributions and trends are broadly consistent with the findings in prior research, although the degree of improvement evidenced in California was somewhat damped relative to other parts of the United States.

For purposes of this study, we focus on those neighborhoods that are close to the GSE-eligible threshold of 90 percent of the area median income. In Los Angeles and many other metropolitan areas, these neighborhoods are in close proximity to each other, which in turn suggests that they face many of the same urban economic and demographic forces. The geographic proximity of the GSE-eligible neighborhoods reduces the need to exhaustively control for all metropolitan forces that might influence housing market outcomes, since the influence is likely to be near identical within the treatment and control groups.[12]

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[12] In Los Angeles, for example, we observe that GSE activity is not randomly distributed across the Los Angeles metro area. For example, in 1994 purchase activity was relatively more concentrated in the north central portion of the county, which includes the San Fernando and San Gabriel valleys and the coastal areas. The central core of the county has not seen high levels of GSE loan purchase activity, in part because there are fewer home purchases in these areas. Over time, the distribution of GSE loan purchases has changed only slightly, although in recent years the intensity of activity has risen across much of the county, just as it has nationwide in the context of the more favorable housing finance environment. It is not appropriate, however, to conclude from this evidence that the GSEs have not served lower-income

4. Data and sample

This study uses data from the 1990s to assess the effects GSE home loan purchase activity on local housing market outcomes. The analysis employs census tract-level data compiled via the 1990 and 2000 Censuses to establish the initial housing market conditions in a neighborhood and to measure how those conditions changed over the decade. We focus on three measures of housing market conditions: the homeownership rate, the vacancy rate, and the median house value.[13] Further, we assess the effects on housing outcomes of the GSE geographically targeted low-income area loan purchase goal as well as interactions of that goal with tracts ranked highly as regards the representation of low-moderate income and "special affordable" qualifying borrowers. Our interest is to test whether changes in neighborhood housing conditions are sensitive to the incentive structure established by the HUD affordable housing goals, from which we will draw conclusions as to whether GSE activity has had a significant positive effect on neighborhood housing markets. This is an indirect test; we do not use GSE activity directly in any of the statistical tests because observed activity is endogenous. In accordance with the identification strategy described above, the analysis is restricted to California metropolitan area census tracts with median family incomes between 80 and 100 percent of the area median family income.

Because trends in the homeownership rate, vacancy rate, and median house values are influenced by factors beyond GSE activity and because the relationship between GSE activity and changes in housing market conditions might also be affected by these factors, we also compiled demographic, economic, and housing-related data for each census tract. We use these data items, which include youth, elderly, and minority population shares, average household size, percentage of all units in the tract that are 1–4 family units and that are owner-occupied, to control for differences across tracts, noting as well that these differences can mediate the relationship between GSE activity and housing market outcomes in important ways.

For the comparisons we examine to be meaningful, it is necessary that the 1990 and 2000 data pertain to the same geographic space. Because tract boundaries change between each decennial Census, we were not able to use the primary data that is publicly available from the Bureau of the Census. Instead, we use a data set constructed by Pci, Incorporated, that recomputed the 2000 Census data based on the 1990 census tract boundaries. Roughly, the process involves reconstituting each census tract using 1990 Census boundaries as a weighted combination of the 2000 census tracts.[14]

The final sample includes 1122 census tracts. Table 3 presents information concerning the sample as a whole as well as regards the subgroups of tracts on either side of the 90 percent GSE eligibility threshold. As shown in the table, tracts in the sample did generally witness improvement in housing market conditions between 1990 and 2000, in that homeownership rates and median house values increased while vacancy rates fell substantially. However, tracts in the sample had relatively young and minority populations, as the share of young people and minorities

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communities that fall under their mandate, for homeownership is not randomly distributed across the metro area either. Indeed, the distribution of homeowners in Los Angeles County roughly mirrors the distribution of GSE loan purchases.

[13] In this study, the homeownership rate is defined as the number of owner-occupied 1-to-4 family housing units divided by the total number of 1-to-4 family housing units in a tract, while the vacancy rate is defined as the number of vacant housing units divided by the total number of 1-to-4 family housing units in the tract. We also used total number of all housing units in the tract as the denominator in this ratio. The results remained qualitatively unchanged.

[14] For example, if a 1990 census tract was the equal product of 3 tracts using 2000 Census definitions, then the average house value for the tract would be calculated as the average house values in the three 2000 tracts.

Table 3
Selected sample averages

	All tracts in sample	Tracts above GSE margin	Tracts below GSE margin	Top 25% of LOW-MOD	Top 25% of AFFORD
Housing market indicators					
Homeownership rate, 1990	46.50	48.46	44.36***	43.85***	42.45***
Vacancy rate, 1990	5.72	5.85	5.59	5.08	5.32
Median house value, 1990 ($)	181,668	191,768	170,626***	149,974***	157,961***
Change in homeownership rate, 1990s	4.36	4.28	4.46	1.35***	1.32***
Change in vacancy rate, 1990s	−10.81	−12.00	−9.49	−8.66	−8.39
Change in median house value, 1990s	17.10	17.97	16.2	9.87***	9.42***
Demographic characteristics					
Percentage aged 17 or less, 1990	25.38	24.94	25.86*	27.12***	26.84***
Percentage aged 65 or older, 1990	11.54	11.29	11.82	10.94	10.81
Percentage minority, 1990	31.35	28.41	34.57***	36.66***	37.69***
Percentage Asian, 1990	9.61	10.11	9.06	9.10	9.34
Household size, 1990	2.89	2.86	2.92	2.97	2.97
Percentage 1–4 unit structures, 1990	72.74	74.13	71.21**	68.95***	67.28***
Percentage single family homes, 1990	76.29	77.16	75.33	76.33	76.50
Number of owner-occupied units, 1990	1095	1135	1051*	1042	1002*
Change in number of units, 1990s	6.57	6.74	6.39	4.44	3.75
Change in median family income, 1990s	33.41	34.24	32.50	14.55***	13.58***
Metropolitan area characteristics					
Per capita income in PMSA, 1990 ($)	22,355.7	22,553.7	22,139.3	21,949	21,879
Share of population employed, 1990 (%)	57.45	58.08	56.76*	55.98	56.56
Per capita wages in PMSA, 1990 ($)	25,692	25,851	25,517	25,118	25,407
Change in PMSA per capita income, 1990s	50.03	51.21	48.75	46.29**	45.24**
Change in PMSA employment, 1990s	3.42	3.45	3.39	3.64	2.69*
Change in PMSA per capita wages, 1990	54.00	55.54	52.25*	49.65*	49.03**
Number of tracts	1122	586	536	258	293

Note. All the change variables are in percent. The first three columns are: tracts with median family income as 80–100%, 90–100% and 80–90% of MSA median respectively; the fourth column is: top 25% of tracts in the metro area ranked by share of families qualifying for the low-moderate income goal of affordable housing goals; the fifth column is: top 25% of tracts in the metro area ranked by share of families qualifying for the special affordable goal of affordable housing goals. In column 3, an asterisk (*) indicates a value that is statistically different from the above margin sample (column 2). In the last two columns, an asterisk indicates a value that is statistically different from the all tracts sample (column 1).

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

exceeded state and national norms.[15] Moreover, sample tracts trailed the state as a whole along a number of housing market dimensions. Sampled tracts recorded relatively low homeownership rates and house values, with the median house value falling well below the state median.

In comparing tracts just above and below the GSE income eligibility threshold, the data show that the tracts are similar along many dimensions. For example, tracts with family incomes of 80–90 percent of metropolitan the area median value and tracts with family incomes of 90–100 percent of metropolitan area median value had statistically similar elderly and Asian population shares as well as statistically similar average household sizes. However, they did differ in some

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[15] State and federal data are not shown.

respects, as GSE-eligible tracts had statistically elevated percentages of children and minorities. For example, tracts just below the GSE threshold with 80–90 percent of area median income had about 35 percent minority population share, compared with a 28 percent minority share for those tracts with 90–100 percent of area median income. Further, the GSE-eligible tracts also saw somewhat lower income growth during the 1990s than those tracts just above the eligibility threshold.

Finally, in terms of housing market indicators, tracts just below the GSE threshold began the decade with an average homeownership rate and an average median house value significantly lower than tracts just above the GSE's 90 percent of the metropolitan area median family income threshold. In both cases, the average values for tracts below the GSE threshold were about 10 percent lower than those for tracts just above the threshold. The two groups of tracts did not show a significant difference in terms of vacancy rates, with both groups showing an average vacancy rate of between 5.5 and 6 percent.

Despite these initial differences, tracts with median family incomes just above and below the GSE threshold did not evidence significant differences in housing market performance during the 1990s. These groups of tracts recorded statistically comparable increases in homeownership rates of close to $4\frac{1}{2}$ percentage points. Average vacancy rate declines were also of similar magnitude across the two sample groups, as was the percentage increase in the median house value. These small differences in the average housing market experiences of tracts that fall just below and beyond the GSE threshold suggests that GSE activity might not have had a significant impact on local housing market outcomes. However, the univariate statistics in Table 3 do not take into account the correlations between housing market outcomes and other important determinants of housing market outcomes and thus leaves open the possibility that these correlations mask the effects of GSE activity.

5. Results

The statistical analysis seeks to assess the effects of GSE loan purchase activity on housing market indicators among California census tracts that are the focus of the 1992 GSE Act and HUD affordable housing goals. The regressions estimate the effects of levels and changes in census tract socio-demographic, local market, and other characteristics on changes in tract housing market conditions (homeownership rate, vacancy rate, and median house values). The empirical specification further includes a categorical control, labeled GEOG, for whether the census tract qualifies for GSE loan purchase under the "geographically targeted low-income area" goal (indicated by whether the Census tract had a median income in the range of 80–90 percent of the metropolitan area median income) as well as interactions of the GEOG term with indicators of whether the track ranks highly in population qualifying for the GSE "low-moderate income" (LOW-MOD) and "special affordable" (AFFORD) housing goals. Specifically, the LOW-MOD variable is defined as a categorical indicator of whether the tract is ranked among the top 25 percent of tracts in the metropolitan area by share of families qualifying for the low-moderate income GSE affordable housing goal. AFFORD is a categorical indicator of whether the tract is ranked among the top 25 percent of metropolitan area tracts by share of families qualifying for the GSE special affordable housing goal. As noted above, the sample is restricted to tracts with median incomes between 80 and 100 percent of the metropolitan area median. The empirical structure enables comparison of housing market performance among those census tracts that fall under the GSE affordable goals but outside the CRA umbrella (tracts with median family incomes of 80–90 percent of the metropolitan area median) with the performance in those cen-

sus tracts just outside the GSE affordable goals umbrella (tracts with metropolitan area median family incomes of 90–100 percent of the area median). Further, we assess the robustness of those results to stratified local market conditions. Given our use of census data, market performance is measured from 1990 to 2000.[16]

Table 4 summarizes estimation results of the effects of GSE loan purchase goals on housing outcomes. As shown in the table, findings are displayed for each measure of housing market conditions, including changes in homeownership rates, vacancy rates, and median house values. The table provides coefficient estimates and related standard errors for the effects of the GSE "geographically targeted low-income area" loan purchase goal (GEOG) as well as interactions

Table 4
Regression results by treatment variable for the percent change in the homeownership rate, vacancy rate and median house value (1990–2000)

Geographic stratification	Treatment variable	Dependent variable		
		Change of home-ownership rate	Change of vacancy rate	Change of median house value
Full sample	GEOG	−1.02	−3.27	−3.23***
		(0.69)	(4.38)	(0.94)
San Francisco Bay Area	GEOG	−0.59	1.22	−5.36**
		(1.28)	(6.82)	(1.92)
Los Angeles Metro Area	GEOG	−2.30**	0.95	−1.49
		(0.85)	(4.67)	(0.92)
Central Valley and Inland Empire	GEOG	−1.00	−19.82	−1.60
		(1.59)	(13.48)	(1.81)
Full sample	GEOG	−1.03	−7.04	−4.14***
		(0.83)	(5.21)	(1.11)
	GEOG∗LOW-MOD	1.84	0.48	−1.43
		(1.76)	(11.06)	(2.36)
	GEOG∗AFFORD	0.82	6.26	3.46
		(1.59)	(10.01)	(2.14)
	GEOG∗LOW-MOD∗AFFORD	−3.59	5.86	0.64
		(2.4)	(15.09)	(3.22)
San Francisco Bay Area	GEOG	−0.11	−3.54	−5.60**
		(1.40)	(7.57)	(2.14)
	GEOG∗LOW-MOD	−1.86	18.31	−2.79
		(2.86)	(15.41)	(4.35)
	GEOG∗AFFORD	7.52*	−4.74	6.61
		(3.66)	(19.74)	(5.57)
	GEOG∗LOW-MOD∗AFFORD	−10.09*	6.84	−2.86
		(4.76)	(25.64)	(7.24)

[16] While changes in census tract housing market conditions are measured for the period between the decennial censuses of 1990 and 2000, note that the GSE Act was not passed until 1992. However, federal legislation rarely occurs without broad debate and in that regard it is plausible to assume that the GSEs were aware of likely GSE Act provisions in advance of the passage of the legislation. If true, then prior to the Act's passage, the GSEs might have internalized a number of its incentives, which would suggest a behavioral response earlier in the decade. Note further that California experienced a deep recession in the early 1990s with house prices tumbling by upwards of 15 percent. The state's economy started to regain its footing only in 1993, had virtually returned to its 1990 position by 1995. In this view, much of the benefit that GSEs afford would have been evidenced primarily during the post-recession years of the 1990s.

Table 4 (*continued*)

Geographic stratification	Treatment variable	Dependent variable		
		Change of home-ownership rate	Change of vacancy rate	Change of median house value
Los Angeles Metro Area	GEOG	−2.17[*]	−1.36	−1.24
		(0.99)	(5.48)	(1.07)
	GEOG∗LOW-MOD	0.61	10.06	−4.83
		(2.42)	(13.38)	(2.61)
	GEOG∗AFFORD	0.07	3.73	1.83
		(1.7)	(9.4)	(1.84)
	GEOG∗LOW-MOD∗AFFORD	−1.38	−7.95	1.85
		(2.95)	(16.27)	(3.18)
Central Valley and Inland Empire	GEOG	−1.72	−31.56	−0.86
		(2.05)	(17.4)	(2.34)
	GEOG∗LOW-MOD	6.85	−13.04	0.77
		(3.65)	(30.92)	(4.16)
	GEOG∗AFFORD	1.31	10.51	−1.70
		(3.56)	(30.17)	(4.06)
	GEOG∗LOW-MOD∗AFFORD	−8.32	36.52	−0.84
		(5.04)	(42.74)	(5.76)

Note. Standard errors are in parenthesis. The treatment variables are as follows: GEOG is an indicator of whether the tract qualified according to the "geographically targeted low-income area" GSE affordable housing loan purchase goal (indicated by whether the Census tract had a median income in the range of 80–90 percent of area median income); LOW-MOD is an indicator of whether the tract is ranked among the top 25% of tracts in the metro area by share of families qualifying for the low-moderate income GSE affordable housing goal; AFFORD is an indicator of whether the tract is ranked among the top 25% tracts in the metro area by share of families qualifying for the GSE special housing affordable goal. The San Francisco Bay Area (342 tracts) includes Alameda, Contra Costa, Marin, Monterey, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano and Sonoma counties. The Los Angeles metro area (469 tracts) includes Los Angeles, Orange, San Diego and Ventura counties. The Central Valley and Inland Empire (283 tracts) includes Butte, El Dorado, Fresno, Kern, Madera, Merced, Placer, Riverside, Sacramento, San Bernardino, San Joaquin, Stanislaus, Sutter, Tulare, Yolo and Yuba counties. Complete regression results for the full sample (rows 1 and 5) are presented in Tables 5 and 6. Complete results for the other regressions are available from the authors upon request.

[*] $p < 0.05$.
[**] $p < 0.01$.
[***] $p < 0.001$.

of that term with indicators of track-level representation of populations eligible for GSE loan purchase under the "low-moderate income" (LOW-MOD) and "special affordable" (AFFORD) housing goals.[17] The table further indicates the robustness of those findings to sample stratification among the San Francisco, Los Angeles, and Central Valley/Inland Empire areas.[18] Table 5 presents the full regression results for the unified sample with the "geographically targeted low-

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[17] The empirical specification for the regressions in Table 4 includes PMSA-level economic variables as controls for metropolitan area variation. Regressions using PMSA-level fixed effects as alternative controls yield identical qualitative results, although the level of statistical significance is in some cases is reduced.

[18] As is well appreciated, California markets vary considerably in degree of housing supply constraint, pace of construction activity, and level of housing affordability. Indeed, much of the housing development in the state has been occurring in interior markets, which diverge sharply from coastal California (San Francisco, Los Angeles, and the like) in terms of the ease of getting land entitled, pace of construction activity, and level of housing affordability.

Table 5
Regression results for the full sample with GEOG as the treatment variable

Independent variable	Dependent variable		
	Change of home-ownership rate	Change of vacancy rate	Change of median house value
Intercept	−25.68***	44.31	6.55
	(5.11)	(32.16)	(6.88)
GEOG	−1.02	−3.27	−3.23***
	(0.69)	(4.38)	(0.94)
Percentage aged 17 or less, 1990	0.48***	−0.05	−0.71***
	(0.11)	(0.71)	(0.15)
Percentage aged 65 or older, 1990	0.16*	0.57	0.04
	(0.07)	(0.46)	(0.1)
Percent minority, 1990	−0.02	0.09	0.11**
	(0.02)	(0.16)	(0.03)
Percent Asian, 1990	−0.08*	0.10	−0.18**
	(0.04)	(0.26)	(0.05)
Household size, 1990	2.96**	1.59	0.80
	(1.09)	(6.9)	(1.47)
Indicator of urban tract, 1990	−0.04	−14.40*	−7.62***
	(1.13)	(7.14)	(1.53)
Percent 1–4 unit structures, 1990	−0.04	0.82***	0.35***
	(0.04)	(0.24)	(0.05)
Percent single family homes, 1990	0.02	−0.05	0.02
	(0.03)	(0.16)	(0.03)
Number of owner occupied units, 1990	0.00*	−0.01	0.00***
	(0)	(0)	(0)
Change in the number of units, 1990s	0.12***	0.59***	0.05
	(0.02)	(0.13)	(0.03)
Change in median family income, 1990s	0.20***	0.40***	0.37***
	(0.02)	(0.12)	(0.03)
Homeownership rate, 1990	−0.26***	−0.71*	−0.48***
	(0.05)	(0.35)	(0.07)
Vacancy rate, 1990	0.41***	−1.97***	0.04
	(0.07)	(0.42)	(0.09)
Median house value, 1990	0.00	0.00**	0.00***
	(0)	(0)	(0)
Per capita income in PMSA, 1990	0.00***	0.00	0.00
	(0)	(0)	(0)
Change in PMSA per capita income, 1990s	−0.09***	−0.11	0.67***
	(0.03)	(0.16)	(0.03)
Change in PMSA employment, 1990s	0.13	−0.70	0.28*
	(0.09)	(0.59)	(0.13)
N	1117	1117	1117
Adjusted R-square	0.2828	0.1274	0.6650

Note. Standard errors are in parenthesis. All change variables are in percent. GEOG is an indicator of whether the tract qualified according to the "geographically targeted low-income area" GSE affordable housing loan purchase goal (indicated by whether the Census tract had a median income in the range of 80–90 percent of area median income).

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

income area" goal specified as the GSE loan purchase treatment variable.[19] Table 6 is similar to Table 5, but also includes the interactive affordable housing goal terms discussed above.

The first set of results, shown for the GSE treatment variable labeled GEOG, show that, for the most part, controlling for changes in tract and metropolitan area characteristics, tracts targeted under the geographically targeted low-income area goal were little different from non-targeted tracts with respect to housing market outcomes. In no case was the GSE low-income area designation associated with a statistically significant improvement in housing market conditions. Further, in the full sample and for the San Francisco Bay Area, tracts qualifying for treatment in accordance with the geographically-targeted low-income area designation were associated with statistically damped rates of house price increase. Elsewhere, in Los Angeles, tracts qualifying for treatment under the geographically targeted low-income area goal were associated with lower rates of homeownership increase. For the most part, metro area targeted tracts were not statistically different from non-targeted tracts (tracts with median incomes just above the 90 percent threshold) in terms of changes in housing market conditions, in turn suggesting little efficacy of GSE loan purchases in elevating the homeownership and housing market conditions of those neighborhoods.

As suggested above, the 1992 GSE Act affordable housing goals are not mutually exclusive, such that a single loan purchase may count towards multiple goals. Accordingly, the research specifies and tests for interactive effects, as pertain to the overlap of the GSE geographically-targeted low-income neighborhood tracts with high proportions of tract population qualifying for loan purchase according to either the GSE low-moderate income household or special affordability housing goals. Those coefficients are estimated both for the unified sample and for the geographically stratified models.

All things equal, the GSE affordable housing goal interactive terms yielded only limited results. In the stratified models, a statistically significant boost to homeownership was estimated in San Francisco in the case of geographically targeted low-income tracts with high levels of special affordable populations. In other areas and as regards the other interactive treatment terms, there was no evidence of statistically significant improvements in housing conditions associated with the incentives established by the GSE affordable housing goals. Accordingly, as before, results of the analysis do not indicate much efficacy of the GSE affordable housing loan purchase targets in improvement of targeted tract housing market conditions.

6. Conclusion

This paper assesses the effects of the GSE loan purchase goals on local housing outcomes. In so doing, the study seeks to infer whether GSE mortgage purchase activity among targeted populations is associated with improvements in homeownership and housing conditions. The test framework exploits differences in the regulatory definition of lower-income neighborhoods under the 1992 GSE Act, which establishes regulation for the GSEs, and the 1977 Community Reinvestment Act (CRA), which lays out regulation for Federally-insured depository institutions. In defining lower-income neighborhoods, the GSE Act establishes a neighborhood median family income threshold of 90 percent of area median family income, whereas the CRA establishes a neighborhood median family income of 80 percent of the area median family income as the regulatory threshold. These definitions leave census tracts with median incomes between 80 and

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[19] To save space, we have omitted the full regression findings pertinent to the geographic stratifications reported in Table 4. They are available from the authors upon request.

Table 6

Regression results for the full sample with GEOG, GEOG∗LOW-MOD, GEOG∗AFFORD and GEOG∗LOW-MOD∗AFFORD as the treatment variables

Independent variable	Change of home-ownership rate	Change of vacancy rate	Change of median house value
Intercept	−25.57***	45.18	6.41
	(5.11)	(32.21)	(6.88)
GEOG	−1.03	−7.04	−4.14***
	(0.83)	(5.21)	(1.11)
GEOG∗LOW-MOD	1.84	0.48	−1.43
	(1.76)	(11.06)	(2.36)
GEOG∗AFFORD	0.82	6.26	3.46
	(1.59)	(10.01)	(2.14)
GEOG∗LOW-MOD∗AFFORD	−3.59	5.86	0.64
	(2.4)	(15.09)	(3.22)
Percentage aged 17 or less, 1990	0.49***	−0.15	−0.74***
	(0.11)	(0.71)	(0.15)
Percentage aged 65 or older, 1990	0.16*	0.54	0.04
	(0.07)	(0.46)	(0.1)
Percent minority, 1990	−0.02	0.08	0.11**
	(0.02)	(0.16)	(0.03)
Percent Asian, 1990	−0.08*	0.09	−0.18***
	(0.04)	(0.26)	(0.05)
Household size, 1990	2.93**	2.04	0.91
	(1.1)	(6.9)	(1.47)
Indicator of urban tract, 1990	0.00	−14.69*	−7.63***
	(1.13)	(7.14)	(1.53)
Percent 1–4 unit structures, 1990	−0.05	0.83***	0.36***
	(0.04)	(0.24)	(0.05)
Percent single family homes, 1990	0.02	−0.06	0.02
	(0.03)	(0.16)	(0.03)
Number of owner occupied units, 1990	0.00*	0.00	0.00***
	(0)	(0)	(0)
Change in the number of units, 1990s	0.12***	0.58***	0.05
	(0.02)	(0.13)	(0.03)
Change in median family income, 1990s	0.19***	0.47***	0.38***
	(0.02)	(0.13)	(0.03)
Homeownership rate, 1990	−0.27***	−0.66	−0.47***
	(0.06)	(0.35)	(0.07)
Vacancy rate, 1990	0.41***	−1.95***	0.04
	(0.07)	(0.42)	(0.09)
Median house value, 1990	0.00	0.00**	0.00***
	(0)	(0)	(0)
Per capita income in PMSA, 1990	0.00***	0.00	0.00
	(0)	(0)	(0)
Change in PMSA per capita income, 1990s	−0.08**	−0.12	0.66***
	(0.03)	(0.16)	(0.03)
Change in PMSA employment, 1990s	0.13	−0.76	0.27*
	(0.09)	(0.6)	(0.13)
N	1117	1117	1117
Adjusted R-square	0.2826	0.1273	0.6658

Note. Standard errors are in parenthesis. All change variables are in percent. GEOG is an indicator of whether the tract qualified according to the "geographically targeted low-income area" GSE affordable housing loan purchase goal (indicated by whether the Census tract had a median income in the range of 80–90 percent of area median income). LOW-MOD is an indicator of whether the tract is ranked among the top 25% of tracts in the metro area by share of families qualifying for the low-moderate income GSE affordable housing goal; AFFORD is an indicator of whether the tract is ranked among the top 25% tracts in the metro area by share of families qualifying for the GSE special housing affordable goal. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

90 percent of the area median family income as the clear GSE treatment group. In this context, we also test for local housing market impacts associated with the interaction of designated GSE geographically targeted low-income neighborhoods and populations. We use changes in measures of housing market outcomes, including house prices, vacancy rates, and homeownership, among these GSE-targeted communities compared to changes in these measures among a control group of census tracts to indicate the impact of GSE activities.

Research findings suggest limited goal effects on local housing markets. GSE targeted tracts tended to lag non-targeted tracts in terms of initial housing market conditions, suggesting the appropriateness of the policy focus on these areas. However, results of the analysis do not indicate much efficacy of the GSE affordable housing loan purchase targets in improving designated tract housing market conditions. For the most part, upon controlling for changes in tract and metropolitan area characteristics, tracts targeted under the HUD affordable goals were little different from non-targeted tracts with respect to housing market outcomes during the 1990s. Only in the case of the San Francisco metropolitan area did the GSE affordable housing goals result in a statistically significant improvement to designated tract homeownership rates.

What might be behind the lack of an observed effect? Aside from the obvious possibility that the incentives do not have a material impact on housing market outcomes, one possibility is that California's position as a high cost market limits the efficacy of GSE purchase activity. Even in lower-income communities, an increasing fraction of California homes falls above the conforming loan limit. If impacts are induced only by exceeding a critical mass threshold of GSE activity, then California may be structurally disadvantaged in terms of GSE effects. An additional possibility is that loans in the targeted tracts are riskier than those just above the target thresholds along credit risk and other dimensions that preclude their purchase by the GSEs. Unfortunately, information on risk profiles is not available.

Both of these potential explanations suggest the importance of ongoing efforts by federal regulators and the GSEs to address the adequacy of GSE home loan support in targeted underserved communities. Credit quality considerations may argue for expanding the set of loans the GSEs are allowed to purchase to include sub-prime and other non-standard loan products. Further, separate pooling and securitization of loans emanating from CRA and GSE policy-targeted communities may be helpful to the risk-based pricing and origination of those loans, given their relatively damped prepayment risk (see, for example, Deng and Gabriel [14]). Finally, this study raises questions as to whether the GSE effects observed for California hold in markets with very different economic and demographic characteristics. An expansion of the analysis to other US metropolitan areas would be useful in addressing these issues.

Acknowledgments

References

[1] B. Ambrose, T. Thibodeau, K. Temkin, An analysis of the effects of the GSE affordable goals on low- and moderate-income families, Research report, US Department of Housing and Urban Development, 2002.
[2] B.W. Ambrose, A. Warga, Implications to privatization: The costs to Fannie Mae and Freddie Mac, in: Studies on Privatizing Fannie Mae and Freddie Mac, US Department of Housing and Urban Development, 1996, pp. 169–204.

[3] R.B. Avery, P. Calem, G. Canner, The effects of the Community Reinvestment Act on local communities, Proceedings of Seeds of Growth: Sustainable Community Development: What Works, What Doesn't, and Why, Conference sponsored by the Federal Reserve System, 2003, http://www.chicagofed.org/cedric/files/2003_conf_paper_session5_canner.pdf.

[4] R.B. Avery, R.W. Bostic, G. Canner, Assessing the necessity and efficiency of the Community Reinvestment Act, Housing Policy Debate 16 (1) (2005) 143–172.

[5] Board of Governors of the Federal Reserve System, The performance and profitability of CRA-related lending, Report to Congress, July 2000.

[6] R.W. Bostic, B.L. Robinson, Community banking and mortgage credit availability: The impact of CRA agreements, Journal of Banking and Finance 28 (2004) 3069–3095.

[7] R.W. Bostic, B.L. Robinson, Do CRA agreements increase lending? Real Estate Economics 31 (2003) 23–51.

[8] H.L. Bunce, The GSEs' funding of affordable loans: A 2000 update, Housing Finance working paper series HF-013, US Department of Housing and Urban Development, 2002.

[9] H.L. Bunce, R. Scheessele, The GSEs' funding of affordable loans, Housing Finance working paper series HF-001, US Department of Housing and Urban Development, 1996.

[10] P.S. Calem, Mortgage credit availability in low- and moderate-income minority neighborhoods: Are information externalities critical? Journal of Real Estate Finance and Economics 13 (1996) 71–89.

[11] G. Canner, W. Passmore, B. Surette, Distribution of credit risk among providers of mortgages to lower-income and minority homebuyers, Federal Reserve Bulletin 82 (1996) 1077–1102.

[12] B. Case, K. Gillen, S. Wachter, Spatial variation in GSE mortgage purchase activity, Cityscape 6 (2002) 9–84.

[13] R.F. Cotterman, J.E. Pearce, The effects of the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation on conventional fixed-rate mortgage yields, in: Studies on Privatizing Fannie Mae and Freddie Mac, US Department of Housing and Urban Development, Washington, DC, May 1996.

[14] Y. Deng, S. Gabriel, Are underserved borrowers lower risk? New evidence on the performance and pricing of FHA-insured mortgages, Journal of Money, Credit and Banking, 2006, in press.

[15] D.M. Harrison, The importance of lender heterogeneity in mortgage lending, Journal of Urban Economics 49 (2001) 285–309.

[16] D. Harrison, W. Archer, D. Ling, M. Smith, Mitigating information externalities in mortgage markets: The role of government-sponsored enterprises, Cityscape 6 (2002) 115–143.

[17] P.H. Hendershott, J.D. Shilling, The impact of the agencies on conventional fixed-rate mortgage yields, Journal of Real Estate Finance and Economics 2 (1989) 1–15.

[18] A. Heuson, W. Passmore, R. Sparks, Credit scoring and mortgage securitization: Implications for mortgage rates and credit availability, Journal of Real Estate Finance and Economics 23 (2001) 337–363.

[19] W.W. Lang, L.I. Nakamura, A model of redlining, Journal of Urban Economics 33 (1993) 223–234.

[20] D.C. Ling, S.M. Wachter, Information externalities and home mortgage underwriting, Journal of Urban Economics 44 (1998) 317–332.

[21] D.L. Listokin, E.K. Wyly, Making new mortgage markets: Case studies of institutions, home buyers, and communities, Housing Policy Debate 11 (2000) 575–644.

[22] P.B. Manchester, Characteristics of mortgages purchased by Fannie Mae and Freddie Mac, 1996–97 update, Housing Finance working paper series HF-006, US Department of Housing and Urban Development, 1998.

[23] P.B. Manchester, S. Neal, H.L. Bunce, Characteristics of mortgages purchased by Fannie Mae and Freddie Mac, 1993–95, Housing Finance working paper series HF-003, US Department of Housing and Urban Development, 1998.

[24] S. Myers, Government-sponsored enterprise secondary market decisions: Effects on racial disparities in home mortgage loan rejection rates, Cityscape 6 (2002) 85–113.

[25] W. Passmore, The GSE implicit subsidy and value of government ambiguity, Working paper 2003-64, Finance and Economics discussion series, Federal Reserve Board, 2003.

[26] A. Schwartz, From confrontation to collaboration? Banks, community groups, and the implementation of community reinvestment agreements, Housing Policy Debate 9 (1998) 631–662.

[27] K. Temkin, R. Quercia, G. Galster, The impact of secondary mortgage market guidelines on affordable and fair lending: A reconnaissance from the front lines, Black Political Economy 28 (2001) 29–52.